CXVI. THE STABILITY OF THE VITAMIN A OF COD-LIVER OIL TOWARDS THE HARDENING PROCESS.

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IN another communication reference was made [Goldblatt and Zilva, 1923] to the fact that cod-liver oil retains its high potency as regards growth-promoting and antirachitic properties when hardened. In the case of the growth-promoting property it was demonstrated that an oil retained almost the entire vitamin A content after hardening. Similar observations have since been made by Dubin and Funk [1923].

This note records the results of a series of experiments instituted with the object of studying the stability of vitamin A under different conditions of hardening in order to ascertain the best way of conducting the process with a view of testing such oils clinically. The results obtained show that the activity is hardly affected when cod-liver oil is hardened to certain degrees of hardness even when it is submitted to fairly high temperatures for an appreciable time, providing certain conditions are observed.

The hardening was carried out by Messrs Ant. Jurgens and the author wishes to express his best thanks to this firm for the trouble they have taken and for the readiness with which they met his requests.

In all the experiments great care was taken to exclude all traces of oxygen during the process of hardening. Previous to the treatment air was removed from the oil by exhausting it under an air pump. Care was also taken to use hydrogen free from oxygen.

Samples of hardened cod-liver oil with melting points of 32° and 45° were tested before and after deodorisation. The deodorising was carried out in a glass apparatus with steam at a temperature of 125° at a pressure of about 25 mm. Partially hardened oil was also examined. Such oils although still liquid have lost the unpleasant fishy taste and smell almost to the same extent as the fully hardened oils. All the samples were palatable.

The original oil, which came from Aberdeen, was amber coloured, having an iodine value of 161, a free fatty acid content (calculated as oleic acid) of 2.3 %, and a saponification value of 191, and promoted growth in rats in daily doses of 5 mg. The iodine value of the partially hardened oil fell in one case when it was treated for 43 minutes at 150° to 119. In another case when the treatment was continued for 140 minutes at 150° the iodine value fell to 100.9.

The samples of oil melting at 32° gave an iodine value of 83·3 whilst that of the sample melting at 45° was 54·2.

The hardened oils melting at 32° and 45° were a mixture of oils hardened under various conditions, the details of which are given in the following table:

Sample	Temperature of hardening	Duration of hardening		Decrease in refraction (65°)	Melting point
M.P. 32°	150°	1 hr. 23 min.		0·0090	30°
	150	2		0·0086	33
	150	1	23	0·0090	33
	175		50	0·0094	31
	150	3	5	0·0115	43·5
M.P. 45°	175	2	10	0·0117	45
	175	1	18	0·0117	45
	175	2	10	0·0117	44·5

No appreciable loss in the growth-promoting activity could be recorded in the partially hardened oils and in the oil M.P. 32° whether deodorised or otherwise. The hardened oil M.P. 45° was found less potent than the original oil from which it was prepared. The importance of these facts from a practical point of view needs no comment.

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REFERENCES.

- Dubin and Funk (1923). *Proc. Exp. Biol. Med.* 21, 139.
 Goldblatt and Zilva (1923). *Lancet*, ii, 647.