planned for the triennial ending in 1942 the following formal program:

Question 1. Study of the origin, drift and dissolution of icebergs, with reference to the forecasting of their seasonal appearance.

Question 2. Physical changes in the snow-cover conducive to runoff, especially floods.

Question 3. Study of the crystalline texture of glacier-ice in relation to the mode of movement of glaciers.

In addition the following four special projects have been assigned to temporary committees:

(1) Standardization of maps of snow-cover and ice-cover for the world.

(2) Uniform classification of different types of snow and snow-cover, and uniform nomenclature for the same.

(3) A system of classification for the international bibliography of snow and ice.

(4) Standardization of methods of snow-surveying and forecasting runoff from snow.

Incidentally, it may not be out of place here to explain for the benefit of those who may wonder why the International Association of Scientific Hydrology insists on keeping the adjective "scientific" in its title, that many of the European members consider it desirable to keep it in order to emphasize the fact that the association is concerned solely with research in hydrologic science, excluding the practical application thereof in the domain of hydraulic engineering.

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SPECIAL ARTICLES

MOBILIZATION OF VITAMIN A FROM ITS STORES IN THE TISSUES BY ETHYL ALCOHOL

ONE of the problems under investigation in this laboratory is the mobilization of vitamin A from its stores in the body. Previous to the experiments with ethyl alcohol reported here, the effects of various drugs and experimental procedures, including the action of adrenalin, histamine, insulin, mecholyl chloride, chloroform, exsanguination, ether inhalations and operative trauma, were tried. Repeated bleeding of rabbits gave some evidence of vitamin A mobilization for, although considerable amounts of blood were withdrawn, the total quantity of vitamin A in the circulating blood remained constant. Prolonged ether anesthesia at times produced a slight rise in the serum vitamin A but this was not a constant finding. However, no agent, in our hands, has yet produced an effect comparable to that of ethyl alcohol. In these experiments the vitamin A content of the serum was determined according to the technic of Evelyn, using the Evelyn Photoelectric Colorimeter.

Two normal dogs were given 60 ml of ethyl alcohol in a 20 per cent. aqueous solution by stomach tube. The dogs had not eaten for twenty-four hours. The vitamin A content of the serum of both dogs showed a prompt increase, with maxima occurring at seven and twenty-four hours respectively after the adminis-

TABLE I

THE VITAMIN A CONTENT OF SERUM IN NORMAL DOGS FOLLOWING THE ADMINISTRATION OF ETHYL ALCOHOL

No. of dog	Ethyl alcohol Ml	Wt. of dog Kg	Time of fasting Hrs.	Evelyn photoelectric units of vitamin A per 100 Ml of serum, time after the administration of ethyl alcohol						
				Fasting	1½ hrs.	3 hrs.	6 hrs.	9 hrs.	24 hrs.	48 hrs.
1	60 By stomach tube	18	24	222	309	440	763	...	638	...
2	60 By stomach tube (Dog vomited)	24	24	263	358	389	385	412	440	362
3*	60 By stomach tube	17	48	89	120	142	...	154	192	150
4†	60 By stomach tube	18	48	203	319	389	453	498	669	849
5	60 By stomach tube	17	48	483	630	699	...	728	621	538
6	60 By stomach tube	17	48	569	1,323	...	805	914	659	...
7	30 By stomach tube	16	48	43	77	103	...	125	127	129
8	15 By stomach tube	18	48	320	424	459	...	471	385	...
9	17.5 Intravenously	21	20	424	518	571	662	600	742	488
10‡	16 By portal vein	17	44	150	249	292	...	...	...	...

* Liver contained 1,926 Evelyn Photoelectric Units of vitamin A per 100 grams of tissue.
† Liver contained 50,463 " " " " " " " " " " "
‡ Liver contained 2,747 " " " " " " " " " " "

tration of the alcohol. To rule out the possible effect of increased absorption of vitamin A which might possibly have been present in the gastro-intestinal tract, the experiment was repeated with six normal dogs that had been fasted for forty-eight hours. These dogs received amounts of ethyl alcohol varying between 15 ml and 60 ml in a 20 per cent. aqueous solution by stomach tube. An increase in the vitamin A content of the serum was observed in all cases as is shown in Table I. In two of the dogs with fistulas of the thoracic duct, the vitamin A content of the lymph was determined and no increase proportionate to the increase in the blood was noted.

To rule out further the possible effect of absorption of vitamin A from the gastro-intestinal tract, one dog was given ethyl alcohol in Ringer's solution intravenously. A rise in the vitamin A content of the serum followed, similar to that observed in the dogs already mentioned. In another dog, ethyl alcohol injected directly into the portal vein produced a marked rise in the vitamin A content of the hepatic vein. This observation suggests a direct effect of the alcohol on the liver. However, another possibility which should be considered is this: Ethyl alcohol may injure the epithelium of the gastro-intestinal tract or the other tissues. The injured tissue may produce a substance X, which enters the blood, passes to the liver or other vitamin A stores and liberates the vitamin.

In three of the dogs a biopsy of the liver was performed and there seemed to be a positive correlation between the increase of vitamin A in the serum after the administration of the alcohol and the concentration of vitamin A originally present in the liver. It is hoped that this correlation may lead to the development of methods for the study of the vitamin A reserves in the body. If further observations confirm a direct action of ethyl alcohol on the liver, this fact may possibly aid in the study of liver function. Further work in this direction is now in progress in this laboratory.

It is also planned to study the effect of alcohols of the homologous series, methyl, ethyl, propyl, butyl and higher alcohols such as cetyl and aldehydes, acids, acetates, lactates, phosphates, etc., to determine whether they have the capacity for mobilizing vitamin A.

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THE ISOLATION OF PHYTIN FROM SOIL[1]

THE general behavior of soil organic phosphorus in extraction and fractionation is explainable on the basis that phytin is present in soil. However, the presence of phytin in soil has not heretofore been demonstrated. It has been shown[2] that phytin, added to silica sand cultures, is readily attacked by soil microorganisms. This led to the conclusion that phytin could not accumulate in soil.

We have found that, when phytin was added to soil cultures, it did not readily decompose, but behaved in a manner similar to our so-called soil "nucleic acid" preparations.[3] Moreover, analyses of soil "nucleic acid" showed the ratio of nitrogen to phosphorus to be very much lower than would be expected from such material. A large proportion of the soil organic phosphorus is stable to alkaline hydrolysis and also comparatively resistant to acid hydrolysis.[3] We have found also that organic phosphorus may be precipitated from an acid hydrolysate of soil by ferric chloride, and that part of the phosphorus of the soil "nucleic acid" is precipitable by ferric chloride in acid solution. These facts strongly indicate the presence of phytin in soil.

The material precipitated by ferric chloride from soil "nucleic acid" preparations was obviously not a pure substance. Oxidation with alkaline hypobromite destroys most of the organic matter of soil extracts, but does not liberate phosphate from a major part of the soil organic phosphorus, as was shown by Dean.[4] Investigation showed that phytin is quite stable to alkaline hypobromite. By means of this treatment of an alkaline soil extract, coupled with ferric chloride precipitation, we have been able to prepare a small quantity (about 1.25 g) of a faintly yellow-colored product which contained about 25 per cent. of the organic phosphorus of the original soil. Similar material was obtained from a soil "nucleic acid" preparation.

The phosphorus : iron ratios of the preparations are given in Table I along with corresponding data for ferric phytate prepared from wheat-bran phytin. All the ferric salts were precipitated from acid solution by an excess of ferric chloride. Solutions of the sodium salts were obtained by decomposing the ferric salts with sodium hydroxide. Phosphorus : iron ratios were also determined by acidifying these solutions to 0.6 per cent. hydrochloric acid and titrating with ferric chloride to the thiocyanate end-point. The ratios determined by titration are in agreement with those reported by Rather.[5] It is noteworthy that phytin combines with much more iron than is indicated by titration to the thiocyanate end-point.

[1] This work was financed in part through a grant from the National Research Council, Ottawa, Canada.

[2] J. T. Auten, *Soil Science*, 16: 281–294, 1923.

[3] C. L. Wrenshall, W. J. Dyer and G. R. Smith, *Sci. Agr.*, 20: 266–271, 1940.

[4] L. A. Dean, *Jour. Agr. Sci.*, 28: 234–246, 1938.