

108.—NATURAL AS COMPARED WITH ARTIFICIAL HATCHING OF WHITEFISH.**By FRANK N. CLARK.**

[In reply to a letter of Mr. R. Bell to Prof. S. F. Baird.*]

The swarms of young fish referred to are not whitefish. They are a species of small "shiner" or "chub" which congregate around docks, wharves, and shoals in countless numbers at nearly all seasons of the year in all of the great lakes. I have seen them so thick that a single thrust of a dip-net would bring in several hundred. I have found a few herring among them, but never any whitefish. The offal and refuse from fisheries undoubtedly attracts large numbers to such places.

The claim that whitefish and herring hatch in six days or less is highly erroneous. It requires two and a half to six months, according to temperature of water; and the time of incubation is neither hastened nor retarded by "artificial" processes or treatment, provided water of the same temperature is used. The claim that millions of fish are hatched from the spawn discharged from the fishery is equally erroneous. Mr. Bell can make some interesting tests and experiments on these questions with very little trouble and expense. I would suggest that boxes or tanks with wire bottoms and sides be provided, and placed under the fish-house, or anywhere else in the lake. Put into one of them a quantity of spawn as discharged from the fishery, and into the other a supply of eggs known to be fertilized; then leave them undisturbed and note the outcome. The fertilized eggs may hatch a few fish the following spring, although the chances are that fungoid and confervaceous growths will destroy every egg; the other box will hatch nothing. Now, place some fertilized eggs in another box and give them the same care they would receive in a hatchery; that is, remove all dead eggs as fast as they appear and keep them free from dirt and sediment. The result will be, if the eggs were ripe when taken and properly fer-

* Under date of Port Clinton, Ohio, March 31, 1885, Mr. R. Bell, of the firm of R. Bell & Co., dealers in fresh, salt, and frozen fish, wrote in substance as follows: "I think there are millions of herring and whitefish hatched every fall under our fish-house, and that they hatch in less than six days after the eggs go into the water. No young fish are to be seen here until about ten days before they commence spawning, when the water becomes perfectly alive with young fish, resembling whitefish and herring. I cannot think it possible for the eggs to lie in the lake three months before hatching. I think artificial hatching of fish of all kinds is a good thing in order to transfer them from one place to another, but to take the eggs from any water and put the fish back in the same water seems time and money lost. To transport the eggs will increase the fish a thousand times faster and with a cost of less than 1 per cent of what hatching and transferring the young fish costs."

tilized, a hatch of 70 or 80 per cent. This will show the value of artificial treatment.

The reasons why spawn as discharged from the fishery will produce no fish, are at once apparent when we consider the conditions that are absolutely essential for reproduction. The eggs must first be fertilized, and to accomplish this they must be mature and come in contact with milt which is unimpaired in vitality; and then, to carry them through the long period of incubation, the dead eggs must be removed; otherwise the confervaceous or "mossy" growth therefrom will spread and destroy them all. Now, the chances of these essential conditions being fulfilled in the case of spawn dumped from the offal barrel, or dropped through the floor of the fishery into the water below, are too small for computation. First, from 75 to 100 per cent of the eggs dressed from the fish are "unripe"—that is, the egg germ is immature and incapable of being fertilized; second, both males and females are generally dead before the dressing is commenced; and fertilization is out of the question when all vitality has departed from the male principle; and, third, granting that 25 per cent of the offal-spawn is fertilized, which is highly improbable, there would still remain 75 per cent of dead eggs—sufficient to make a rotten mass of the whole batch in a comparatively short time.

Artificial propagation consists simply in bringing the germ and vitalizing principle together at the proper time, and then protecting the embryo; and the assistance thus rendered enables us to produce results many times greater than nature can produce.

NORTHVILLE, MICH., *April 15, 1885.*

MEMORANDUM BY PROFESSOR BAIRD.

The conditions under which the whitefish develop have been thoroughly established, both in this country and in Europe. Such acceleration of development as that referred to is entirely contrary to the nature of the fish. The small fish mentioned are probably of quite a number of species, principally the young of minnows and chubs, mixed with a few species that never attain a length of more than a few inches. The drippings from the fish-houses and the discharge of offal into the water in their vicinity would undoubtedly tend in a short time to bring together an immense congregation, a phenomenon which I have myself witnessed many times.

I shall be glad, however, to put this question to a careful test by an examination of any specimens that may be collected and sent to me. An ounce of fact is worth a pound of speculation, and whatever may be the probability the question can only be settled positively by observation and experiment. There is not the slightest difficulty in identifying a whitefish, even just from the egg, still less when several inches in length.

The egg of the sea salmon requires still longer to hatch out than that of the whitefish, and many cases are on record where an examination of natural spawning beds in the spring has shown the existence of eggs with embryos in them which had been deposited by the parent fish during the previous autumn.

WASHINGTON, D. C., *April 18, 1885.*

109.—REPORT ON THE SCHOODIC SALMON WORK OF 1884-'85.

By CHAS. G. ATKINS.

The measurement of the stock of Schoodic salmon eggs at Grand Lake Stream at time of packing and shipment, and the record of previous losses, enable me to complete the statistics, as follows:

Original number taken.....	1,820,810
The total losses up to that time, including the unfertilized, which were removed before packing.....	254,410
Net stock of sound eggs.....	1,566,400
Reserved for Grand Lake.....	397,400
Available for shipment to subscribers.....	1,169,000

These were divided among the parties supplying the funds for the work in proportion to their contributions, as follows:

Allotted to the United States Commission ($\frac{1}{3}$).....	608,000
Allotted to the Maine Commission ($\frac{1}{3}$).....	234,000
Allotted to the Massachusetts Commission ($\frac{1}{3}$).....	187,000
Allotted to the New Hampshire Commission ($\frac{1}{3}$).....	140,000
Total.....	1,169,000

The share of the United States Commission was assigned and shipped, under orders, as follows:

A. W. Aldrich, commissioner, Anamosa, Iowa.....	50,000
E. A. Brackett, commissioner, Winchester, Mass.....	25,000
H. H. Buck, Orland, Me., to be hatched for Eagle Lake, Mount Desert....	20,000
Paris, Mich., for Michigan commission.....	50,000
Madison, Wis., for Wisconsin commission.....	50,000
R. O. Sweeny, commissioner, Saint Paul, Minn.....	50,000
South Bend, Nebr., for Nebraska commission.....	20,000
E. B. Hodge, commissioner, Plymouth, N. H.....	40,000
Cold Spring Harbor, N. Y., for New York commission.....	60,000
Plymouth, N. H., for Vermont commission.....	25,000
Plymouth, N. H., for Lake Memphremagog.....	25,000
Central Station, Washington, D. C.....	10,000
R. E. Earll, World's Exposition, New Orleans.....	5,000
G. W. Delawder, commissioner, Baltimore, Md.....	5,000
Myron Buttles, North Creek, N. Y.....	5,000
A. R. Fuller, Meacham Lake, N. Y.....	20,000