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**98.—NOTES UPON FISH AND THE FISHERIES.**

[Extracted from the official correspondence and compiled by the editor.]

STATISTICS OF THE SEA FISHERIES OF FRANCE.\*—The following tables give a recapitulation for two years of the sea fisheries of France proper and of the French colony of Algeria :

TABLE I.—Quantity and value of the sea fisheries of France in 1883 and 1884.

Kind.	1883.		1884.		Value in 1884 compared with 1883.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.
Cod.....pounds..	75,834,858	\$3,485,176	80,510,764	\$2,643,332	.....	\$841,644
Herring.....do.....	81,248,705	2,547,034	101,352,473	1,720,844	.....	820,190
Mackerel.....do.....	14,624,102	706,925	21,162,427	712,487	\$0,102	.....
Sardines.....number..	1,148,375,978	3,894,137	411,810,005	1,702,949	.....	2,191,188
Anchovies.....pounds..	4,918,075	177,553	11,460,603	201,354	.....	23,801
Other fish.....do.....	116,875,465	6,914,475	115,456,692	7,043,843	129,368	.....
Oysters.....number..	157,660,246	437,450	110,277,795	336,742	.....	100,678
Mussels.....bushels..	1,637,526	515,058	1,361,066	350,540	.....	156,509
Other shell-fish.....do.....	825,800	219,622	1,040,529	246,184	20,562	.....
Lobsters, &c.....number..	1,712,885	434,009	1,927,229	528,184	94,175	.....
Shrimps.....pounds..	2,802,094	284,905	3,466,623	365,080	80,085	.....
Marine fertilizers.....cu. feet.	80,722,455	1,080,962	88,174,261	1,118,919	37,957	.....
Total.....	.....	20,694,796	.....	16,976,497	.....	3,718,299

TABLE II.—Quantity and value of the sea fisheries of Algeria in 1883 and 1884.

Kind.	1883.		1884.		Value in 1884 compared with 1883.	
	Quantity.	Value.	Quantity.	Value.	Increase.	Decrease.
Mackerel.....pounds..	790,411	\$42,009	847,148	\$67,753	\$25,744	.....
Sardines.....number..	131,623,227	141,030	110,138,331	134,508	.....	\$6,522
Anchovies.....pounds..	820,451	42,491	688,031	34,455	.....	8,036
Other fish.....do.....	6,105,807	329,317	7,027,057	356,442	27,125	.....
Lobsters, &c.....number..	27,542	10,739	34,510	12,890	2,151	.....
Alaches.....do.....	20,011,126	62,440	30,639,040	43,874	.....	18,566
Other shell-fish.....bushels..	161	199	207	383	184	.....
Shrimps.....pounds..	40,429	4,053	95,968	8,276	4,223	.....
Bonitos.....do.....	38,902	2,864	232,136	14,024	12,000	.....
Tunnies.....do.....	7,710	540	112,179	7,724	7,184	.....
Coral.....do.....	29,087	102,049	11,823	42,437	.....	59,612
Mussels.....bushels..	243	753	125	505	.....	248
Oysters.....number..	100,450	560	238,020	739	179	.....
Total.....	.....	730,044	.....	724,910	.....	14,134

\* For an article on this subject, see F. C. Bulletin for 1886, p. 219.

**EXPORTS OF FISHERY PRODUCTS FROM NORWAY.**—The total value of the exportation of fishery products from Norway, calculated at the wholesale prices paid at the ports of exportation, and hence inclusive of the Norwegian profit, was, from 1866 to 1884, annually about 42,000,000 crowns [\$11,256,000]. Norway therefore receives every year about the same sum for fish which Germany pays annually for fish imported from abroad. The lowest sum, 29,000,000 crowns [\$7,772,000], realized from the exportation of fish was in 1868, and the largest, 50,000,000 crowns [\$13,400,000], was in 1881. From the year 1870 exportation has gradually increased. Of the total value of fish exported, 27,500,000 crowns [\$7,370,000], or 65 per cent, were received for the products of the cod fisheries, namely, "klip-fish," "stock-fish," cod-liver oil, roe, fish-flour, guano, &c.; while the products of the herring fisheries (salt and smoked herring and anchovies) represented 32 per cent, or 13,250,000 crowns [\$3,551,000]; and other fish 3 per cent, or 1,340,000 crowns [\$359,120], as follows: 434,000 crowns [\$116,312] for fresh salmon, 501,000 crowns [\$134,268] for fresh mackerel, and 405,000 crowns [\$108,540] for lobsters. The increase in the exportation of salmon and mackerel has been very considerable since 1876, principally owing to better methods of preserving these fish.

The principal ports of exportation are Bergen ("stock-fish," cod-liver oil, roe, and salt herring), Christiansund ("klip-fish" and fish-guano), Christiansand and Farsund (salmon, mackerel, and lobsters), Bod in Northland and Vadsöe in Finmark (fish-guano).

The following are the principal countries to which Norway exports fish: "Klip-fish" to Spain; "stock-fish" to Italy, Austria, Sweden, and Holland; salt herring to Germany and Sweden; mackerel, salmon, and lobsters to Great Britain; cod-liver oil to Germany and Holland; roe to France; and fish-guano to Great Britain and Germany.

**LOBSTERS AND OYSTERS IN NORWAY.**—The lobster fisheries are also principally carried on in the Skager Rack and the North Sea. North of Cape Stat very few are caught, and none at all in the Polar Sea. They are caught in fish-pots. From 1879 to 1884 the average annual yield was 1,175,000 lobsters, valued at 401,000 crowns [\$107,468]. The greater portion is shipped to England.

The Norwegian oyster fisheries, carried on principally in the Skager Rack, are inconsiderable, and yield annually about 240 hectoliters [679 bushels], valued at 6,900 crowns [\$1,849.20].

**COD FISHERIES AT SAINT PIERRE.**—Reports from the French colony of Saint Pierre and Miquelon show that the cod fishermen there have been very successful in the amount of their catch. Five hundred boats have been engaged by them in transporting their fish; and 13,000 quintals of cod had been taken to Halifax up to September 15. The price was less than \$2 per quintal, a figure that is unprecedentedly low. [From the French *Moniteur de la Pisciculture*, &c., 2d year, No. 20. Paris, September 18, 1886.]

THE ROOSEN PROCESS OF PRESERVING FISH.\*—In dispatch No. 79 to the State Department, from the United States consulate at Leith (Edinburgh), Scotland, August 10, 1886, Consul Oscar Maluros spoke of obtaining an equipment for preserving fish by the "Roosen" process, which was to be shipped to the Smithsonian Institution, and inclosed an article from the Fish Trades Gazette, of London, July 31, 1886, from which the following extract is made:

The Roosen process is now pretty well known in England, and it is generally accepted as being by far the most successful attempt to keep fish not only fresh, but also sweet, wholesome, and attractive for long periods. The process, it may be added, is not confined to fish, but has been applied with equal success to meat, game, fruit, &c. Experiments have been carried out in Scotland, and public demonstrations of the value of the process made in Edinburgh and Glasgow, where its merits have been recognized by the very highest authorities on the subjects of fishing and the fish trade. Messrs. Dufresne & Lüders, the agents of Mr. August R. Roosen, of Hamburg, the inventor of the process, lately decided that it would be well to make the process better known in London, and accordingly invited a number of representative guests to witness the opening of several casks of fish preserved by the Roosen process, and to taste the same when cooked. There was an excellent response to the invitation, the guests including many famous authorities in science and in medicine, as well as others holding important governmental positions or being connected with commerce, not only in England, but also in the colonies and Indian Empire. Two casks, which had been closed for seventeen days, were opened before this company, and the fish when taken out were found to be perfectly sweet and fresh, bright looking, and as attractive as the day they were caught. On being eaten they were pronounced excellent, and the advantages of the process were highly commended.

It may be as well to give a brief description of the principles of the now famous Roosen process. For many years the value of boracic acid has been recognized as a preservative agent, but it has been left for a German scientist to discover how properly to apply it and rid it of all obnoxious properties or effects. This end is accomplished in the following manner: A strong cask of iron with an adjustable lid is provided, something like the well-known cans used for conveying milk, but considerably larger. In this galvanized-iron barrel are placed a certain proportion of water and a quantity of boracic and tartaric acid. The latter chemical has the effect of removing the slightest taste of the boracic acid, which, by the way, is perfectly harmless and even health-giving. The fresh fish are then placed in the liquid, as many as the cask will conveniently hold. The lid, which is fitted with a large india-rubber ring, so as to make it perfectly air and water tight, is now ad-

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\* For previous articles on this subject, see Fish Commission Bulletin for 1886, pp. 65 and 109.

justed and secured. A small portable force-pump is next fixed to a hole in the lid, and the water is pumped into the cask, expelling all air, which escapes at another little hole in the lid. As soon as the cask is completely full and the air expelled the water begins to flow through the latter aperture. An air-tight cap is then screwed tightly on this hole to prevent any further escape. Then the pump is once more set to work forcing in water, until a gauge affixed to the pump shows a pressure of 90 pounds to the square inch. By an ingenious contrivance the second hole in the lid is now hermetically closed, and the force-pump removed. The effect of the enormous pressure on the water is to drive the chemical right into the veins and tissues of the fish, and so prevent organic change in any part. So well is this done that the fish will keep for any length of time, and may be sent with perfect safety to any part of the world.

A WAY OF EXTERMINATING FISH IN FINLAND.\*—Near the place where the Lappo River flows out of Lake Kuortane its water is compressed between two rocky mountain sides, and forms a little fall. In midsummer when the fish, especially the salmon which were strong enough, have reached a dike which blocks up nearly the entire river, and have gathered near the fall, a dam is constructed in the pass, with a small opening which can be closed with a gate. A little lower and in calmer water an obstruction is placed across the river, also with an opening closed by a large net. The gate in the dike is now closed, the water falls, and with it some of the fish go into the net. The remaining fish are driven into it by pushing and chasing them, or are caught with hand-nets, or killed with all sorts of weapons. When all the water has run out, the net is taken up and the upper gate is opened, whereby a number of fish are enticed to the returning water within the obstruction. The same process is repeated several times within a few days. In consequence the water in the river several miles below begins to fall, and the few salmon which still ascend the river gather in the holes, whence they either are taken alive or are clubbed to death. Men, women, and children engage in this work of destruction. The same scenes are repeated every year during midsummer, just about the time when the bream has deposited its spawn. No one thinks of what is to become of this spawn, which thus for two days lies dry, exposed to the sun and air, nor of all the young fish which are thus destroyed. The fishermen meanwhile very naively express their surprise at the fact that the fisheries have decreased from year to year, so that this year not a single salmon was caught. [From Sporten, Helsingfors, Russia, September 15, 1886.]

SPAWNING OF FISH IN CONFINEMENT.—Sea-trout have been artificially spawned with great success at the South Kensington aquarium, even from fish that had been kept in captivity for three years and had never visited the sea. The different species of the *Salmonidæ* living in

\* "*Också ett flake!*" Translated from the Swedish by HERMAN JACOBSON.

the tank are found to pair quite readily with one another. Fish in captivity yield their ova much later than they do when in a wild state, but of every thirty subjected to artificial existence, only one is, on the average, found to be barren. [From the Popular Science Monthly, New York, November, 1886, p. 143.]

**SALMON IN SCOTLAND AND SHIPMENTS TO NEW ZEALAND.**—Mr. John Anderson, writing to Prof. S. F. Baird from Denham Green, Edinburgh, Scotland, on July 30 and September 6, 1886, speaks of the taking of salmon eggs in Scotland and of shipments to New Zealand, substantially as follows:

For many years we in Scotland have been taking our salmon ova, as I think, too late. There are five runs of salmon to each river during the year—coming in March, May, July, October, and December—and for forty years all the eggs have been taken in December. Now, it is impossible that ova taken from a salmon in December should ever turn out early fry or salmon. It is not reasonable to look for early fry, if we hatch eggs only from late fish. I have also advised a change of breed from one river to another; and have suggested means for preserving a greater percentage of the spawn and fry than is done under the present natural or even artificial conditions.

I have just heard from New Zealand, that the 29,000 salmon smolts, 9 to 11 inches long, raised from what Mr. Farr took out last year from the river Tweed, were planted in the Southland River in June, 1886, and are doing well. The salmon eggs sent out by Sir James G. Maitland, which were taken from large salmon in December, 1885, were so paralyzed with cold (I suppose) that when the shells broke the fry could not stretch themselves out, but continued in a circular state for some time and then died. It is thought that the cold on the voyage was too severe; while perhaps the eggs were not far enough advanced on being shipped, or were taken from too late fish.

**CODFISH ON THE NORTH PACIFIC COAST IN 1886.\***—The last of this season's codfish fleet arrived on October 11. This was the schooner *Czar*, which has made three trips this season, as she also did last year. Though not the first vessel off this year, she was the first to return from the fishing-grounds, because her owners have established a fishing-station at Pirate Cove, at one of the Shumagin Islands. There are small vessels engaged in fishing off the islands all through the season, and the *Czar* is used simply for transporting the fish from the islands to San Francisco. Lynde & Hough, who have long been in this trade, have also this year established a fishing-station at the islands, the materials for which were sent up by the *Arago* last January. As a result, one of their vessels, the *Dashing Wave*, made two trips this season. There were eleven vessels employed in the trade this year, against twelve last year; but there were fourteen cargoes received in each year. The Shumagin Islands are 2,500 miles northwest of San Francisco; the

\* For statistics for 1885, see Fish Commission Bulletin for 1886, p. 89.

Behring Sea is about 3,500 miles, and the Okhotsk Sea is about 4,000 miles distant. Some details of the business this year will be found in the annexed table:

*Trips of the North Pacific codfish fleet of 1886.*

Name of vessel.	Class.	No. of crew.	Destination.	Days on passage.	No. of fish.
Constitution .....	Barkentine .....	35	Okhotsk Sea.....	150	85,000
Fremont .....	do .....	35	do .....	104	140,000
Jane A. Falkenburg .....	do .....	35	do .....	137	100,000
San Luis .....	do .....	35	do .....	151	102,000
Helen W. Almy .....	Bark .....	35	Behring Sea.....	155	170,000
Arago .....	Schooner .....	15	Shumagin Islands .....	256	60,000
Czar (three trips) .....	do .....	15	do .....	155	265,000
Dashing Wave (two trips) .....	do .....	16	do .....	162	108,000
Francis Alice .....	do .....	18	Behring Sea.....	103	60,000
Isabel .....	do .....	18	Shumagin Islands .....	130	92,000
John Hancock .....	do .....	16	do .....	115	41,000
Total .....		273		1,678	1,232,000

The catch the past season was taken from the following localities:

Shumagin Islands.....	566,000
Behring Sea.....	239,000
Okhotsk Sea.....	427,000
Total.....	1,232,000

The fourteen cargoes were consigned to the following parties in San Francisco:

	Cargoes.	Number of fish.
Lynde & Hough .....	6	440,000
McCollam Fishing and Trading Company .....	4	435,000
N. Richard .....	3	250,000
A. Anderson & Co .....	1	92,000
Total .....		1,232,000

It is difficult to get at the exact facts and figures in this fishery, but the foregoing may be regarded as an accurate approximation. The average weight of the fish this year was 3 pounds, which makes an aggregate of 1,848 tons for 1886. The number reported is the smallest in five years, there having been a steady falling off in the catch reported for the past four years. [From the San Francisco Bulletin, October 13, 1886.]

**CODFISH IN THE GREAT MARKETS OF THE WORLD\*.**—According to calculations given in the Norwegian statistics of fisheries for 1880, there were annually brought into the markets of the world, during the period from 1872 to 1878, not less than 153,600,000 salt and dried cod-

\* "*Klippfisch und Stockfisch auf dem Weltmarkte.*" From reports of the section of the German Fishery Association for the coast and high-sea fisheries, No. 9, Berlin, September, 1886. Translated from the German by HERMAN JACOBSON.

fish, 50 to 75 going to a hundredweight; of this number 124,500,000 were "klip-fish," that is, codfish first salted and then dried; and 28,500,000 were "stock-fish," that is, codfish not salted but simply dried. The latter come exclusively from Norway. The most important countries from which codfish are exported annually are Norway, 63,600,000 (35,100,000 "klip-fish," and 28,500,000 "stock-fish"); Canada, 36,300,000, and Newfoundland, 33,500,000. The remainder is exported from the United States, Iceland, France, Scotland, and Holland. Among the countries which import and consume "klip-fish" and "stock-fish" the Catholic countries of course rank first, Spain taking the lead with 37,900,000 per annum, and the West Indies with 37,700,000; next come Italy and Austria with a total of 18,400,000; Brazil, 12,500,000; Portugal, 8,800,000; and Great Britain and Ireland, 7,100,000. The remaining 31,000,000 are distributed among Sweden, Holland, the United States, South America, Germany, Denmark, Russia, Finland, Belgium, &c. Europe consumes about 60 per cent of the entire quantity, and America 40 per cent. The total annual value of the "klip-fish" and "stock-fish" exported from Norway was, during the period from 1866 to 1884, on an average 19,000,000 crowns [\$5,092,000]. Taking the same average price for the "klip-fish" exported from other countries, the average annual value of the "klip-fish" and "stock-fish" brought into the markets of the world, would be upwards of \$16,660,000. Although this sum is of course only an approximation, it nevertheless gives a fair idea of the great value to the human race of a single kind of fish, the cod.

AMERICAN CATFISH IN GERMANY.—Max von dem Borne writes from Berneuchen, Germany, on September 23, 1886, stating that on that day he had caught 310 little catfish, which were the young of those sent over by the U. S. Fish Commission in July, 1885.

FISH-CULTURE ON THE FRISCHE-HAFF.—Superintendent of Fisheries Hoffmann, of Pillau, East Prussia, in a communication on the application of fish-culture to the Frische-Haff, printed in the communications of the section for the coast and high-sea fisheries, Berlin, June, 1886, stated that the ponds at Stöbbendorf, in which the first experiments with fish along the Frische-Haff were carried on, were stocked in spring with mature bream (*Abramis brama*) of both sexes. These became accustomed to the water by the time they were ready to spawn; and on several warm days deposited their spawn, so that a large quantity of fry could be raised. The young fry were fed with flour, and when sufficiently developed were gradually allowed to pass through the sluice-gates into the Frische-Haff.

The seeming success of this experiment led to other attempts being made, and three ponds were constructed near the little town of Tolke-mit and stocked with mature specimens of *Lucioperca sandra* and fry of the *Coregonus lavaretus*. In spite of the greatest care, however, these experiments proved a failure, as nothing more was seen of the young

*Coregonus lavaretus*, which when placed in the ponds, were in excellent condition, nor were any fry of the *Lucioperca sandra* observed. It is intended to make further experiments with mature bream, and to repeat the attempt with the lavaret (*Coregonus lavaretus*).

**TURBOT AND SOLE.**—In April, 1880, five soles which had been sent from England reached New York, and were taken charge of by Mr. E. G. Blackford, who deposited them outside of Sandy Hook. In October, 1881, out of a consignment of turbot and soles sent from England three soles and six turbot survived. These were transferred to the ocean in Sheep's Head Bay, opposite the Oriental Hotel, in the presence of Mr. Blackford and others who had been conveyed to the spot by the U. S. revenue steamer U. S. Grant.

In order to ascertain whether any trace of the planting of these fish could be found, the Fish Commission steamer Fish Hawk visited the vicinity of Sandy Hook, October 26, 1886, and Capt. James A. Smith reports under date of November 4 that he made several hauls of the beam-trawl about Coney Island, Rockaway, and Sandy Hook, but did not succeed in capturing any soles. From the refuse and rubbish which came up in the trawl (evidently offal from dumping scows) he was of the opinion that if any soles existed in the region they would naturally seek a cleaner bottom. He therefore made several hauls in the vicinity of Sandy Hook light-ship, but with no better success.

**PRESSING KYACKS AND SHORE-WHALING FOR FINBACKS IN MAINE.**—At Boothbay, Me., I found two parties engaged in pressing fish locally known as "kyacks," which I think will prove to be alewives, but which I could not identify owing to the lack of fresh specimens when I was there. Last year there were two factories engaged in pressing "kyacks," and about 10,000 barrels were landed, in addition to large quantities caught by the mackerel fishermen and thrown away. This year the "kyacks" appeared on the coast in great numbers about July 20; but a few days later they disappeared, and have not been seen in large quantities since, though for the past few weeks they are being taken in increasing numbers, the schools being more or less mixed with large mackerel. Some idea of the size of the schools may be obtained from the fact that single hauls of 200 barrels have been made. The fish are much fatter than is generally supposed, yielding between 2 and 3 gallons of oil to the barrel; and the scrap is equal if not superior to that from menhaden, analyzing about 11 units of ammonia. The oil is of good color, but it chills in cold weather.

Thus far the "kyacks" have not been sufficiently abundant to warrant the factory men in devoting their attention exclusively to this species; but the business is carried on profitably in connection with the shore-whaling for finbacks, which has become important. Last year five small steamers were engaged in this shore-whaling, the fleet landing part of the whales at Provincetown, Mass., and the remainder at the factories in Maine. About seventy-five whales were captured by



this fleet last year, and the carcasses of some of them were boiled and made into scrap, which sells when dried at \$22 a ton, the only objection to it being the large percentage of oil which it contains. That made to date averages about 25 per cent of oil. [Extract from a letter of Mr. R. Edward Earll to Prof. S. F. Baird, dated Gloucester, Mass., September 17, 1886.]

**SALMON PACKING ON THE COLUMBIA RIVER IN 1886.\***—The salmon industry is on the decline on the Columbia River, the total pack for this season being about 436,000 cases,† against 565,000 in 1885, and 626,000 in 1884. The main cause of this falling off is owing to the greed of the fishermen. In former times the fish were caught the entire length of the river as far as the cascades, but by the wheel system in the rapids, and by the entrance at Astoria being almost completely blocked with nets, traps, and seines, not enough get through to the spawning-grounds to keep up the supply. So persistent are the gill-net fishermen that boats go far out from the mouth of the river, and as a consequence many are lost in the breakers on the treacherous sand-bar, which is a terror to all navigators, even in the calmest weather. Fifty men have been lost this season in this perilous business.

There are four methods of fishing: By the wheels; the traps (called pounds on the New England shores); the seines, which are hauled by horse-power in the middle of the stream at low tide; and the gill-nets, the latter being the most important, both in the number of men employed and in the catch.

At Astoria, Oreg., where the Columbia is 12 miles wide, I boarded a tugboat and explored the harbor and observed the fishing, following the unfortunate fish from the net until safely packed in pound cans and cased ready for the Portland steamer. The number of men engaged in this comparatively new industry is estimated at twelve thousand, about one-third being employed on the river and the balance in the canneries. Of the latter, fully three thousand are Chinamen. The labor societies, it is said, will demand the expulsion of these Chinese next year, which if successful, my informant said, would compel the majority of the packers to close their canneries.

The perfection to which the art of preparing this wholesome food for market has attained is the admiration of all who inspect its workings in detail. In all of the packing houses cleanliness is enforced from the dressing to the last act of filling the cans. Hence no one need fear to eat canned salmon, if packed by a reliable house under the factory label. Not a few packers, however, put up what are called "seconds," which may be a poorer grade of fish called "steel-heads," or fish too long out

\* This is taken from the letter of a correspondent to the Journal, dated Trinidad, Colo., August 24, 1886.

† The pack for 1886, as here given, is too small. The figures mentioned for 1884 and 1885 may be regarded as approximately correct, though not strictly so. See Fish Commission Bulletin for 1886, pp. 90, 139, and 286.

of the water. These "seconds" are sold to middlemen at a low price and put upon the market as genuine Columbia River stock, but under the label of some one not a packer. There are thirty-nine canneries on the river, but the number of brands on the market is legion. The packers near the mouth of the river are in the best position to furnish good stock, as owing to their nearness to the fishermen they can receive the fish within a few hours after being caught; yet not a few have been twenty-fours dead before "John Chinaman" ranges them on the dissecting table. There are but two canneries out of the thirty-nine that do in fact pack the fish fresh from the water. [From the Journal and Courier, New Haven, Conn., September 1, 1886.]

GROWTH OF SALMON AND WHITEFISH.—The English National Fish Culture Association reports that its last year's growth of newly-hatched salmon was  $6\frac{1}{2}$  inches, and of whitefish 5 inches. [From the Popular Science Monthly, October, 1886, p. 864.]

SALMON AND TROUT AT THE McCLOUD RIVER STATION.—Mr. Loren W. Green, writing to Professor Baird from the United States trout ponds at Baird, Cal., on September 13, 1886, says substantially as follows:

Salmon in the McCloud River are now very numerous, being more abundant here probably than at other points in the river, on account of the two runs meeting. There is now a very nice run here, fresh from the ocean. The salmon of the large run which went up the river some time ago are now falling back in an exhausted condition, having deposited their spawn near the headwaters. Many of them are floating back dead and a great many more are in a dying condition. In nearly every case their tails are worn threadbare, their eyes sunk deep in their heads, and their bodies covered with a thick coat of fungus. The fish of the up-going run, which is now here, are fresh, bright, round, and fat; their eyes are bright and rounded out; and they are much above the average in size. The Indians are catching a good many and preparing them for their winter use. One passed here yesterday with four which would weigh 30 pounds each. I have weighed several between 5 and 40 pounds.

Trout in the river seem rather scarce. The majority of those we are catching now are small, while those of much size seem poor. Very few young trout can be seen, except those we planted last spring. Near the places where we planted them they seem abundant, but at most other points only straggling trout are seen. A great many trout are being caught out of the river, and but comparatively few are being planted in their stead.

HATCHING AND FEEDING OF ROCKY MOUNTAIN TROUT.—The following is extracted from a letter of Gordon Land, dated Nathrop, Colo., September 7, 1886:

"I believe that the Rocky Mountain trout (*Salmo virginialis*) of this

State are very desirable fish for the trout breeder, inasmuch as they are summer spawners and grow rapidly, are easily taught to feed, and will readily take food from the bottom as well as in transit. They do not bite each other as much as do the common brook trout (*Salvelinus fontinalis*), and live quite harmoniously together. My experience this year in hatching their eggs was somewhat unusual. I took the spawn on June 21, and in seventeen days the eye-specks were plainly visible; in twenty-five days, or on July 16, they hatched. The temperature of the water varied from 52° Fahr. at night to 62° during the middle of the day. Part of the time the eggs were buried in mud from a freshet that had flooded my hatchery, but I did not lose any on that account. They feed like little pigs. I never used water of so high a temperature before. At my other hatcheries the temperature was 45° and 52°; in either case the eggs did well, but were of course longer in hatching. The best results I ever had in feeding were at Buffalo Springs, in South Park [Park County, Colorado], where I fed them on finely chopped suckers—bones, fins, heads, entrails, and everything. The water was cold, 44° Fahr., but when fed on suckers the trout grew at an astonishing rate; many of them, which I sold in the market at nine months old, averaged 4 and 5 ounces each, dressed. Had I possessed warmer water and such an abundance of fish-food, I believe I could have done still better.”

CATFISH AND SHAD IN CALIFORNIA.—Mr. William Utter, writing from Campo Seco, Calaveras County, California, on August 12, 1886, states that there are millions of catfish in the Mokelumne River, and that during the summer he had caught a number of fine shad, some of them weighing as much as 3 pounds apiece.

SPANISH MACKEREL ABUNDANT IN SUMMER AT GALVESTON.—Mr. Henry L. Labatt, writing from Galveston, Tex., on September 29, 1886, says: “We have rare sport here in July and August catching Spanish mackerel with hooks and lines. This fishing from the wharves in our harbor is carried on during midsummer with abundant results.”

YOUNG SHAD IN THE HOUSATONIC RIVER, CONNECTICUT.—The fish commissioners of Connecticut, in a letter from New Haven, dated October 11, 1886, spoke of having forwarded to the U. S. Fish Commission 40 young fish taken on October 10, with a hook, from the canal at the dam at Birmingham, on the Housatonic River, and asked whether the young fish were not probably some of the shad planted by the U. S. Fish Commission messenger above the dam on May 21, 1886. Dr. Tarleton H. Bean, replying on October 22, stated that these young fish were all shad.

SHAD IN THE MISSISSIPPI AT MEMPHIS.—Mr. W. W. McDowell, fish commissioner for Tennessee, writing from Memphis, Tenn., September 15, 1886, says: “Last April we caught a good many shad in the Mississippi River, near the mouth of Wolf River, about a mile above

Memphis, the daily catch continuing for a little over a week. This is encouraging, as shad were never caught here before."

In a letter dated November 16, 1886, Mr. McDowell adds: "A fish-dealer informs me that his book shows that he bought shad caught here from the 15th to the 28th of March last, his purchases amounting to about 75. From what I can learn, the catch did not at any time exceed 100 per day. The persons that caught them were not fishing for shad, nor were they in the best places for such a catch, but they were after larger fish and the catch of shad was merely incidental. There is no doubt but that the fish in question were actually shad, as the men who bought them have dealt in the Atlantic coast shad for many years. Hence, it is evident that these fish are the results of plants made by the U. S. Fish Commission in the tributaries of the Mississippi."

**EDIBLE QUALITIES OF CARP.**—The annual dinner of the American Carp Culture Association, whose headquarters is at 44 North Fourth street, Philadelphia, was held October 14. Concerning it the secretary states: "The caterer carried out our instructions to the letter, and the result was that a select party of acknowledged epicures not only tasted but ate several pounds of carp without condiments or seasoning of any description whatever. The verdict seemed to be unanimous that carp raised and treated according to the system prevailing in this region is a first-class food-fish, excelled only by the *Salmonidæ* and superior to the domestic trout.

"After some years of experience we now know that the flavor of the carp depends upon the quality of the water they are in and the quality of food they consume for two or three weeks prior to being served at the table, and also upon the method of their death. If they are taken directly from a muddy pond and allowed to smother and die a lingering death, the flavor will certainly be a 'trifle strong.' If, on the other hand, they are taken from their ponds two or three weeks before coming to the table, and placed in clean water which undergoes constant change, and are fed on clean, cooked vegetable food, almost any grain, or on bread, their flavor will be second only to the salmon family, certainly fully equal to the far-famed shad; but they should be killed by thorough bleeding immediately upon being taken from the water."

**CARP IN JAMES RIVER.**—Mr. W. F. Page, writing from Lynchburgh, Va., on August 20, 1886, says: "I have seen several very fine German carp taken from the James River at this place, one of which was a female scale carp 25 inches long and weighing 8 pounds."

**CARP PLANTED IN PASSAIC RIVER.**—Mr. George Shepard Page met the Fish Commission car at Newark, N. J., November 10, 1886, and received 500 carp, which he took to Stanley, N. J., and deposited in the Passaic about midnight. The fish were all in good condition.

**GROWTH OF CARP.**—The leather carp referred to me, and said to be six months old, was raised in the Government carp ponds at Washington, D. C. It is 9 inches long, 2½ inches deep, 6½ inches in circumfer-

ence, and weighs  $5\frac{3}{4}$  ounces. It has been delivered to a curator of the National Museum for preservation in alcohol. [A. Howard Clark, Washington, D. C., October 23, 1885.]

**GAME QUALITIES OF CARP.**—Mr. A. Shinkle, president of the First National Bank of Covington, Ky., writes concerning the game qualities of carp, that as to the sport of catching them he has never seen their equal, as they exceed the black bass in strength, and that after hooking one he has been as much as fifteen minutes in getting it safely landed.

**HOW TO CATCH CARP.**—Make a thick mush of corn-meal, in which plenty of salt should be placed; cook it well; tie it up in pieces of cheese-cloth from  $1\frac{1}{2}$  to 2 inches square, and pass a hook through the cloth, being careful that it does not appear on the opposite side of the ball of mush. A small wire should be stretched along the dam or along the deepest and straightest edge of the pond, and hooks suspended on cords  $2\frac{1}{2}$  feet long, about 4 feet apart. The hooks should just touch the side of the dam or bank which is most frequented by carp in search of food. The bait being on the ground, carp can find and take hold of it better. I use the bass-hook for this purpose, and have caught several that weighed from  $2\frac{1}{2}$  to 3 pounds. Care should be taken in handling the fish, for, being very tender, their mouths may be torn. [E. B. Brouster, Clayton, Missouri.]

**THE USE OF FISH REFUSE AS MANURE.\***—If for some reason one cannot find any other use for dead fish, or for the refuse of fish, this material may profitably be gathered for manure. It should be remembered that as we get only about 3 pounds of dried fish from 13 pounds of fat cod, so the heap of refuse will shrink very much when transformed into manure. This is caused by the quantity of water (about 80 per cent) contained in the flesh and body of the fish. Everybody knows how a fish looks which is exposed to wind and sun and dries in the open air.

Fishermen who have a small piece of ground to cultivate, even if it is only a garden patch, are recommended to gather the refuse from the fisheries and place it in a hole in the ground. They thereby secure a valuable fertilizer, which, used judiciously, will amply repay them for their trouble. The hole should be dry at the bottom, and about 6 feet deep, long, and broad. If the soil is sandy, it will be best to spread some clay at the bottom. On this there should be placed a layer of ashes about 10 inches thick; on the ashes spread a layer of fish for another 10 inches or so, the fish being sprinkled with fine lime. Then follows another layer of ashes, another of fish and lime, and so on until the hole is full. It should be covered with sod, the grassy side downward, and finally the whole spread over with boards, on which some heavy stones may be placed. After six months the hole will contain excellent manure, which may be used or even sold.

\* Translated from the *Norsk Fiskeritidende*, October, 1886, by HERMAN JACOBSON.

VEGETABLE PARASITES ON CODFISH AND SALT PORK.—Prof. William G. Farlow, writing from Cambridge, Mass., November 28, 1886, says:

“There has appeared on salt pork in this region a bright red growth and a mold. The latter is the same as the *Torula morrhua*, described by me on codfish from Gloucester.\* The red form, as far as I can yet tell, does not appear to be the *Clathrocystis* found on cod, but is perhaps a form of *Bacterium* or *Bacillus* previously seen on salt pork in France and referred doubtfully to the *Clathrocystis*. It is interesting to know that we have both the forms on codfish and on salt pork.”

SALTING AND DRYING THE TONGUES OF CODFISH IN NORWAY.†—The tongues to be used must be quite fresh, as tongues of fish which have been lying even for a day have dark red spots, and make an inferior article which is not worth the trouble and expense of preparing. It is therefore best to use tongues of fish caught with lines, which should be cut out as soon as the fish are brought into the boat, or at any rate as soon as they are landed. Tongues of fish caught in nets are not so good for this purpose, and those of fish which have lain for some time cannot be used at all.

As soon as the tongue is cut out, with the round piece of gristle attached to the root of the tongue, but without any of the portions on the other sides, it is well washed in sea-water, which seems to give to it a more transparent appearance than if it is washed in brine. When the water has run off, the tongues are strongly salted in tight kegs with fine salt (Cadiz or Liverpool salt). When salted they can stand for several months without spoiling. The brine should, however, be examined from time to time. As soon as there is the slightest indication of its being sour, it must be drawn off, and the tongues, after having been well washed in strong brine, must be salted over.

When the drying is to begin, the tongues are well washed in sea-water and immediately piled up in little heaps, so that the water can run off. They should not be allowed to lie in water for any length of time, as is done with klip-fish, but they are taken direct from the keg, washed off, and piled up. When the water has run off, they are laid out to dry, either loose on rocks or, better still, in boxes. After they have dried for a day they will generally be dry on the outside, on which a salt crust forms. When they are taken in at evening, each tongue is well stretched, smoothed down with the hand, and carefully laid in boxes, where they are exposed to a strong pressure. Thus they may stand for two days, or, if the weather is unfavorable, for several days. On the first windy and sunny day they are laid out, turned once during the day, and when they are taken in at night they are again pressed as before. Thus the drying process is continued; laying them out during the day and press-

\* See F. C. Bulletin for 1886, p. 1.

† “*Saltning og Tørring af Torskætunger.*” From the *Norsk Fiskeritidende*, Vol. V, Nos. 3 and 4, Bergen, October, 1886. Translated from the Danish by HERMAN JACOBSON.

ing them at night, until after three or four days they are ready for exportation to European markets. If intended for transportation to transatlantic countries, they must be dried better, about two weeks being sufficient. When half the drying process has been accomplished, the tongues should be pressed without interruption for three or four days.

In case of unfavorable weather the tongues are simply left in press, as they do not easily sour. They should, of course, not be exposed to rain, and when the weather looks threatening they should be taken in in time. They should also be taken in before the sun goes down, even if the air seems dry. The greatest trouble during drying is caused by the fog, which gives to the tongues a gray appearance, which should be avoided. They should, therefore, never be laid out in foggy weather, or whenever it looks as if there might be fog. Those tongues which are dried under shelter should under such circumstances be covered with tarpaulin.

The principal European market for salted and dried tongues is Spain. The Spaniards would rather have them a little soft than too hard. They are packed in wooden boxes of 3 kilograms ( $6\frac{3}{4}$  pounds) or more. For the transatlantic market they are packed in tin boxes.

TRANSPORTING LOBSTERS IN NORWAY.\*—The fast sailing vessels, with tanks, which formerly were used for transporting lobsters, have gradually been superseded by steamers, and lobsters are now almost exclusively transported in boxes placed on board the steamers. The boxes generally used for the purpose in Norway have the following outside dimensions: Length, 39 inches; breadth, 19 inches; and height, 15 inches. If ice is used they are made 4 inches lower. Each box contains from 100 to 120 lobsters. Sometimes smaller boxes are used, with the following dimensions: Length, 24 inches; breadth, 19; height, 13. Between the boards there should be suitable openings to admit fresh air.

In summer there is placed at the bottom of the box a layer of ice two or three inches thick, and on this a frame, so that the lobsters are not disturbed in their position even if the ice melts. On this frame there is first spread a thin layer of fresh heather (long, thin grass) or straw, on which the lobsters are laid carefully, back downward, the tail being bent forward and across the box, so the claws turn inside towards the center. When the box is full some heather or straw is spread over the lobsters and the box is closed. Heather is preferable to straw, as this easily spoils on account of the moisture caused by the ice, and the lobsters cannot well endure any bad odor.† For this reason it is not advisable to use dry sea-weeds, which formerly were often employed. Old sail-cloth dipped in sea-water forms an excellent cover, as it keeps moist

\* "*Forsendelse af Hummer.*" From the *Norsk Fiskeritidende*, Bergen, Norway, October, 1886. Translated from the Danish by HERMAN JACOBSON.

†As the boxes are generally, on board the steamers, piled one on the top of another, the layer of straw or heather should not be too thin, for the object of the covering is partly to absorb the ice-water from the upper boxes, so that it does not reach the lobsters.

and cool for a long time. If one has no ice, heather soaked in sea-water may be used, dry fresh straw, or sail-cloth. During the cooler season only heather or straw should be placed at the top and bottom of the box.

In winter the sides of the box may be lined on the inside with paper, so as to protect the lobsters against the cold, but there should not be any paper either at the top or bottom, as the lobsters would be stifled, owing to the lack of air. When the lobsters have not been kept prisoners for more than eight days, they will, when packed in boxes in the manner described above, keep for four days. The fresher the lobsters the better will they be able to stand the fatigue of the voyage.

The boxes are placed on the deck in such a position that the water from the melting ice does not reach the lobsters, which cannot well endure fresh water, and so that the lobsters are protected against rain, as rain-water is very apt to injure them. Lobsters which during transportation have been exposed to the rain, when placed in tanks will generally lose their claws. The persons who ship lobsters should therefore see to it that the boxes are placed in proper position on board the steamer. It is best to place the boxes containing lobsters on the fore part of the steamer, so that the lobsters may get the benefit of the spray from the waves.

SHAD IN NORTH CAROLINA.—The following extracts are made from the Weekly News, of Fayetteville, N. C., Mr. S. G. Worth, late fish commissioner of the State, being its editor:

From persons who handle about 95 per cent of the fish in the lower part of the Cape Fear River, it is learned that the catch of shad up to the first part of April is double that of last year, when more shad were caught than in any previous season. The season here begins with February and lasts three months. Thus far, from careful estimates, 60,000 shad have been caught at the fisheries below Wilmington. With one month's more time in which to run the seines, the season's catch may safely be estimated at 100,000 fish. The greater part of the catch is made by seines in the river, there being 140 men engaged in the shad fisheries below Wilmington, using 70 nets.

It is stated on good authority that Cape Fear River shad are the best caught on the Atlantic coast, being larger and of more delicate flavor than those from the Connecticut, the Delaware, or Savannah. Large numbers of Connecticut shad, however, are being taken in the Cape Fear this season, the river having been partly stocked with young shad from the Connecticut in 1876 and subsequent years.

Many more shad than usual have been caught up the Northeast Cape Fear this season, residents saying that they have never before seen fish so abundant. The yield of the shad fishery for the State may be placed at \$1,000,000 a year.

FAYETTEVILLE, N. C., April 7, 1886.