

It is suggested that the methods described may be advantageously applied to the direct determination of strychnine and brucine in strychnos preparations. First the sum of the two alkaloids could be determined by precipitation in acid medium with an excess of potassium ferrocyanide. The weighed precipitate then might be decomposed with ammonia and the strychnine determined as described above.

SUMMARY.

1. The sensitivity of the precipitation of strychnine and brucine in hydrochloric acid medium with hydroferrocyanide has been determined.

2. Strychnine can be determined with great accuracy by precipitation as hydroferrocyanide. The precipitate is weighed in the air-dry form. The method yields quantitative results even at great dilutions. The determination of brucine is less accurate owing to the greater solubility of its hydroferrocyanide.

3. A simple method is described for the quantitative determination of strychnine in the presence of brucine. It is based on the fact that the hydroferrocyanide of strychnine is less soluble and is formed more rapidly than that of brucine.

SCHOOL OF CHEMISTRY OF THE UNIVERSITY OF MINNESOTA,
MINNEAPOLIS, MINNESOTA.

THE ARSENIC CONTENT OF CHONDRUS.*

BY CHARLES H. LAWALL AND JOS. W. E. HARRISSON.

In 1931 and 1932 we conducted an investigation of the sulphur dioxide content of Chondrus, which was reported in the JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, Vol. XXI, No. 11, November 1932, page 1146.

In this paper we showed that sulphur dioxide is not a normal constituent of natural chondrus as had been claimed, and that chondrus of European origin as sold in America was invariably contaminated with sulphur dioxide as a result of the "sulphur bleaching" process to which it is exposed before shipment to America, and that the natural chondrus shows no evidences of sulphur dioxide when subjected to tests for that adulterant by the methods of the A. O. A. C.

In view of the fact that the European samples might possibly have been bleached with arsenic containing sulphur, it seemed advisable to make a further investigation of the samples to ascertain the arsenic content.

As we had sufficient amount of all but one of the samples in question, we undertook the investigation and report the results herewith:

The method followed was that of the A. O. A. C. Methods of Analysis, page 306, 3rd Edition.

The preliminary procedure was as follows:

Ten Gm. of chondrus were digested with 25 cc. of sulphuric acid and a total of 30 cc. of nitric acid. After the organic matter had been destroyed and the digestion was complete the remaining liquid was diluted to 100 cc. and 10 cc. of this liquid was used for each determination.

The laboratory numbers, sources of the samples and sulphur dioxide content are repeated from the previous article.

* Scientific Section, A. PH. A., Madison meeting, 1933.

The following results were obtained, the figures being the average of closely agreeing duplicates:

Lab. No.	Source.	SO ₂ p. p. m.	As ₂ O ₃ p. p. m.
33469	Wholesale Drug House	1260	6
33641	Wholesale Drug House	920	7
33642	Wholesale Drug House	4040	11
33705	Importing House "Technical"	4080	3
33706	Importing House "Medicinal"	2520	3.5
33902	Natural—before drying	none	12
33903	Natural—after first drying	none	10
33904	Natural—ready for shipment	none	8
33772	Natural—after 4 hrs.' drying	none	9
33773	Natural—after 2 days' sun-bleaching	none	10
33774	Natural—after 6 days' sun-bleaching	none	2
33775	Natural—in finished condition	none	5

Two other specimens were added to the list for investigation. One was a sample of genuine natural chondrus imported from Ireland, and the other was an Irish Moss Pudding made from this same material.

There was not sufficient of either of these samples to make sulphur dioxide determinations but the arsenic trioxide content of the chondrus itself was found to be 4 p. p. m. and of the pudding 0.11 p. p. m.

Upon studying these results it will be seen, *first*, that the arsenic content does not parallel the sulphur dioxide content; *second*, that the arsenic content of natural chondrus averages slightly higher than that of sulphur-bleached chondrus, the average for the natural being 7.5, while that of the sulphur-bleached is 6.1; *third*, that the arsenic content of every sample, whether natural or bleached is in excess of the tolerance of 1.4 p. p. m. established for arsenic in food products; and *fourth*, that the content of arsenic is not uniform, even in samples from the same locality.

In view of the wide variations in the arsenic content in samples from the same locality and in the same "collection" after the usual methods of handling, it was thought that possibly the arsenic content was due to adhering impurities and foreign matter. In further investigation of this fact one of the samples of which a considerable quantity was still available, was carefully garbled, removing all portions of shell as well as sand and adhering foreign matter. The garbled material was finely ground and subjected to examination for the arsenic content in comparison with the arsenic content of the impurities removed by garbling.

The following results were obtained:

	As ₂ O ₃ p. p. m.
Arsenic content of original sample	12.5
Arsenic content of garbled chondrus	12.5
Arsenic content of foreign matter removed by garbling	2.0

Our conclusions are that genuine unbleached or sun-bleached chondrus contains arsenic naturally, and that the arsenic content is well in excess of the tolerance for arsenic in food products.