

in the course of the development of the embryo. It was found that the liver of the newly-born chick is practically devoid of this factor. Furthermore, a composite ethereal extract of the entire bodies of 50 newly-hatched chicks was found lacking in this factor when tested quantitatively on rats. These results would seem to give new significance to the function of what is commonly termed the antirachitic factor. The failure to hatch, associated with this nutritional deficiency, is a phenomenon due to the lack of development of the embryo. Complementary experiments, a report of which follows, were carried out on fish in connection with this study of reproduction.

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Relation of the Antirachitic Factor to Reproduction in Fish.

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In a recent communication it was reported that in the cod there is a definite relationship between the percentage of calcium in the blood and the maturation period, the calcium rising to a markedly high level at the spawning season.¹ It was found likewise, in agreement with the investigations of others, that there is an inverse relationship between the size of the liver and the size and development of the roe, the liver becoming smaller as the ovary fills up and grows larger. At this time the liver may lose 50% or more of its fat. In many instances the weight of the fully matured ovary far exceeds that of the liver; for example in 3 fish, the ovary weighed 400, 345, and 270 gm. respectively, whereas the liver weighed 29, 105 and 60 gm. On testing the roe for antirachitic potency it proved in every instance to be active; this held true for the roe of the cod, sheepshead, flounder, carp, buffalo fish and smelt. The milt of the cod and of the carp had similar protective value. When the respective weights of the organs, of the liver and the ovary, were taken into consideration it was found that the latter contained quite as much as, or even more, of the antirachitic factor than the liver. In

¹ Hess, A. F., Bills, C. E., Weinstock, M., and Rivkin, H., *PROC. SOC. EXP. BIOL. AND MED.*, 1928, xxv, 349.

view of these facts it seems that the liver may be the source of the specific factor in the roe.

In the course of these experiments it was found that the antirachitic potency of the liver of the cod is in inverse ratio to its content of oil. Much to our surprise tests of the ether extract of livers, very small and poor in fat, showed them to be exceptionally potent—far exceeding in potency any oil which has been heretofore reported. The details of these tests will be published elsewhere.

Following the plan carried out in connection with an investigation of the antirachitic content of the egg of the hen and of the newly hatched chick, a biologic test was made of the fry. It was found that the fry of the cod, as well as of the smelt, was practically devoid of this factor which evidently had been used up in the course of the development of the larvae. Furthermore, the specific factor was not noted in trout 2 months old, although the liver of the adult fish was potent when as little as 0.1 gm. daily was fed.

It is believed that the antirachitic factor, or so-called vitamin D, is of essential importance in the development of the young fish as well as of the young chick. Whether this is to be interpreted as indicating a dual functional activity of this nutritional factor, or as due to the presence of an intimately associated factor, must be left for further study to determine.

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A Hemolytic Substance in Pneumococcus Culture Broth.

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In the course of previous studies,^{1, 2} it was found that type I pneumococcus culture broth contained a substance which resembled the hemotoxin described by Cole^{3, 4} and later by Avery and Neill.⁵ Unlike the substance described by Cole, which was contained within the cells and was only set free by their dissolution, the hemolytic

¹ Sickles, G. M., *J. Infect. Dis.*, 1927, **xl**, 369.

² Wadsworth, A. B., and Sickles, G. M., *J. Immunol.*, 1927, **xiv**, 321.

³ Cole, R., *J. Exp. Med.*, 1912, **xvi**, 644.

⁴ Cole, R., *J. Exp. Med.*, 1914, **xx**, 346.

⁵ Avery, O. T., and Neill, J. M., *J. Exp. Med.*, 1924, **xxxix**, 745.