

MANNA: A BRIEF STUDY OF SOME COMMERCIAL SAMPLES.*

BY CHARLES H. LAWALL AND LEROY FORMAN.

Manna has been variously described by the authors of works on materia medica. Its history goes back with definiteness to the Arabians of the 8th and 10th centuries. Before that time the name seems to have been applied to a number of substances not even remotely related to our present drug known by that title.

The name originated in Hebrew literature in connection with the manna of the Israelites and it is stated by etymologists that it originally meant "What is it?" That this meaning of the word has some application at the present time is apparent to anybody who makes a practical study of the subject and tries to harmonize the statements in the literature with the properties as shown by analytical investigation.

The favorite statement in literature seems to be that manna contains from 80 to 90 percent of mannite, mannite (mannitol) being understood to be the hexatomic alcohol, $C_6H_8(OH)_6$. Some authorities qualify the statement as is done in U. S. Department of Agriculture F. I. D. 162, in which, among the requirements adopted, is mentioned mannite (soluble in 90 percent alcohol), not less than 75 percent.

That there is a great difference between true mannite and the substance soluble in 90 percent alcohol is shown by the researches of Tanret (*Bull. Soc. Chim.*, 1902, 27, 947), who shows that manna contains notable quantities of other sugars. His analyses show the following composition:

Mannite.....	40-55 percent
Levulose.....	2.5-3.4 percent
Dextrose.....	2.2-3.0 percent
Mannetriose.....	6.0-16.0 percent
Mannetetrose.....	12.0-16.0 percent

together with small amounts of resin and ash and about 10 percent of moisture.

Although, as will be seen, Tanret's work was published 14 years ago, many authorities and works of reference published since then still continue the statement of the presence of large quantities of mannite and give the impression that simple extraction with strong alcohol and cooling of the solvent will result in the production of beautiful crystals of mannite.

Several samples of manna have been submitted for investigation, which were slightly substandard as regards solubility in 90 percent alcohol; an attempt was made to obtain samples of various ages and qualities in order to make a comparison of some of the chemical and physical properties with those of the suspected samples.

For purposes of comparison a sample of pure crystal mannite was also obtained. All of these samples were subjected to a number of tests and determina-

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tions, as shown by the following table. The old samples came from collections in the Philadelphia College of Pharmacy and represented the highest type of the market product of their respective periods:

	Mannite: pure crystals.	Sus- picious sample.	Sample of so- called high- grade manna purchased in open market.	Sample of large flake manna at least 25 yrs. old.	Sample of small flake manna at least 25 yrs. old.	Sample of large flake manna over 30 yrs. old.
* Polarization of whole manna be- fore inversion	0°	73.5°	72.8°	73.8°	78.0°	45.8°
Polarization of same after inversion..	0°	52.9°	39.5°	59.2°	51.5°	37.2°
Reducing sugars before inversion . . .	None	17.10%	13.2%	17.7%	10.8%	11.3%
Reducing sugars after inversion	None	36.4%	32.6%	26.6%	26.8%	16.6%
Percent sol. in 90% alcohol	Entirely soluble	68.8%	90.5%	93.7%	77.9%	96.7%
Polarization of alc. sol. ext. before inversion	0°	65.3°	55.1°	44.5°	insuf. material	57.3°
Polarization of same after inversion..	0°	51.5°	35.5°	32.3°	"	45.6°
Reducing sugars in alc. sol. ext. be- fore inversion	None	15%	16.4%	11.6%	"	18.7%
Reducing sugars in same after in- version	None	30.3%	33.2%	23.1%	"	23.9%
Melting point	163° C.	131° C.	123° C.	140° C.	140° C.	140° C.
Charring with strong H ₂ SO ₄	None	slight	slight	slight	slight	very slight
Fermentation test with yeast	Negative	positive	positive	positive	positive	positive

The investigation of the residue of the suspicious samples after extraction with 90 percent alcohol shows 7.83 percent reducing sugars before inversion and 21.0 percent after inversion.

A brief study of the above results will convince one that there is a necessity for further work upon authentic samples and that the statements of mannite content have been in all probability grossly inaccurate, due to lack of correct knowledge of the subject.

It is true that for the present we may as well retain the requirements of alcohol-soluble matter, ash and moisture that have been promulgated, but it is time to discard the term mannite in connection with this alcohol-soluble factor.

In this connection it is surprising to note that the requirements of the U. S. P. IX make no mention of any of these factors as requirements, although the Swiss Pharmacopoeia since 1907 has required a 90 percent alcohol-soluble factor of not less than 75 percent and a maximum of 10 percent of moisture and 3 percent of ash.

* All of the polarization figures are sugar scale readings in a 200 mm. tube, using 26 Gm. in 100 Cc. of solution.