foot against the steamship traffic as a means of chasing the herrings from the coast.

Greater weight might possibly be attached to another reason advanced in favor of a protective law, viz, that an unlimited fishing season would diminish the number of whales and seriously endanger the future of the whale-fisheries. A reckless destruction of whales during the spawning season would certainly be a most senseless proceeding; and if we consider that last year no less than 145 whales were caught on a comparatively small extent of coast, such a fear is not entirely unfounded. Not long ago it has been found necessary to conclude an international convention between Norway, Sweden, Germany, Denmark, and England for the purpose of protecting the seal during its spawning season against the war of extermination waged against it near Iceland, Greenland, and Jan Mayen. It is to be hoped that it will be more generally recognized that we owe it to the coming generations to protect the useful and interesting animal life of the Arctic and Antarctic regions.

THE FOOD OF YOUNG WHITEFISH—COREGONUS CLUPEIFORMIS.

By Prof. S. A. FORBES.

DEAR SIR: The letter to Mr. Frank N. Clark which you kindly sent me last summer, resulted in an arrangement by which he was to hatch out a lot of whitefish eggs in January, and send me the young fry at intervals for a study of their food.

Having finished my study of these specimens, and thinking it probable that you would like to know the result, I will give you a brief outline of the observations made.

Mr. Clark writes me that these fry were divided into two lots, one (hatched January 18) being kept in a small tank in the hatchery, and the other (hatched January 20) in a perforated can in the stream from a spring. The water in the hatchery varied in temperature from 31½° to 48°, but was usually at about 37°; that of the spring was uniformly at 47°.

These lots were examined from the spring water February 1, 15, and 25. There were 242 individuals in these three lots. Only 8 of these gave any evidence of food in the intestine, and these in only trivial quantity. It included a few common forms of filamentous algæ, with smaller amounts of desmids and diatoms.

Samples of the water sent me contained an abundance of algæ, but no animal life except *protozoa* and *rotifera*. The remainder of this lot died late in February.

From the hatching-house four lots were sent, numbering 340 specimens, February 1, 15, and 25, and March 15. The last of these had reached a stage of development little, if any, in advance of that of the

first received from the spring. These fry were fed daily with *gammari* in minute fragments.

Of the first 90, 4 showed signs of food, 3 in the form of a few grains of dirt in the intestine, and the fourth a fragment of the crust of gammarus; in the second lot (111), 17 had eaten. I discovered 9 of these, and found only fragments of *Gammarus*. Twelve out of the 90 in the third lot had lately taken food; 4 had eaten fragments of *Gammarus;* 7, small particles of the leaves and stems of vascular plants; 2, larvæ of *Culicidæ* and 1, a *Cypris*, entire. In the fourth and last lot were 39 specimens; 14 had taken food, 5 in such minute quantity that I did not dissect them; *Gammarus* fragments were found in 4; larvæ of gnats (one *Chironomus*) in 3; and a minute vegetable fragment, a *Cyclops*, a *Cypris*, and some undetermined entomostracan each in 1.

To recapitulate: The specimens from the spring ate only vegetable food, but could apparently get nothing else. There was an abundance of vegetation about them, but only 3⅓ per cent. of them took food at all. They apparently died for want of animal food.

Fourteen per cent. of those from the hatching-house had taken food (47 out of 340). Of the 35 dissected, 18 had eaten fragments of *Gammarus;* 5, minute insect larvæ; 4, *Entomostraca;* and 8, small particles of vegetation. Few of these died, and those not used in the investigation were living a few days since.

A structural detail observed throws light on the question. With the complete disappearance of the egg-sac (and not before) two small, but stout, sharp, recurved teeth are developed on each side of the lower jaw. These are well adapted to the capture of a minute living prey, and apparently could not have any other use. I am very well satisfied, on the whole, that the earliest food of this fish will prove to be living *Entomostraca*, with probably some admixture of filamentous algæ. As the gill-rakers are not developed at this early age, I don't see how any smaller forms could be separated from the water, except accidentally.

The *Gammarus* "hash" makes evidently a very good substiute for the *Entomostraca*. The thicker crust and the necessary loss of much of the soft parts, in pulverizing the animals, make these less nourishing than the natural food—a fact likewise indicated by the greater abundance of the orange oil globules derived from *Crustacea*, in the intestines of those which had fed on *Entomostraca*.

I shall endeavor to collect some of the fry from Northern Lake, Michigan, next month, if I can get away, with a view to putting these conclusions to a more definite test.

Very respectfully, your obedient servant,

S. A. FORBES.

Professor S. F. BAIRD.

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