

abnormality was observed in the livers of these chicks.

Since the completion of these experiments, Topelberg and Honorato⁷ have reported that a vitamin K-free diet increases the total extractable fat of the chick liver, and that addition of vitamin K to the diet reduces the value toward that found in chicks fed a standard commercial diet. They also observed that injection of choline in the amount of 10 γ per animal per day would depress the fat content of the livers of chicks fed the artificial K-free diet. Our diet supplied much more choline than 10 γ per animal per day.

⁷ Topelberg, G. S., and Honorato, C. R., *Rev. Soc. Argentina Biol.*, 1943, **19**, 409.

Summary. 1. Hypoprothrombinemia was produced in chicks by feeding a vitamin K-free diet, or by adding dicumarol to a standard commercial diet. 2. The livers of these animals showed no gross or microscopic changes which would distinguish them from corresponding groups of control animals. 3. Fatty infiltration of the liver which occurred in some of the chicks was related to the synthetic diet employed; but was not related to the lack of vitamin K or choline, or to the degree of hypoprothrombinemia. 4. In chicks there can be produced severe hypoprothrombinemia unassociated with histologic evidence of liver damage demonstrable by the methods employed in this study.

14571 P

Influence of Body Movement on Shock Due to Repeated Hemorrhage.*

ROBERT ELMAN AND HARRIET W. DAVEY. (With the technical assistance of Harry Riedel.)

From the Department of Surgery, Washington University School of Medicine, and Barnes Hospital, St. Louis, Mo.

In the present experiments bodily movement is shown to have a beneficial effect on the mortality from repeated hourly hemorrhages in the dog. In a recent publication¹ a similarly beneficial effect was observed after severe trauma to both hind legs in animals allowed to move about as compared with those which were kept immobile in the supine position.

The present experiments were carried out as previously described except that instead of assuming the immobile supine position the animals were allowed to move freely about between each hemorrhage. Blood was removed (10 cc per kilo of body weight per hour) by puncture of the femoral artery through the intact skin except that it was often necessary after the initial hemorrhage to expose the con-

tracted vessel. For this local anesthesia was employed when necessary. Hematocrit determinations were made from a portion of the removed blood. Twenty-five experiments were performed in all as described in Table I, of which 7 were controls. Of the 18 experiments permitted voluntary body movement, 6 were allowed nothing by mouth, 6 were allowed water *ad libitum*, and 6 were given a solution containing 5% hydrolyzed casein and pork pancreas (Amigen) and 5% glucose by gavage equal in amount to the blood which had been removed; it so happened that the volume of water voluntarily taken averaged the same as the amount given by gavage.

Experimental Findings. Hematocrit determinations revealed a drop in red cell volume of 20 to 30% below the initial value in all groups. The greatest drop occurred in those allowed water by mouth *ad libitum*, or given a solution of Amigen and water by gavage; of these 2, the drop was less rapid in the

* Aided by a grant from the Commonwealth Fund.

¹ Eversole, W. J., Kleinberg, W., Overman, R. R., Remington, J. W., and Swingle, W. W., *Am. J. Physiol.*, 1944, **140**, 490.

TABLE I.

	Hours	No. alive after onset							Avg	
		0	1	2	3	4	5	6	Total bleeding (% of body wt)	Survival time (in hours)
1. Immobile in the supine position		7	7	7	5	0	0	0	3.9	3.1
2. Full body movement in cage										
a. Water withheld		6	6	6	6	6	0	0	4.9	4.2
b. Water <i>ad libitum</i>		6	6	6	6	6	1	0	5.0	4.5
c. Amigen and glucose by gavage		6	6	6	6	6	3	0	5.5	4.8

former. More striking were differences in the 2 groups given nothing by mouth in which there was a more pronounced drop in the hematocrit value in those immobile in the dorsal position, as compared with those allowed to move in the cage.

The most significant findings are those on the survival time and the amount bled as shown in Table I. The survival time in the controls kept immobile in the dorsal position averaged 3.1 hours. In similar experiments previously reported² the figure was 3.7 hours, which may have been due to a significant difference in technic, *i.e.*, ligation of the femoral

artery was performed. In the present experiments the animals which were allowed to move in their cages survived from 4.2 and 4.5 hours, due to the fact that they were able to withstand at least one more hemorrhage than the controls. The beneficial effect of hydrolyzed protein and glucose by mouth is shown by the fact that two more animals survived the fifth bleeding in this group than in the next best group in which water only was ingested.

Summary. Voluntary body movement had a beneficial influence on the resistance of the dog to the fatal effects of repeated hemorrhage, as shown by a longer survival time, *i.e.*, the ability to sustain greater loss of blood, as compared with similar experiments carried out in the immobilized supine position.

² Elman, R., and Lischer, C. E., *Ann. Surg.*, 1943, **118**, 225.

14572

Pathogenic Myxobacteria.

E. J. ORDAL AND R. R. RUCKER.

From the Laboratories of Bacteriology and Oceanography, University of Washington, and the U. S. Fish and Wildlife Service, Seattle, Washington.

During the summer of 1942 an epizootic occurred in a population of blueback-salmon fingerlings, *Oncorhynchus nerka* (Walbaum), which were being reared at the Fish and Wildlife Service hatchery at Leavenworth, Washington. The disease was recognized by Dr. F. F. Fish of the Fish and Wildlife Service as similar to, if not identical with, a bacterial disease occurring among warm-water fishes of the Mississippi Valley which was described by Davis.¹ Its occurrence as a disease of

cold-water fishes has been described by Fish and Rucker.²

Davis gave an excellent description of the bacteria that appeared abundantly in lesions on the surfaces of infected fish, and proposed the name *Bacillus columnaris* for the species concerned. Of particular interest was his observation that when a little material was scraped from a lesion and placed in a drop of water on a slide, the bacteria present collected on the edges of infected tissues and scales to

¹ Davis, H. S., *Bull. U. S. Bur. Fish.*, 1923, **38**, 261.

² Fish, F. F., and Rucker, R. R., *Trans. Am. Fish. Soc.*, 1944, **73**, in press.