3. The pastes made from tragacanth or Irish moss are more elegant but are more difficult to prepare. The air bubbles found in these are driven off by heat.

4. All of these pastes are non-irritating, are easily injected, and can be removed from the injected area at once by a stream of warm saline solution, if desirable. In the latter respect they possess a decided advantage over oily preparations.

5. They are retained long enough to permit good roentgenograms to be made. If the opening of a tract or sinus is plugged with cotton after the paste is injected, the latter can be retained until operation.

6. The pastes can be sterilized in the autoclave before the phenol is added and can then be put into collapsible tubes for future use.

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## NOTE ON DIGITALIS SAPONINS.

BY WILLIAM J. McGILL.

From results obtained in tests upon digitalis leaf saponins (prepared during a previous investigation of methods for extracting the active glycosides of the drug),[1] the conclusion was drawn that these were non-hemolytic. According to Kobert,[2] the leaf saponins themselves are non-hemolytic, but the sapogenins produced by hydrolysis have pronounced hemolytic properties, and the non-hemolytic properties of a fresh infusion are not due to a combination of the saponins and phytosterols in the drug, a supposition which has been advanced.

In a recent paper,[3] Githens states that solutions of leaf saponins, as prepared by him, hemolyze red blood cells.

Solutions of the saponins and their hydrolytic products were prepared as follows:

A. Fresh 2 percent infusion of the leaf prepared with physiological salt solution.

B. Fresh 2 percent infusion of the leaf with physiological salt solution and autoclaved 30 minutes at 15 lbs. pressure.

C. Infusion prepared as in A and autoclaved 30 minutes at 15 lbs. pressure after adding a trace of sulphuric acid. Resultant precipitate filtered, washed, suspended in physiological salt solution, carefully neutralized with $NH_4OH$ (which produces a clear solution), and made up to the original volume of the infusion with physiological salt solution.

D. Solution of the saponins and tannins prepared as described by Githens,[4] by washing the alcohol-ether mixture of the active principles from the drug which had been previously extracted with chloroform. The aqueous solution of the saponins was diluted with physiological salt solution to a volume such that 1 Cc. represented 0.04 Gm. of chloroform extracted drug.[5]

E. A portion of solution D, hydrolyzed as in C, and the precipitate treated in like manner.

The hemolytic system was set up as follows:

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[1] *Journal Am. Chem. Soc.*, 42, 1900 (1920).

[2] *Ber. d. Pharm. Ges.*, 22, 205–242.

[3] JOUR. A. PH. A., 9, 1060 (1920).

[4] *Loc. cit.*

[5] It is imperative that all traces of ammonia be removed from the aqueous solution of the saponins, otherwise misleading results are obtained.

| Saponin or sapogenin solution. | | 2.5% suspension of rabbit R. B. C. in .85% salt. | .85% salt solution. |
|---|---|---|---|
| Tube I | 2.5 Cc. | 0.5 Cc. | 2.0 Cc. |
| Tube II | 2.0 Cc. | 0.5 Cc. | 2.5 Cc. |
| Tube III | 1.5 Cc. | 0.5 Cc. | 3.0 Cc. |
| Tube IV | 1.0 Cc. | 0.5 Cc. | 3.5 Cc. |
| Tube V | 0.5 Cc. | 0.5 Cc. | 4.0 Cc. |
| Tube VI | 0.0 Cc. | 0.5 Cc. | 4.5 Cc. |

Solution A. No hemolysis in any of the tubes.

Solution B. No hemolysis in any of the tubes.

Solution C. Total hemolysis in tubes 1, 2, 3, 4 and 5 after 45 minutes. No hemolysis in tube 6.

Solution D. No hemolysis in any of the tubes.

Solution E. Total hemolysis in tubes 1, 2, 3, 4 and 5 after 15 minutes. No hemolysis in 6.

The above experiments were carried out in duplicate, one set being upon drug obtained from *Digitalis purpurea*, the second on *Digitalis Siberica*, both from plants grown in the Stearns Medicinal Plant Gardens at the University of Michigan.

These results appear to support the view originally put forward by Kobert, that any hemolytic activity of the leaf-drug is due to sapogenins resulting from hydrolysis of the saponins. It may be possible that the saponins of improperly dried or stored drug undergo sufficient decomposition so that preparations from such drug will exhibit hemolytic action.

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## NOTES ON THE BLISS METHOD FOR THE SEPARATION OF STRYCHNINE FROM QUININE.

BY L. E. WARREN AND A. H. CLARK.

A case having arisen in the experience of one of the writers (A. H. C.) in which an accurate separation of strychnine from quinine became desirable, the applicability of the method published by A. R. Bliss[1] was considered. As a preliminary, a mixture of quinine and strychnine in unknown proportions was tested by the method. The results obtained by the qualitative tests on the mixture were unsatisfactory. The fraction supposed to be quinine contained strychnine and the remaining fraction (supposed to be strychnine) contained quinine. Since the findings for the unknown mixture were so unsatisfactory, it seemed worth while to have the method checked on a known mixture of the two alkaloids.

In theory, the Bliss method is based primarily on the ready solubility of quinine in ether (1 in 1.5) and the scant solubility of strychnine in this solvent (1 in 5500). Secondarily it depends on the solubility of strychnine in water (1 in 6420). Although the solubility of strychnine is greater in ether than in water, the method requires a sufficient volume of water to dissolve all of the strychnine while permitting the use of but small volumes of ether. As recommended by Bliss, the total alkaloids are obtained in the usual way, weighed and dissolved in dilute sulphuric acid. An excess of water (more than 6500 times the weight of strychnine supposed

[1] A. R. Bliss, "A Method for Estimating Quinine and Strychnine when Occurring in Common Solution, JOUR. A. PH. A., 8, 804 (1919).