extensions of this approach may be possible since our preliminary experiments with basic dyes such as methylene blue and acriflavin indicate that these dyestuffs potentiate the action of tyrothricin and the anionic detergent, Tergitol-7, in the same way as does the protamine. (2) The similarity in chemical structure of protamine, histone, tyrothricin and the germicidal protein from wheat[12] strengthens the suggestion made by Dubos and Hotchkiss[1] that certain relatively simple polypeptide configurations may serve as the basis for a large group of antibacterial compounds. Since protamines from different species of fish vary considerably in chemical composition, it should be desirable to investigate the antibacterial effects of a number of protamines. The antibacterial properties of partial hydrolysis products of the protamines and histones, as well as of similar synthetic polypeptides, merit further study.

Chemotherapeutic applications of protamine or histone are probably greatly limited by the relatively high toxicity of these compounds when administered intravenously or intraperitoneally.[8, 13] Our preliminary tests confirm the results in the literature, but indicate that these compounds have no apparent toxicity for such a tissue as the rabbit eye.

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THE EFFECT OF VITAMIN E ON THE BLOOD PLASMA LIPIDS OF THE CHICK[1]

IN a previous communication[2] Dam and Glavind have drawn attention to the fact that the two lipotropic substances, lipocaic and inositol, can to a considerable degree protect against the exudative diathesis in vitamin E deficient chicks, whereas addition of cholesterol to the vitamin E deficient diet accelerates and aggravates the symptom.

We have now made a study of the fasting level of the lipids in the blood plasma of chicks living on vitamin E deficient diets with or without the addition of lipocaic or vitamin E. This study has shown that vitamin E exerts an effect on the plasma lipids similar to that of lipocaic and that the ingestion of cholesterol acts in the opposite direction.

The observed effect of adding vitamin E or lipocaic to the vitamin E deficient diet consists in an increase of the average ratio of the phospholipids to the other lipid fractions (total lipids, cholesterol or fatty acids) of about 20 to 40 per cent., whereas addition of cholesterol to the diet lowers this ratio without increasing the absolute cholesterol content of the plasma. The values for the individual chicks within a group of 5 chicks receiving the same diet show considerable variation so that it is not possible to predict from a simple determination of the plasma lipids of one single chick whether the animal belongs to the protected group or not. This is, however, not astonishing when attention is paid to the great individual variation of the lipid values in humans which renders it impossible, for instance, to diagnose pregnancy from a plasma cholesterol determination even if there is a definite hypercholesterolemia during pregnancy.

Since any effect on the blood plasma lipids must be a consequence of changes in the metabolism of the lipids in tissue, our observations suggest that vitamin E has a lipotropic effect similar to that of lipocaic. Further investigation of this problem must determine whether direct evidence for such an effect of vitamin E on tissue lipids can be found and whether a particular fraction of the phospholipids is involved.

Whereas a sufficient dose of vitamin E gives complete protection against exudates, lipocaic does not seem to give absolute protection but merely brings down the incidence of the symptom from 80 to 100 per cent. in the group receiving the basal diet to 10 to 20 per cent. in the lipocaic group. This seems to indicate that the effect of vitamin E is of a more fundamental nature than that of lipocaic and is not confined to the lipotropic effect alone—or that lipocaic probably remedies only one of the consequences of the lack of vitamin E.

Since vitamin E and lipocaic[3] apparently can bring about the same change of the blood plasma lipids, it is likely that the vitamin E deficient chick is lacking in the active principle of lipocaic, which would mean that the formation of this substance in the body of the chick depends upon the presence of vitamin E in the diet. This question should be elucidated by further experiments.

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VITAMIN C CONTENT OF PERSIMMON LEAVES AND FRUITS

PERSIMMON leaves have been found to give excep-

[12] A. K. Balls, W. S. Hale and T. H. Harris, *Cereal Chem.*, 19: 279, 1942.

[13] W. B. Shelley, M. P. Hodgkins and M. B. Visscher, *Proc. Soc. Exp. Biol. and Med.*, 50: 300, 1942.

[1] Aided by a grant from the Josiah Macy, Jr., Foundation.

[2] H. Dam and J. Glavind, SCIENCE, 96: 235, 1942.

[3] We are indebted to Hoffman LaRoche, Inc., Nutley, New Jersey, for supply of synthetic vitamin E (Ephynal acetate) and to Dr. L. R. Dragstedt, University of Chicago, and the Lilly Research Laboratories, Indianapolis, Indiana, for lipocaic.

tionally high values in content of vitamin C when the latter was estimated by the method of Tillmans[1] and as perfected by others.[2, 3, 4, 5]

Leaves of trees found in the wild run equally high in vitamin C as those from trees of named varieties.

TABLE 1

Variety	Milligrams of Vitamin C per kilogram of leaves		Milligrams of Vitamin C per kilogram of fruit	
	Fresh green leaves	Leaves recently dried in a Bussler oven	Green fruit	Ripe fruit
Early Golden.	32,500	40,700	3,000	1,050
Silkeline ...	20,300		3,800	950
Lucinda	22,700			
Miller	26,900	28,500	2,500	
Ruby	30,600	40,900	3,700	
Wild	32,800	38,000	2,100	
Wild	25,000	41,500	2,500	
Wild	27,100	25,500		

The fresh leaves seem to have about ten times the vitamin C concentration of the fruit. Leaves picked and held in the dried condition since October 9, 1940, still retained about one tenth of the original titratable material.

A tea made from green leaves was very acceptable, after the addition of a little sugar, as was also that made from leaves dried in a Bussler oven at 140° F. for 18 hours, with the fan on the entire time. In drying the leaves lost 58 per cent. of their weight and were quite brittle when removed from the oven.

The tea was made in the orthodox way by steeping the finely divided leaves in a cheese-cloth bag or ball for five minutes in water, after the latter had been brought to a boil. The flavor of the tea was similar to sassafras tea, and in color and general appearance it was much like a light-colored tea from tea leaves. About 60 per cent. of the titratable material in the original dried persimmon leaf was in the tea. There was about one third as much titratable material in the tea from green leaves as that from dried leaves. The titratable material in *tea* from *tea* leaves was about one per cent. of that in tea from the same weight of dried persimmon leaves.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SEROLOGICALLY ACTIVE POLYSACCHARIDE FROM TRICHINELLA SPIRALIS

A POLYSACCHARIDE, which gives immunologically specific reactions when tested on Trichinella-infected rabbits has been obtained in a reasonably pure chemical condition. The methods used were similar to those employed for the studies of polysaccharides from Ascaris[1] and other parasitic helminths.[2, 3]

The worms were liberated from the host tissue (hog) by peptic digestion of the infected muscle and washed with sterile saline until free of debris. The cleaned material was then rapidly frozen in a dry-ice bath and lyophiled. The dehydrated material was finely ground and suspended in 20 volumes of pH 8.0 buffer, placed in a boiling water bath and stirred vigorously with a mechanical stirrer. After 30 minutes the mixture was removed, cooled and centrifuged. The residue was washed once and the solution added to the original extract. The polysaccharide along with other soluble worm materials was then precipitated by the addition of 5 volumes of chilled 95 per cent. ethanol. In order to facilitate precipitation enough NaCl was added to give a concentration of approximately 0.5 per cent. before the addition of ethanol. After 4 hours at 4° C. a white gummy precipitate formed which was removed by centrifugation and carefully resuspended in approximately 20 volumes of pH 4.6 acetate buffer. The material which failed to redissolve was removed and discarded and the solution, which contained mostly polysaccharide, adjusted to pH 8.0 by the addition of 1.0 N sodium carbonate solution. The polysaccharide was again precipitated by the addition of sodium chloride solution and 2 volumes of 95 per cent. ethanol. Reprecipitation at pH 8.0 and redissolving at pH 4.6 was repeated until a preparation was obtained which failed to give the usual tests for protein and was completely soluble at pH 4.6 after alcohol precipitation. Five to eight treatments were required to obtain such a product. The polysaccharide was finally precipitated with ethanol and dried with several changes of absolute ethanol and ether. Approximately 0.3 gram of polysaccharide was obtained from 3.0 grams of whole worm material.

The resulting product was a fine white powder which readily dissolved in water giving an opalescent

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