W. L. SCOVILLE: Do you know how much of cantharidin was present in the free state, if any?

MR. NITARDY: It was not estimated with this point in view. We assumed that all existed in combined form.

The questions in my mind are, first, whether potassium cantharidate is really active; second, whether the alkali can be so adjusted as to always obtain a neutral tincture. It seems that the oil is likely to vary. In fact I did expect that the amount of alkali required would have to be varied with different lots of drugs, but practical experience so far has shown that no variation is necessary and the amount of alkali used is in accordance with that recommended by Doctor Squibb in 1871.

We have succeeded in making a tincture much more active than has been possible by any other method. I have never seen tincture of cantharides, except the one made by this formula, which will actually raise a blister. I believe the vesicating qualities of the tincture are due not only to its cantharidin content, but also to the oil present in cantharidin and which is rendered soluble by the use of KOH. I have given the formula with complete detail and hope others will try it and determine the quality of the preparation they obtain.

OTTO RAUBENHEIMER: There is no doubt that Mr. Nitardy's work is constructive and it may result in a change in the pharmacopoeial formula for this preparation. There is a question in my mind regarding Mr. Nitardy's suggestion and that is, Is tincture of cantharides supposed to be a vesicant? I have never heard of its being used as a vesicant.

W. L. SCOVILLE: The best solvent for cantharidin is acetone; the next best chloroform, the next acetic acid, then acetic ether. It is very slightly soluble in most solvents. I will agree with Mr. Nitardy that the U. S. P. process does not give a tincture which shows activity in any way. The question is, do we want a tincture which will present cantharidin in acid condition or in neutral or alkaline condition? The thing that surprises me is the activity that he obtains from a tincture made with an alkali. If its process will always yield an active tincture it is probably the easiest and most economical method for making it; otherwise we can make it by the use of acetic acid, acetic ether, chloroform, acetone or various other solvents.

F. W. NITARDY: I did not mean to leave the impression that it would not be possible to produce an active tincture of cantharides by some other means, but I did not like to use acetic acid in the proportion necessary, because I believed that the finished product would be too acid for practical purposes, nor did I like to use chloroform, ether, acetone or a similar solvent, because it would render the tincture less miscible with preparations containing water, such as hair tonics. The tincture offered is clearly miscible in any proportion with dilute alcohol preparations.

As to whether we expect tincture of cantharides to be vesicant or not, I do not believe that this is within the province of the pharmacist to decide; that is a question for the medical profession. Tincture of cantharides should represent the drug in the proportion in which it is used. That is, a liter of tincture should represent the total activity of 100 Gm. of cantharides.

GEORGE M. BERINGER: Tincture of cantharides is one of the puzzling problems of the Pharmacopoeia. The cantharidin content in the drug is very difficult to extract; the process of heating and macerating was adopted because it was believed that it yielded the best solution that could be obtained in an alcoholic menstruum. The use of acetone, chloroform, etc., to the extent in which it would be necessary to make a good tincture, did not seem practicable to the Revision Committee.

I am surprised that Mr. Nitardy's tincture assays so high; the assay for cantharidin is not an easy matter. I should like to see Mr. Nitardy's method tested out very thoroughly. I have made some experiments along that line myself but they were not entirely satisfactory and that is one of the reasons why they were not recommended for consideration in the previous Pharmacopoeia.

## A MICROSCOPICAL METHOD FOR THE QUANTITATIVE DETERMINATION OF VEGETABLE ADULTERANTS.*

BY FANCHON HART.

The following method for the quantitative determination of vegetable adulterants is based upon the observation that the percentage of the various

* Read before Scientific Section, A. Ph. A., New York meeting, 1919.

tissues composing any one part of the plant, is at all times the same for a particular species.

Although the microscope has been used in the qualitative analysis of vegetable drugs, it has rarely, if ever, been adapted to quantitative analysis.

Hartwich and Wichmann have devised a counting chamber for estimating the amount of an adulterant in a powdered mixture, but I have found this method inaccurate, inasmuch as different degrees of fineness will give varied results for the same percentage of adulterant.

Careful examination of several drug powders showed the following method to be accurate and practical.

The first powder selected was black pepper, an article most commonly adulterated with pepper shells. The method of procedure is as follows:

Five grammes of whole pepper fruit were deprived of pericarp or shell, the latter separated from the kernels and both reduced to a No. 80 powder.

Each powder was examined microscopically to determine its composition. The shells are composed almost wholly of sclerenchymatic tissue and the kernels of starch.

Since a thorough mixture of both powders will obviously contain all the tissues of the whole fruit, a microscopical examination of a small portion of this mixture was used for the quantitative analysis of the various tissues.

The area of each piece of tissue is obtained by the aid of an ocular micrometer, used in conjunction with a stage micrometer. In this way, measurements may be taken of all of the mounted material.

To obtain the total amount of shell present, the areas of sclerenchymatic tissue are noted in one column, while the kernels are measured in terms of starch masses and placed in a separate column.

After examination of all the material on the slide, each column is totaled and the figure representing the total area of sclerenchymatic tissue is divided by the figure obtained by the addition of the total areas of both columns.

For example, the total area of stone cells is 50 microns and the total area of starch masses is 200 microns. Therefore, 50 divided by 250 represents the percentage of shells in the whole fruit.

Repeated examination by this method gave me an average of 3.2 percent of shells. In order to check these results, I measured the powdered shells in a 10-minim graduate and compressed the powder evenly in the cylinder with a 20-gramme weight. I next added the powdered kernels on top of the shells and compressed the whole. The shells measured 1.4, the kernels 3.1. The percent of shells is therefore equal to 0.03222, which is practically the same as the results obtained by the microscope.

It is interesting to note that by weight, the shells amounted to 3.3 percent, and that by the ashing process, the residue which is largely composed of stone cells, weighed 3.1 percent. These figures should not be taken into consideration when checking the results obtained by means of the microscope, as the microscopical results are based entirely upon relative areas and not relative weights.

In drugs, such as colocynth, in which the pulp, although greater in amount, is so much lighter in weight, an answer based upon weight is entirely wrong and cannot be used in checking the results obtained by measurement.

The results obtained in the determination of the four samples examined are as follows:

*Pepper:*

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|---|---|
| Percentage of shells by weight | 3.3% |
| Percentage of shells by ash | 3.1% |
| Percentage of shells by cylinder measure | 3.22% |
| Percentage of shells by microscopical analysis | 3.2% |

*Colocynth:*

| | |
|---|---|
| Percentage of seeds by cylinder measure | 4.3% |
| Microscopical analysis, with the aid of Millon's reagent | 4.61% |
| The same, with the aid of chlor-zinc iodide | 4.7% |

*Buchu:*

| | |
|---|---|
| Percentage of stems by weight | 17% |
| Percentage of stems by Cylinder measure | 16.1% |
| Percentage of stems by Microscopical analysis | 16.2% |

*Saffron:*

| | |
|---|---|
| Percentage of yellow tissue by weight | 23.0% |
| Microscopical analysis | 23.7% |
| Cylinder measure | 23.0% |

## BOSTON'S ETHER MONUMENT TO THE UNNAMED DISCOVERER OF GENERAL ANESTHESIA.*

BY CHARLES M. FORD.

Prior to March 1842, there is no evidence extant that any surgical operation had ever been performed under a general anesthesia; that is, by means of an agent producing paralysis of the sensory nerves, as well as the nerves of motion, notwithstanding the fact that sulphuric ether was known to chemists and pathologists for two centuries. But the world at large was not informed of the properties of ether as a general anesthetic until after a demonstration in the Massachusetts General Hospital at Boston, October 16, 1846.

Rival claimants to the honor of discovery with sordid zeal were instrumental in heralding to humanity everywhere the discovery of this greatest blessing to mankind, medical or otherwise.

How proud we should be that this great blessing was conferred by an American in America. How natural that the State of Georgia when called upon to name its two most distinguished sons, to be immortalized in the Hall of Fame at Washington, should have given one of these places to Crawford Williamson Long as the author of painless surgery. Harvey, the discoverer of circulation of the blood; Jenner, in saving the world from the scourge of small-pox, are dwarfed in the presence of the modest dignified physician-pharmacist, who, in the little hamlet of Jefferson, Ga., performed a surgical operation with general anesthesia induced by ether. And the greatest act in the career of the brilliant Dr. Jackson—whom the scientific world would have loved to honor as the first to make use of ether as a general anesthetic—was, when after a painstaking investigation, he, in 1861, placed the crown of original discoverer upon the brow of Crawford Williamson Long.

*Read before Section on Historical Pharmacy, A. Ph. A., New York meeting, 1919. Illustrated by lantern slides.