TITLE: The Action of Shrimp Oil (Penaeus foliaceus) on the Vitamin A Deficient White Rat
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BIOLOGICAL CHEMISTRY. – *The Action of Shrimp Oil* (Penaeus foliaceus) on the Vitamin A Deficient White Rat. Note (*) by Mr. Rene Grangaud and Ms. Renee Massonet, presented by Mr. Maurice Javillier.

Crustacean oil contains practically no vitamin A and is low in carotenes [(Lederer ([1])], such that their effect on the growth of vitamin A deficient white rats is very minimal. Penaeus foliaceus oil, which we studied, is not an exception. On the other hand, its action on the development of xerophthalmia lesions was observed to be unexpected.

Oil Preparation. –Cephalothoraxes from 1 kg of shrimp were emptied of their contents which were ground with anhydrous sodium sulfate then the mass was stripped using acetone (400 ml, then three times with 200 ml). The stripping liquids were collected in an ampule and diluted with water (250 ml) then petrol ether (300 mil). After agitation and rest, the etheropetrolic phase was separated and distilled under a nitrogen atmosphere with reduced pressure. The residue was an oil with a deep red color. The yield was on the order of 5 g of oil.

The resulting product was administered to albino rats which, since they were weaned, had been fed with the regime deficient in vitamin A factors as specified by A. Chevallier ([2]). 16 rats from the same rearing, aged from 75 to 90 days and weighing from 60 to 70 grams with weight stabilisation of at least 10 days at the same time as an intense xerophthalmia, were divided into 3 lots (A, B and C). Each day, in addition to the base regime, each animal received the following: Lot A: (2 males, 3 females): 90 mg of oil; Lot B (3 males, 2 females): 45 mg of oil; Lot C (3 males, 3 females): 22 mg of oil. In parallel, three control lots (D, E and F) with signs of deficiency, in all points comparable to those of the preceding lots, received the following on a daily basis:

(*) Meeting of 30 August 1948.
(1) Bull. Soc. Chim. biol., 20, 1938, p. 567.
(2) G. H. ROGER and Léon BINET, Traité de Physiologie normale et pathologique, 22, (supp.), p. 237.

Lot D (2 males, 3 females): base regime + 15 IU of vitamin A; Lot E (2 males, 2 females): base regime + 4 IU of vitamin A; Lot F (3 males, 3 females): base regime without any addition of vitamin A.

The five animals in Lot D quickly reached a normal growth rate, showing that the lesions had not reached an irreversible stage. Lot E also started to grow but much more slowly and one of the two died on the 99th day, 24 hours after having received the first dose of vitamin. Finally, the six Lot F animals died before the 100th day, i.e., 15 to 25 days after the appearance of the first signs of deficiency.

Among the animals which received the shrimp oil, only those in Lot A quickly reached a normal growth rate. In Lot B, weight gain was much slower and three of them died, 22, 30 and 38 days after the first administration of oil. Two, more robust animals reached weights of 127 g and 138 g and survived beyond the 125th day but had signs of physiological distress including, in particular, paralysis of the hindquarters. Lot C, which gained practically no weight, all died in less than 35 days after the appearance of the first signs of deficiency.

These results were not surprising: in all likelihood, the carotene traces present in the shrimp oil were responsible for the recorded growth action. After this action, there was an unappreciable or hardly detectable effect on the development of the xerophthalmia lesions in the animals of lots B and C. It is evident that the healing of these lesions was slower than the weight gain and a daily dose of 4 micrograms of carotene, though clearly greater than the *maintenance dose* [Mr. Javillier and Ms. Emerique ([3])] and sufficient to re-establish growth, *only allowed healing of the xerophthalmia* [Ms. L. Randoin and R. Netter ([4])]. However, among the 16 rats which received the shrimp oil, only those in Lot A could find their daily ration of carotene in the order of 4 micrograms. However, the 16 animals, without exception, were healed from their xerophthalmia; 14 of them in less than 10 days, 2 which had more severe cases, in 15 days. Undeniable improvement was always seen in the four days following the first administration of oil ([5]).

(3) Bull. Soc. Chim. biol., 13, 1931, p. 771.
(4) Bull. Soc. Chim. biol., 15, 1933, p. 706.
(5) Our results should be compared with those recently published by P. Dubouloz, R. Merville C. Chevalier (Bull. Soc. Chim Biol., 30, 1948, p. 112). These authors, administering to rats deficient in vitamin A a regime incapable of restoring growth, found that remaining characteristics of eye injuries were significantly decreased.

At the same time, in the control animals, only Lot D (15 IU *pro die* vitamin A) were healed of xerophthalmia; the healing was, however, overall, a little slower than in the rats which received shrimp oil. The lesions in the Lot E animals (4 IU "*pro die*" vitamin A) were still in full development and had not discernibly improved three weeks after the first administration of vitamin. Finally, all the Lot F rats died with signs of intense xerophthalmia.

It is evident from these experiments that oil extracted from decapod crustaceans, Penaeus foliaceus, caught in the Mediterranean, exhibit a much more evident antixerophthalmic action which its action on the white rat's growth could not be used to predict. The carotene traces could not alone be responsible for this action. It is, therefore, likely that, in this oil, there is a constituent, other than the carotenes and vitamin A, which play a role in the antixerophthalmic activity.