XI.—REPORT OF OPERATIONS AT COLD SPRING HARBOR, NEW YORK, DURING THE SEASON OF 1886.

By Fred Mather.

On the work done in hatching and distributing different fishes for the U. S. Fish Commission at this station, which is leased by the New York Fish Commission, I have the honor to report as follows:

CODFISH (GADUS MORRHUA).

Early in January, 1886, we had 2,000,000 eggs in the house, which were doing well, and we could see the embryos in the eggs, but on January 11 a cold northeast wind blew through our old hatchery and froze our salt water solid, and they all perished.

WHITEFISH (COREGONUS CLUPEIFORMIS).

On January 7, 1886, we received from Mr. Frank N. Clark, of the Northville, Mich., station, one case containing 1,000,000 whitefish eggs in excellent order, the temperature of the eggs in the packages being 44° Fahr. They were placed in seven McDonald hatching-jars and did very well, the loss being 57,700, or a little less than 6 per cent., and 942,300 were distributed to the different waters on Long Island, but thus far I am unable to report any captures of these fish in waters on the island previously stocked. They are deep, cold lakes containing plenty of small crustaceans and other food, but, no net-fishing being allowed in them, it is possible that the fish may be there, but have not been seen.

LAKE TROUT (SALVELINUS NAMAYCUSH).

On December 19, 1885, we received from F. N. Clark, Northville, Mich., one case containing 150,000 eggs in good condition. Of these we lost 12,000 eggs and fry before distributing, and tried the experiment of keeping 50,000 until they should be a year old or so, in our rearing ponds. They were put in the upper ponds in the coolest water, and before September the last one had died. My experience with this fish is that they are the most delicate of all the *Salmonidæ* which I have had any experience with, and that they require colder water than any others

of the family that I know. Our fish took food very well until some time in June, when the temperature in their ponds reached 60° Fahr., and then they began to die. A table of distribution will be found at the close of the report.

ATLANTIC OR PENOBSCOT SALMON (SALMO SALAR).

This was the third season of operations with this fish at this station, and the fourth in which plantings in the Hudson River were made. The first plant in the Hudson was from Roslyn, Long Island, in 1882, when I obtained the use of the stream and hatchery building of Mr. Thomas Clapham of that place, to carry on the work; and the captures of salmon in the Hudson River during the summer of 1886, which will be detailed further on, have given us great encouragement.

On January 7, 1886, we received from Mr. Charles G. Atkins, in charge of the salmon station at Bucksport, Me, three cases containing 240,000 eggs, which were in excellent condition; and on the following day we received four cases, containing 260,000 eggs, which were also in good condition. The fry were placed in tributaries of the Hudson, Saint Lawrence, and Lake Ontario, the details of which are in the tables of distribution appended to this report.

In May, 1885, we made plantings of salmon in Paulinskill and the Pequest River, New Jersey, tributaries of the Delaware River, and the fry have been seen there, as is shown by the following letters from one of the fish commissioners of New Jersey:

"NEWTON, N. J., *November* 13, 1886.

"FRED MATHER, Esq.:

"DEAR SIR: Yours of the 8th ultimo is at hand, making inquiries about the salmon fry placed in the Pequest, Paulinskill, and Musconetcong rivers, they being tributaries of the Delaware. These salmon were placed in the streams about 20 miles from where they empty into the Delaware, and were found in the Paulinskill in September, 1885, in the small spring-runs near the main stream. In May of the present year I learned that some had been taken by a party while fishing for trout at a point about 5 miles below where they were placed the year before. The party that caught them at first thought they were rainbow trout, but on examination I learned they were young salmon, from 4½ to 6 inches long. They were taken with a common angle-worm bait, and seemed to be quite numerous at this point. I have seen them, during the early part of last September, in the same stream, and have no doubt that they have done equally well in the two other streams. There were, perhaps, about forty taken at this point, and nearly all of them were returned to the stream. I am satisfied, from this experience, that the planting of the fry in the headwaters of the tributaries, in natural trout water, is the best way to stock the

Delaware, and if the effort to do so succeeds, it must be done in this manner. Allow me to congratulate you on the success, so far, of this experiment.

"I am yours, etc.,

"F. M. WARD,

"*New Jersey Commissioner of Fisheries, in charge of Northern New Jersey.*"

Mr. Ward wrote again on the subject of salmon, as follows:

"NEWTON, N. J., *April* 29, 1887.

"FRED MATHER, Esq.:

"MY DEAR SIR: I wrote you, some months since, that in May and June of last year there were taken from the Paulinskill, in the head-waters of which you caused to be placed some of the salmon fry two years ago, what I supposed to be young salmon, from 5 to 6 inches long. For a few weeks past they have been taken in small numbers, at the same point, from 8 to 9 inches in length, but, on examination, I doubt their being young salmon, the sides having the bright red spots of our brook trout, and all the other marks of the oquassa or Dolly Varden trout, as described in recent reports by the U. S. Commission of Fisheries. Presuming that you might be interested in this unlooked-for development and may be able to account for it, I have been induced to write you in relation to it.

"Yours, etc.,

"F. M. WARD,

"*Commissioner of Fisheries for New Jersey.*"

To which I made the following reply:

"COLD SPRING HARBOR, N. Y., *May* 2, 1887.

"F. M. WARD, Esq.:

"MY DEAR SIR: I have yours in reference to some fish taken in Paulinskill, where we planted the salmon fry two years ago, and which were then from 5 to 6 inches long. You now say that for a few weeks past they have been taken in small numbers from 8 to 9 inches in length, but doubt their being young salmon because of the sides having little red spots like a brook trout. Now, the fact is that young salmon have these red spots during the first year or 'parr' stage, but they can easily be distinguished from the trout on account of the forked tail. The second year they assume the 'smolt' stage, and are then silvery, the red spots having gone never again to appear. But I should think that they would have gone farther down the river by this time; but your letter is a very valuable contribution to their life history, and I am exceedingly obliged to you for it, for I have not the slightest doubt that the red-spotted fish were young salmon which had not yet taken on the silvery coat. I should much like to have a specimen, if possible.

"Very truly, yours,

"FRED MATHER."

For information concerning the captures of adult salmon in the Hudson we are greatly indebted to Mr. A. N. Cheney, of Glens Falls, N. Y., a gentleman who is well known as an angling authority in this and other countries, and who has taken a great interest in the work of stocking the waters with fish. He writes me, under date of March 23, 1887, as follows:

"Last year twenty-four salmon were taken in the Hudson River at the places named:

Troy Dam	9
An island, below Troy	2
Stockport	2
Albany	2
Rhinebeck	2
Poughkeepsie	3
Yonkers	4
	24

"The New York Herald also reports some taken at Staten Island."

The largest salmon taken in the Hudson, of which we have any account, was caught at the State dam, at Troy, and weighed 14½ pounds. This fish was seen by Dr. H. P. Schuyler, of Troy, who has also taken a great interest in the stocking of the river, and who has said that he believes that the waters in the vicinity of the dam contain many salmon that are unable to get farther. In addition to the list of twenty-four salmon given by Mr. Cheney, I am able to add one which I saw in Fulton Market, which weighed about 10 pounds, and was captured by John Denyse, of Gravesend, in Gravesend Bay, some time in the latter part of May, 1886. Several gentlemen, among whom are Messrs. Cheney and Schuyler, before referred to, and Dr. Samuel B. Ward, of Albany, president of the Eastern New York Fish and Game Protective Association, have moved to induce the State legislature to make an appropriation for fishways, to be placed in the Troy and other dams, in order that the salmon may reach the breeding grounds. If they accomplish this, and the fish have proper protection, it is among the possibilities that we may yet take eggs from salmon which have been artificially hatched and planted in the Hudson, a feat which we might justly regard as one of the greatest triumphs in fish-culture.

LANDLOCKED OR SCHOODIC SALMON (SALMO SALAR *var.* SEBAGO).

On March 18, 1886, there was received from Mr. H. H. Buck, of Grand Lake Stream, one case containing 34,000 eggs in exceedingly good condition, only 76 being dead. After hatching, the fry were planted in Adirondack lakes by request of General R. U. Sherman, of the New York Fish Commission.

BROWN OR EUROPEAN TROUT (SALMO FARIO).

Three lots of brown-trout eggs were received from Germany. On March 1, 1886, one case came from the Deutscher Fischerei-Verein con-

taining 64,000 eggs. These were in very bad condition, one-fourth had hatched in the package, and the remainder of the eggs were dead. It was evident that they had not been iced on the ship. On March 20 we received from the Fischerei-Verein a case containing 40,000 eggs which were in better condition, only 4,134 being dead. Ten thousand were sent to Mr. F. N. Clark, of Northville, Mich., and 3,000 to George A. Seagle, of Wytheville, Va. On April 16 we received from Herr Max von dem Borne, of Berneuchen, two cases containing 50,000 eggs, which were in very good order, about 500 being dead. Thirteen thousand were repacked and sent to Mr. Clark, at Northville, and 1,000 to James Nevin, superintendent of the Wisconsin Fish Commission at Madison.

SHAD (CLUPEA SAPIDISSIMA).

On April 26, 1886, we received from Central Station at Washington two cases containing 546,000 eggs, which were all dead on arrival. On April 29 we received from the same place five cases containing 1,250,000 eggs. These were not in good condition, and the loss in hatching was very great, but we succeeded in getting 100,000 good fry, which were planted in the Hudson, near Troy.

SMELTS (OSMERUS MORDAX).

We have succeeded in hatching large numbers of smelts, the parent fish being obtained on the south side of Long Island and brought here in cans. The glutinous nature of the eggs has rendered their hatching very difficult, but we have managed to bring out about 50 per cent. of the eggs taken, and in the spring of 1886 turned out over 2,000,000 fry in Cold Spring Harbor. There has been no smelt in the harbor for a number of years, but in the spring of 1887 a number were reported to have been taken in Oyster Bay, which connects with the harbor; and at the upper end of Cold Spring Harbor we have seen several male fish in the little streams where our plants have been made for the past two years, but no females were observed.

TOMCOD (MICROGADUS TOMCODUS).

These little fish, although very plentiful here, are more numerous than ever since our efforts in cultivating them. The eggs are free and heavy enough to hatch well in the McDonald jars. They are about one-seventeenth of an inch in diameter. A small Bar glass, 2¼ inches high, 1½ inches at the bottom and 2¼ inches at the top, inside measurements, holds 20,000 eggs when filled up to a height of about 2 inches. Two million two hundred and twenty-five thousand of these eggs were taken and placed in hatching jars, and at about the time when the embryos in the eggs could be seen, a blizzard blew through our old building and froze them all.

LOBSTERS (HOMARUS AMERICANUS).

On May 29, 1886, I brought from the United States hatching station at Wood's Holl, Mass., 5,000 young lobsters which had been hatched there and also 50,000 lobster eggs. The eggs were all dead on arrival at the Cold Spring Harbor hatchery, but the young lobsters were in very good condition. They were placed in small aquariums and fed on soft clams (*Mya arenaria*), and did very well for a few days until they began to molt, when as soon as one little fellow cast his shell his brethren would devour him. I think that Prof. J. A. Ryder, who hatched these lobsters, told me they had molted twice before and that they were then between two and three weeks old. After losing perhaps two hundred of them I decided to plant them, and did so on June 5, six days after receiving them, off Rocky Point in Cold Spring Harbor. When planted the young were about five-sixteenths of an inch in length. There have been no lobsters in this harbor for a number of years, and in September, 1886, Capt. S. A. Walters and Capt. Bunce each caught young lobsters while working on their oyster-beds, which they informed me measured about an inch and a half in length, but I have been unable to secure specimens.

GENERAL REMARKS.

As before stated the grounds are leased by the New York Fish Commission, and much work was done for that commission which is not here reported. The codfish work mentioned was done at the expense of the State. The building used for a hatchery is an old mill nearly ready to tumble down and not worth repairing. A bill has been introduced into the New York legislature to appropriate $5,000 for the purpose of building a new hatchery, and at present writing (May, 1887) it has passed the assembly, and there is every reason to hope that it will become a law.*

* Since the above was written, the following law has been passed (chapter 613, Laws of New York):

"An act to provide for the erection of a fish-hatchery at Cold Spring Harbor, and making an appropriation therefor. Passed June 18, 1887, three-fifths being present.

"The People of the State of New York, represented in the senate and assembly, do enact as follows:

"SECTION 1. There shall be appropriated from any funds in the treasury of the State, not otherwise appropriated, for a new hatchery building and improvement of grounds at the Cold Spring Harbor station of the commissioners of fisheries, $5,000, or so much thereof as shall be necessary, to be expended under the direction of the commissioners of fisheries on vouchers to be approved by the comptroller; but no money shall be paid out of the appropriation till a lease of the lands and water rights now occupied for such hatchery shall be executed to the State, rent free, from the owner, for such period as the same may be occupied as a public hatchery, which lease, when accepted by the commissioners, shall be filed in the office of the secretary of state."

Such a lease was given by the owner, Mr. John D. Jones, and the building is now (October 26, 1887) in process of erection. The contract requires its completion by January 1, 1888, which will be in time for the salmon work of that year. In the mean time a small building outside the grounds is being used for trout and other fishes.

In case we have a new building there will be no danger of such accidents by freezing as that referred to, and we shall be enabled to have our work all on one floor and to do much better than has been done, both in salt and in fresh water.

The following tables show the distribution of the various kinds of fish handled at this station during the season:

TABLE I.—*Distribution of whitefish from Cold Spring Harbor in* 1886.

Date	Messenger.	Where planted.	Number.
Feb. 16	C. H. Walters	Large mill-pond near Riverhead, N. Y	500,000
Feb. 23	O. V. Rogers	Ronkonkoma Lake, Long Island	400,000
Mar. 12	O. V. Rogers	Saint John's Lake, Long Island	30,000
Apr. 3	O. V. Rogers	Saint John's Lake, Long Island	12,300
	Total		942,300

TABLE II.—*Distribution of lake trout from Cold Spring Harbor in April and May,* 1886.

Date.	At whose request.	Messenger.	Where planted.	Number.
Apr. 3	J. H. Perkins	O. V. Rogers	Riverhead, L. I.	15,000
Apr. 9	H. Shoskinsky	Delivered	Breslau, L. I	5,000
Apr. 18	Prof. S. F. Baird		Ponds at hatchery	27,775
Apr. 20	R. U. Sherman	F. A. Walters	In Adirondack waters	50,000
Apr. 22	Prof. S. F. Baird	Delivered	Gloucester, Mass	5,000
Apr. 27	A. N. Cheney	O. V. Rogers	Lake George, N. Y	30,000
May 2	E. G. Blackford	O. V. Rogers	Monroe, N. Y	5,000
	Total			137,775

TABLE III.—*Distribution of Atlantic salmon from Cold Spring Harbor in April and May,* 1886, *on account of the U. S. Fish Commission.*

Date.	Messenger.	Place of deposit.	Fish supplied.	Loss in transit.	Fish planted.
Apr. 12	C. H. Walters	Carr's Brook, Hudson River	50,000	200	49,800
Apr. 12	F. A. Walters	Raymond Brook, Hudson River	50,000	200	49,800
Apr. 20	C. H. Walters	St. Regis and Brandon Lakes, St. Lawrence River.	50,000	500	49,500
Apr. 27	O. V. Rogers	Clendon Brook, Hudson River	20,000	300	19,700
Apr. 29	C. H. Walters	Oswego River, Lake Ontario	50,000	300	49,700
May 3	C. H. Walters	Eldridge Brook, Hudson River	60,000	200	59,800
May 3	O. V. Rogers	Oak Orchard Creek, Lake Ontario	50,000	500	49,500
May 7	C. H. Walters	Roaring Brook, Hudson River	60,000	200	59,800
May 10	O. V. Rogers	Balm of Gilead Brook, Hudson River.	59,073	100	58,973
	Total		449,073	2,500	446,573

TABLE IV.—*Distribution of landlocked salmon from Cold Spring Harbor in May,* 1886.

Date.	At whose request.	Messenger.	Where planted.	Number.
May 13	R. U. Sherman	F. A. Walters	St. Regis Lake, Franklin County, N. Y.	15,000
May 13	R. U. Sherman	F. A. Walters	Clear Pond, Franklin County, N. Y.	16,020
	Total			31,020

TABLE V.—*Distribution of brown trout from Cold Spring Harbor in April and May*, 1886.

Date.	Messenger.	Place of deposit.	Fish supplied.	Loss in transit.	Fish planted.
Apr. 20	.....	Large reservoir at hatchery.....	8,000	.....	8,000
Apr. 27	O. V. Rogers	Clendon Brook, Hudson River.....	8,000	1,000	7,000
May 13	F. A. Walters.....	Lake Brandon, near Adirondack Hatchery.	8,000	.....	8,000
May 27	Delivered.....	Pond of Mr. Beekman, Oyster Bay.	500	.....	500
	Total	....	24,500	1,000	23,500

TABLE VI.—*Distribution of shad, smelts, and lobsters from Cold Spring Harbor in* 1886.

Date.	Kind.	Messenger.	Where planted.	Number.
May 10	Shad.....	O. V. Rogers	Hudson River, at Albany, N. Y	100,000
Apr. 20	Smelts	F. A. Walters.....	Saranac Lake, Franklin County, N. Y..	50,000
Apr. 25	Smelts.....	O. V. Rogers	Cold Spring Harbor, N. Y.....	50,000
Apr. 27	Smelts.....	C. H. Walters.....	Cold Spring Harbor, N. Y.....	2,000,000
June 5	Lobsters.....	.....	Cold Spring Harbor, N. Y.....	5,000

COLD SPRING HARBOR, N. Y., *May* 16, 1887.