Wide laticiferous ducts.
Bast fibers very thin in interrupted radial series.
With "KOH," sections give blood-red reaction-bast fibers orange color=*C. succirubra.*
With "KOH," thin sections give yellow or reddish-brown reaction-fibers yellow=*C. cal.* or *ledger.*

B. Barks in which cork is absent.
a. Bast fibers in tangential bundles—moderately thick, bark very soft, brittle and fibrous=*C. lucumaefolia.*
b. Bast fibers expanding in outward direction—many in radial series thin or very thin—for the largest part in uninterrupted lines.
In double lines-cork still present—wide laticiferous ducts and numerous stone cells, fracture rough showing protruding ends of fibers=*C. scrobiculata.*
In single lines—stone cells wanting—short fracture=*C. australis.*
Moderately thick in interrupted single lines.
Bast fibers equally thickened—medullary rays extending directly outward—sharp fracture=*C. calisaya.*
Bast fibers not equally thickened.
Large celled medullary rays=*C. officinalis.*
Small celled medullary rays=*C. micrantha.*

Literature which may be consulted upon the subject of Cinchona.
"Historie Naturelle des Quinquinas," M. H. A. Weddell, 1849.
"Pharmacognosie," Dr. A. Vogl.
"Atlas zur Pharmacognosie," Dr. A. Vogl.
"The Cinchona Barks," Dr. E. A. Fluckiger, translation by F. B. Power.
"National Standard Dispensatory," 6th Ed., Hare, Caspari, Rusby.
"United States Dispensatory," 18th Ed., Wood, Remington, Sadtler.

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ASSAY OF HYDRASTIS AND FLUIDEXTRACT OF HYDRASTIS.

H. W. JONES.

The abstracts of proposed changes to be made in the forthcoming revision of the U. S. P. have been greeted with great interest and none perhaps more so than those dealing with the alkaloidal assays. (Jour. A. Ph. A., 1914-7, pp. 984-997.) Among the various assay processes of the U. S. P. (VIII), there was assuredly none more in need of revision than that of Fluidextract of Hydrastis, and the proposed change in the assay of this preparation will no doubt meet with general approval.

Puckner (Pharm. Rev., 1908, 26, pp. 132-137) called attention to the considerable error incident to the use of the eighth revision method, and pointed out the source of error, namely, the carrying down of hydrastine by the berberine hydriodide precipitate with the result that the 50 cc. aliquot part taken did not fully represent 5 cc. of the fluidextract, but gave too low a result. He proposed an excellent modification of the method, although apparently this modification has not met with general approval.

Eldred and Pence (Proc. A. Ph. A., 1908, pp. 836-838) also remarked on the low results obtained through the use of the eighth revision method, and also gave results obtained by a method used in their practice.

Dichgans, working under Prof. Tschirch, in a comparative examination of the assay processes of the different Pharmacopœias (*Apoth. Ztg.*, 29, 46, pp. 516-519),

has also discovered the fault in the method, and through comparison with the methods in use in other countries, has shown the low results obtained by its use.

While there is no doubt that most manufacturers have abided by the eighth revision method in standardizing Fluidextract of Hydrastis, it is evident that this has led to grave errors, for when this preparation was standardized to 2% hydrastine by the eighth revision method, the preparations were in fact some 15% to 20% above this figure. This also worked an injustice on the manufacturer who, instead of being able to obtain a full yield of fluidextract from a given amount of this high-priced drug, was able to gain only 80% to 85% of his possible yield.

The following results were obtained in this laboratory on different samples of Fluidextract Hydrastis and will suffice to bring out the points I wish to make. Preparations 1 and 2 were made in the laboratory strictly according to the U. S. P. (VIII) process for Fluidextract Hydrastis. Preparation 3 was also prepared in the laboratory but contained 20% glycerin instead of the official 10%. Preparation 4 was the product of a well-known manufacturer and was purchased in the open market.

Preparation	Drug assayed by U. S. P. VIII	Fluid extract by U. S. P. VIII	Fluid extract by U. S. P. IX
1	4.15	3.52	4.22
			4.2
2	3.12	2.56	3.14
3	3.83	2.61	3.21
			3.26
4	....	2.0	2.26

It will be observed that in preparations No. 1 and 2, the assay of the fluidextract by the ninth revision method is slightly higher than that of the drug from which it was made. In preparation No. 3, this peculiarity does not occur, and this is no doubt due to the fact that a 20% glycerin menstruum does not extract the drug as completely as does a 10% glycerin menstruum. In our opinion the apparently high results obtained by the ninth revision method are not incorrect, but the fault lies in the eighth revision method for the assay of Hydrastis, which unfortunately has been carried on into the ninth revision, that is, the amount of ether used in the maceration of the drug (150 cc. ether to 15 g. Hydrastis) is too small to prevent a crystallization of the hydrastin. This has been remarked upon by Dichgans (*Apoth. Ztg.*, 1914, 45 pp. 498-501) who shows that the results obtained by this method are lower than those obtained by the Swiss Pharmacopœia method, or by the method of Caesar & Loretz (*Jahres-Bericht von Caesar & Loretz*, 1913, pp. 155-156), in both of which methods 6 g. of drug are macerated with 120 g. (168 cc.) of ether, or more than two and one-half times as much ether in proportion as is used in the U. S. P. method. This might not be necessary for drugs low in hydrastin, but as an assay method should be applicable to all grades of the drug.

It might be remarked further, that the high results obtained by the ninth revision method for the fluidextract were at first attributed to the hydrastin being contaminated with glycerin. The hydrastin residues were, however, dried to constant weight and showed no appearance of glycerin. To be assured further, the combined ethereal extractions of the fluidextract were washed with several small portions of water in the hope of removing any glycerin which they might

contain, but the final results were practically identical with those first obtained.

The conclusions to be drawn are then, that the ninth revision method for the assay of Fluidextract of Hydrastis is satisfactory; and that the method for Hydrastis might well be reconsidered, and a larger proportion of ether used to extract the drug.

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WHAT IS THE BEST END-POINT OF THE REACTION IN THE FROG-HEART METHOD OF DIGITALIS ASSAY?

L. W. ROWE.

While there are various methods in use for standardizing the digitalis series of heart tonics, the frog-heart method devised and introduced by Houghton,[1] in 1894, has perhaps been most widely used in more or less modified form.

These modifications are specifically due to differences of opinion, as to the proper length of time, after dosing, to note the end-point of the reaction, namely, the characteristic systolic stand-still of the heart or the death of the animal with its heart in systole.

The original method made use of the minimal lethal dose, or smallest dose capable of causing the death with heart in systole, of a majority of the frogs to which a certain amount of the preparation in question had been administered. In a somewhat amplified form[2] the method was presented before this Society in 1909.

In 1902, Famulener & Lyons[3] described a method which has been in use in the University of Michigan Pharmacology Department for some time, according to Edmunds.[4] This consists, in brief, in administering such a dose of a digitalis heart-tonic to a frog, as to cause paralysis of the heart in systole in one hour. Edmund's modification differs only in having complete stoppage of the heart—not only systolic but auricular as well.

Barger and Shaw[5] used the same method of injection, namely, into the dorsal lymph-sac, but the frogs were kept under observation until the heart stopped, which they found was within three hours, if at all.

Fraenkel[6] practically limited the time to one hour, although a range from thirty-five to one hundred minutes is allowable, in his modification.

Ziegenbein[7] used the modification originated by Hans and Arthur Meyer of fastening male frogs to a board and exposing the heart before injection. The solution is injected into the thigh lymph-sac and in such a quantity as to produce systolic standstill in two hours.

Gottlieb[8] used as his unit "The smallest amount of the solution which will call forth systolic standstill of the heart of a 30 gm. frog in exactly thirty minutes."

Focke first published his modification of the frog-heart method in 1902.[9] This has been changed somewhat, but is essentially to determine the minimum dose causing systolic standstill in seven to fifteen minutes.

His method is more complicated than the others because of his taking into account the time period. The value of a sample is the result obtained by dividing