pregnant mare's urine. P. G. Weil, University Clinic, Royal Victoria Hospital, Montreal, is pursuing biochemical studies on the metabolism of progesterone, investigating the sterol metabolism in the toxemias of pregnancy, and studying a new sterol, with reference to the adrenal cortex.

The trustees were pleased to note that medical literature of last year contained over thirty reports of research carried out with the assistance of the Banting Research Foundation. The indication many of these reports gave to the effect that medical science is slowly making inroads upon some of man's most stubborn ills, should, in the opinion of the trustees, be a source of satisfaction to those who showed their appreciation of Sir Frederick Banting's researches by endowing a foundation to allow him and others to continue to advance the state of medical knowledge.

V. E. HENDERSON,
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SPECIAL ARTICLES

THE OCCURRENCE OF GAMMA TOCOPHEROL IN CORN EMBRYO OIL[1]

OLCOTT and Emerson[2] showed that the tocopherols have strong antioxidant powers, and concluded that they represent at least a large part of the antioxidants in wheat-germ and cotton-seed oils. There seems to be no relation between the vitamin and antioxidant activities of these substances, since alpha, which is the most potent as the vitamin, is the weakest antioxidant. Gamma, which is approximately equal in vitamin potency to beta, is definitely a more powerful antioxidant.

It seemed interesting to determine if the antioxidant properties of other vegetable oils might be due to the presence of tocopherols, and those oils with less vitamin potency might contain the less vitamin-potent beta or gamma. Accordingly we investigated corn oil, since Mattill and Crawford[3] had shown it to be rich in antioxidants.

Freshly pressed, unrefined corn oil[4] was assayed for vitamin E. A single dose of 4 gm enabled all four test rats to cast good litters, but at 2 gm only resorptions resulted. Three kilograms of the oil was saponified, the non-saponifiable fraction distributed between high boiling petroleum ether and 92 per cent. methanol, and then dry methanol, and the methanol solution was concentrated, chilled to free it as much as possible of sterols, and finally the oily residue distilled in a molecular still, as previously described for palm oil[5]. The fraction distilling between 120–140°, which contained the bulk of the vitamin, weighed 5.65 gm. Fed at a level of 15 mg, three resorptions and one litter resulted, but at 45 mg all four rats fed had litters. Karrer and Keller[6] measured by titration with gold chloride the tocopherol content of a non-saponifiable fraction of corn oil, freed from most of the sterols, and found it to be 0.2 per cent. Assuming the critical level of gamma tocopherol to be 6 mg, Karrer and Keller's measurement would appear to be in reasonable agreement with the results of our feeding tests.

The concentrate was treated with cyanic acid in benzene, as previously described. The only tocopherol which could be isolated was gamma, whose allophanate, mp. 137–140°, gave no depression on admixture with gamma tocopheryl allophanate previously obtained from cotton-seed oil. The yield was about 700 mg.

The allophanate was saponified, and the free tocopherol fed at levels of 3 to 6 mg. Of four rats fed 3 mg one had a litter and three resorbed, while of five rats receiving 6 mg, two had litters and three resorbed.

The gamma allophanate, on admixture with beta allophanate, mp 143–6°, melted at 130–5°. This, together with the complete difference in the habit and appearance of the two allophanates, would seem to leave little reason to doubt their non-identity. On the other hand, the admixture of alpha tocopheryl allophanate mp 158–60° lowers the melting point of gamma only two or three degrees, which makes it very difficult to be certain that a preparation of gamma is not contaminated with alpha. However, the absence of any considerable amounts of alpha from corn oil greatly facilitates the preparation of gamma in a comparatively pure form.

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[1] Aided by grants from the Department of Agriculture, University of California and by Merck and Company, Inc., Rahway, N. J. Assistance was rendered by the Works Progress Administration, Project No. 10482 A-5.

[2] H. S. Olcott and O. H. Emerson, *Jour. Am. Chem. Soc.*, 59: 1008, 1937.

[3] H. A. Mattill and Blanche Crawford, *Jour. Ind. Eng. Chem.*, 22: 341, 1930.

[4] The corn oil was kindly supplied by the Miner Millard Milling Co., Wilkes-Barre, Pa.

[5] O. H. Emerson, G. A. Emerson, Ali Mohammad and H. M. Evans, *Jour. Biol. Chem.*, 122: 99, 1937.

THE QUANTITATIVE DETERMINATION OF VITAMIN C IN MILK

RECENT studies[1, 2, 3, 4] have shown that there are a number of important factors which may influence the

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