

Several experiments were conducted in which the drug in the form of the fluidextract, infusion or colloidal solution was administered intravenously and the blood pressure was recorded simultaneously. All of these experiments indicated that the drug caused a general depression. The blood pressure fell after each injection of drug but it was not sustained at the lower level. It rose almost as quickly as it fell. However, it never reached its preceding value. Therefore, throughout the course of the experiment there was a gradual decrease in the blood pressure. In general the carotid pulse rate decreased throughout the experiment. Respirations appeared to be normal until the fatal injection was approached. Eight deaths were due to respiratory failure and two deaths were due to cardiac paralysis. For the sake of comparison, two experiments were carried out in a similar manner in which Fluidextract of *Phytolacca* Root was used. One death was due to respiratory failure and the other was due to cardiac paralysis. These experiments indicated that *Phytolacca* Root was five to eight times as active as *Phytolacca* Berries.

It was believed that the action of the drug was primarily upon the medullary centers. The heart rate in some cases was quite irregular and in a few experiments it was believed that extra systoles had occurred. In the majority of the experiments, as fatality was approaching the rate of respiration decreased and the pressure waves were shallow, which indicated either a decreased demand for oxygen or lack of the normal gas exchange. In several of the experiments it was noted that the pulse pressure increased. This was due to a decrease in the diastolic pressure. Such a condition might be indicative of a failing circulation.

Effect on Cats.—Intraperitoneal injections were made into cats. There was no immediate indication of any toxicity; however, a slow death occurred. Goldstein, Jenkins and Thompson (1) had observed under the same conditions with Fluidextract of *Phytolacca* Root that an ascending paralysis had occurred.

When intravenous injections of the fluidextract (25 per cent alcohol) were made into a cat the same effect was produced as with rabbits.

SUMMARY

From the berries of *Phytolacca americana* the following constituents were isolated:

1. Glycerol as the glyceryl ester of naturally occurring fatty acids.
2. Saturated Fatty Acids.
3. Oleic Acid.
4. A Sterol.
5. A Compound which resembled a Sterol.
6. Hentriacontane.

The pharmacological experiments showed that:

1. The Fluidextract of *Phytolacca* Berries produced a mild degree of depression.
2. The toxicity of *Phytolacca* Berries was not as great as that of *Phytolacca* Root.

From the pharmacological data it can be concluded that *Phytolacca* Berries have no advantage over *Phytolacca* Root.

REFERENCES

- (1) Goldstein, S., Jenkins, G. L. and Thompson, M., *JOUR. A. PH. A.*, 26 (1937), 306.
- (2) Rosenthaler, L., "The Chemical Investigation of Plants," G. Bell and Sons, Ltd., London, England, 1930, p. 22.
- (3) Twitchell, E., *J. Ind. Eng. Chem.*, 13 (1921), 806.
- (4) "United States Pharmacopœia XI," Mack Printing Co., Easton, Pa., 1936, p. 473.

Tabasco a Substitute for Capsicum*

By Carmel H. Olden and E. V. Lynn†

In a recent number of the *Journal*, Youngken (1) called attention to the pungency of tabasco peppers, the fruit of *Capsicum annuum* L. var. *conoides* Irish. Preliminary tests by us showed that the material is at least as pungent as capsicum, and we decided to determine by extraction

whether it could advantageously be employed as a substitute and whether it actually contains capsaicine. We had available also a quantity of waste from making tabasco sauce and used this for extraction. Only the pulpy part of the fruit is employed in making sauce, the waste being largely seeds and cortical tissue.

EXPERIMENTAL

The material was ground to a coarse powder and extracted according to Tice (2) with ether. It

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† Department of Chemistry, Massachusetts College of Pharmacy.

was necessary to carry out the process long after the extract was colored, since the removal of pungency is slow and does not parallel that of color. From 4 Kg. of waste was obtained about 800 cc. of oleoresin. This was mixed with twice its volume of heavy liquid petrolatum and extracted three times, using 1500 cc. of 57 per cent alcohol each time. The alcohol was removed by distillation, the aqueous residue was completely extracted by ether, and the solvent was removed again by distillation. The residual crude substance was mixed with 25 Gm. of purified lithium hydroxide and 1500 cc. of water, and the whole was boiled for about 10 minutes with vigorous stirring. After this had stood for 24 hours and had been filtered, carbon dioxide was run in to saturation, giving a fine, crystalline precipitate. This was dried in a desiccator and crystallized repeatedly from hot petroleum benzin, in which it is only slightly soluble. The total yield of highly purified crystals was 8.81 Gm. or 0.22 per cent. It is estimated that the total amount present in the tabasco waste is about 0.4 per cent.

The crystalline product was completely identified as capsaicine. It gave the color reaction with ammonium vanadate or vanadium oxychloride in acetone. The corrected melting point was found to be 64.8°. When it was intimately mixed with an equal amount of the purified substance from capsicum which melted at the same temperature, this mixture was found to have the identical melting point.

Tests with smaller amounts of material indicated that the whole tabasco pepper contains about 0.4 per cent of capsaicine. We conclude that the latter is distributed uniformly throughout the fruit and that the waste is just as pungent as the whole peppers. This was confirmed by organoleptic tests, which also indicated that either contains about four times as much pungency as Capsicum U. S. P. In the literature the latter is said to yield 0.007 to 1.0 per cent, but actually no one has apparently made an accurate determination; the most reliable statements place the content at about 0.1 per cent. In any event, tabasco peppers or any portion of them contains at least as much and probably several times this.

CONCLUSION

The recommendation is accordingly made herewith that the domestic tabasco pepper be considered for inclusion in the Pharmacopœia in place of capsicum, or at least that the monograph be revised to include tabasco pepper.

REFERENCES

- (1) Youngken, H. W., *Jour. A. Ph. A.*, 27 (1938), 323-331.
- (2) Tice, L. F., *Am. Jour. Pharm.*, 105 (1933), 320-325.

The Assay for Menthol*

By Charles O. Wilson†

It has been the experience of the author that the United States Pharmacopœia XI assay for menthol in oil of peppermint gave very faulty results and according to the literature, other workers have also found this to be true. Since the method now used was first introduced by Power and Kleber (1) there has been a continued effort to remedy some of its more obvious sources of error. This subject has been under investigation by the author for some time and a report was practically completed when Brignall (2) published his work on oil of peppermint, covering the same method of approach. The evidence here offered, therefore, serves to confirm Brignall's findings.

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† Assistant Professor of Pharmaceutical Chemistry, College of Pharmacy, University of Minnesota.

Elliott (3) has pointed out the difficulty of completely removing the excess acetic anhydride from the acetylated oil. He suggested that one add 10 cc. of water to the acetylated oil and boil the mixture for ten or fifteen minutes to break up the acetic anhydride, then wash several times with dilute sodium carbonate solution to remove the acetic acid. Nelson (4) states that the reagents used should be of the best quality and that the sodium acetate must be perfectly dry for best results. In 1939 Baldinger (5) carried out experiments on oil of peppermint, varying the time of both acetylation and saponification. The saponification time for most consistent results was found to be forty-five to sixty minutes. He also found that the acetylation time may vary greatly, that in some cases fifteen minutes was sufficient. The author has