

sential factor connected with the scorbutic condition. This should be borne in mind, and the results of experiments on growth should not be considered as directly transferable to infantile scurvy or similar dietary diseases.

81 (1145)

Oxygen utilization by fishes and other aquatic animals.¹

By GEO. G. SCOTT.

[*From the United States Fisheries Biological Station, Woods Hole, Mass.*]

A. Lowering of the temperature causes a reduction in the rate of oxygen consumption. In one case, while one lot of fishes consumed 78 per cent. of the available oxygen supplied at 12° C; a similar lot of fishes in water 4° colder consumed but 60 per cent. In a second case, a fish in water at 20° C. consumed 94 per cent. of the oxygen present while a similar fish at 3° C. consumed but 57 per cent. Breathing had ceased in this case but was resumed on return to warmer water.

B. It was noted that oxygen was consumed more rapidly in tall, narrow vessels of water than in broad shallow ones. Fishes moving about in shallow vessels of water tend to reaeerate the same. In one experiment to test this, one lot of fishes in tall narrow vessels of water consumed 80 per cent. of the oxygen supply, while in the broad shallow water at the end of the same period, the analysis indicated a reduction of but 20 per cent. of the original oxygen supply.

C. Fishes kept in dark vessels apparently consume oxygen at a less rapid rate than those exposed to light. Thus in the light one fish consumed oxygen at the rate of 0.12 c.c. per gm. per hr. while in the dark the rate was D. 11 c.c. per gm. per hr. But there was no evidence as to rate of oxygen consumption being less at night than in the daytime the rate being approximately the same.

D. Some forms show more resistance to low oxygen supply

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than others. This is particularly true of invertebrates. Respiration ceases altogether, and returns if the specimen is returned within certain time limits, to aerated water. The toad fish and killifish live in water with low oxygen content while butterfish and menhaden quickly succumb to reduction in oxygen supply.

E. The average rate of oxygen consumption for two species of marine worms is about 0.0205 c.c. per gm. per hr.; while that of two mollusks is about the same, *i. e.*, 0.0215 c.c. O₂ per gm. per hr. That of the fish, tautog, was 0.088 c.c. per gm. per hr. Most marine invertebrates consume oxygen at a very low rate; fishes at a much higher rate; with amphibia the rate is between that of invertebrates and fishes; the rate with mammals and birds is relatively high, that of birds being extremely high as compared with anatomically lower forms.

82 (1146)

The nutritive value of some cotton-seed products in growth.

By **THOMAS B. OSBORNE** and **LAFAYETTE B. MENDEL.**

[From the Laboratory of the Connecticut Agricultural Experiment Station and the Sheffield Laboratory of Physiological Chemistry in Yale University, New Haven, Connecticut.]

When certain animals are fed on a ration containing an abundance of cotton-seed meal they frequently give evidence of so-called cotton-seed injury. This has been attributed to irritation from the indigestible husks, the oil, harmful microorganisms, and specifically toxic chemical compounds. The possibility suggests itself that the rations are frequently far from ideal or adequate in respect to the various essential nutrients, inorganic salts and "accessories." Richardson and Green¹ have found that when the ration of rats is otherwise suitable, toxic symptoms do not follow the use of cotton-seed meal. With their approval we refer to our own experiments, which are still in progress. To ascertain whether

¹ This has since been published: Richardson and Green, *Jour. Biol. Chem.*, June, 1916, XXV, 307.