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By R. EDWARD EARLL.

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# PART VI.

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## 1.—THE HERRING FISHERY OF THE UNITED STATES.

### 1. THE FISHING GROUNDS.

General movements of herring.—The natural history of the herring has, perhaps, been less thoroughly understood than that of any other of our important food-fishes.

Pennant was the first to construct a theory with reference to the movements of the herring. His theory, which was based largely upon the traditional ideas of the fishermen, was that the herring lived in the Arctic seas during the greater part of the year. Here he claimed they found an abundance of suitable food, and were entirely free from the ravages of the numerous enemies which preyed upon them in the more southern latitudes. He stated that at certain seasons of the year large schools gathered from the surrounding waters and soon started on their annual migrations to the shores of Europe and America. The division of the army that was to populate the European seas was supposed to be so extensive as to occupy a surface greater than that of Great Britain and Ireland combined. It was further claimed that as the schools proceeded southward they naturally subdivided into smaller schools or battalions five or six miles long by three or four broad. The particular schools that were to visit the waters of Great Britain in summer arrived at Iceland in March, and next appeared at the Shetland Islands, where they divided, one portion passing directly southward, between Scotland and the Continent, while the other was turned to the westward, and after passing Cape Wrath followed the western shore of the island. It was thought that each school was led by herring of "unusual size and sagacity," claimed by some to be the *alice* or *twaite* shad. This theory, though now amusing on account of its absurdity, was generally accepted for many years, and it was not until 1854 that it was overthrown by a more rational one. At this time Mr. Cleghorn, of Wick, Scotland, published his ideas of the movements of the herring. These were so wholly opposed to those of Pennant as to attract universal attention, and to call forth considerable discussion, which has resulted in the addition of much information regarding the movements of the fish.

Mr. Cleghorn's theory, briefly stated, was as follows: First, that the herring is a permanent resident of the waters which it inhabits, and that it never migrates to any distance from a given locality; second, that distinct races exist on different portions of the coast; third, that although the quantity of netting now in use is much greater than that formerly employed, yet the catch is, generally speaking, much smaller; fourth, that the yield of the fisheries gradually increased up to a certain point, after which it began to fluctuate, and soon decreased rapidly, so that many stations that were once prosperous have been abandoned; fifth, that the fisheries were soonest exhausted in the vicinity of the larger cities, and among the smaller bays and islands, where the fishery could be extensively prosecuted, and that the supply was least affected in the open sea.

From these premises he reached the conclusions that the former fluctuations and recent decrease in the yield is due to overfishing.

Numerous other ichthyologists have written extensively of the movements of the herring in later years, and others have devoted considerable attention to the classification of the genus *Clupea;* but even now the whole subject is in confusion. Many of the leading European authorities claim that there are a number of distinct species inhabiting the European seas, and some of them have gone so far as to assign special names to the different schools. Mr. J. M. Mitchell says that different schools of herring have a different look, and that such peculiarities are noticeable that practical men can distinguish between them. Mr. Bertram, in his Harvest of the Sea, says:

"It has been deduced, from a consideration of the figures of the annual takes of many years, that the herring exists in distinct races, which arrive at maturity month after month; and it is well known that the herring taken at Wick, in July, are quite different from those taken at Dunbar in August or September; indeed, I would go further and say that even at Wick each month has its changing shoal, and that as one race ripens for capture another disappears, having fulfilled its mission of procreation." *

Most American writers, on the other hand, recognize but one species of herring, this being the *Clupea harengus*, the common herring of both Europe and America. Some of the American fishermen, however, claim that though the large fish are all undoubtedly of the same species, the small herring, which are in some localities called "brit," and in others "spurling," are quite different, and that they never grow to any considerable size. Others, on the contrary, insist that these small fish are but the young of the common herring, and that there is no more difference between them than is noticeable between the young and adult of any other species.

In America, the herring occur from the coast of Labrador on the north to Cape Cod, and occasionally even to New Jersey on the south, and there are extensive spawning and feeding grounds for the species along various portions of the coast; while immense schools of them are often seen by the fishermen at different seasons of the year on many of the outer fishing banks. It is claimed, however, that they invariably resort to the inshore grounds for the purpose of spawning, though the fact is not yet fully established.

THE SPAWNING SEASON.—In America, as in Europe, there is considerable uncertainty as to the time of spawning. The Fish Commissioners of Scotland, after having collected a large amount of valuable information, arrived at the conclusion that "herrings spawn at two seasons of the year, viz, in spring and autumn. They have no evidence of spawning during the solstitial months, viz, June and December, but in nearly all the other months gravid herring are found, and the Commissioners assert that the spring spawning certainly occurs in the latter part of January, as also in the three following months, and the autumn spawning in the latter end of July, and likewise in the following months up to November. 'Taking all parts of the British coast together, February and March are the great months for spring spawning, and August and September for the autumn spawning.'" In America, also, the herring spawn at various seasons of the year. On the south coast of Newfoundland they spawn between the middle of May and the first of July. They usually approach the shores of the Magdalen Islands, in the Gulf of Saint Lawrence, during the last week in April. They visit this locality wholly for the purpose of spawning, and leave as soon as the eggs have been deposited, which usually requires from three to five weeks.

About the time of their departure from the Magdalens, schools of spawning fish make their appearance at the western end of Cape Breton Island. They are first seen in the vicinity of Port

* Harvest of the Sea, page 164.

Hood, and from this point they gradually work toward the Strait of Canso. These remain but a short time, frequently leaving in less than two weeks from the time they are first seen.

At Grand Manan Island, New Brunswick, the herring strike in, in June, and the spawning season continues from the first of July to the middle of September.

At Boisbubert, Castine, and Crabtree Point, in the eastern part of Maine, the spawning-time is from the latter part of July till the first of September.

At Wood Island, Maine, and at Cape Ann, Massachusetts, they usually arrive about the 20th of September, and the spawning is at its height from that time till the middle of October. According to Professor Baird, the spawning season occurs even later as we proceed southward.

It is claimed, however, and is doubtless true, that the spawning season for the winter schools in the vicinity of Eastport is in March and April, and that they frequently spawn in St. Andrews Bay as late as the middle of May.

From these facts it will be seen that it is difficult to construct a theory as to the laws that regulate the spawning conditions of the fish.

HERRING ON THE NEW ENGLAND COAST.—But it is not our purpose to go into any general discussion of the herring fisheries as they exist on the coasts of Europe and America, nor even to treat of the fisheries of the British Provinces of North America, any further than is necessary to show the extent of the business in the United States. Confining ourselves, then, for the present, to the coast of New England, we find that although there are numerous spawning-grounds where the fish are taken in considerable quantities, yet the herring occur in greater or less numbers in almost every harbor and cove between Cape Cod and Eastport, and that they are frequently observed at a considerable distance from the land. In the spring they usually make their appearance along the southern shores of this district during the latter part of April, and are taken a few weeks later along the coast of Maine. Great schools of them are also seen on George's and other outer fishing-banks as early as February, though with the exception of the school visiting Eastport they are not known to occur in the shoal waters along the coast during the winter months.

The young and the old usually go in schools by themselves, remaining separate from each other during the entire year. Some localities are visited only by young fish, others only by those that are fully mature; while others still are frequented by both young and old at different seasons, or the two may occasionally be seen in the same region at the same time, though even then they seldom mingle to any considerable extent.

FISHING-GROUNDS IN THE VICINITY OF EASTPORT.—The principal fishing ground for small herring is in the vicinity of Eastport. These immature fish appear in the early spring, and are abundant among the numerous islands and ledges throughout the summer, often remaining as late as the middle of December. The fishing ground extends from Beaver Harbor, New Brunswick, to Cutler, Me., a distance of thirty-two miles. Along this stretch of coast the herring are chiefly taken in brush weirs, and are used for smoking and canning, any surplus being frequently made into pomace and oil. This region is also the center of the winter herring fisheries of New Brunswick, and is much resorted to for bait by American fishermen in the spring.

Most of the fish taken in the early spring are locally known as "brit," being but three or four inches long. A little later larger individuals appear, and by midsummer those taken average five to seven inches in length. Later still even larger herring are taken, the bulk of them at this season being smoked and shipped to Boston for distribution to the consumers.

Formerly large numbers of herring visited Cobscook Bay, where they remained during a greater part of the season, but when brush weirs came into general use the passage between Campobello Island and Lubec was almost completely closed by the building of particularly large

weirs, which often extended well out into the channel, frequently nearly meeting from the opposite shores. The bulk of the fish having been turned from their usual passage, they seemed to move a few miles to the eastward, and the center of the fishery is now at the eastern end of Campobello and in the vicinity of Deer Island, New Brunswick, though considerable numbers of small fish are still taken at Lubec, and even as far west as Cutler and Cross Island.

The fisheries of this region, though extensive, are not yet fully developed, for the small fish, prior to the establishment of sardine canneries in 1875, were of little use, and fishing for them was not considered profitable. On account of the small size and the supposed worthlessness of the fish, little or no attention was paid to their capture, and until recently many fishermen have been wholly unaware of the immense quantity of herring in the region.

The catch being sold almost exclusively to the sardine canneries, the subject will be treated more fully in the chapter on the sardine fisheries.

THE FISHING-GROUNDS OF JONESPORT AND BOISBUBERT.—The next important herring ground as we proceed westward is that in the vicinity of Jonesport, or in and about Moos-a-bec Reach. According to Mr. M. P. Chandler, of Jonesport, large schools of herring have visited these waters regularly since 1830, and probably for a much longer period. He claims that schools of small fish arrive about the last of April and remain till the middle of June, when they are driven farther out to sea by schools of full-grown herring that visit the waters along the shore. Vessels from the surrounding fishing ports resorted to this locality with gill-nets as early as 1840, and the fishery continued until 1872, when, owing to a depreciation in the value of the fish, the business was wholly discontinued, and no vessels have visited the region since that date. During the height of the fishery a fleet of twenty-five sail often anchored in Head Harbor, and the fisheries were prosecuted from small boats in the surrounding waters Though the vessel fishery ceased some time since, the herring are reported as abundant as formerly, and considerable numbers of them are taken in nets and weirs by the local fishermen, the greater part being used for bait, while the remainder are employed as a dressing for the land, or sold to the sardine canneries established at Jonesport in 1880.

Lying to the southward of the towns of Millbridge and Steuben, between the mainland and Petit Manan light, is the small rocky island of Boisbubert. This island is about two miles long by half a mile wide, and the waters lying off its southern head are a favorite resort for the herring during the spawning season, which extends from the middle of July to September. The spawning-grounds are located within a radius of two or three miles of the southern head of the island, and include a number of small rocky islands and ledges, the principal ones being Egg Rock and Jordan's Delight. The bottom of the ocean in this region is covered with large stones and bowlders, to which large quantities of algæ are attached. During the spawning season the entire bottom is often covered to a depth of several inches with the eggs of the herring.

This has been a favorite spawning-ground for the species from the earliest recollections of the oldest inhabitants, and, according to Mr. Sanborn, of Millbridge, a brush weir was built in the mouth of the Naraguagus River, near the village of Millbridge, as early as 1820. Though herring were taken in considerable numbers, the weir fisheries increased very slowly, owing to a limited demand for the fish, the supply being used only for bait by the few local fishermen and for fertilizing the land. About 1850 parties from Lubec came to the region and built large weirs on Boisbubert Island and other places along the mainland, and then, for the first time, the herring fisheries became important. The business continued to increase, and each of the weir-owners built large smoke-houses and presses for utilizing the catch. The fishery was at its height between 1858 and 1863, when twelve to fifteen weirs were fished regularly and 75,000 to 100,000 boxes of herring were

smoked annually, the greater part being shipped to Boston for a market. Large quantities of fish were also pressed for the oil, the pomace being used locally as a fertilizer. The pressing of fish was discontinued fully ten years ago, and, owing to the low price of smoked herring, the weir fisheries have constantly decreased, so that in 1880 only 500 boxes of fish were cured in Millbridge and the fishermen of Steuben had entirely discontinued their work. Eight small weirs were occasionally fished during the season of 1880, and it is estimated that considerably over 2,000 hogsheads of fish were taken; but the greater part of them were turned out for want of a market, a few being sold to the lobster and boat fishermen for bait, and others were carted upon the land.

About 1868 the vessel fishermen of the surrounding islands, on learning of the abundance of the herring on the spawning-grounds of Boisbubert, began to resort to the region in small vessels to engage in the fishery. A larger number came each season, until, in 1875, there were from twenty to twenty-five sail, averaging five men each, anchored in the harbor at the southern end of the island. These vessels arrived about the last of July and remained till September, some of them securing only one and others two trips before the fish had left the grounds.

From that time the business declined until during the summer of 1880 there were but nine vessels engaged in this fishery, the total catch being from 700 to 800 barrels. The fish were salted in barrels and carried to Portland and Boston for a market.

MOUNT DESERT AND VICINITY.— The waters in the vicinity of Mount Desert and Blue Hill Bay are favorite feeding grounds for the herring from May to October. Different schools visit this region, and the fish are usually very abundant about the smaller islands in the vicinity. They are of medium size, and, with the exception of those at Cranberry Islands, are taken exclusively in weirs. Those visiting the shores of Cranberry Islands are quite large, and are taken by the local fishermen in gill-nets, the catch being salted or smoked for the different markets. At other points, especially at the various islands in Blue Hill Bay, there are numerous smoke-houses for curing a portion of the fish, but the bulk of the catch is sold to the vessels from Cape Ann and other places that resort to the locality for the purchase of bait. A number of weir-owners have built large ice-houses, and do an extensive business in supplying ice and bait to the New England fishing fleet. This trade is of recent origin, being the result of the absence of the menhaden from the coast of Maine. Formerly the fishermen used menhaden almost exclusively in the summer, but within the last few years these fish have entirely deserted the region, and herring have been substituted for them. The result is, that a considerable number of large weirs have been built, and the inhabitants are just coming to know the value of the herring fisheries in their own waters. The principal islands where the fisheries are prosecuted are Stave Island, off the western shore of Gouldsborough; Bar Island, on the northeast coast of Mount Desert; Cranberry and Gott's Islands, two small groups lying to the south of Mount Desert, and Long Island, Tinker's Island, and Flye's Island, in Blue Hill Bay.

The catch is very often extensive, several of the larger weirs stocking upwards of $2,000 during the short season.

PENOBSCOT BAY, ISLE AU HAUT, AND CASTINE.— Different portions of Penobscot Bay are, also, frequented by schools of herring at different seasons. Though the fish are fairly abundant in almost any part of the outer bay, the fishery is extensive at only a few points. The principal fisheries are located at Isle au Haut, at the eastern entrance of the bay; Castine Harbor, about 30 miles farther north; Crabtree Point, at the western entrance of Fox Island Thoroughfare; and about Matinicus Island, lying 15 miles to the southward in the mouth of the bay.

According to Capt. J. W. Collins, small herring are abundant about the shores of Isle au Haut from May to October, and a school of larger fish makes its appearance along the southern

portion of the island about the middle of July, remaining from three to four weeks. A little later another school arrives, and remains about the same length of time. Formerly, a considerable number of herring were taken in nets by the local fishermen, and vessels have occasionally visited the region, securing full fares. For the past few years, however, the business has not been prosecuted to any extent, and the fishing has been confined to the capture of bait by the local fishermen.

Though herring have been taken in small numbers in the vicinity of Castine for many years, little seems to have been known of their abundance prior to 1874, when the bait fishermen engaged in their capture with gill-nets. Spawning herring were found to be quite plenty, and two years later the first vessels from the surrounding islands resorted to the region, securing full fares, which were carried to Boston. From this date a fleet of four or five vessels have visited the locality yearly, and they have invariably found fish fairly abundant. In 1880, according to Mr. George Morey, of Castine, there were six vessels engaged in the fishery at that place. The fish are of large size, averaging from twelve to thirteen inches in length. They arrive about the middle of July and pass up the harbor for a distance of one to two miles above the village, where they remain until the middle of August for the purpose of depositing their spawn. They are sometimes so abundant that the water is literally filled with them as far down as the village; and instances are on record where nets set just abreast of the wharves have been sunk by the weight of the fish taken in them.

Mr. Morey states that as soon as the school of spawning herring has disappeared, a large number of smaller or "sardine" herring are noticed in the harbor, where they remain till late in the fall.

According to Mr. S. T. Meeker, of North Haven, the first herring fishing of any note at Crabtree Point was in 1870, but even then the fishery was of little importance, and for several years it was carried on only by the local fishermen. In 1873 the fish were unusually plenty, and during the height of the season they were taken in such numbers that many of the nets were sunk as fast as they were put overboard. During this year one small vessel engaged in the fishery, and met with such success as to warrant others in visiting the region the following season. By 1875 the fleet had increased to twenty or twenty-five sail; but in 1878 the herring arrived in such small numbers that the fishermen lost heavily, and no vessels have visited the region since that time. The absence of the fish in 1878 was exceptional, as shown by the catch of the local fishermen during the subsequent years.

MATINICUS ISLAND AND EBENCOOK HARBOR.—Capt. J. W. Collins, who visited Matinicus Island in the fall of 1879, says that the waters about its shores are among the best in the State for the summer herring fisheries, and that vessels from various fishing towns between Cape Cod and Mount Desert resort to the locality to obtain their supply of bait, which they buy from the local fishermen, and from the small vessels that make a specialty of this fishery during the height of the season. Herring were formerly peculiarly abundant, but for the past ten years the catch has been considerably below the average. The fishery is prosecuted wholly by means of nets about the smaller islands in the locality, and a considerable number of the resident fishermen spend a greater part of the summer in netting the fish. Captain Collins estimates that in the summer of 1879 about 2,000 barrels of herring, in addition to a quantity of small mackerel, were taken in the region.

Ebencook Harbor, situated in the northwestern part of the island of Southport, is said by Mr. William T. Maddocks to be a favorite feeding-ground for small herring from August to December. According to the same authority, the fishery began at this point as early as 1806, when a number of local fishermen made large catches by the use of torches and gill-nets. The fishery gradually

increased in importance, and most of the residents built smoke-houses for curing their catch. A little later small vessels began to engage in the fishery, and soon twenty-five or thirty sail, including several of the larger crafts, were often anchored in the harbor at the same time.

The development of the Magdalen herring fisheries had a depressing effect upon the fisheries of this region, and as the supply from that region increased the local fishermen were obliged to turn their attention to other branches of the business. From 1850 the decline of the local fishery was quite rapid, and for a number of years no vessels have visited the harbor, though a few of the boat-fishermen still net a small quantity of herring, which are reported as still abundant in these waters.

CASCO BAY AND SOUTHWARD.—Though considerable numbers of herring are taken about the numerous islands in the mouth of Casco Bay, and at Richmond Island near Cape Elizabeth, the principal herring fisheries of the western coast of Maine are confined to the waters in the vicinity of Wood Island, lying near the mouth of Saco River, 12 miles to the southwest of the city of Portland. This is one of the principal spawning grounds for the herring within the limits of the United States, and the fishery is more extensively prosecuted in this vicinity than at any other point, except Eastport, where not only large but immature fish are taken.

Wood Island is the largest of a group of small rocky islands and ledges lying just off the cape which forms the southern boundary of Casco Bay. It is about half a mile long by less than a quarter of a mile wide. Inside of the island is a harbor, which, though it offers fair anchorage, is exposed to easterly gales, while farther in is a shoal-water cove affording excellent shelter for the fishing fleet.

The herring visit this region solely for the purpose of spawning. They arrive in small numbers about the 20th of September and gradually become more abundant until, a week later, the water is literally filled with them. The great bulk of the fish remain but a few days, after which they disappear.

The accounts of some of the early voyagers mention the fact that herring were very abundant in this region, and it is probable that the fishery has been more or less extensively prosecuted from the earliest settlement of the country. For the last twenty years the locality has been the favorite resort of many of the smaller vessels of the various fishing towns between Cape Cod and Penobscot Bay, and, though the fleet has varied considerably from year to year, it has gradually increased, until in the fall of 1879 there were, according to the statements of the leading Portland packers, fully one hundred and fifty sail, with from two to seven men each, engaged in the fishery, the catch amounting to nearly 20,000 barrels. The greater part of the vessels are owned at Gloucester, Mass., and at Portland, Booth Bay, Bristol, and Friendship, Me.

About the time the herring leave Wood Island a large school makes its appearance among the numerous rocky ledges just south of Cape Ann. On their arrival the principal fishing is at Norman's Woe, at the entrance of Gloucester Harbor, but a little later the herring are more abundant off Marblehead, and later still near Boston Light, at the entrance of Boston Harbor.

Many of the vessels that have been fishing at Wood Island proceed to Cape Ann, and other vessels and boats from the region join in the work, so that the water is soon well filled with nets, and the catch sometimes reaches upwards of 12,000 barrels during the two or three weeks that the fishing continues.

It is claimed by some that the herring taken here belong to the school that visited Wood Island earlier in the season, and that they could readily be followed from one place to the other, a distance of over 50 miles. Others insist that the schools are wholly distinct, and that those leaving Wood Island have thrown all of their eggs and milt, while the school that visits Cape Ann is "*full-roed*"

on its arrival. No careful study has been made of this subject, as the opportunity has not yet presented itself; but it seems more than probable that the whole coast from Seguin Island, at the eastern entrance of Casco Bay, to Boston will prove to be one continuous spawning ground for enormous schools that remain at a considerable distance from the shore, and approach it only in the fall for the purpose of depositing their spawn, after which they return to the deeper water outside, and that there are particular relations between currents and temperature and the movements of the fish that cause them to visit the northern portion of the ground nearly two months earlier than they do the waters about Boston.

The theory advanced recently that the herring, unlike the shad and alewife, spawn on a falling temperature is very naturally suggested by the habits of the fish in this locality, but when we remember that the herring spawn in April and May at Magdalen Islands, in midsummer at Grand Manan, and probably in March at Eastport, Me., there is abundant reason why this theory should be rejected.

South of Boston there are no extensive herring fisheries, and there is no particular locality where the fish are known to be abundant. According to Mr. F. W. True, a few are taken in the weirs along the shores of Cape Cod, and Mr. W. A. Wilcox reports an occasional catch in the weirs of Narragansett Bay. Both of these gentlemen, however, state that no one makes a business of catching the herring, and that most of those taken while fishing for other species are used for bait by the local line-fishermen or sold to the Cape Ann vessels that resort to the region in spring to purchase menhaden and alewives to be used in the George's Bank cod fisheries.

## 2. VESSELS AND CREWS.

THE VESSELS AND OUTFIT.—As has already been stated, there is not a single vessel belonging to the United States that is engaged regularly in the herring fisheries throughout the year, since they are not considered sufficiently remunerative to warrant the fishermen in devoting any considerable portion of their time to them. During the spawning season, however, a large number of small vessels of an inferior grade, that have been engaged in shore trawling, or to a limited extent in the coasting trade, are fitted out for this work. These proceed carefully along the shore from harbor to harbor until they reach the fishing grounds. Some are considered nearly unfit for the other fisheries and lie idle during the greater part of the year, their trip for herring in the fall being their principal work. The poorer class of vessels, though scarcely seaworthy, can be employed to advantage in the herring fisheries, as they remain constantly in or near the harbor, where they can be securely anchored during stormy weather, while the fisheries are prosecuted from small boats that go daily to the fishing grounds. The vessels serve principally as a home for the fishermen and as a storehouse for receiving their catch; and they are also used for carrying the fish to market at the close of the season.

These vessels range from 5 to 40 tons, the larger ones going a distance of more than a hundred miles from home either for the purpose of catching or marketing their fish. Even the smaller vessels frequently go from 50 to 75 miles away, though their captains are very careful to wait for a favorable opportunity, often anchoring in a convenient harbor a number of times on the passage. The value of these vessels depends upon their size and condition, the price varying from $150 to $1,000.

In preparing for this fishery the vessels lay aside their trawls and other fishing gear and supply themselves with gill-nets, after which they proceed to some of the principal fishing ports, where they are supplied with barrels and a sufficient quantity of salt for preserving the catch.

The herring-nets are 15 to 20 fathoms long, 2 to 3 fathoms deep, and have a mesh varying from 2¼ to 2¾ inches. Each vessel usually carries from 8 to 15 of these nets, which, together with the anchors and hangings, are worth $10 to $15 apiece. The webbing is usually purchased from the various factories in the larger cities, and, after being hung by the fishermen, the nets are tanned with catechu or dipped in tar for the purpose of preserving them.

Each vessel is also provided with small open boats, varying from 14 to 18 feet in length, one of these being carried for every two members of the crew, with the exception of the cook, who usually remains on board to care for the vessel while the others are tending the nets.

THE FISHERMEN.—The greater part of the men engaged in the herring fisheries are those who have been employed in some branch of the shore fisheries during the summer months. With few exceptions, they are native-born Americans, though a considerable percentage of the Boston fishermen are of foreign birth, the majority of these being Irish. The crews vary in number, according to the size of the vessel. The smallest vessels usually carry two men and a boy, while the larger ones carry as high as seven or eight men. Taking the entire herring fleet, a fair average would be four or five men to the vessel.

## 3. THE LAY AND SHARE.

SCOTCH METHODS.—It might be interesting, under this head, to give an idea of the relations between the fishermen and dealers in Scotland, where the fisheries are very important. Mr. James G. Bertram says:

Commerce in herring is entirely different from commerce in any other article, particularly in Scotland. In fact, the fishery, as at present conducted, is just another way of gambling. The home "curers" and foreign buyers are the persons who at present keep the herring fishery from stagnation; and the goods (*i. e.*, the fish) are generally all bought and sold long before they are captured. The way of dealing in herring is pretty much as follows: Owners of boats are engaged to fish by curers, the bargains being usually that the curer will take two hundred crans of herring—and a cran, it may be stated, is forty-five gallons of ungutted fish; for these two hundred crans a certain sum per cran is paid, according to arrangement, the bargain including as well a definite sum of ready money by way of bounty, perhaps also an allowance of spirits, and the use of ground for the drying of the nets. On the other hand, the boat-owner provides a boat, nets, buoys, and all the apparatus of the fishery, and engages a crew to fish; his crew may, perhaps, be relatives and part owners, sharing the venture with him, but usually the crew consists of hired men, who get so much wages at the end of the season and have no risk or profit. This is the plan followed by free and independent fishermen who are really owners of their own boats and apparatus. It will thus be seen that the curer is bargaining for two hundred crans of fish months before he knows that a single herring will be captured; for the bargain of next season is always made at the close of the present one, and he has to pay out at once a large sum by way of bounty, and provide barrels, salt, and other necessaries for the cure before he knows even if the catch of the season just expiring will all be sold, or how the markets will pulsate next year. On the other hand, the fisherman has received his pay for his season's fish, and very likely pocketed a sum of from ten to thirty pounds as earnest money for next year's work. Then, again, a certain number of curers, who are men of capital, will advance money to young fishermen in order that they may purchase a boat and the necessary quantity of netting to enable them to engage in the fishery, thus thirling the boat to their service, very probably fixing an advantageous price per cran for the herrings to be fished and supplied. Curers, again, who are not capitalists, have to borrow from the buyers, because to compete with their fellows they must be able to lend money for the purchase of boats and nets, or to advance sums by way of bounty to the free boats; and thus a rotten, unwholesome system goes the round—fishermen, boat-builders, curers, and merchants all hanging on each other, and evidencing that there is as much gambling in herring fishing as in horse-racing. The whole system of commerce connected with this trade is decidedly unhealthy, and ought at once to be checked *and reconstructed if there be any logical method of doing it.* At a port of three hundred boats a sum of £145 was paid by the curers for "arles" and spent in the public houses! More than £4,000 was spent in bounties, and an advance of nearly £7,000 made on the various contracts, and all this money was paid eight months before the fishing began. When the season is a favorable one and plenty of fish are taken, then all goes well, and the evil day is postponed; but if, as in one or two recent seasons, the take is poor, then there comes a crash. One falls, and, like a row of bricks, the others all follow. At the large fishing stations there are comparatively few of the boats that are thoroughly free; they are tied up in some way between the buyers and curers, or they are in pawn to some merchant, who "backs" the nominal owner. The principal, or at least the immediate sufferers, by these arrangements are the hired men.

This "bounty," as it is called, is a most reprehensible feature of herring commerce, and, although still the prevalent mode of doing business, has been loudly declaimed against by all who have the real good of the fishermen at

heart. Often enough men who have obtained boats and nets on credit and hired persons to assist them during the fishery are so unfortunate as not to catch enough of herrings to pay their expenses—the curers for whom they engaged to fish having retained most of the bounty money on account of boats and nets; consequently the hired servants have frequently to go home, sometimes to a great distance, penniless. It would be much better if the old system of a share were reintroduced. In that case the hired men would at least participate to the extent of the fishing, whether it were good or bad. Boat-owners try of course to get as good terms as possible, as well in the shape of price for herrings as in bounty and perquisites. My idea is that there ought to be no engagements, no bounty, and no perquisites. As each fishing comes round let the boats catch and the curers buy day by day as the fish arrive at the quay. This plan has already been adopted at some fishing towns, and is an obvious improvement on the prevailing plan of gambling by means of "engagements" in advance."*

AMERICAN METHODS.—In New England the relation of vessel owners and dealers to the fishermen is very different from that already described. The vessels are usually owned by the captain, who selects his crew from among his friends on account of their supposed fitness for and experience in the fishery. The owner furnishes the vessel in a condition ready for sea, and receives in return from one-fifth to one-seventh of the first value of the catch. The crew, on the other hand, provide all the apparatus for the fishery, including boats, nets, and other fishing-gear. They are also expected to provide themselves with provisions, and to arrange with one of their number to act as cook. The cook is, in most cases, the son of the captain, or of some member of the crew, whose services are obtained for a small compensation. He is expected to remain constantly on board to care for the vessel while the men are tending their nets, and, in addition to preparing the food, must assist in salting and packing the fish.

The vessel is generally taken to one of the larger ports in the vicinity of the fishing-grounds, where an arrangement is made with a fish-dealer to supply barrels and salt for packing and curing the catch. The dealer usually supplies the provisions necessary for food, and in some instances furnishes a portion of the fishing-gear, it being understood that he shall receive the fish at a stated price. The fishermen seldom pay for the outfit when it is received, but on the contrary run an account with the dealer, who depends largely upon their catch for his money; and it often happens, when the fisheries are poor, that he loses heavily. There is a disposition among certain crews to avoid the payment of their obligations, and it frequently occurs that, unless carefully watched, they will carry the greater part of their catch to other places for a market, selling for cash and pocketing the money. The dealers have lost so heavily in this way that they are now very cautious as to whom they will trust, and the skippers who for any reason are not considered responsible, experience considerable difficulty in finding a dealer who is willing to advance them the necessary outfit. Many of them are thus placed at a disadvantage, as they seldom have sufficient funds to pay for their goods until they have disposed of their catch.

After the catch has been marketed the vessel's portion of the money is set aside. All bills, including the cook's wages and the cost of salt, barrels, provisions, &c., are then paid out of the general stock, after which the money is divided equally among the different members of the crew, the captain sharing equally with the others. The amount of money realized by the men engaged in the herring fisheries varies exceedingly; some vessels are very successful and secure large trips, while others may fish the entire season with only moderate success. The average share to the fishermen would be, perhaps, $30 to $50 per month.

## 4. METHODS OF CAPTURE.

TORCHING.—There are three principal methods of catching the herring on the coast of the United States. The oldest, and in early years the most common method, was that known as "torching." Later, brush weirs were introduced, and these are now extensively employed in

* Harvest of the Sea, pp. 183–185.

the capture of small herring along the eastern part of the coast of Maine. The spawning herring are usually taken in gill-nets, a method which has been employed for many years on different portions of the coast.

The well-known instinct of herring to follow a light was observed by the Indians prior to the settlement of the country by the whites. The discovery was doubtless the result of their extensive camp-fires, which were built along the shores in the principal fishing districts. The method of torching is also said to be in use by the fishermen of other countries. Torching is a very simple method. For this purpose the fishermen usually select a medium-sized boat, which can be propelled rapidly through the water by means of oars. The boat is provided with a small iron frame called a "dragon," which projects from the bow. In this dragon a fire of birch bark and other highly combustible materials is kept constantly burning while the fish are being taken. The fishermen usually go to the shore late in the afternoon and time their departure so as to reach the fishing grounds shortly after sunset. As soon as it becomes sufficiently dark the fire is lighted, one man takes his position in the stern to steer the boat and another stations himself in the bow, armed with a dip-net for securing the fish as they gather in little bunches just in front of the light. The remaining members of the crew row the boat rapidly through the water, while the man in the bow is busily engaged in throwing the fish into the boat by means of his dip-net. Great numbers of herring are attracted by the light and it is not uncommon for fifteen or twenty barrels to be taken in a few hours.

Where the current is strong it is often customary to row out into the channel, and then gradually work in toward the shore, thus bringing the fish into shoaler and stiller water where they can be more easily secured.

Torching is the method commonly employed at Ipswich Bay, Massachusetts; it is also practiced to a considerable extent at Eastport, Me., these being the only points where it has been generally adopted; but the method is occasionally employed on a smaller scale by the fishermen of other portions of the New England coast.

POUNDS, TRAPS, AND WEIRS.—Pounds, traps, and weirs are also used for the capture of herring. These are all built upon the same general plan, having a "leader" or "wings," which direct the fish to one or more "pockets" or "pounds," which retain them until they can be secured. They vary greatly in size and shape, according to locality and the peculiar character and shape of the shore and adjoining ocean bed. The material of which they are constructed also differs. In one region netting will be exclusively employed, in another the traps will be built largely of lath and boards, while in another still the entire weir will be built of brush and poles. At Cape Small Point, near Portland, Me., and at Bristol, the pounds, which are quite large, are composed chiefly of netting; and, owing to the rocky character of the bottom, the poles, instead of being driven into the ground, are secured by means of large flat stones, in which they are inserted, or poles are entirely dispensed with and the pounds are held in position by means of anchors and ropes. In this case the bottom of the netting is weighted with lead or stones and the top is supplied with large floats to keep it at the surface. Some of these floating traps are very successful in the capture of large quantities of fish.

About Cape Cod, according to Mr. F. W. True, the traps usually have leaders of netting and pockets of board or lath. Though fished for other species, they often take considerable numbers of herring at certain seasons.

The brush weir is extensively used in the herring fisheries of the coast of Maine. It is peculiarly adapted to the capture of small herring, which are used in the preparation of sardines at Eastport and other places along the eastern shores of the State. Being the principal method by

which the "sardine-herring" are secured, it will be described in detail in the chapter on the sardine industry.

FISHING WITH GILL-NETS.—The gill-nets used in the herring fishery are from 15 to 20 fathoms long, 2 to 3 fathoms deep, and have a mesh varying from 2¼ to 2¾ inches. They are usually made of cotton twine, the weight varying considerably in different localities. Hemp nets were formerly extensively used, but cotton is found to answer the purpose equally well, and is much cheaper. The nets to be used on the principal spawning grounds, where the fish are known to occur in immense schools, are usually made of strong and comparatively coarse twine, as they are liable to be so heavily loaded with fish that those of light weight would be ruined in a single night. Along other portions of the coast, where the fish are less abundant, nets of finer material are often employed.

In former years the webbing was usually knit by the wives and children of the fishermen, and this is done to a limited extent at the present time, though most of the fishermen have come to use machine-knit webbing, which they buy from the net factories of the principal cities.

When the webbing is ready it is hung to small double lines of opposite lays, about one-third of the length of the net being taken up in hanging, so that a piece of webbing 30 fathoms long will make a net of 20 fathoms when hung. After the net has been properly tanned or tarred and hung to these double lines a heavier cork-rope, supplied with egg-shaped wooden floats or with corks, is made fast to the upper margin. The floats are placed at distances varying from 2½ to 4 feet, according to their size and the strength of the current in which the nets are to be used. Small leaden sinkers are sometimes attached to the bottom, but more frequently oblong stones are used, these being more readily obtained and as easily fastened by means of small loop-lines. In the vicinity of Eastport iron anchors varying from 20 to 50 pounds are generally employed. On some parts of the coast the fishermen use stone killicks. These as a rule must be considerably heavier to answer the same purpose.

Several nets are usually fastened together and set in one string, though in some instances they are set separately. Where the current is strong they are usually anchored at only one end, the other being allowed to swing with the tide, but in still water an anchor is ordinarily placed at either end of the string. Large buoys are attached to either end of each net to assist in holding it up and to mark its position in the water. In addition to these, larger watch-buoys are attached to either end of the string, to provide against the loss of the nets in case they should be carried to the bottom by the weight of the fish. The watch-buoys have lines of sufficient length, so that if the nets should be sunk the buoy will still float on the surface and enable the fishermen to secure them. The buoys in general use are made of spruce or other light wood, and, on account of their shape, are known as "spar-buoys." Those to be placed at the end of each net are usually 3½ to 5 feet in length and from 6 to 8 inches in diameter, while the watch-buoys are proportionately larger. Where the current is weak and a large catch is expected pine kegs are frequently employed.

Toward the close of the afternoon a busy scene is presented at Wood Island. The men are now engaged in transferring the nets to the small boats, and soon after they may be seen making their way out of the harbor, some sailing and others pulling vigorously at the oars. After reaching the fishing ground, which is some 2 or 3 miles distant, the fishermen select their berth and begin setting their nets. One man rows the boat in the desired direction, which may be either with or across the tide, while the other throws out the nets. There is frequently a lively competition among the fishermen as to who shall secure the best berth, and it is not uncommonly the case that they will row about for a considerable time in search of "signs of fish" before deciding exactly where to locate for the night.

The nets are set at varying depths; they are at times placed on the surface, and at others sunk to a depth of 1 or 2 fathoms, in which case heavier sinkers are attached to the bottom of the net, and the "tail ropes" of the buoys are increased to the desired length. As soon as the nets have been properly set the fishermen return to the vessel.

If a large catch is expected the nets are visited about midnight for the purpose of "underrunning." By this method the net is not removed from its moorings. The fishermen proceed to one end of the string, raising the net, passing it over the top of the boat, and returning it to the water on the opposite side as fast as the fish are removed. In this way only a few feet of the net are out of the water at a time, while the balance is fishing as usual. The fish are either shaken or picked out of the nets, as is most convenient. The time required for underrunning depends wholly upon the size of the catch and the number of nets that are out.

One object in underrunning the nets at midnight is to secure an additional quantity of herring; another is to remove a portion of the catch, and thus prevent the nets from being so heavily loaded as to injure them by the weight of the fish.

When there is no indication of a large catch the nets are not visited till morning. At the approach of dawn the work of the fishermen begins, and soon the glimmer of lights may be seen in all directions, as they move to and fro about the decks of the vessels making their preparations for "a start." A little later they enter their boats and are off for the fishing grounds. The nets are usually reached by daybreak, when they are at once loosed from their moorings and hauled into the boat with the fish still hanging in the meshes. If the berth is a good one, the moorings are left in the water to mark the position and to retain it for another set. The boat, with its load, at once returns to the vessel. The nets are then taken on deck, where the fish are removed. They are then carefully examined and mended, if need be, after which they are placed in the rigging of the vessel or carried to the adjoining shore to be thoroughly dried.

GILL-NET FISHING FOR BAIT.—For many years prior to the introduction of frozen herring into the American markets the vessels engaged in the cod fisheries of George's and Brown's Banks and other fishing grounds in the Gulf of Maine usually carried from three to six herring nets, to be used in the capture of herring for bait. These were sometimes set from the vessel's stern as she lay at anchor on the fishing grounds, but quite as frequently the vessel proceeded to the deep water off the edge of the bank, where she was hove to under her mainsail and foresail in such a manner that she might drift in a direction at right angles to that in which she was headed. The nets were then put out, their inner end being attached to the mainmast by means of a long rope called a net-string. As a rule, the vessel was hove to in the evening and allowed to drift during the greater part of the night.

When the nets were to be taken in all hands were called to assist in the work. The nets were at once hauled on deck, after which the fish were removed. When the catch was small the fish were usually placed in barrels or tubs, to be used during the day's fishing; but when a large quantity were secured, the greater part were transferred to the hold of the vessel, where they were iced or lightly salted, to be used later in the fishing. After the fish had been stowed away, the nets were washed and hung upon the stern to dry.

It frequently happened that enough fish were taken at a single set to last until a fare was secured. At times when the fish were large and fat the surplus was often sorted and carried to market. Occasionally, however, herring were found very scarce, and vessels had great difficulty in securing a supply, a longer time being required in catching the bait than in using it. It was largely due to this fact that the frozen herring met with such general favor when they were first introduced.

Another method, known as "sweeping," was frequently employed. By this method ordinary gill-nets were used in the daytime. When the fish were seen schooling at the surface they were at once surrounded by a wall of netting, and driven into the meshes by means of rocks or oars, which were thrown or darted into the water. This method was extensively used by the vessel fishermen in former times, and is still employed to a greater or less extent by the shore fishermen in various localities along the coasts of Maine and Massachusetts.

SEINES.— Seines, though extensively employed in the herring fisheries of Newfoundland and other places, are seldom used in the capture of these fish on the coast of the United States, as traps and weirs are found to be less expensive and answer the purpose equally well.

Large catches of herring are often made in the purse-seines of the mackerel fishermen. These are used at a considerable distance from the shore in the capture of mackerel, and it occasionally happens that schools of herring are taken by mistake, or that both herring and mackerel are taken at the same set. The fishermen claim that the two species seldom mingle freely in the same school, and they explain the fact of their being taken together by saying that the herring have a habit of following the mackerel and of swimming beneath them in the water. There seems no sufficient evidence to substantiate or to disprove this theory. Captain Collins, who has been extensively engaged in the mackerel fisheries, gives it as his opinion that the purse-seine can be used to great advantage in the herring fisheries off the American coast whenever the price of the fish will warrant the fishermen in engaging in their capture. At the present time, however, the demand for them is so light and the price is so low that no attention is given to the capture of herring by the mackerel fishermen, and when a school is accidentally taken it is at once turned out, the men not considering the herring worth the time and trouble required in curing them.

## 5. DISPOSITION OF THE CATCH.

STATISTICAL SUMMARY.—The total catch of herring by the fishermen of Maine in 1880 was 34,695,192 pounds, which entered into consumption as follows: 4,300,000 pounds used fresh for food, 8,819,875 pounds used for pickling or brine salting, 6,138,942 pounds used for smoking, 6,496,375 pounds used for canning, 7,000,000 pounds used for bait, and 1,940,000 pounds used for fertilizer.

In New Hampshire the catch was 108,750 pounds of herring, about 60,000 pounds being used for food and the remainder for bait and fertilizer.

In Massachusetts the catch in 1879 was 7,794,780 pounds, of which quantity 3,827,124 pounds were consumed fresh (2,610,514 pounds for bait and 1,216,610 pounds for food) and 3,967,656 pounds were used for pickling.

CARE OF THE FISH ON THE VESSELS.—As shown above, very many of the herring taken by the American fishermen are used for bait in the shore and bank cod fisheries and in the fresh-halibut fishery. Many more were salted for the market in former years than at the present time. The greater part of those now prepared by American fishermen are salted without splitting, and are known in the market as "round herring," in distinction from those that have the gills and viscera removed, which are known as "split herring."

In the vessel fisheries the greater part of the herring are salted in barrels before being landed. After being taken from the net they are heaped upon the deck and water is thrown upon them for the purpose of washing off the loose scales and the blood that has collected. A quantity of salt is then sprinkled over them and thoroughly mixed among the fish. They are then placed in barrels, when a little more salt is added, and they are rolled aside, where they are allowed to settle, and are again filled up with fish. As soon as the fish have become properly "struck" the barrels are

headed up and stowed in the hold until such time as the vessel shall arrive at the market where they are to be sold. The fish in this condition are known as "sea-packed" herring, and bring about two-thirds of the price of herring that are properly packed.

HERRING-CURING ON SHORE.—On reaching the market the fish are sold to some of the principal dealers, who at once dump them out of the barrels and thoroughly wash them. They are then weighed in lots of two hundred pounds, each lot being carefully packed in a barrel by itself, care being taken that the herring may be placed in such a position as to show to the best advantage. A quantity of salt is sprinkled among them as they are packed. When the barrel is full it is headed up and a hole is bored in one side, through which a quantity of strong brine is poured upon the fish. After being allowed to settle for a number of hours, more brine is added, care being taken that the barrel shall be completely filled. The hole is then plugged up and the fish are ready for market.

In many cases the fishermen in the vicinity of the larger fishing ports dispose of their herring before they have been salted. As soon as the nets have been hauled they set sail and proceed to the harbor, where, unless some contract has been previously made, the catch is sold to the highest bidder. The fish are at once thrown upon the wharf and salt is sprinkled upon them. They are then shoveled into boats or hogsheads, and strong brine is added until they are completely covered. Here they are allowed to remain for a number of days or weeks, until they are thoroughly cured, when they are packed as above described.

Another brand known as "split" or "gibbed" herring is frequently put up. The split fish differ from the round herring in that the gills and entrails have been removed. The gibbing is usually done by the fishermen before the herring are salted. A rough method of gibbing, which is occasionally employed, is to tear the gills from the fish by means of the thumb and fore-finger, and to remove the entrails through the opening thus made. The more common practice, however, is to split the fish down the belly with a knife, in order that the viscera and gills may be more easily removed. The blood is also scraped from the backbone, and the fish are thrown into a tub of water to be soaked before salting. When the blood has been sufficiently removed to give the herring a light color they are carefully packed in barrels, with enough salt to preserve them. The roe-bags of spawning herring are usually left in the fish, as these are considered a great luxury by the Irish. Most of the gibbed herring are among the best quality of fat fish taken on the coast, and fish of inferior quality are generally salted without splitting. The market price of split herring is usually from one to two dollars more than that of fish prepared in the ordinary way.

It is claimed by many that the American methods of curing are very inferior to those employed in other countries, as the fish are often allowed to remain a considerable time before they are salted, and they are also washed and new pickle is used for repacking them. By changing the pickle, or by soaking the fish, they are thought by many to lose much of the rich and delicate flavor for which the herring are so highly prized by the herring-eating nations of Europe. In Holland and other countries where herring are regarded with great favor the fishermen aim to salt the catch as soon as possible after the fish have been taken, and the herring are seldom allowed to stand more than two or three hours before they are cared for.

HERRING-CURING IN SCOTLAND.—The method of curing in Scotland is described by Mr. Bertram in the following manner:

"At stations about Wick the quantity of herrings disposed of fresh is comparatively small, so that by far the larger portion of the daily catch has to be salted. This process during a good season employs a very large number of persons, chiefly as coopers and gutters; and as the barrels have to be branded, by way of certificate of the quality of their contents, it is necessary that the

salting should be carefully done. As soon as the boats reach the harbor—and as the fishing is appointed to be carried on after sunset they arrive very early in the morning—the various crews commence to carry their fish to the reception-troughs of the curers by whom they have been engaged. A person in the interest of the curer checks the number of crans brought in, and sprinkles the fish from time to time with considerable quantities of salt. As soon as a score or two of baskets have been emptied, the gutters set earnestly to do their portion of the work, which is dirty and disagreeable in the extreme. The gutters usually work in companies of about five—one or two gutting, one or two carrying, and another packing. Basketfuls of the fish, as soon as they are gutted, are carried to the back of the yard and plunged into a large tub, there to be roused and mixed up with salt; then the adroit and active packer seizes a handful and arranges them with the greatest precision in a barrel, a handful of salt being thrown over each layer as it is put in, so that in the short space of a few minutes the large barrel is crammed full with many hundred fish, all gutted, roused, and packed, in a period of not more than ten minutes. As the fish settle down in the barrel, more are added from day to day till it is thoroughly full and ready for the brand. On the proper performance of these parts of the business the quality of the cured fish very much depends."

LAWS REGULATING HERRING CURE.—Many of the European countries have laws describing in detail the exact manner in which the herring shall be prepared, and great care is taken that the fish shall be properly cured in every particular. In America, on the contrary, little care is taken in the preparation of the fish, and though there are laws relating to the subject they refer more to the quantity of fish which a package of a given size shall contain, and to the amount of salt used in packing the fish, than to the quality of the fish. At one time the laws of all the States having extensive herring fisheries required that all of the pickled herring should be inspected before they were sent to market. A law to this effect is still in force in the States of Maine and New Hampshire. According to section 7, chapter II, of the Laws of Maine for 1875:

"Every inspector who inspects pickled alewives or herring, packed whole or round, shall see that they are struck with salt or pickle, and then put in good casks of the size and material aforesaid, packed closely therein and well salted, and the casks filled with fish and salt, putting no more salt with the fish than is necessary for their preservation; and the inspector shall brand all such casks with the name of the inspected fish as aforesaid, but in no case shall the inspector brand the casks unless the fish contained therein shall have been packed and prepared under his immediate supervision."

Section 8 of chapter XI of the Revised Statutes of Maine for 1871 gives the following description of the barrels in which fish are to be packed:

"All tierces, barrels, or casks, used for the purpose of packing pickled fish, shall be made of sound, well seasoned white oak, white ash, spruce, pine, or chestnut staves of rift timber, with headings of either of such kinds of wood, sound, well planed, and seasoned, and the heads, if of pine, free from sap; the same to be well hooped with at least three strong hoops on each bilge, and three also on each chime; the barrel staves to be 28 inches in length, and the heads to be 17 inches between the chimes, and made in a workmanlike manner to hold pickle, and branded on the side near the bung with the name of the maker or owner thereof. The tierces shall contain not less than 45 nor more than 46 gallons each, the barrels from 29 to 30 gallons each, and the aliquot parts of a barrel in the same proportion."

The laws of the State of Maine, as recently amended, do away with an inspector-general, but require the secretary of state to appoint deputy inspectors in the various fishing towns, these to receive their commission from him and to be obliged to report to him the quantity of fish inspected

by them each season. The law is practically of little value, as many of the inspectors fail to report on their work, and a considerable quantity of herring salted at Eastport and elsewhere are never inspected.

In Massachusetts the inspection of herring intended for pickling is not required by law, though the fish are often properly packed and branded before being placed upon the market. Section 36 of chapter XLIX, of the General Statutes of Massachusetts for 1859, says:

"Under the supervision of the inspector-general and his deputies, respectively, all kinds of split pickled fish and fish for barreling, except herring, and all codfish tongues and sounds, halibut fins and napes, and swordfish, whenever said articles are intended for exportation, shall be struck with salt or pickle," &c.

THE MARKETS.—The principal markets for salt herring along the New England coast are Portland, Boston, Gloucester, and Eastport. Portland probably takes the lead in this trade, receiving the bulk of the herring taken about Wood Island, as well as those caught in Penobscot Bay, and on the spawning grounds off Boisbubert. This port also secures a considerable portion of the fish caught off Cape Ann. Boston is more of a distributing center for the fish, and many of those bought and packed by the Portland dealers are shipped there for distribution to the trade. Gloucester affords a fair market for the catch taken about Cape Ann by the local fishermen; and when the export trade will warrant it sometimes buys largely from the herring dealers of other cities.

Eastport, being situated in the center of the principal herring fisheries of the United States, necessarily handles a large quantity of these fish. The fisheries are prosecuted chiefly in winter, when the herring can be frozen, and the merchants have come to make a specialty of this trade, and they now, in connection with several Boston companies, control the frozen-herring trade of New England. During the spring and fall, and at such times during the winter as the weather will not admit of freezing the fish, a limited quantity are pickled and sold to the Eastport dealers for shipment to Boston and New York.

Prior to the rebellion the bulk of the pickled herring were consumed by the negroes of the Southern States, but the liberation of the slaves had a decided influence on the trade, which has since come to be of little importance. At the present time a majority of the herring are shipped to the mining districts of Pennsylvania, though considerable quantities find their way to the West, where they are consumed largely by the poorer classes, noticeably by the Germans, the Scotch, and other foreigners.

HERRING FOR BAIT.—Mention has already been made of the extensive herring fisheries in different localities for the purpose of supplying bait for the New England fishing fleet. Those vessels engaged in the various branches of the codfishing, as well as some of those employed in the fresh halibut and winter haddock fisheries, are dependent almost entirely upon herring for their bait. The whole question of the use of frozen herring as bait will be found in the chapter on frozen herring, but the bait used by the vessels in summer will more properly be considered in this connection.

For the last twenty years few vessels, with the exception of those employed in the shore fisheries, have carried nets for the purpose of securing their own bait, as they have found it more desirable to purchase their supply from the weir, net, or seine fishermen at different points along the shore. A portion of the fleet depended largely on the catch of menhaden in the Gulf of Maine, and these in a measure took the place of herring. Since 1879, however, the menhaden have been almost wholly absent from these waters, and the fishermen have been seriously inconvenienced

on this account, as the shore herring fisheries have not been sufficiently developed to furnish them with an abundance of fish.

A portion of the fleet engaged in the George's cod fishery visit the southern shores of Cape Cod, or even go as far as Long Island Sound, to secure a supply of menhaden and alewives, rather than run the risk of finding herring on the coast of Maine. In the winter, when frozen fish can be obtained, there is usually an abundant supply in Gloucester; but when these are no longer to be had the George's-men must depend wholly on fish bait and must secure their supply before starting for the fishing banks. For this purpose they usually proceed to the nearer herring grounds on the coast of Maine; but if fish cannot be obtained in these localities they work eastward, stopping at the various bait-stations until a supply has been secured. It frequently happens that from ten to twenty-five vessels may be seen in the same harbor waiting their turns to secure a supply, and those coming last are often obliged to wait four or five days or even a week before a sufficient quantity can be obtained.

The vessels engaged in the George's cod fisheries range from 50 to 75 tons, the average being a trifle over 60 tons. These carry from nine to twelve men, and are fitted for an absence of four or five weeks, though the average trip does not exceed twenty days. A fair catch is 25,000 pounds of split fish, or 50,000 pounds as they come from the water. In the hope of securing a full fare a "George's-man" usually carries as much bait as will be needed under ordinary circumstances. An average quantity is from 25 to 30 barrels for a trip. The price of the herring varies according to supply and demand, the average being from 75 cents to $1 per barrel.

When the fish have been caught they are brought at once to the vessel, where they are carefully packed in ice in one of the bait-pens located in the forward part of the ice-house. The method of packing is similar to that employed in "stowing the bait" in the vessels engaged in the Grand Bank cod-fisheries, a description of which will be given farther on.

Herring as ordinarily packed will keep in good condition for two or three weeks, after which they become so soft that they will not remain on the hook for any length of time, and are therefore of little value.

The greater part of the bait used by the George's fishermen during the summer months is purchased from the various weir and net fishermen of the coast of Maine and Massachusetts, though in the spring and fall a few vessels visit the fishing grounds of New Brunswick to secure their supply, and in seasons of peculiar scarcity vessels have gone as far east as Pubnico, Nova Scotia.

In the Western and Grand Bank cod-fisheries most of the vessels measure between 60 and 100 tons, the average being about 75 tons. A few of larger size are also employed, some of them measuring upward of 120 tons.

The vessels frequenting the Western Bank are gone from five to ten weeks, while those visiting the Grand Bank are absent from three to five months. The number of men carried by these vessels depends largely upon the method of fishing. Those using trawls average from twelve to fourteen men each, while the largest of those engaged in "hand-lining from dories" carry twenty or more men. The last-named vessels are provided with salt clams, and seldom use any herring in the fishery. Most of the trawlers, on the contrary, depend almost wholly upon fresh herring, with the exception of the summer months, when capelin (*Mallotus villosus*) and squid (*Ommastrephes illecebrosa*) are used. The entire supply, with few exceptions, is obtained along the coast of the British Provinces, the greater part being secured at Newfoundland and Nova Scotia, though considerable quantities are purchased from the fishermen of New Brunswick. The vessels fishing in the Gulf of Saint Lawrence usually obtained their supply in that region.

As soon as the vessel is fitted out for the fishery she proceeds to one of the "baiting stations,"

where a supply of 40 to 60 barrels is purchased. Capt. D. E. Collins, in his manuscript journal of a fishing trip to the Western Bank, in the spring of 1879, gives the following account of the method of icing the bait on a vessel engaged in the Bank fisheries: "Our bait-pen is built forward of the cabin bulk-head, between it and the after-hatch. It is 9 or 10 feet wide by 10 or 12 feet long, and holds about 60 barrels of bait in addition to the ice necessary for preserving it. The bottom of the pen is raised a foot or more above the keelson. There is a partition in the middle, dividing the pen into two parts, so that all the fish of one may be used before the others are disturbed. This arrangement is important, as the fish do not keep well after they have been once disturbed. The pen is built of double boards, having a door on either side at the forward end. The lower part of the door is raised about 6 feet above the bottom. When bait is being iced boards are shipped into grooves in the opening as fast as they are needed to prevent the fish from falling out, and, when full, the door is put up on the outside and held in place by means of a horizontal bar. When the bait has been secured the ice is at once removed from the pens and taken on deck. As the work proceeds one cake after another is placed in a large tub, and four or five men, armed with fish-forks, are engaged in 'picking it up fine' until the necessary quantity has been broken. Others of the crew are engaged in passing the baskets of herring and fine ice to those who are stowing the bait. There are generally two men in the hold, one in the bait-pen and another at the hatchway. A layer of ice is first put upon the floor of the pen, after which a thin layer of herring is added, then another layer of ice, and so on until the pen is nearly full. The whole is covered by a quantity of ice varying from 6 inches to 1 foot in thickness, according to the season, the pen to be opened last having the largest quantity."

Bait iced in this manner will keep about three or four weeks, after which the vessel must return for a fresh supply. The fishermen of Long Island Sound have a practice of "gutting" a portion of the fish, and claim that in this way they are enabled to keep them for a much longer period.

When bait is scarce the vessel frequently sails without having secured a full supply, as it is desirable to reach the fishing ground as soon as possible.

The vessels fishing on Western Bank use herring almost exclusively, and make from one to three trips to the land to purchase a fresh supply while securing their load of codfish. The vessels engaged in the Grand Bank fisheries frequently make five or six "baitings" during the season; but they depend largely upon capelin for four or five weeks, beginning with June 15, and on squid from the middle of July to the 1st of September, as these are abundant during their respective seasons, and the cod are thought to prefer them.

Captain Collins states that there is often considerable competition between the captains of the vessels that are in search of bait. When a number of them reach a harbor at the same time, being anxious to secure their bait at the earliest possible moment, underhand methods are sometimes resorted to, and the price is often carried far beyond what the fish are actually worth. On April 23, 1879, he was obliged to pay $2.25 a barrel for herring, and three days later it sold as high as $3.25 at Ketch Harbor, Nova Scotia. The Provincial fishermen are fully aware of the dependence of the Americans upon them for their supply, and they frequently take an undue advantage of it. They are certainly greatly benefited by the trade, and those engaged in the capture of bait are reported as more successful than those engaged in any other branch of the Provincial fisheries.

## 6. STATISTICS OF THE HERRING FISHERY.

The following table shows the number of vessels and other details of the herring fleet from New England ports in 1880. It does not include the hundreds of small boats employed in the fishery, but only decked vessels over 5 tons burden.

*Herring fleet of New England for the year 1880.*

| Towns. | Number of herring vessels. | Tonnage. | Value. | Number of men. |
|---|---|---|---|---|
| MAINE. | | | | |
| Eastport | 10 | 194.35 | $6,375 | 51 |
| Pembroke | 2 | 42.12 | 2,500 | 16 |
| Lubec | 6 | 81.42 | 1,900 | 26 |
| Machiasport | 2 | 54.37 | 1,700 | 14 |
| Jonesport | 1 | 18.42 | 600 | 5 |
| Steuben | 1 | 11.33 | 400 | 3 |
| Gouldsborough | 1 | 26.94 | 350 | 5 |
| Sullivan | 1 | 7.65 | 150 | 3 |
| Mount Desert | 2 | 48.32 | 1,000 | 8 |
| Tremont | 6 | 92.77 | 1,425 | 25 |
| Cranberry Islands | 6 | 94.97 | 2,300 | 24 |
| Blue Hill | 1 | 6.86 | 150 | 2 |
| Brooklin | 3 | 60.41 | 1,300 | 14 |
| Deer Isle | 18 | 390.79 | 4,985 | 80 |
| Sedgwick | 1 | 17.27 | 500 | 2 |
| Bucksport | 1 | 43.20 | 500 | 6 |
| Swan's Island | 9 | 184.08 | 4,150 | 41 |
| Isle au Haut | 1 | 25.85 | 500 | 6 |
| Total for Eastern Maine | 72 | 1,402.14 | 36,785 | 331 |
| Belfast | 1 | 7.76 | 100 | 2 |
| Camden | 1 | 20.92 | 6,250 | 3 |
| North Haven | 1 | 8.32 | 250 | 2 |
| Vinal Haven | 2 | 30.86 | 550 | 7 |
| Bear Island | 1 | 6.82 | 500 | 3 |
| Rockland | 1 | 31.00 | 700 | 5 |
| Saint George | 2 | 20.26 | 550 | 7 |
| MAINE—continued. | | | | |
| Cushing | 6 | 101.20 | $1,800 | 25 |
| Friendship | 22 | 429.63 | 13,375 | 76 |
| Matinicus Island | 2 | 19.06 | 850 | 6 |
| Waldoborough | 3 | 65.96 | 1,053 | 14 |
| Bremen | 4 | 52.95 | 1,075 | 14 |
| Bristol | 9 | 202.38 | 4,375 | 42 |
| Monhegan Island | 1 | 18.93 | 200 | 4 |
| Booth Bay | 2 | 15.93 | 800 | 5 |
| Portland | 14 | 186.84 | 7,750 | 52 |
| Biddeford | 6 | 48.63 | 3,050 | 23 |
| Kennebunk Port | 8 | 103.57 | 6,150 | 35 |
| York | 1 | 30.64 | 2,000 | 9 |
| Kittery | 2 | 15.09 | 550 | 6 |
| Total for Western Maine | 89 | 1,416.15 | 48,925 | 340 |
| Total for Maine | 161 | 2,818.29 | 79,710 | 671 |
| NEW HAMPSHIRE. | | | | |
| Portsmouth | 1 | 18.14 | 400 | 6 |
| MASSACHUSETTS. | | | | |
| Gloucester | 22 | 308.75 | 19,820 | 102 |
| Boston | 2 | 71.26 | 1,200 | 18 |
| Hull | 5 | 66.44 | 1,300 | 15 |
| Total for Massachusetts | 29 | 447.45 | 22,320 | 135 |
| Grand total | 191 | 3,283.88 | 102,430 | 812 |

The following tables show the yield of the herring fisheries of New England and of the Dominion of Canada in 1880, and include the catch of vessels, boats, and weirs:

*Table showing the quantity and value of herring taken in New England in 1880.*

| | Maine. | New Hampshire. | Massachusetts. | Total. |
|---|---|---|---|---|
| *Fresh herring.* | | | | |
| Pounds used for food | 4,300,000 | 18,750 | 1,216,610 | 5,535,360 |
| Pounds used for bait | 7,000,000 | 30,000 | 2,610,514 | 9,640,514 |
| Pounds used for fertilizer | 1,940,000 | | | 1,940,000 |
| *Pickled herring.* | | | | |
| Pounds of fresh herring used for pickling | 8,819,875 | 60,000 | 3,967,656 | 12,847,531 |
| Barrels of pickled herring produced | 32,830 | 200 | 15,870 | 48,900 |
| Value when pickled | $102,473 | $600 | $47,612 | $150,685 |
| *Smoked herring.* | | | | |
| Pounds of fresh herring used for smoking | 6,138,942 | | | 6,138,942 |
| Boxes of smoked herring produced | 370,615 | | | 370,615 |
| Value when smoked | $99,973 | | | $99,973 |
| *Canned herring (sardines).* | | | | |
| Pounds of fresh herring used for canning | 6,496,375 | | | 6,496,375 |
| Pounds of canned herring produced | 2,377,152 | | | 2,377,152 |
| Value when canned | $772,176 | | | $772,176 |
| Total number of pounds caught | 34,695,192 | 108,750 | 7,794,780 | 42,598,722 |
| Total value as sold | $1,043,722 | $1,200 | $95,812 | $1,130,734 |

*Table showing the quantity and value of the herring taken in the Province of Quebec in* 1880.

| Divisions.* | Fresh or pickled herring. | | | Smoked herring. | | | Page of Report of Canadian Minister of Marine and Fisheries. |
|---|---|---|---|---|---|---|---|
| | Barrels. | Price per barrel. | Value. | Boxes. | Price per box. | Value. | |
| South shore of Saint Lawrence (Cape Chatte to Restigouche) | †10,743 | $5 00 | $53,715 | 552 | $0 25 | $138 00 | 53 |
| North shore of Saint Lawrence (Manacouagan to Blanes Sablons) | †4,021 | 5 00 | 20,105 | ..... | ..... | ..... | 76 |
| Magdalen Islands | 17,644 | 5 00 | 88,220 | ..... | ..... | ..... | 100 |
| Anticosti | †1,472 | 5 00 | 7,360 | 10 | 25 | 2 50 | 106 |
| South shore of Saint Lawrence (Point Lévis to Cape Chatte) | 21,218 | 4 00 | 84,872 | ..... | ..... | ..... | 118 |
| Total | 55,098 | 4 61½ | 254,272 | 562 | 0 25 | 140 50 | ..... |

* The divisions of the Province of Quebec—*from the city of Quebec to Bersimis* and *the Saint Lawrence above Quebec* (see pp. 119 and 123, Report of Minister of Marine and Fisheries)—are omitted, having no mackerel or herring.

† *Pickled.*

*Table showing the quantity and value of the herring taken in the Dominion of Canada in* 1880.

| Province.* | *Pickled herring.* | | | *Smoked herring.* | | | Page of Report of Canadian Minister of Marine and Fisheries. |
|---|---|---|---|---|---|---|---|
| | Barrels. | Price per barrel. | Value. | Boxes. | Price per box. | Value. | |
| Ontario | 7,066 | $4 00 | $28,264 | ..... | ..... | ..... | 292 |
| Quebec | 55,098 | 4 61½ | 254,272 | 562 | $0 25 | $140 50 | 53, 76, 100, 106, 118 |
| Nova Scotia | 136,543 | 4 00 | 546,172 | 60,020 | 25 | 15,005 00 | 185 |
| New Brunswick | 125,552 | 4 00 | 502,208 | 477,340 | 25 | 119,335 00 | 215 |
| Prince Edward Island | 18,020 | †4 00 | 72,080 | ..... | ..... | ..... | 249 |
| British Columbia | ‡10 | †4 00 | 40 | ..... | ..... | 1,750 00 | 269 |
| Total | 342,289 | ..... | 1,403,036 | 537,922 | ..... | 136,230 50 | ..... |

* The inland Province of Manitoba, which of course has no mackerel or herring, is omitted. † Not given in official report. ‡ Pickled.

## 2.—THE FROZEN-HERRING INDUSTRY.

### 1. ORIGIN OF THE TRADE.

NEWFOUNDLAND FROZEN-HERRING TRADE.—The island of Newfoundland has, from its earliest discovery, been a very important locality for the herring. Different schools have appeared upon different portions of the coast at various seasons of the year. For any particular locality, however, the time of arrival and departure of the different schools has been quite constant, and, in some places, the herring have remained but a few weeks. On other portions of the coast, and particularly along the southern shores of the island, they remain during the greater part of the year, and at Fortune Bay can be taken in considerable numbers for fully eight months.

As early as 1837 a Gloucester fishing vessel visited the island for a trip of salt herring, and other vessels from the same port went occasionally a few years later. The salt-herring fisheries, however, did not become important for many years.

In those early days the fresh-fish trade of the United States was of little importance, and the present methods of icing, freezing, and shipping were little known. The present trade in fresh fish is of recent growth and is the result of a series of experiments in different methods of icing and refrigeration. In those days, when ice was not used, the fresh-fish trade was confined largely to the locality where the fish were taken, and if any shipping was done it was confined to a radius of a few miles at the most. The idea of engaging in an extensive traffic in fresh fish did not, there-

fore, present itself in the early history of our fisheries, and it was only through the experiment of a Cape Ann fisherman that the trade in frozen herring originated.

The Cape Ann Advertiser of February 23, 1877, gives the following account of the origin and growth of this trade on the coast of Newfoundland:

The frozen herring trade of Gloucester, the foundation of the prosperity of our extensive Bank fisheries, like many another important feature of our leading industry, had its origin in that spirit of adventure which is ever a characteristic of the men who man our fishing fleets and shrink at no hazard which promises profit to self and prosperity to the business community.

Previous to 1854 fresh herring found no place in the fishing industry of this port. Newburyport and other fishing towns were engaged on a small scale in the Magdalen Islands herring-fishery to supply the demand for smoked herring, but in this branch of the business the Gloucester fleet did not participate. Though an occasional trip of pickled herring was brought from Newfoundland before 1850, the idea of bringing fresh herring from that locality, "for baiting purposes and family use," was not thought of until the winter of 1854–'55.

In the fall of 1854, from representations of Newfoundland fishermen that large quantities of halibut caught on the shores of that island were annually cut up and barreled, Capt. Henry O. Smith, now a veteran skipper, conceived the idea that it would be a profitable venture to make a trip to Newfoundland and bring home a cargo of frozen halibut. Accordingly he sailed from this port in the schooner Flying Cloud some time in December, but after arriving in Newfoundland and lying in port about a fortnight, during which time he secured only about 2,000 pounds of halibut, he found that his venture would be a losing one unless he turned his attention to some other cargo than that of which he was in quest. Codfish being plenty, he concluded to obtain a quantity, and soon succeeded. The catch of herring was also large that season, and it occurred to Captain Smith that on one of his trips to George's he had brought in some herring left over from his bait, which, on account of the extreme cold weather, had become frozen stiff, and remaining in that condition had proved serviceable on the next trip to the Banks. At that time the George's fleet were obliged to rely upon the schools of herring found on the Banks for their supply of bait, first catching the bait, sometimes requiring two or three days, either on the Banks or by drifting into deeper water, before commencing to fish. The advantage of starting out with a good supply of bait suggested itself to Captain Smith, and he felt that now was the opportunity to test an experiment which might prove of inestimable importance to the fisheries of Gloucester. Accordingly he took on board about 80,000 frozen herring of prime quality, and with his assorted cargo of cod, halibut, and herring, sailed for home.

On arriving in Gloucester, in February, 1855, about 20,000 herring were sold to Mr. George W. Floyd, who took them on sleds for distribution around the Cape to bait the shore fishermen, then pursuing a profitable industry. Captain Theo. Parsons was the first to see the advantage of frozen herring for George's bait, and took 1,000 fish, while another skipper was willing to try the experiment and took 500 more. The balance of the cargo, not finding sale for bait, was taken to Boston for a market. * * * Captain Parsons sold one-half of his lot to another skipper, so that out of the herring brought by Captain Smith, three George's-men were baited, each taking 500 herring, which proved sufficient bait in those days. * * * The three vessels made speedy trips, and after eight or nine days arrived home again, one with 90,000 and the others with over 80,000 pounds each of codfish—the crack voyages of the season. The anticipations of Captain Smith were more than realized, and had there been a cargo of frozen herring then in port there would have been no need for seeking another market for the bulk of the stock.

Later, the same season, Captain McKinnon arrived from a halibut trip, bringing about 40 barrels of fresh herring on a venture; but the herring had spoiled before reaching port and were not marketed.

Gratified with the success of this venture, and unmindful of the peril attending the enterprise, Captain Smith resolved to make a second trip the same season, and sailed for Newfoundland in March, 1855, but was caught in an icefield, where his vessel was confined for a period of nineteen days, with no clear water in sight from the masthead. She was finally released, with a broken rudder, and arriving at Newfoundland took on board a cargo of oil, and returned home in safety.

The experiment having proved a success, Captain Smith determined to prosecute the business on an extensive scale the following winter. Accordingly, in copartnership with George Garland, four vessels were fitted out for trading trips to Newfoundland, Captain Smith going down in the schooner John to take charge of the business, accompanied by Captains James Ayer in schooner Mary Hart, Stephen Smith in the Flying Cloud, and John Welch in the Diadem. A Marblehead schooner was also chartered by the firm, but threw up the charter before proceeding on the voyage. The same season Capt. Andrew Leighton embarked in the business in the schooner Queen of Clippers. The Mary Hart was first laden with about 20,000 pounds frozen codfish and some 350 barrels frozen herring, and arrived home in due season, being the first to arrive, and Captain Ayer the first skipper to land a cargo of frozen herring at this port. Her arrival was hailed with joy by the George's fleet, who saw in her cargo the hopes of a repetition of the big trips of 1855. As she rounded Eastern Point she was recognized by Capt. Jesse Lewis, who was bound out on a George's trip, and who at once returned and was the first to take bait from the new stock. Before the Mary Hart's cargo was fully disposed of Captain Leighton arrived with a full cargo, and after disposing of some 30,000 herring for bait sold the rest of the cargo to Messrs. Garland and Smith, who marketed it in Boston. The Flying Cloud's fare was disposed of here. The Diadem brought a cargo of salt herring and frozen fish, which were sold in New York, and the John came home in April with cargo of fish oil, &c.

From this humble beginning may be traced the success of the herring business, which was developed into a leading business industry, and employs many of the finest vessels of the fleet. For the first dozen years the business was con-

fined to Newfoundland voyages, but of late years an extensive herring business has grown up with Grand Manan, and a few cargoes are brought annually from Nova Scotia. This herring industry enables our vessels to prosecute the Bank fisheries in February and March, when immense schools of fish resort thither, and the largest fares are brought in. It furnishes a valuable article of nourishing food for the New York, Boston, and other markets at low price.

NEW BRUNSWICK FROZEN-HERRING TRADE.—From the beginning of the present century Grand Manan is known to have been a favorite resort for the herring, and the waters off its southern head have been one of the principal spawning grounds on the entire coast. Mr. M. H. Perley, in his report of the fisheries of New Brunswick for 1850, describes these grounds as of peculiar importance, and speaks of the herring as "striking in" in such vast quantities as to completely cover the sandy spots, while immense numbers were compelled to drop their spawn on the rough, rocky bottom beyond these limits. It seems that the fisheries of this region early became important, and, according to the same authority, there were in 1849 one hundred and twenty vessels engaged in the herring fisheries of the region. A part of this fleet came from Nova Scotia, while the remainder belonged to the various fishing ports of Maine and Massachusetts.

The fisheries soon became so extensive that laws were passed to protect the spawning fish, and vessels were limited to the use of nets of 30 fathoms each, while the boats were not to have them more than 15 fathoms in length. These laws were soon changed so as to entirely do away with the fishing in the vicinity of the spawning grounds between the 15th of July and the 15th of September.

Though the fish were peculiarly abundant about Grand Manan, and also appeared in considerable numbers along the shore at different seasons, they were not known to frequent the shore grounds in any considerable numbers during the winter months prior to 1850. Mr. Perley speaks of their appearance at this time as something extraordinary. He says:

"In November last fine cod, averaging about thirty to a quintal, were taken by the hand-line fishermen between Musquash and Le Preau. At that time fine herring made their appearance, requiring nets with 2¼-inch mesh. These continued to increase in numbers until January. While this report is being written (February, 1851,) they are taken daily in considerable quantities. The appearance of large bodies of herring so close to the shore during the depth of winter is an unusual circumstance. In general they do not approach the coast until the latter part of winter or in early spring, and then in only moderate quantities."

Notwithstanding these statements, it does not seem improbable that the fish might have been abundant in these waters during the winter months for many years, and that the fishermen failed to learn of their presence on account of the lack of a market and the cold, stormy weather, which interfered to a great extent with the prosecution of the fishery. However this may be, little was done in the capture of herring in this locality prior to 1860, and even then the business was so small as to attract no attention, the greater part of the catch being used for bait by the local fishermen. Gradually, however, as the Newfoundland fisheries developed and the value of frozen herring became more generally known, the fishermen engaged to a limited extent in their capture, freezing the fish and selling them to Eastport dealers, who distributed them by wagons to the towns in the vicinity, and shipped them by steamer to the principal fishing ports, to be used for bait and food.

The shipping began in a small way as early as 1864, and in 1866 the first Gloucester vessel visited the region to engage in the fishery. Up to this time the fishery had been so unimportant that little was known of the abundance of the fish and of the extent to which the business might be prosecuted. It soon became apparent, however, that immense numbers of fish could readily be taken, and that the business could be made a very profitable one. Some vessels from Portsmouth,

Portland, and other towns began to come regularly to the region, though the Gloucester fishermen engaged in the frozen-herring trade hesitated to visit this region on account of a prejudice against the net herring, the higher price demanded by the fishermen, and the smaller size of the fish when compared with those taken in Newfoundland.

The extensive fleet engaged in the frozen herring trade soon found it more profitable to make short trips to the Bay of Fundy than to visit the more distant grounds at the island of Newfoundland, and in a few years the New Brunswick fisheries had grown to be more extensive than those of Newfoundland. The expense of a long trip to Newfoundland, together with the additional risks and exposures of the voyage, more than counterbalanced the difference in the price paid for the fish. In addition to this, there was some uncertainty as to the supply of fish in Newfoundland, as vessels had occasionally failed to secure full cargoes, while, at Grand Manan, no such scarcity of fish had occurred, and, besides, trips from Grand Manan would reach the market nearly a month earlier.

About 1868 the business may be said to have been properly inaugurated, and, from this date, it grew with surprising rapidity until in the winter of 1879–'80 it had quite supplanted the trade with Newfoundland; 8 cargoes being brought from Newfoundland, while 102 cargoes, in addition to the large quantity shipped by steamer, were brought from Grand Manan.

## 2. FISHING GROUNDS.

NEWFOUNDLAND.—The principal localities for frozen herring, as has already been intimated, are the island of Newfoundland and the southern coast of New Brunswick.

This fishery for Newfoundland is confined almost exclusively to the southern shore of the island, which is of peculiar formation, being exceedingly high and rocky and indented by numerous long and deep arms of the sea, which are frequented by immense schools of herring during the winter and spring months.

The first trip of frozen herring taken to the United States was obtained at Rose Blanche, a small harbor about 20 miles east of Cape Ray, the southwestern point of the island. Cargoes have frequently been secured at other points along the shore; the principal fishing ground, however, is at Fortune Bay, a large bay 65 miles in length, situated about midway of the southern shore of the island. This bay is irregular in shape, having a width of 35 miles at its mouth and gradually narrowing toward the center, where it varies from 10 to 20 miles in breadth. It is separated from Placentia Bay by a long peninsula, which forms its southeastern shore. This shore, though high, is comparatively regular, and, in various portions of its length has low and sloping banks. The northern shore of the bay, however, is peculiarly rough, rugged, and barren, being composed of a series of steep, rocky peninsulas intersected by deep and narrow bays, which are the favorite feeding and spawning grounds for the herring. Long Bay, or "Long Harbor," as it is locally called, has for several years been the principal fishing point of the region. This bay is about 16 miles long by a mile and a quarter wide, and during the winter months is usually covered with ice through a greater part of its length. The lower portion, however, is open, and affords an opportunity for seining and netting the fish.

Other harbors, including Saint Jacques, Bay the North, and Rencontre, were formerly important points in connection with this fishery, and vessels occasionally visit them at the present day.

NEW BRUNSWICK.—When the frozen-herring trade of New Brunswick began, the principal fishing was at Grand Manan.

This is a small rocky island, 13 miles long by 7 wide, lying about 6 miles southeast of West Quoddy Head, which is the nearest land. Vessels have regularly visited this island and obtained

full fares, and, at certain times, the principal fisheries of the region have been prosecuted from the various harbors and coves along its eastern shore.

Gradually, however, the fisheries of the main shore have become more important, and the bulk of the catch is taken there, few, if any, of the vessels going to Grand Manan for their cargoes.

The fish arrive off the southern head of Grand Manan during the month of July, where they remain until the middle of September. Late in October other schools gradually approach the shore of the main land, in the vicinity of Campobello Island, just opposite Eastport; as the season advances the numbers increase, until, in midwinter, the waters between Eastport and Le Preau are literally filled with herring, great numbers of them entering and remaining in Saint Andrews Bay until late in the spring.

The fishing begins in a small way as soon as the fish arrive, but it does not become extensive until the weather is sufficiently cool to freeze the catch. During the first of the season the bulk of the herring are usually taken in the vicinity of Deer Island and Campobello; later they are more abundant about Beaver Harbor and Point Le Preau, while in the spring the fishing is often extensive in Saint Andrews Bay. This rule is not constant, however, as the fisheries of the different localities vary greatly from time to time, one particular section being much less important in one season than another.

Herring also occur in considerable numbers along other portions of the coast, and trips have been taken at various points along the shores of Nova Scotia and Cape Breton, but there is no extensive fishery in these places.

## 3. THE VESSELS AND THEIR CREWS.

The vessels engaged in the frozen-herring trade are those that have been employed in the cod and mackerel fisheries during the summer months; many of these are among the largest, strongest, and swiftest of the fleet. In visiting Newfoundland vessels are obliged to encounter the roughest weather, and to be exposed to the strongest winter gales. In addition to this they often encounter vast fields of ice, and are frequently detained for weeks at a time. For this reason only the largest and most able vessels have been engaged in the Newfoundland fisheries, the average of these ranging from 80 to 100 tons.

In preparing a vessel to engage in this fishery it is usually brought to the wharf, after which the fishing gear and salt are removed and the hold is thoroughly cleaned. After this is done, from 20 to 50 tons of dirt or stone are usually placed in the hold for ballast and properly secured. Those vessels which have been engaged in the mackerel fisheries, however, retain their summer ballast, but usually put in a few tons additional.

After the vessels are ballasted the owners purchase a large amount of provisions, including flour, beef, and pork. In addition to this they usually carry a considerable quantity of kerosene oil, oil clothing, rubber boots, and other articles worn by the fishermen. These goods are exchanged with the natives for herring, the bulk, or even all of the cargo, often being paid for in this way. After the goods are properly stowed, it frequently occurs that the vessel takes a considerable quantity of fruits or vegetables to be sold along the coast of Nova Scotia and Cape Breton.

THE NEWFOUNDLAND FLEET.—Vessels visiting Newfoundland usually start by or before the middle of December. Those sailing first secure their cargoes and return home during the latter part of January, while those sailing later are sometimes detained until the middle or last of March.

The crews are usually hired at $20 to $25 per month to sail the vessel. The captain is sometimes hired outright, but more frequently he has an interest in the trip. Only enough men are taken to manage the vessel on the voyage, six to eight able-bodied seamen being a fair average. These

are usually men who have been engaged in other branches of the fisheries during the summer season.

On account of the rough weather and dangerous passage it is customary for vessels to "hug the shore" on the outward passage, so that they can "make a harbor" in case of bad weather, and also to obtain a market for their cargo of fruits and vegetables. They usually make several stops on the coast of Nova Scotia, and later enter the harbor of Louisburg to wait for a favorable chance for crossing the gulf between Cape Breton and Newfoundland. They usually touch at St. Pierre if the weather is unfavorable for continuing their passage up the bay. The most dangerous part of the entire trip is the passage in or out of Fortune Bay. The water is so deep that anchorage cannot be found at any distance from the land, and good anchorage can only be secured in a few of the smaller harbors. The weather is also very changeable, and vessels are frequently overtaken by snow-storms, accompanied by severe gales, in which case it is next to impossible to make the land.

Formerly, after securing their cargoes, the captains came cautiously from harbor to harbor, watching for a good opportunity to leave the bay; but, as the competition increased, the first fish arriving in market came to bring a much higher price than the later arrivals; the result has been a peculiar rivalry between the different vessels, and many of them have run great risks in order to be first at the market. Many of the more reckless captains have attempted to leave the bay when the weather was unsuitable, and many have narrowly escaped destruction, while a number have been lost in this way. Other vessels are lost on the homeward passage by coming in contact with the ice while under a heavy press of sail.

From the origin of this trade until the spring of 1877, according to the Cape Ann Advertiser, twenty-three vessels, valued at $214,500, and fifty-seven lives were sacrificed.

THE NEW BRUNSWICK FLEET.—Owing to the nearness of the fishing grounds the vessels engaged in the frozen-herring trade of New Brunswick are usually smaller and inferior in size and build to those employed in the Newfoundland trade. Many shoal-draught swift-sailing vessels employed in the summer mackerel fisheries, though unsuitable for the Newfoundland trade, are well adapted for this business; while vessels of 30 to 40 tons, from various fishing ports along the shore, are regularly engaged in it during the winter months.

The vessels going to New Brunswick seldom carry any goods to exchange with the fishermen, but buy the fish outright, paying cash on delivery.

The first of the fleet reach the ground about the middle of November, or as soon as the weather becomes cold enough to freeze the catch. From this time until the following March vessels are constantly arriving and leaving with their cargoes. Those engaging in the New Brunswick fisheries usually proceed at once to Eastport, where they obtain full information of the abundance of the fish and their market value. Some of them then proceed to the smaller harbors in the vicinity of the fishing grounds and buy their catch directly from the small boats; while others remain at Eastport and take such fish as are brought to them by the small vessels engaged in the fishery.

The first arrivals from this region in the principal markets occur during the first week in December, and the business reaches its height by the 1st of January, and continues as long as the weather will warrant.

As in the Newfoundland fishery, the captain usually hires only a sufficient number of men to handle the vessel on the voyage and to receive and stow the cargo, buying the fish directly from the local fishermen. Occasionally, however, the crews of some of the smaller vessels catch their own herring, and after properly freezing and stowing them set sail for Boston or Gloucester to market them. The crew is usually hired at from $20 to $30 a month, while the captains, with few

exceptions, have a direct interest in the voyage, either from their share in the vessel, or by special arrangements with the owners.

## 4. THE FISHERMEN OF NEWFOUNDLAND AND NEW BRUNSWICK.

NEWFOUNDLAND FISHERMEN.—The island of Newfoundland is settled only along the coast line, the interior being a rough and rocky region, wholly incapable of cultivation. At occasional points along the shore there is a small amount of arable land, which is cultivated to a certain extent; the bulk of the produce consumed on the island, however, being imported from Prince Edward Island and other points in the Dominion. With their limited resources these people are almost wholly dependent upon the fisheries for a livelihood, and many of them are living in the most abject poverty.

The principal fisheries of the island are for seal, cod, and herring; while considerable money is obtained from the sale of capelin and squid for bait in the summer season. In the section visited by the American vessels, however, the fishery is confined largely to the capture of cod and herring, and when these fisheries fail there is often a vast amount of suffering.

The Cape Ann Advertiser of January 24, 1862, gives the following with reference to the suffering caused by the scarcity of fish at that time:

"Recent news from Newfoundland reports a sad case of destitution among the inhabitants, especially in the vicinity of Placentia Bay. The unsuccessful summer fishing is the principal cause of this state of things, but it is much aggravated by the want of that winter employment which the herring fishery in Fortune Bay has afforded for some years past. The civil war in the United States, in its mischievous influences, has for the present almost if not entirely put an end to the traffic which this business produced. The Government is making every provision possible for the relief of these destitute people."

A few of the more energetic fishermen, by incessant labor and careful economy, have succeeded in accumulating a small amount of money, and some of them have been enabled to buy vessels and to build themselves suitable homes. The ones who have been most successful are those who have catered most largely to the American trade, spending the summer in the cod fisheries and the winter and spring in supplying the American and French vessels with herring and capelin for bait. Many, however, have only the rudest houses, and are deprived of even the ordinary comforts of life. Mr. Augustus Dower, who visited the island in the winter of 1879–'80, on one of the vessels engaged in the frozen-herring trade, writes in his log-book, under date of January 11: "I went into a fisherman's house to-day for the first time this winter. It was full of half-naked children, and had every indication of poverty in the extreme." This is no exceptional case, but, as we are assured by those familiar with the region, is a common occurrence in different portions of the island.

When we consider the illiteracy of these people and their extreme poverty, together with the fact that many of them are almost wholly dependent upon the fisheries for a livelihood, it is natural to suppose that there would be a peculiar prejudice against any participation in their fisheries by the people of other countries; as the capture of fish by the crews of foreign vessels at anchor in the Newfoundland harbors means simply the depriving the natives of the chance of obtaining money from the capture and sale of the fish which these vessels require. On account of this feeling the American fishermen have usually abstained from the capture of herring, and have bought their supplies largely from the native fishermen; but, as the apparatus and methods of capture employed by the Newfoundlanders have been very crude, our fishermen have been greatly inconvenienced both by the unnecessary expense and the additional time required in securing their

cargoes. For these reasons the Americans have for some time been interested in the introduction of better methods among these people. Many of the New England fishermen have recently carried purse-seines on their trips to the island in order that the herring could be readily taken in any depth of water and at any distance from the shore. They have usually placed them in the hands of the natives, hiring them to catch the fish and paying them a liberal amount for their labor. They did this, not because they could not catch their own fish, but because they did not care to antagonize these people; in fact the Newfoundlanders had threatened violence in a number of cases provided any attempt should be made by the crews of the American vessels to fish their own seines.

### INTERNATIONAL DIFFICULTIES AT FORTUNE BAY.

THE FORTUNE BAY DIFFICULTY.—Such a condition of affairs existed for a number of years, and the feeling between the fishermen of the two countries became stronger with each succeeding season. The Americans, accustomed to prosecute the fisheries by means of the more modern and expeditious methods, were greatly annoyed at the inconveniences to which they were subjected in Newfoundland. Learning that the commissioners, who had been in consultation at Halifax, had just decided that the United States should pay the sum of $5,500,000 to the British Government for the privileges granted them under the treaty of Washington, they decided that they had a right to free themselves from these restraints and to enjoy the privileges for which their Government was to pay so large a sum. An attempt to carry these ideas into practice during the winter led to the serious disturbance at Fortune Bay, Newfoundland, known as "the Fortune Bay outrage," which has caused so much trouble between the two Governments.

As the difficulty occurred in connection with the herring fishery, and most seriously affects the trade in frozen herring, a brief review of it and the steps that led to its final settlement may not be out of place in this connection, though an extended discussion of the matter in all its important bearings would lead us too far from our subject.*

It seems that in the fall of 1877 twenty-six American vessels were sent to Newfoundland for the purpose of securing cargoes of frozen herring to supply the principal New England markets. Extensive preparations were made for this trade, and after the vessels had been put in order and properly ballasted many of them took on board a quantity of merchandise to exchange with the natives for herring. Most of them were also provided with purse seines for use in catching the fish. By the middle of November many of them were under way, and three weeks later the last one had taken its departure. This entire fleet proceeded to the southern shores of Newfoundland, and one after another of them reached Fortune Bay and proceeded to Long Harbor, the principal fishing ground of the region. A number arrived early in December, and others came a little later, but as the herring had not yet put in an appearance in any quantities, the captains were obliged to anchor and await their arrival.

A few of the captains had succeeded in purchasing small quantities of herring from the native fishermen who lived in the region or who came hither in small "jacks" to engage in the fishing with nets and haul-seines; others had, as formerly, hired some of the Newfoundland fishermen to take charge of and fish their seines, paying them a definite sum for their labor. By January 5 no less than twenty-two American vessels were lying at anchor waiting for herring, and as no vessel had succeeded in getting more than a few barrels, the outlook was not very encouraging.

On Sunday, January 6, bubbles could be seen rising to the surface of the water, an unmis-

*All of the correspondence on the subject between the two Governments, together with the affidavits of the fishermen on both sides, appear in the Foreign Relations of the United States for 1879, 1880, and 1881.

takable sign that the fish had arrived. Later in the day they became more abundant, and the captains of some of the American vessels decided to "man their own seines" and thus secure their cargoes immediately. Accordingly four vessels sent their boats to lay out their seines, and others were preparing to follow, when the enraged Newfoundlanders (some of whom it is said had on the same day been fishing with nets and seines in the vicinity), seeing that all of the American vessels were likely to secure full cargoes before dark, and knowing that this would destroy their chance of finding a market for their catch, gathered on the beach and demanded that the seines be taken up, giving as a pretext that it was unlawful to fish on the Sabbath. At the same time the Americans were assured that if they did not comply with the demands that their nets would not only be opened and the fish turned out but that the seines would be destroyed.

The captain of the schooner Frank A. Smith, after a vigorous protest, decided to accede to their demands, and at once took up his seine and returned with it to his vessel. John Hickey, an Englishman, living near Fortune Bay, who had set his seine and was threatened in a similar way, followed the example of the Smith. The other American captains, however, continued their fishing and refused to desist. Captain Jacobs, of the schooner Moses Adams, had made a haul and had emptied his catch into the seine of one Thomas Farrell, a Provincial fisherman then in his employ, when the mob, for such it had come to be, attempted to liberate the fish and to tear up the seines, but Captain Jacobs, armed with a revolver, determined to protect his property. The natives, seeing his firmness, turned their attention to the two remaining seines belonging to the schooners New England and Ontario, respectively. These had been joined, and an enormous school of herring, containing upwards of 2,000 barrels, an ample quantity to load both vessels, had been surrounded, and the fishermen were fully determined to secure their fish. Finding that threats would not avail, the infuriated mob seized the seines and, after liberating the fish, tore them to pieces and divided them up among themselves as trophies of their victory. No less than sixty men were engaged in the onslaught, while fully one hundred and forty more stood by and urged them on with shouts and cheers.

This attack very naturally put an end to the seining, as no one dared to jeopardize his life and property by longer opposing the frenzied crowd. Finding that they had carried the day, the Newfoundlanders returned to their own vessels or gathered in crowds upon the shore and gave themselves over to general rejoicing. In describing the scene Captain McAulay, of the schooner Ontario, says they "made a jubilant demonstration, firing guns, blowing horns, and shouting, as if celebrating a victory, to impress upon the masters of the American vessels present that they were prepared to stand by and justify what they had done, and that the Americans might expect to be treated in future in the same manner should they attempt to catch herring in the Newfoundland waters."

On the following morning the herring had disappeared and most of the vessels were obliged to go home in ballast or with the few fish that they had already purchased. It is said, however, that several remained for a time in the hope of buying fish from the natives with which to fill up their vessels, but in this they were disappointed, for herring continued scarce and they too were compelled to return home with only partial fares.

It was not pleasant to the Americans to submit to such abusive treatment and to be deprived of the privileges for which our Government had paid the enormous sum of $5,500,000, and, though it was doubtless the proper course, yet our knowledge of these men leads us to believe that had they not been so hopelessly in the minority they would have insisted upon their rights. As it was they decided to give up the voyage as a losing one and to return home and lay the

matter before their Government, and ask that steps be taken, not only to make good their loss, but to secure to them the enjoyment of their rights under existing treaties.

The testimony of many of the fishermen was taken by the proper authorities, and the owners on whom the loss came most heavily, on account of the expense incurred in fitting the vessels, made up their claims for damages and loss amounting in the aggregate to $105,305.02. These were at once forwarded to the Secretary of State, who, after examining into the evidence, promptly instructed our minister at London to lay the matter before the British Government. An extended correspondence ensued between the two Governments and the subject was under discussion for several years.

It was at first maintained by Her Britannic Majesty's Government that the complainants had violated the provisions of local laws in three particulars: (1) The use of seines at a forbidden time; (2) fishing on Sunday; (3) "barring fish." Sections 1 and 2 of chapter 102 of Title XXVII of the Consolidated Statutes of Newfoundland, passed in 1872, on the ground of which the first and third charges were made, are in the following language:

"SEC. 1. No person shall haul, catch, or take herrings by or in a seine or other such contrivance on or near any part of the coast of this colony or of its dependencies, or in any of the bays, harbours, or other places therein, at any time between the 20th day of October and the 12th day of April in any year, or at any time use a seine or other contrivance for the catching and taking of herrings except by way of shooting and forthwith hauling the seine: *Provided*, That nothing herein contained shall prevent the taking of herrings by nets set in the usual and customary manner, and not used for in-barring or inclosing herrings in a cove, inlet, or other place.

"SEC. 2. No person shall, at any time between the 20th day of December and the 1st day of April in any year, use any net to haul, catch, or take herrings on or near the coasts of this colony or of its dependencies, or in any bays, harbours, or other places therein, having the mokes, meshes, or scales of such net less than two inches and three-eighths of an inch at least, or having any false or double bottom of any description; nor shall any person put any net, though of legal-size mesh, upon or behind any other net not of such size mesh, for the purpose of catching or taking such herring or herring fry passing a single net of legal-size mesh."

The assertion of the illegality of Sunday fishing was based upon section 4 of chapter 7 of an act passed April 26, 1876, entitled "An act to amend the law relating to the coast fisheries," which provided that—

"No person shall, between the hours of 12 o'clock on Saturday night and 12 o'clock on Sunday night, haul or take any herring, capelin, or squid with net, seines, bunts, or any such contrivance for the purpose of such hauling or taking."

Secretary Evarts, in his instructions of August 1, 1879, to Mr. Welsh, the American minister at London, claimed that, by virtue of the provisions of Articles XVIII and XXXII of the treaty of 1871, the fishermen of the United States had an unlimited and unlimitable right to prosecute the fisheries in the waters of Newfoundland and other North American British provinces during the period therein specified; that such was the intent of the two Governments at the time of its promulgation, and that it was for this privilege, which Great Britain had asserted to be more valuable than the equivalent offered in the treaty, that the immense sum of $5,500,000 had been paid by the United States under the Halifax award. To substantiate her position our Government brought forward extracts from the statement of Her Majesty's case presented to the Halifax Commission, and from the arguments of British counsel before that body, which showed their interpretation of the terms of the treaty to be substantially identical with that now maintained by the United States. He claimed that the American fishermen had not interfered in any way with the rights of British

subjects or gone beyond their treaty privileges, and refused to admit the competency of municipal legislation to nullify or diminish aught from the privileges granted by the Imperial Government. He held, moreover, that, even if the local laws could in any case have such an effect, they certainly were not so intended in the present instance, and, in support of this position, cited section 18 of the Newfoundland law alleged to have been infringed, which is as follows:

"Nothing in this chapter shall affect the rights and privileges granted by treaty to the subjects of any state or power in amity with Her Majesty."

Regarding the amount of the claim against Great Britain, Mr. Evarts said:

"The evidence in this case shows that the catch which the United States fishing fleet had on this occasion actually realized was exceptionally large, and would have supplied profitable cargoes for all of them. When to this is added the fact that the whole winter was lost and these vessels compelled to return home in ballast; that this violence had such an effect on this special fishery that in the winter of 1878–'79 it has been almost entirely abandoned, and the former fleet of twenty-six vessels has been reduced to eight, none of which went provided with seines, but were compelled to purchase their fish of the inhabitants of Newfoundland, the United States Government is of opinion that $105,305.02 may be presented as an estimate of the loss as claimed, and you will consider that amount as being what this Government will consider as adequate compensation for loss and damage."

The British Government finally acknowledged that local legislation passed after the ratification of the treaty of Washington ought not to affect the American fishermen in any of their rights, but it claimed that any laws existing prior to 1871 should be considered as binding upon our fishermen. Lord Salisbury, therefore, in his letter of April 3, 1880, omits the question of "Sunday fishing," but bases the case of his Government on an act passed by the colonial legislature of Newfoundland on March 27, 1862. He shows that section 1 of that act forbids the taking of herring with a seine between the 20th of October and the 12th of April, and further prohibits the use of seines at any season for the purpose of barring herring. In this letter he claimed that the fishermen of the United States had no right to use the shores of Newfoundland for purposes of actual fishing, and (2) that they had no right to use a seine for herring at that particular season of the year, and, indeed, that they could not use one for barring herring at any time. He states that the evidence in the case shows that "on the day in question a large number of the crews of the United States fishing vessels came on shore and from the beach barred the herring, the ends of their seines being secured to the shore." This fact alone, he thinks, would warrant his Government in refusing to pay the claims for losses sustained by our citizens.

In commenting upon the language of the treaty, he said:

"Thus, while absolute freedom in the matter of fishing in territorial waters is granted, the right to use the shore for four specified purposes alone is mentioned in the treaty articles from which United States fishermen derive their privileges, namely, to purchase wood, to obtain water, to dry nets, and cure fish.

"The citizens of the United States are thus, by clear implication, absolutely precluded from the use of the shore in the direct act of catching fish. This view was maintained in the strongest manner before the Halifax Commission by the United States agent," &c.

The American vessel-owners in their claims for damages had included not only the actual expenses of the voyage, but also the profits that might have accrued to them from the sale of the fish, these last being figured on the basis of profits in former years of vessels engaged in the same business.

Finally, in the spring of 1881, a compromise was suggested by which each Government should make certain concessions. By the terms of this compromise the British Government were to pay the actual losses incurred by the various vessels, which amounted to $52,977.26, the vessel-owners, in turn, agreeing to withdraw their claims for the additional $50,000 representing the probable profits of the business. A settlement was made on this basis, and during the following summer the money was received by our Government and paid over to the proper parties.*

NEW BRUNSWICK FISHERMEN.—The New Brunswick fishermen are, as a class, far superior to those of Newfoundland. They are very much less dependent upon the fisheries than the people of Newfoundland, and many of them only engage in the business during the winter months, when there is a scarcity of employment at their various trades, or when little can be done about the small farms of the region. They manifest a disposition of friendliness toward the American fleet, and do not seriously object to Americans engaging regularly in the work of catching the herring. The bulk of the catch is taken by the various islanders and people living along the shore, but perhaps a quarter of the entire catch is secured by the American fishermen living in the vicinity of Eastport or by those coming in small vessels from the fishing towns in the eastern part of Maine.

## 5. METHODS OF CAPTURE.

METHODS AT NEWFOUNDLAND.—The vessels on reaching Fortune Bay usually proceed to Long Harbor, where they are securely moored, head and stern, and, in addition, two lines are put out and made fast to objects on the shore. Owing to the lack of a market the fishing does not begin until the American vessels arrive, though the natives from other portions of the coast often come to the harbor and make full preparation before the vessels arrive.

When the fishing began gill-nets were almost exclusively used, but, as the work became extensive, some of the more provident of the Newfoundland fishermen provided themselves with large haul-seines. The seine-owners are usually the masters of small vessels locally known as "jacks." The first vessels owned were quite small and of an inferior model and rig. These, however, have gradually been replaced by those of larger size, until the fleet, at the present time, average from 20 to 40 tons. These vessels are employed in summer for running the catch of herring and capelin to the island of St. Pierre, where it is sold to the French fleet engaged in the cod-fisheries. These vessels are also a great convenience in the winter herring fishery, as they enable the men to follow the herring from harbor to harbor and transport the fish to other localities in case no market offers where the fish are taken.

* The following quotation includes those articles of the treaty of Washington which bear upon the points under discussion:

"XVIII. It is agreed by the high contracting parties that, in addition to the liberties secured to the United States fishermen by the convention between the United States and Great Britain, signed at London on the 20th day of October, 1818, of taking, curing, and drying fish on certain coasts of the British North American colonies therein defined, the inhabitants of the United States shall have, in common with the subjects of Her Britannic Majesty, the liberty for the term of years mentioned in Article XXXIII of this treaty, to take fish of every kind, except shell-fish, on the sea-coast and shores, and in the bays, harbors, and creeks of the provinces of Quebec, Nova Scotia, and New Brunswick, and the colony of Prince Edward Island, and of the several islands thereto adjacent, without being restricted to any distance from the shore, with permission to land upon the said coasts and shores and islands, and also upon the Magdalen Islands, for the purpose of drying their nets and curing their fish: *Provided*, That in so doing they do not interfere with the rights of private property, or with British fishermen, in the peaceable use of any part of the said coasts in their occupancy for the same purpose.

It is understood that the above-mentioned liberty applies solely to the sea-fishery, and that the salmon and shad fisheries, and all other fisheries in rivers and the mouths of rivers, are reserved exclusively for British fishermen.

XXXII. It is further agreed that the provisions and stipulations of Articles XVIII to XXV of this treaty, inclusive, shall extend to the colony of Newfoundland, so far as they are applicable. * * *

XXXIII. * * * The said articles shall remain in force for the period of ten years from the date at which they may come into operation, &c.

In seining the fish the captain usually takes his position in the bow of the seine-boat while the crew are employed in rowing the boat along within a few rods of the shore. The herring are detected by means of small bubbles rising to the surface. As soon as these are seen, one end of the seine is made fast to the shore, after which it is "shot" around the fish and the other end is again brought to the land. The net is often hauled across the mouth of a small cove and the fish are readily confined until such time as the market offers or until the weather becomes cool enough for freezing them. Again, after the ends of the seine are brought to the shore it is frequently anchored and the fish confined within its walls for several days, until they can be satisfactorily disposed of. The fish are seldom if ever hauled upon the beach, but the seine is hauled in until the fish are confined in a small space, after which they are dipped out and boated to the vessels or to the shore, as the case may be.

The catch is often very large, sometimes reaching upwards of a thousand barrels at a single haul.

The fish "strike in" in great numbers at certain seasons, and, unless taken at once, are apt to pass up under the ice out of reach of the nets, and many are thus frequently lost.

Many of the poorer fishermen who do not own seines, and who are not hired by the seiners to engage in the fishery, provide themselves with gill-nets, setting them at night in the ordinary way and visiting them early in the morning, sometimes securing a large catch in this way.

The fish taken are sometimes mixed, several sizes being found in the same school. Such fish are seldom bought by the American vessels if large fish of uniform size can be obtained—the difficulty being in finding a market for the smaller fish—and a vessel bringing a cargo of mixed fish to the United States finds it difficult to dispose of them except at reduced rates.

METHODS AT NEW BRUNSWICK.—In the New Brunswick fisheries the herring are taken exclusively in gill-nets, no seines of any kind being used. The fishermen gather from different places along the coast of New Brunswick and from the nearer fishing towns on the coast of Maine, remaining in the locality until the close of the season. Most of them have small vessels, which serve as a home and on which they dry and mend their nets. These are usually anchored in some cove convenient to the fishing grounds or in the lee of some island, where they remain until enough fish have been taken to be carried to Eastport or elsewhere for a market. The vessels engaged in this fishery vary in size from 5 to 40 tons. They are among the poorest vessels engaged in the fisheries of the American coast, a portion of them being only partially decked, with small cuddies forward for eating and sleeping. Others are the old-style sharp and square sterned vessels that have practically become worthless for the other fisheries.

Many of the New Brunswick fishermen live on the shores in the immediate locality, and use only small boats for engaging in the work.

The vessels are provided with the ordinary reach-boats, 15 to 20 feet in length. These are locally known as net-boats, and are worth about $40 each. The number varies from one to five, according to the size of the crew. The crews of the vessels average only four or five men, though they vary from two to ten. In the larger vessels one man remains on board to keep things in order and to do the cooking, while the remainder are engaged in catching the fish. In the smaller vessels all are engaged in fishing, and each takes his turn in cooking the food. Two men go in the same boat to set, tend, and haul their nets.

They usually leave the vessel about three in the afternoon for the purpose of setting, and on reaching the grounds set their nets in 8 to 25 fathoms of water, sinking them to a depth of several feet below the surface. The nets are allowed to remain until the following morning, when they are visited, hauled, and carried to the vessel, where they are picked and dried. Formerly several nets

were usually set in a string, but with the strong tides it has been found more desirable to set them separately. The depth to which they are sunk is regulated by straps, attached to a wooden float, which are placed at short intervals along their entire length and vary from a few feet to 6 fathoms. These floats hold the net in proper position, and, by shortening or lengthening the strings, *it can be set at any required depth. Anchors are also attached to each end to hold the* net in position, and, in addition, each is provided with a watch-buoy having a long line attached, so that if the net should be carried to the bottom by the weight of the fish this will still float at the surface and enable the fishermen to haul it up.

Each fisherman usually supplies himself with two nets. These are usually 2¾-inch mesh, 30 fathoms long, and 150 meshes deep. The webbing costs about $9, but when properly tanned, hung, and provided with buoys and buoy-lines a net costs little short of $20. The man is then said to be properly "geared," and is ready to ship in one of the vessels for the fishery.

The catch is very irregular, and no estimate could be given of a day's catch, for at times *almost no fish are secured, while at others the nets are so heavily loaded that they sink to the* bottom and are not strong enough to hold the weight of the fish in bringing them to the surface. Men have been known to catch nothing for weeks together, while a crew of five men have made $500 in a single night. The average season's work for two men is said to be from 120,000 to 250,000 fish to the boat, selling at 25 cents per hundred, which would be a fair average for several consecutive years. The best fishermen can make $250, while the average, after taking out the *vessel's one-seventh loss of nets and material for mending, is said to be only $150. The nets* usually last two and, with care, three seasons; but a large catch of fish injures them greatly, and they are often lost altogether, so that one must allow $25 each season for replacing them.

## 6. PRESERVING THE FISH.

METHODS OF FREEZING AND PACKING THE FISH.—As soon as the vessel has been properly moored in one of the many coves convenient to the fishing grounds, part of the ballast is thrown overboard, the remainder being retained until it becomes certain that a full cargo can be secured. The hold is then sheathed up around the sides to prevent the frozen fish from being injured by coming in contact with the salt plank which forms the ceiling of the vessel; or, occasionally, it is thoroughly dried by the use of lime. A platform is built in the bottom of the hold, being raised from a few inches to a foot above the keelson, so that the fish may be out of the way of injury from any water that may be in the hold. Two bulkheads or partitions are placed across the forward part of the hold to separate it from the forecastle. These are about five or six inches apart, and the space between them is carefully packed with sawdust or straw to prevent the heat of the stove from entering the hold and injuring the fish. If the fish are to be frozen on the vessel, which is frequently the case at Newfoundland, a large scaffold of rough boards is built for the purpose.*

*Capt. D. E. Collins, in an unpublished letter, describes the erection of the scaffold used in freezing herring on shipboard in the following language:

"*In the first place the tacks of the foresail* and mainsail are come up with, and the face-lines on the *boom are* unreeved and the sails furled to the gaffs. They are then hoisted so as to be above the scaffold, when it is built, about six feet. The scaffold is placed six feet or more above the deck. To build the scaffold a piece of scantling or joist is lashed from the fore to the main rigging on each side, and another extends on each side from the main rigging to the end of the davits. These are blocked up forward, if necessary. This being done, the fore and main booms are raised so as to form a middle support. From these side pieces small joists, generally two by four inches thick and about twenty feet in length, are laid to the booms, overlapping them about five feet. These pieces are placed all along, with about two and one-half feet space between them—the whole width of a scaffold, on a large-sized vessel, being about thirty feet—and the ends of the joists projecting over the vessel's side about three feet. These being

The lumber is usually purchased in some convenient harbor along the coast on the outward passage, and as soon as the vessel reaches the harbor the work of building begins, and as the crew are usually unskilled mechanics it is generally three or four days before the scaffold is ready for use. The journal of Mr. Augustus Dower, of the schooner Victor, of Gloucester, gives the following description of its construction:

"Strong scantling are selected, and, after being carefully spliced together, are propped up and securely lashed to the shrouds of the vessel about seven feet above the deck. These scantling extend from bow to stern on either side of the vessel. Shorter scantling are now laid across these stringers, on which the boards are nailed. After the platform has been made, boards are put up along either side to prevent the fish from sliding off, and, after being thoroughly propped from beneath, the scaffold is complete."

The scaffolds vary considerably, according to the size of the vessel, the average dimensions being ninety to one hundred feet long and twenty-five feet wide. As soon as the trip has been secured, the platform is taken down and the lumber is sold to the islanders, who usually contract for it as soon as the vessel arrives. The quantity of fish to be placed on the scaffold varies considerably, according to the weather. When the temperature is little below the freezing-point the fish must be spread very thin in order that those underneath may be thoroughly frozen; but, with a lower temperature, the fish can be heaped together to a depth of a foot or more, though in such cases it is necessary to turn them every few hours.

When the scaffold has been filled the remainder of the catch is often spread upon the deck of the vessel, where it remains until frozen. The greatest care is necessary in this work, and parties must be constantly watching the weather, day and night, to guard against loss from a sudden rise of temperature or a storm of rain or snow. The watch usually turns the fish with shovels or stirs them with his feet every few hours, and during storms of snow it becomes necessary to work constantly among them to keep them from being covered up and injured. This process is called "picking."

When the weather becomes warm, so that the fish would be thawed by exposure, it becomes necessary to "heap" them or shovel them into piles and carefully cover them with canvas or other material that will protect them from the weather. When the change comes suddenly all hands are sometimes kept busy for several hours in placing those below that are thoroughly frozen and in carefully covering the others on the scaffold or on deck.

It frequently happens that fish that have not been thoroughly frozen are placed in the hold for protection against continued warm weather. In such cases they must be again taken out and refrozen as soon as the weather is suitable for the purpose. The fish treated in this manner are considered inferior to those frozen during the first exposure.

The usual method of ascertaining whether a fish is sufficiently frozen is by breaking. If the herring bends at all in the hand it is not frozen sufficiently; but if it breaks short, like a dry stick, it is considered ready to be packed in the hold.

In New Brunswick and, to a certain extent, in Newfoundland the fish are frozen by the fishermen who catch them. After being taken from the nets they are brought to the shore in baskets

down, boards are laid over them, fore and aft, openings being left over the hatchways through which to shove the herring into the hold. Indentations are also formed in the sides of the platform abreast of the hatchways to allow the herring to be hoisted up from the boats. For additional support to the scaffold, tackles are attached to the main boom topping-lift and jib-stay. During gales or heavy storms the sails are lowered down, so that they rest on the scaffold, thus preventing it from being blown away. The fore gaff and sail, when hoisted up, are secured to the main rigging by a guy from the after end of the gaff. As many as one hundred and twenty barrels of herring have been frozen at one time on the schooner Centennial's scaffold."

and are spread out upon the land to the depth of a few inches to a foot, and occasionally stirred or kicked about by the fisherman who may chance to be on watch for the purpose of noting the weather and calling all hands in case it becomes necessary to take in the fish. The place selected for freezing is usually a clean gravelly beach above high-water mark, or a surface of crusted snow and ice, or, in case no such spot can be found, clean grassy land is occasionally used. If the day is cold they can be frozen at once, but if warm they must be kept on the vessel till night before spreading, or, in case of a continued thaw, they must be salted or thrown away. Herring kept over three or four days before they are frozen are not considered equal to those frozen immediately, as the scales of the former are apt to come off, which very much injures their appearance, while the latter remain constantly fresh and bright.

There is often a lively competition between the trading vessels as to which shall secure the largest amount of fish in the shortest time. This generally results in a rise in the price, as one vessel will frequently outbid another, and it sometimes occurs that much more is paid for the bait than it is actually worth. Another method adopted by the captains is that of winning the favor of the fishermen. This is especially noticeable by the vessels visiting the Newfoundland coast. In this region the captain who is kindest is the one who will have the preference of the fish taken by them. The Newfoundlanders are not slow to improve the opportunity of asking and accepting favors, and in the bait as well as the herring fishery many of them often board the vessel as soon as she reaches the harbor. Capt. D. E. Collins, in speaking of a visit to Newfoundland in the summer of 1879, says: "It is customary in most of the baiting-places of Newfoundland for the fishermen to flock aboard of an American vessel as soon as she anchors, and it is not unusual to see a dozen or twenty on deck at once, all eager to gather and retail the fishing news and to make arrangements for baiting the vessel. If near meal-time they may also be attracted by the hope of getting an invitation to eat, and thereby a 'square meal,' for there is a great difference between the food of American fishermen and that of the average Newfoundlander." In another place, while speaking of the competition between the vessels in securing a supply of bait, Captain Collins adds: "There being twenty-five sail of bankers here (Carboniere, Concepcion Bay), and all wild to get it with as little delay as possible, it follows, as a matter of course, that every possible effort is put forth by each. The price having reached 40 cents per hundred none of them felt like going beyond it, but every other artifice has been resorted to, and the Newfoundland fisherman, who was fortunate enough to have a good catch of squid, has been the subject of more attentions than were ever lavished upon a belle of society, and, for the time being, the bait-fisherman is master of the situation. The cook, too, with a full appreciation of the influence of a good dinner upon a hungry fisherman, keeps a well-spread table below always ready, and takes care to invite the fishermen below for a 'bite.' It is scarcely necessary to add that generally they are in no way loath to accept the invitation, and they rarely fail to do justice to the occasion."

This same fact is noticeable to an equal or even greater extent in the frozen-herring fisheries during the winter months, and we learn of instances where twenty to twenty-five natives have been fed at one time, the cook being kept constantly busy preparing food for them during the stay at the island.

In return for this kindness some of the fishermen improve the opportunity of their visit to steal certain articles belonging to the vessel, and, unless they are carefully watched, a good many things are lost in this way.

Mr. Augustus Dower, who visited Fortune Bay in the winter of 1879-'80, says in his journal of January 9: "We bought sixty-nine barrels of frozen herring from a Bay-the-North schooner, the crew of which stole two shovels, a bucket, and a pair of oars. We searched their vessel

thoroughly and found one of the shovels, the remainder of the goods having probably been thrown overboard while we were below."

The herring are carefully packed loose in the vessel, the hold, and even the cabin, being completely filled, the crew usually living in the forecastle on the homeward passage. Formerly the fish were packed in frozen snow, or a considerable quantity of snow was placed around the sides of the hold and the fish heaped together in the middle; but, for many years, this practice has been wholly abandoned, as it is found that the fish will keep equally well without the use of snow. A quantity of straw, however, is sometimes placed around the sides of the hold, and is scattered among the fish to a limited extent.

The quantity carried by the vessels engaged in the trade varies considerably. The largest schooners often carry cargoes of five or six hundred thousand fish, while the smaller ones engaged in the New Brunswick trade often carry less than a hundred thousand. The average cargo for the entire fleet would be 250,000 to 300,000.

At Eastport, a large trade has sprung up between the dealers and the local fishermen. Many of the dealers have large wooden platforms at some convenient point near the harbor, where the fish are spread and frozen, after which they are stowed in buildings lined with sawdust, to be kept until a market offers. They are then packed in rough barrels and shipped to different portions of the country, some going as far west as Cincinnati or Chicago.

## 7. MARKETS.

FROZEN HERRING FOR BAIT.—As has already been said, the frozen-herring trade originated with Capt. Henry O. Smith, in the winter of 1854–'55, his object in making the experiment being to supply the vessels engaged in the George's Bank cod fishery with bait. At this time the vessels engaged in the spring fisheries were provided with gill-nets for catching their own bait, and it was customary for them to proceed to the outer edge of the bank, where they remained for several days setting their nets to secure a supply, after which they proceeded to the shoaler parts of the bank to engage in fishing. It frequently happened that herring were scarce at this season, and more time was consumed in catching the bait than in using it.

Captain Smith succeeded in selling 500 fish to each of three vessels that were about to sail, and in addition sold a few to the boat-fishermen of the region. He was, however, obliged to carry the remainder of his catch to Boston for a market. The three vessels thus provided with bait secured large fares and made quick trips, and frozen herring at once came into general favor in this fishery. For many years, however, the fishermen took only a limited quantity, depending largely, or in part, upon their nets for their supply. They continued to buy more herring each season and to depend less upon their nets, till about 1864, when nets were wholly thrown aside and the entire trip was secured with frozen bait.

At this time from 5,000 to 8,000 fish were taken by the average George's-man for a trip of two to three weeks. Gradually the quantity of bait has been increased, and the vessels have remained longer upon the fishing grounds, until now the average George's-man takes from 15,000 to 18,000 fish for a "baiting," while an occasional vessel will use 20,000.

If the fish are to be sold for bait the vessel anchors in the middle of the harbor on her arrival, and hoists her flag in the rigging as a signal that bait may be secured. The captains of the different vessels soon come aboard to examine the fish and to arrange for purchase. If several "baiters" are in the harbor at the same time a lively competition is apt to occur, and prices are lowered accordingly. To avoid this reduction they usually agree upon a definite price, but it frequently occurs that, though they charge according to agreement, they give the captain or owners

of the vessel from $15 to $25 as a bonus for the privilege of supplying them with bait, though the item appears in the vessel's bills at regular market rates, and the crew of the George's-man are obliged to settle on this basis. This bonus was formerly paid to the captains who arranged for the bait, but of late years the owners have come to take the matter in hand, and the baiting vessels make their arrangements directly with them, paying the bonus to the owners rather than to the captains.

Probably one-third of all the frozen herring brought to the United States each season is sold to the Gloucester fishermen for bait. According to Mr. A. Howard Clark, Gloucester used in the winter of 1879–'80 9,954,000 frozen herring, and in the winter of 1880–'81 10,265,000. The price varies according to the scarcity of the fish or the competition in the market. When the supply is large the price sometimes falls to 25 or 30 cents per hundred, but at the beginning and close of the season, or during periods of scarcity, it sometimes reaches $2. The average price for the past two or three winters has been from 50 to 75 cents.

FROZEN HERRING FOR FOOD.—When frozen herring were first taken to Boston there was a peculiar prejudice against them, and it was with difficulty that a market could be found. The Cape Ann Advertiser of February 23, 1877, after speaking of the small quantity sold for bait to the Gloucester vessels, gives the following account of Captain Smith's experience in introducing this fish into the Boston market:

"The balance of the cargo not finding sale for bait was taken to Boston, when the fish merchants and hucksters refused to have anything to do with them, believing that the people would not buy and eat such fish. The captain, however, succeeded in inducing some Irish fish-peddlers to take a few at 75 cents per hundred, and soon after they commenced retailing them (at 2 cents each) it was found that a profitable vein had been struck, and the crew of the Flying Cloud had all they could do in counting out herring, the price soon advancing to $1 per hundred, until the whole was disposed of, and as many more could have been placed on the market without difficulty."

The same difficulty was experienced in disposing of the first cargo of frozen herring in the New York market. The first fish taken to that city were carried by Capt. Sylvanus Smith, in the winter of 1857. "The fish dealers were shy of the new enterprise, but finally the cargo was disposed of, and from that time fresh herring in a frozen state have been an important feature of the New York market during the winter months."

From the introduction of this fish into the leading markets frozen herring have become a favorite article of food among the laboring classes of the larger cities, and are distributed to a considerable extent among the people of the smaller country towns. They form a cheap and wholesome food at a season of the year when other fresh fish are obtained with difficulty and usually bring a high price. They have a great advantage over the ordinary fresh fish in that they can be packed in barrels and shipped to a considerable distance without danger of loss. With the exception of those sold in Gloucester for bait, nearly all of the frozen herring are carried directly to Boston and New York by the vessels, two or three cargoes being carried to Philadelphia each season. At these places they are packed in barrels for distribution, and sent as far south as Washington and as far west as the Mississippi River. Some of them after reaching their destination are thawed and salted by the dealers and sold as pickled herring, while others are salted and placed in the smoke-houses, where they are cured for bloaters or hard herring. Fish once frozen are not particularly desirable for either of these purposes, as they become very soft and their flesh is of a peculiarly dark and unattractive color.

In Boston the fish are usually sold by the hundred, while in New York they are almost invariably sold by weight.

Of the 30,875,000 herring brought from New Brunswick in the winter of 1879–'80, about ten millions were sold for bait to the Gloucester fishermen, eleven millions were brought to Boston, and two millions were sold to New York, the remaining quantity being landed in Portland, Philadelphia, Portsmouth, and the other principal cities along the coast. The price varies according to the supply; the wholesale dealer charges from 75 cents to $2 per hundred, while the retail price averages from 4 to 6 cents per pound.

## 8. EXTENT OF THE TRADE.

STATISTICAL REVIEW OF THE TRADE, 1854 AND 1880.—From the time of their first introduction into the American markets for bait and food, frozen herring have continued to grow in favor and have found a ready sale. The number of vessels engaged in the Newfoundland trade, though varying considerably from year to year, owing to various causes, steadily increased until, during the winter of 1866–'67, the United States sent 44 vessels to Newfoundland and imported 14,000,000 herring. The business of this region was most prosperous about this time, as, owing to the Rebellion, the market price of the herring was unusually high and the demand often exceeded the supply. The vessels were of large size, carrying from 300,000 to 400,000 fish each, and some of them stocked for as much as $4,000, or, in exceptional cases, even $5,000 on a trip. There were some drawbacks, however, as the fishing ground was a long way off, and the business had to be prosecuted at a season when the weather was particularly unfavorable. In addition to these, the herring fisheries of the island were not always as successful as could be desired, and vessels were at times obliged to return home with only partial fares. As the expenses of the voyage were necessarily large, a failure to secure a full cargo often resulted in serious loss to the parties interested.

Until the winter of 1866–'67 the trade had been confined exclusively to Newfoundland, and only the largest and stanchest vessels could engage in the business. At this time the trade with New Brunswick began, and on account of the nearness of the fishing grounds to the American markets and the diminished risks to the vessels from storms and other causes, a large fleet soon engaged regularly in the business, many of them making two trips during the season. The markets soon came to be well supplied with fish from this source, and the Newfoundland fleet gradually diminished until, in the winter of 1873–'74, but fifteen vessels visited the island. From this time it again increased, but the belligerent attitude of the natives in Fortune Bay and other places has had a decided influence in causing the American fleet to abandon the Newfoundland fisheries and to turn their attention to the trade with New Brunswick. The result is that in the winter of 1880–'81 only three American vessels visited the island, and the business seems to be practically at an end.

The trade with New Brunswick, on the other hand, has rapidly increased. Mr. D. I. Odell, in a letter to Professor Baird dated Eastport, Me., January 22, 1873, gives the statistics of the frozen-herring business of that region as fifty vessel loads, in addition to 500,000 fish that were packed in barrels and shipped by steamer. If we allow 225,000 fish for each cargo we have a total of 11,750,000 herring, which, at $5 per thousand, the price stated by Mr. Odell, would have a value to the fishermen of $58,750. Other authorities place the number of cargoes for the same season at 44, and the total quantity of fish at 10,900,000.

A careful investigation of this fishery in the summer of 1880 showed that the shipments during the previous winter had reached 102 cargoes, averaging 230,000 herring each. In addition to these, 9,500 barrels, containing about 475 fish each, making a total of 28,175,000 herring. These,

at 30 cents per hundred, the average price paid to the fishermen, would have a value of over $84,500. If we add to this the cost of the barrels and the labor in handling it would bring the first cost of the fish up to nearly $90,000.

According to Mr. R. C. Green and Mr. Thomas L. Holmes, two of the principal herring dealers of Eastport, about twenty-five American vessels and eight or ten large boats, with one hundred and thirty men, were engaged in the capture of the herring. During the season, which lasts from late in November to the 10th of March, these fishermen caught about 8,000,000, the remainder being taken by the fishermen of New Brunswick.

According to the statement of Capt. Henry B. Thomas, published in the Eastport Sentinel, there were shipped from Eastport and vicinity during the winter of 1880–'81 32,630,000 herring, which, including labor and barrels, had a value of $98,700 to the producers.

The following table, compiled from the files of the Cape Ann Advertiser, the Eastport Sentinel, and other sources, shows approximately the number of cargoes of frozen herring, together with an estimate of the number of fish brought to the United States each year since the origin of this trade.

| Season. | Number of cargoes from Newfoundland. | Number of cargoes from New Brunswick and Nova Scotia. | Total number of cargoes. | Estimated number of herring from Newfoundland. | Estimated number of herring from New Brunswick and Nova Scotia.* | Estimated number of herring from all sources. |
|---|---|---|---|---|---|---|
| 1854–'55 | 1 | ..... | 1 | 80, 000 | ..... | 80, 000 |
| 1855–'56 | 4 | ..... | 4 | 720, 000 | ..... | 720, 000 |
| 1856–'57 | 6 | ..... | 6 | 1, 500, 000 | ..... | 1, 500, 000 |
| 1857–'58 | 11 | ..... | 11 | 3, 300, 000 | ..... | 3, 300, 000 |
| 1858–'59 | 13 | ..... | 13 | 3, 900, 000 | ..... | 3, 900, 000 |
| 1859–'60 | 16 | ..... | 16 | 4, 800, 000 | ..... | 4, 800, 000 |
| 1860–'61 | 19 | ..... | 19 | 5, 700, 000 | ..... | 5, 700, 000 |
| 1861–'62 | 15 | ..... | 15 | 4, 500, 000 | ..... | 4, 500, 000 |
| 1862–'63 | 28 | ..... | 28 | 8, 400, 000 | ..... | 8, 400, 000 |
| 1863–'64 | 39 | ..... | 39 | 10, 700, 000 | ..... | 10, 700, 000 |
| 1864–'65 | 21 | ..... | 21 | 6, 800, 000 | ..... | 6, 800, 000 |
| 1865–'66 | 29 | ..... | 29 | 9, 500, 000 | ..... | 9, 500, 000 |
| 1866–'67 | 44 | 1 | 45 | 14, 200, 000 | 200, 000 | 14, 400, 000 |
| 1867–'68 | 29 | 8 | 37 | 9, 400, 000 | 1, 600, 000 | 11, 000, 000 |
| 1868–'69 | 32 | 12 | 44 | 10, 400, 000 | 2, 700, 000 | 13, 100, 000 |
| 1869–'70 | 24 | 20 | 44 | 7, 800, 000 | 4, 500, 000 | 12, 300, 000 |
| 1870–'71 | 23 | 36 | 59 | 7, 500, 000 | 8, 600, 000 | 16, 100, 000 |
| 1871–'72 | 18 | 26 | 44 | 6, 280, 000 | 6, 500, 000 | 12, 800, 000 |
| 1872–'73 | 18 | 44 | 62 | 6, 300, 000 | 10, 900, 000 | 17, 200, 000 |
| 1873–'74 | 15 | 34 | 49 | 5, 250, 000 | 9, 650, 000 | 14, 900, 000 |
| 1874–'75 | 23 | 33 | 56 | 8, 000, 000 | 8, 400, 000 | 16, 400, 000 |
| 1875–'76 | 20 | 52 | 72 | 7, 000, 000 | 13, 700, 000 | 20, 700, 000 |
| 1876–'77 | 28 | 57 | 85 | 9, 300, 000 | 15, 000, 000 | 24, 300, 000 |
| 1877–'78 | 26 | 70 | 96 | 6, 300, 000 | 18, 500, 000 | 24, 800, 000 |
| 1878–'79 | 10 | 90 | 100 | 3, 400, 000 | 23, 700, 000 | 27, 100, 000 |
| 1879–'80 | 8 | 102 | 110 | 2, 700, 000 | 28, 175, 000 | 30, 875, 000 |
| 1880–'81 | 3 | 118 | 121 | 1, 000, 000 | 32, 630, 000 | 33, 630, 000 |

* Including the quantity shipped by steamer from Eastport.

# 3.—THE PICKLED-HERRING TRADE WITH THE MAGDALEN ISLANDS, ANTICOSTI, NEWFOUNDLAND, AND LABRADOR.

## 1. HISTORY OF THE FISHERY.

ORIGIN AND GROWTH.—From the earliest settlement of the country, as is well known, the American fishermen have been accustomed to catch herring along the shores of New England, and in former years, when the demand was much greater than now, they often pickled or smoked considerable quantities for shipment to the larger markets, and quite a profitable business was developed. Before the close of the last century a number of American fishing vessels were engaged in the Grand Bank cod fisheries, and a little later some of them were accustomed to fish in the Gulf of Saint Lawrence and along the coast of Labrador.

Prior to the Revolution our fishermen had perfect freedom in common with all other subjects of Great Britain to catch and cure fish in any of the British North American waters, and the treaty of 1783 restored to us the right to engage in the fisheries of any part of "His Britannic Majesty's dominion in America, and also the liberty to dry and cure fish in any of the unsettled bays, harbors, and creeks of Nova Scotia, Magdalen Islands, and Labrador so long as the same shall remain unsettled." The convention of 1818, while it took from us the right to fish within three marine miles of the shore in many localities, retained for us the right to visit the western and a portion of the southern shore of Newfoundland, the Magdalen Islands, and Labrador. While engaged in the capture of codfish in these waters the crews of the American vessels came into intimate relations with the resident fishermen, and from them, as well as from their own observations, learned of the abundance of the various species at different seasons.

One of the principal fishing grounds for cod was about the Magdalen Islands, where a large fleet of vessels resorted each spring and spent a greater part of the summer in catching their trips. The fishermen soon learned that the shores of these islands were favorite spawning-grounds for the herring, and that they "struck in" regularly each season about the 1st of May and remained in enormous numbers for several weeks.

Though some of the fishermen had talked of making trips to the Magdalens, especially for herring, nothing seems to have been done toward the inauguration of the trade prior to 1822, when, according to Mr. William Webb, of Deer Isle, Me., the first cargo of Magdalen herring was brought to the United States by Capt. Jonathan Carleton, of Isle au Haut, Me. He arrived at the Magdalens in the early spring for a fare of codfish, but finding them scarce it occurred to him that it would be an excellent time to try the experiment of carrying home a load of herring. He therefore secured 350 barrels, which he landed at Isle au Haut, to be smoked for the Boston market. His venture proved a very profitable one, and the following year two or three sail were sent from the locality to the Magdalens for the same purpose. A year or two later vessels were sent from Deer Isle, Fox Island, Mount Desert, Lubec, and Eastport, and within a few years the business had spread so as to include a large number of the principal fishing towns between Eastport and Cape Cod. From 1858 to 1865 the business was particularly prosperous, and a fleet of about fifty vessels went annually to the region, bringing home full fares, which were sold to good advantage.

The Labrador herring fisheries were probably developed in a similar manner to those of the Magdalen Islands. By the beginning of the present century a small number of American vessels

were engaged in the Labrador cod fisheries, catching their bait, which consisted of capelin, herring, and sand-lant, in the vicinity, by means of nets which they carried with them for that purpose. In this way they came to know of the abundance of herring, and found that they were present during the greater part of the summer, at which time they were very fat. There being a good demand for them in the home markets, whenever the fishermen failed to secure a full fare of cod they usually took a few barrels of them on board to fill out their trips. Mr. Lorenzo Sabine, writing in 1853, describes the herring fishery of Labrador as of little importance, being at that time confined to the capture of small quantities by vessels engaged in the cod fishery, showing that there were no vessels engaged exclusively in the Labrador herring fisheries. From that date to the present time most of the herring brought from that region have been by those employed in the cod fisheries, though a few vessels have engaged exclusively in the capture of this species from time to time.

According to the Cape Ann Advertiser, the American fleet did not engage in the Newfoundland herring fisheries until 1837, when Capt. James Pattillo, of the schooner Tiger, left Gloucester about November 28, returning home in the following May with a cargo of 130 barrels of pickled herring, which were sold "at $7.50 per barrel, being the first Newfoundland herring imported into the United States." The schooner Amazon, of Gloucester, Mass., engaged in the fishery about the same time.

For some years from this time almost no vessels went to Newfoundland for this purpose, and it was only during seasons of scarcity at the Magdalen Islands, or at times when the demand was particularly good, that vessels resorted to the region in any numbers or with any regularity. Even now the business, as far as American vessels are concerned, is of little importance, and the bulk of the fish received are taken by the natives and shipped to the United States for a market.

It is said by fishermen familiar with the fisheries of Anticosti Island that the American herring fisheries of that region resulted from the failure of the fisheries of the Magdalen Islands. Some of the fishermen failing to secure their cargoes in the above locality, knowing of the abundance of herring at Anticosti, set sail for that island, and succeeded in loading up with fish of excellent quality. Prior to 1870 no vessels visited the region, and it is only recently that the fishery has been at all important, and even now the fleet is quite small.

## 2. THE FISHING GROUNDS.

THE MAGDALEN ISLANDS.—The Magdalen Islands are situated about midway of the Gulf of Saint Lawrence, in latitude 47° 30′, longitude 61° 45′. The group is composed of eight small islands, separated from each other by shoal channels varying from a few rods to half a mile in width. Their greatest length is 36 miles in a northeasterly and southwesterly direction, while their greatest breadth is but 5 or 6 miles. The shores are quite irregular, some portions being very bold and rocky, while others are formed by long stretches of sand. Amherst Island, the southernmost of the group, curves to the eastward, inclosing Pleasant Bay, the principal fishing ground for herring. The shores of the bay in its northern portion are bold and rocky, but at other points they are low and sandy. The bay varies in depth from 3 to 8 fathoms, the bottom being composed of white sand. Coffin's Island, the largest of the group, is 25 miles long, but very narrow. The other islands are named Grindstone, Allright, Grosse, Bryon, and Entry Islands. The principal fisheries are for cod, herring, mackerel, lobsters, and seals. The spring herring fishery is sometimes a failure because of the ice blockade, as in the season of 1882, when Pleasant Bay was full of ice during the entire month of May. The average annual catch of herring at these islands from 1861 to 1876, according to Mr. H. Y. Hind, was about 29,000 barrels.

*The fish arrive about the 1st of May and continue in great numbers through the spawning* season, entirely disappearing about the 1st of June.*

ANTICOSTI.—Anticosti is an island about 30 miles wide by 120 miles long, lying in the mouth of the Saint Lawrence River, about 90 miles north by west from the Magdalens, with good fishing grounds along almost any portion of its coast. The principal herring grounds, however, are about East Cape, the eastern extremity of the island. The fishing is at its height during the month of June, and vessels failing to load up at the Magdalens can reach this island in time to secure their fares. On account of an abundance of herring at other and more convenient places, few of the American vessels visit this locality.

*NEWFOUNDLAND.—Various portions of the coast of Newfoundland are visited by herring, and* they are taken, to a greater or less extent, in all of the larger bays and harbors. The principal fishing grounds, however, are Fortune Bay, on the southern side, and Bonne Bay and Bay of Islands, on the western shore, these being almost the only ones visited by the American vessels in search of pickled herring.

Bonne Bay is situated on the western shore of the island, about midway between the Straits of Belle Isle and Cape Ray. It is a small, deep-water bay, with two arms, the southernmost of which is frequented by the herring in the largest numbers.

Bay of Islands is situated about 25 miles further south, and is not only a larger but a more important fishing ground. This bay also has several arms extending 15 or 20 miles into the interior, and, like those of Bonne Bay, they are very deep. The principal fishing is in the southern arm, locally known as the "Sou'west Arm."

The fish are found in this region during the greater part of the year, visiting it in early spring for the purpose of spawning and remaining through the season to feed upon the numerous small crustacea that are so abundant in these waters. When they arrive in the spring they are quite poor, but *with such quantities of food they soon become very fat, and those caught in the fall are consid*ered superior to those taken on the American coast.

The vessels occasionally visit Bonne Bay and Bay of Islands in the spring when failing to secure fares at the Magdalens, but the principal fishing occurs in the fall. The fleet usually arrive in October and leave about the last of December, though they are frequently obliged to leave somewhat earlier to prevent being frozen in by the ice that forms in the bays. Vessels remaining too long have frequently been caught in the ice and have been detained until the following spring.

Fortune Bay, though occasionally visited by the pickled-herring fleet, is more frequently resorted to by vessels engaged in the frozen-herring trade, and will be more properly considered *under that head.*

* The following, taken from a table published by Mr. H. Y. Hind, gives the time of arrival of the herring at the Magdalen Islands each season from 1861 to 1876, inclusive:

| Year. | Date of first appearance of herring. | Year. | Date of first appearance of herring. |
|---|---|---|---|
| 1861 | May 1. | 1869 | ..... |
| 1862 | May 2. | 1870 | April 15. |
| 1863 | May 17. | 1871 | May 8. |
| 1864 | May 1. | 1872 | May 3. |
| 1865 | April 27. | 1873 | April 27. |
| 1866 | April 25. | 1874 | May 2. |
| 1867 | May 7. | 1875 | May 6. |
| 1868 | ..... | 1876 | May 5. |

LABRADOR.—The shores of Labrador are rough and barren, and with the exception of the few families gathered about the principal harbors they are almost uninhabited. The fisheries, though only partially developed, are known to be very valuable. The region is visited annually by companies of fishermen from Newfoundland, and in former times a large fleet of American vessels fished from some of the larger harbors each summer for cod. The herring are very abundant along various portions of the coast, but, though valued for their enormous size and great fatness, they are taken, in limited quantities only, by vessels engaged in the capture of other species. The fishing is confined largely to the region lying between the Straits of Belle Isle and Cape Harrison.

## 3. THE VESSELS AND THEIR CREWS.

THE VESSELS.—A large portion of the vessels engaged in the Magdalen herring fisheries in former times were those that went to Labrador for cod later in the season. The large schools of codfish visiting the Labrador coast did not usually arrive until the middle or last of June, or sometimes till the first of July, and it was customary for vessels engaged in this fishery to make a trip for herring before the cod-fishing season began. These vessels varied in size from 40 to 80 tons, the average being about 65 tons. A vessel of this size would carry 700 to 800 barrels of herring. Later, as the fisheries became more important, other and larger craft visited the locality, and during the height of the trade the largest fishing schooners and several topsail schooners and brigs, measuring from 150 to 175 tons, engaged in the work, carrying large cargoes to the different markets.

The herring fisheries of the west coast of Newfoundland have been confined chiefly to the Gloucester, Boston, and Eastport vessels of the largest size, these usually going in the fall, after returning from their summer trips to the offshore fishing banks.

Vessels engaged in the pickled-herring trade carried from 100 to 400 hogsheads of salt, and had large salt-pens, located near the center of the hold. They fitted with provisions for a three or four months' trip, and were absent from a few weeks to several months, depending largely on the locality visited and the abundance of the fish.

THE FISHERMEN.—The crews varied considerably, according to the method by which the cargoes were to be secured. In some cases the herring were caught by the vessel's crew, and in others they were bought from parties fishing in the locality. When the fish were to be purchased, only enough men were needed to salt and care for them and to sail the vessel on the passage; but when provided with an outfit for taking their own fish, a crew of ten men were needed.

## 4. APPARATUS AND METHODS OF CAPTURE.

GILL-NETS AND HAUL-SEINES.—When the fishing began, each vessel carried gill-nets with which to take its load of herring, but as the business increased it was found desirable to introduce seines for the purpose of catching larger quantities of fish and of loading in a shorter time. These were either brought by the vessels and fished by the crews, one seine answering for four or five vessels, or they were owned by Nova Scotia fishermen who came regularly to the island each season and made a business of catching fish and selling them to American vessels at a stated price. The vessels also brought gill-nets, to provide against loss in case the fish did not approach near enough to the shore to be taken by the seines. They very frequently took the greater part of their trip in this way. The usual method adopted by the American fleet was to buy the fish, as considerable time could be saved and a smaller number of men were required for the work.

If the vessels were to catch their own fish, on reaching the islands they usually anchored in Amherst Harbor and at once started out with their seines in search of the fish. Owing to the

whiteness of the sand of the bay, the presence of the herring, if in shoal water, was readily detected by the contrast between their color and that of the bottom. In case the herring remained in deeper water and failed to "show up," their presence was often known by the numerous bubbles that rose to the surface above them. It often happened that one or more of the fishermen were stationed on the top of a high hill overlooking the bay, where they could more easily detect the presence of the fish. If any were seen, the seining-masters of the vessels were at once notified, the lookout indicating by signal or otherwise the exact location of the school.

Whenever a school came within half a mile of the land it was at once surrounded by a seine, and lines made fast to either end were taken to the shore, where the hauling was commenced by some twenty-five to thirty men. While the seine was being landed, one boat was usually rowed back and forth across its mouth to prevent the fish from escaping, and whenever they attempted to swim out, oars were thrown into the water to frighten them back. The ends of the netting having been brought to land, the seine was gradually hauled in until the fish were confined in a small space, after which the seine was made fast and the dipping began.

The catch was often enormous, sometimes reaching four or five thousand barrels at a single haul. At such times it was very difficult to get the ends of the seine to the shore. When only a small haul was made, a smaller and lighter seine was occasionally shot inside of the large one, so that the fish could be more easily handled.

The extensive fishing is said by some to have caused a diminution of the supply, and it frequently happened that the bulk of the fish remained in the deeper water at a considerable distance from the shore, and consequently could not be taken in sufficient quantities to supply all the vessels, and many that had not provided themselves with nets were compelled to return "light" or with only partial fares. To overcome this difficulty the Gloucester vessels began bringing their purse-seines which they used in summer for catching mackerel. With these they were enabled to fish in the deeper waters of the bay, at any desired distance from the shore, and they were often very successful when the haul-seines secured almost nothing.

PURSE-SEINES.—The first purse-seines were carried by Gloucester fishermen about 1865, and from this date to 1872 the large part of the herring was taken in this way. Many of the fishermen of other towns, including Eastport, Lubec, and Lamoine, soon began to use purse-seines, and all were for a time very successful.

For various reasons, principal among which were cleanliness and convenience of handling, the herring were never landed on the beach, and even when the fish had been inclosed in a haul-seine they were simply drawn towards the land until they were brought into a compact mass, after which they were taken out by means of dip-nets into small boats and carried to the vessel. The boats used are usually the ordinary "Hampton" build, 20 to 25 feet in length. Each vessel carried from two to four of these, for transporting the fish from the seine to the vessel. Sometimes the crews of twenty or more vessels would be engaged in dipping from the same net, each vying with the other in securing the largest possible quantity before the supply should be exhausted. The competition has at times been so great that some in their greediness have loaded their boats so heavily that they have been swamped in the rougher water on their way to the vessel. Large, long-handled dip-nets were used in transferring the fish to the boats, one man handling the net and the other assisting in "rolling in the fish." As soon as the boat had been loaded it was rowed at once to the vessel, which usually lay in the harbor, from 1 to 4 miles distant. On arriving the fish were thrown upon the deck, to be cared for by those on board, and the boat returned for another load. From three to seven loads could be taken by a boat in a day, the number depending, of course, upon the distance to which the fish must be carried and the condition of the weather.

The purse-seines are used in a manner exactly similar to that of the mackerel and menhaden fisheries, and they have a great advantage over the drag-seines, especially as they are set in the deeper water at a considerable distance from the shore, where the vessels can be brought alongside and fastened to them; and the herring can be landed directly upon the deck by means of large dip-nets. This is a great saving of time and labor, as no men are required for boating, and the trips are, as a rule, much more easily and quickly secured.

METHODS AT NEWFOUNDLAND AND LABRADOR.—On the west coast of Newfoundland, according to Captain Collins, the fish are taken almost exclusively in gill-nets, as they usually remain in the deep arms of the bays, where they cannot be seined. The fishing is carried on wholly by the natives of the island, who seriously object to the use of nets or other apparatus by American fishermen. For this reason the Americans seldom attempt to catch their own trips, but buy them from the jack (small vessel) and boat fishermen of the islands. The vessels engaged in this trade usually proceed to some convenient cove or harbor, where they remain until a trip box has been secured, the fishermen bringing the herring to the vessel as soon as they have been taken. When for any reason the fish are scarce in the locality first visited they proceed to another harbor, and are sometimes obliged to visit several before securing full fares. The captains before starting from home often purchase a considerable quantity of provisions, such as flour, pork, and beef, besides various articles of clothing, and an assortment of trinkets. These articles are taken to Newfoundland and given to the natives in exchange for their herring. In fact the American fisherman often becomes a trader, having his stock of goods on his vessel, where he is visited by many of the islanders, who frequently purchase considerable quantities. The practice is of great advantage to both parties, as one is enabled to make a fair profit on the goods and the other secures necessary articles of food and clothing, which otherwise it would be almost impossible to do on account of the absence of any resident in the region. At one time the method of barter was almost universally adopted in the trade with the herring-catchers of the island, but of late years a good many captains are paying cash for their cargoes.

On the coast of Labrador the herring are usually taken in ordinary gill-nets carried by the vessels for this purpose. A few, however, are taken by means of small haul-seines owned by the natives of the various harbors or by the Newfoundland fishermen who spend their summers in this country.

## 5. LAY OF THE FISHERMEN.

When the fishery began the vessels carried nets for catching the fish, and the crew fished on shares. In this case the owners provided the vessels with the necessary outfit, including provisions, while the fishermen furnished their time and labor, receiving one-half of the net proceeds of the trip for their services. This was also the case when the vessels carried purse-seines. When they bought their fish, however, it was customary for the owners to hire a sufficient number of men to handle the vessel on the passage and to hire men and boats at Canso, or some other point along the shore, to transport the fish from the nets to the vessel, paying them a definite sum for their services and leaving them at their homes on their return. In other cases a contract was made with the foreign fishermen to furnish the fish on the vessel's deck, where the crew were of course in readiness to receive and care for them.

In the fall and winter fisheries of the Newfoundland coast the fish are purchased, as already stated, a larger number of men being required to sail the vessel on account of the storms that frequently occur at this season.

## 6. METHODS OF PRESERVING THE FISH.

SALTING IN BULK AND IN BARRELS.—Various methods have been adopted by different parties in the same and different localities for salting the fish and stowing them in the hold of the vessel. A common method, known to the fishermen as "salting in bulk," is often employed. By it the fish are thrown upon the vessel's deck as they come from the water, and a quantity of salt is sprinkled upon them, after which they are thoroughly stirred with large wooden shovels, made expressly for the purpose, that the two may be thoroughly mixed. From 4 to 5 pecks of salt are required for each barrel of fish. When properly salted the herring are shoveled into the vessel's hold, a wooden shoot being usually arranged in the hatchway to carry them in any direction desired. They are then shoveled against the bulkheads and sides of the hold until it has been completely filled, or till a sufficient quantity have been secured.

The "salters" are men detailed expressly for the work, and it is their duty to see that proper care is taken in mixing the salt evenly among the fish, and that a sufficient quantity is used to properly cure them. These frequently prefer to salt the fish in the hold, in which case the herring are shoveled down the hatchway, a few at a time, and the salters add the requisite amount of salt as the work goes on. The fish are then thrown to one side and stowed loose as before.

The method of salting in bulk, although extensively adopted, is very crude, and the work is generally done in a hurried and careless manner; the result being that the fish often reach the market in poor condition, and are sometimes even unfit for food. This more frequently occurs with the fish taken at the Magdalens, where the fishermen are obliged to work very rapidly in order to care for the fish as fast as they are secured. At Newfoundland and other places, however, the catch is not so large, and the salters have ample to cure them properly.

Even when carefully salted, the bulk herring, when transferred to barrels and covered with brine, are said to be inferior, both in color and flavor, to those that have been put in pickle while fresh; for smoking purposes they are, however, as good as those prepared in other ways, and during the height of the Magdalen trade the greater part of the bulk herring were sold to the smokers. On account of the difficulty of making good pickled fish out of the bulk herring many of the vessels were formerly provided with a quantity of barrels and hogsheads, which were arranged in the bottom of the hold so that the fish would fall in and around them as the hold was being filled. The barrels thus served to retain the moisture that drained from the fish above, and those contained within were in this way kept constantly covered with pickle, and when the cargo was landed they were sold as pickled fish, while the others were used for smoking.

There are several advantages in the method of salting in bulk, the principal one being the saving of the cost of the barrels required for holding the fish. Again, the quantity that a vessel will carry is greatly increased by this method; for though the vessel may be loaded "scupper deep" in the water before starting, the moisture soon begins to drain from the fish, and can be pumped out in sufficient quantities to lighten the vessel sufficiently for the voyage. Some time is also saved on the voyage, as the fish can be handled so much more rapidly.

Herring are also salted in barrels in the ordinary way, each package being filled with pickle before it is stowed in the hold. This method has been frequently employed in the Magdalen fisheries, but it is much more common among the fleet visiting Bonne Bay and the Bay of Islands.

Nearly all of the herring brought by this fleet are known to the trade as "round herring"; that is, they are fish that have been salted just as they came from the water, without even being cut open. A few, however, more particularly of the Newfoundland fish, are cut or torn open and the gills and entrails are removed before salting. These are called "split," or gibbed, herring. The

wives and children of the native fishermen are usually employed for this work. They sometimes work on shore, but as frequently they board the vessel and work on her decks on account of the convenience of handling the fish. Many of them have become very proficient in this work. In most cases the knife is dispensed with, the gills being removed with the thumb and forefinger, and the entrails are drawn out through the opening thus made.

When the vessels arrive home those fish intended for pickling, whether previously packed in bulk or in barrels, are at once taken out and thoroughly washed. They are then packed in barrels with strong new brine, and inspected or not, according to the laws of the State where they are landed, after which they are ready for the market. Those intended for smoking, however, are taken out gradually as they are needed, and soaked from 24 to 48 hours, after which they are strung and again washed before being placed in the smoke-houses.

The fish from Labrador and Newfoundland, being of superior quality, are usually pickled and bring a high price in market. Those from the Magdalens, on the contrary, being taken during the spawning season, are of an inferior grade and are chiefly used for smoking. During the height of the trade the pickled fish from that region were sold to the poorer classes in the Southern States, or were shipped to the West Indies.

SMOKED HERRING.—Formerly, many of the vessel-owners engaging in the Magdalen fisheries had a number of smoke-houses where they prepared the fish before sending them to market. After smoking, they were packed in boxes and shipped to Boston, New York, and Philadelphia for exportation. On account of their large size and poor condition they always rank lower than any other brands and have never been extensively used by the people of the Northern States, the bulk being consumed by the laboring classes of the South. Some of the firms extensively engaged in the smoked-herring trade had no interest in the vessels, and it was customary for these to contract with the vessel-owners or masters for cargoes at a stated price; and they sometimes even chartered the vessels outright, and assumed the responsibility, making their own arrangements with the fishermen.

## 7. EXTENT OF THE FISHERIES AND THE EXPORT TRADE.

THE FORMER IMPORTANCE AND THE DECLINE OF THE FISHERIES.—As has been said, the first vessel visiting the Magdalen Islands for herring went from Isle au Haut, Me., in 1822. From this date the business spread rapidly to other fishing towns of the New England coast, and within a few years a large fleet was engaged in the business.

Mr. Lorenzo Sabine, referring to the Magdalen herring fisheries in 1853, gives the following statement with reference to the extent of the fisheries in 1839, together with his comments upon them:

"Capt. R. Fair, in command of Her Majesty's ship-of-war the Champion, visited these islands officially in May, 1839, and after the commencement of the fishery. He found the 'quantity of herrings very great, exceeding that of any former year; and the expertness and perseverance of the American fishermen' to be 'far beyond that of the colonists.' 'About one hundred and forty-six sail of American fishing schooners, of from 60 to 80 tons, and each carrying seven or eight men,' were engaged in it, he continues, and caught 'nearly 700 barrels each;' making for the number stated, 'a presumed product of 100,000 barrels, of the value of £100,000; the tonnage about 10,000, and the number of men about one thousand.' Whatever the statistics of the year in question, the average quantity of herrings caught by our vessels is not probably 40,000 barrels; while the price—*a pound sterling the barrel*—is quite fifty per cent., I suppose, above that generally received in any market in the United States for the article of 'Magdalene herrings.'"*

* Sabine's Report on the Principal Fisheries of the American Seas, 1853, pp. 195, 196.

Mr. Sabine, though thoroughly posted on various branches of the fisheries, seems to have less positive information as to the extent of the Magdalen fisheries of this time, for we have it from good authority that the fishery was much larger than would be supposed from his statements.

The Barnstable *Patriot* of June 21, 1859, says:

"A writer from Eastport states that no less than 30,000 pounds of Magdalen herring have already been brought to that place the present season and are now ready for market. They will find a quick sale, thus bringing into the small place $00,000 for a few weeks' labor in one department of the fisheries."

A letter from the Magdalen Islands, printed in the Halifax *Express* of April 30, 1860, says:

"One hundred sail have already arrived for herring, but the bulk of the fleet are detained in Canso by head winds."

Mr Fox, the collector of customs at Magdalen Islands, testified before the Halifax Commission that in 1861 he counted five hundred American schooners engaged in fishing near the island. It is probable, however, that the majority of them were engaged in the mackerel rather than in the herring fishery.*

No records have been kept of the interest of the United States in this fishery, and it is difficult to show its extent with any degree of exactness. The height of the business occurred between 1855 and 1861, when it is claimed that between two hundred and three hundred American vessels were engaged in this trade each season, including the small fleet engaged in the Newfoundland and Labrador fisheries. The cargoes varied from 500 to 1,200 barrels, according to the size of the vessel, the average being about 800. The price received for the fish in the American market varied from $1.75 to $2.50 per barrel, according to the demand.

In addition to the American fleet a few vessels from Nova Scotia and other of the British provinces were engaged in the fishery, smoking their fish before bringing them to the United States for a market. Other of the British Provinces probably caught or purchased considerable quantities of herring in the same locality each season.

From 1861 the fishery as far as American vessels are concerned has rapidly declined. Various causes have operated to bring about this result. The quantity of fish, according to some authorities, has greatly decreased from overfishing, and during certain seasons the catch has been insufficient to supply the fleet. At such times the vessels have been obliged to return home with only partial fares. Instances are cited where the fisheries have either partially or wholly failed. In 1862 the catch is said to have been small. In 1870 the fishery was a total failure, and 1873 was a repetition of 1870. Others claim that the fish are still nearly or quite as abundant as formerly, and that other causes have operated to reduce the catch.

*The following table, published by Mr. H. Y. Hind in his communication to the Halifax Commission in 1877, purports to show the total catch of herring at the Magdalen Islands for each season from 1861 to 1876, inclusive:

| Year. | Number of barrels of herring taken. | Year. | Number of barrels of herring taken. |
|---|---|---|---|
| 1861 | 41,500 | 1869 | 70,800 |
| 1862 | 9,195 | 1870 | 2,915 |
| 1863 | 26,500 | 1871 | 52,575 |
| 1864 | 3,000 | 1872 | 17,823 |
| 1865 | 29,640 | 1873 | 4,647 |
| 1866 | 10,893 | 1874 | 12,137 |
| 1867 | 15,620 | 1875 | 49,951 |
| 1868 | 30,000 | 1876 | 77,443 |

With these conflicting opinions it is impossible for us at so great a distance to arrive at any positive conclusions as to the varying quantities of herring that resort to the islands each spring, but it is certain that the size of the fleet has been greatly reduced by the loss sustained by natural causes, such as storms and encounters with ice.*

The great decrease in the demand and the uncertainty of reaching the grounds have also played their part in reducing the fleet. The expense of fitting for the trip is considerable, and the loss of time of both vessels and men when they could be profitably employed in other branches or the fisheries caused the parties interested to avoid uncertainties as far as possible. The loss sustained by the owners on several occasions was so great as to cause them to exercise considerable caution lest a repetition of the same should occur. The Gloucester Telegraph of May 25, 1870, gives the following account of the fisheries in the spring of that year:

"Five vessels of the Magdalen Island herring fleet arrived home on Monday and two yesterday; the balance of the fleet will soon be along. This fishery has proved an entire failure this season, the vessels being unable to find herring, and returning home virtually empty. The failure of this branch of the fisheries this season entails a large loss upon Gloucester, as an unusually large fleet fitted away in this business, all of which have lost the time consumed on the trip, as well as the considerable expenses of the voyage. The vessels are all of the first class, and might have been profitably employed elsewhere.

"The herring made their appearance on the coast and in the rivers fully a month earlier than usual, and had disappeared before our vessels put in an appearance at their regular haunts at this season. The fleet from the other fishing towns of New England, though much smaller than the Gloucester fleet, met with the same ill success. Lamoine, Me., had ten vessels in this fishery, all of which together did not secure enough to make a single full fare. Newburyport had two vessels in the fishery, both of which have arrived home, one with 50 barrels of herring to show for a month's work, and the other without a single herring."

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* "These islands [Magdalens] were visited on the 23d August by one of the most terrific hurricanes which have ever yet swept the gulf, and lasted till the 26th. At the beginning of the gale there were 83 vessels anchored in Pleasant Bay. Of this number 48 broke away from their moorings and were stranded (10 on the shores of Pleasant Bay and 38 in Amherst Harbor), and 26 were able to make the harbor and anchor in safety, while 9 rode out the tempest with their anchors and cables. From what I have heard it must have been a fearful sight to witness these little vessels struggling against the gale, and, finally conquered by the contending elements, strike against the rocks during the cruel hours of darkness. It seems almost incredible that three persons only were drowned when we look at the deep cliffs on which some schooners grounded. The unfortunate men belonged to the E. J. Smith, of Wellfleet, United States, which vessel came ashore during the night under the cape at the entrance to Amherst Harbor and went to pieces two hours afterwards. Some other vessels, such as the Diploma, Helen C. Woodward, and Emma L. Rich, after tossing about and losing their anchors, ran ashore on a solid ledge at the foot of the Demoiselles Hill, where the sea was breaking 100 feet high! The crews of these vessels would most probably have been lost had not two of the islanders, Aimé Nadeau and James Cassidy, seen them coming ashore. These hardy fellows let themselves down the side of the cape by a rope, and were saved with the help of Cassidy's Newfoundland dog, which plunged into the surf and seized the men, bringing them all on shore. Had it not been for this courageous behavior on their part, thirty-one more lives would in all probability have been lost.

"Among the stranded vessels was a Jersey bark, the Swift, Captain Le Sellour, who had on board one hundred and thirty fishermen from the islands, all returning from Blanc Sablons. Most luckily for her passengers she was able to be guided to a sand bank at the entrance to the harbor when she lost her moorings. Had she gone a little to leeward there would have been a fearful loss of life to chronicle. A steamer, the Commerce, from Boston, with the agent of the insurance offices, Captain Proctor, and all the appliances on board necessary to haul off vessels, was sent by the interested parties to give what assistance she could. Several schooners were got afloat, but I doubt if all will be as lucky. The United States Government also sent a vessel, the revenue cutter Woodbury, Commander Barr, to render what assistance he could in the way of transporting distressed fishermen back to their homes. Most of those shipwrecked men had, however, left in the schooner before she arrived. The gale will long be remembered by all seafaring men, not only for its duration but for the destruction it caused to life and property all throughout our gulf—many are the families left fatherless and with scanty means of subsistence. Let us hope our shores will never again witness such a storm, or at least that a great number of years will elapse before its occurring again."—Sixth Annual Report of the Department of Marine and Fisheries of Canada, 1872–'73, Appendix B, pp. 53, 54.

N. Lavoie, in his "Report of the Cruise of the Government Schooner La Canadienne in the River and Gulf of Saint Lawrence for the Season of 1870," gives another and more detailed account of the fisheries, from which we learn the extent of the catch at the islands for two seasons and the exact size of the American fleet. He says:

"The yield of the first part of the season in herring fishing was much below an average, if we can call fishing a catch of 2,100 barrels of fish divided between one hundred and nineteen schooners and the whole of the islands fishermen. The same fishery yielded in 1869 75,000 barrels. The failure is in nowise to be attributed to a want of fish in the waters of Pleasant Bay. They resorted thither as usual to spawn, but owing to an early spring and the early disappearance of the ice, the fish struck in three weeks earlier than usual, thus disappointing the expectations of foreign as well as of our own fishermen. At the date of our reaching Magdalen Islands we found one hundred and nineteen schooners from the United States in Amherst Harbor and Pleasant Bay. They were expecting new shoals of herring, but they waited in vain; the fish did not come. The first schooners of the spring fleet arrived on the 27th, the second and third on the 28th April. A few herring were still near shore when these fishermen arrived. They managed to catch about half a cargo on their first arrival, but next morning the fish were all gone.

"It is useless to remark here that the owners and outfitters of these vessels must have suffered heavy loss from the disappearance of herring. On the 18th of May, thirty schooners, which had been detained by the ice, reached the islands for the same fishery, but on finding out that it was over they immediately left. Mr. Painchaud, of Amherst Island, is the only one who has been provident enough to supply himself with seines and salt. He caught 1,100 barrels in two hauls, which pays him a hundred fold for the cost incurred. This improvident spirit displayed by our people is the more to be regretted, as, when they repair to the coast of Labrador again for herring fishing, they are still at the mercy of foreign fishermen, and often return empty-handed after undergoing great hardships and danger."*

Again, in his report for 1873, Mr. Lavoie, in referring to the herring fisheries, shows that though fish were plenty, the fisheries were almost a total failure owing to the abundance of ice that caused most of the fleet to abandon their voyage and return home. He writes as follows:

"Herring made its appearance along the shores of this coast several days sooner than last year, and on the 27th of April Pleasant Bay was full of them. As I have said before, the greater part of the herring fleet were unable to reach the islands, and had to put back to their respective ports on account of the large quantity of ice they met with in the straits or gulf. Four schooners, however, were able to make their way to Amherst Harbor, and to complete their loads in a few days. The following gives their names, tonnage, &c.:

| Date of arrival. | Name of vessel. | Port of registry. | Master. | Tons. | Men. | Boats. | Nets. | Seines. | Barrels. |
|---|---|---|---|---|---|---|---|---|---|
| May 13 | A. B. Higgins | Lamoine | A. B. Higgins | 42 | 8 | 2 | ..... | 1 | 800 |
| May 14 | Susan | Canso | J. Walker | 19 | 4 | 2 | ..... | 2 | 300 |
| May 22 | Hero | Prince Edward Island | McKay | 29 | 3 | 1 | ..... | ..... | 500 |
| May 23 | Anemone | Anticosti | Battersy | 10 | 4 | 1 | ..... | ..... | 50 |
| | | | Total | 100 | 19 | 6 | ..... | 3 | 1,650 |

"On the 27th of April some fishermen from the islands had a cast of the seine, which brought in about 300 barrels of herring. Only a few barrels were, however, saved, as with their usual negligence they had not thought of procuring last year the means of pickling their fish this spring. Salt was too dear and the price of fish too low to allow them to take advantage of their good luck.

* Annual Report of the Department of Marine and Fisheries of Canada, 1869–'70, pp. 222, 223.

"Owing to the above-mentioned causes the herring catch of 1873 is much inferior to that of 1872. In that year 14,806 barrels of it were caught by foreign vessels, while 2,956 barrels were prepared by the inhabitants.

"From what I have heard herring was not much more abundant this season than last."*

From that time the fleet has been so small as to be quite unimportant, and during several recent seasons no vessels have visited the Magdalens for herring. We know of but one vessel that engaged in the trade in 1879, and in 1880 it is said that none were employed. According to Mr. A. Howard Clark, herring were plenty at Magdalen Islands in the spring of 1881, when two Gloucester and four Boston vessels brought home 2,500 barrels salted in bulk. They were taken in a haul-seine carried by one of the fleet, all of the fishermen assisting in the work of capture. Nearly all of the fish were landed in Boston.

The Newfoundland and Labrador herring fisheries are so wholly different from those just described that it is difficult to give any statistics of the quantity of pickled herring brought home by American vessels. The fish being present during a greater part of the year, the fleet visiting these localities for other species often bring home partial cargoes of herring, and no vessels can be said to be regularly engaged in the pickled-herring trade with either place, though a few vessels fit out for trips to some of the principal harbors whenever they chance to be otherwise occupied, provided, of course, that the condition of the herring market will warrant such a venture. From our limited information on the subject we would say that from six to ten cargoes, aggregating 3,000 to 4,000 barrels, would be landed yearly by American vessels. This represents, of course, only a small part of the herring brought to the United States from these places, as the various transportation lines bring considerable quantities and a number of cargoes are brought by the fishing vessels of the provinces. In addition to these, American vessels are engaged in running frozen herring during the winter months. The following table, compiled from those given under oath before the Halifax Fishery Commission, by James S. Hayward, assistant collector of Her Majesty's customs at St. John's, Newfoundland,† shows the quantity of herring imported into the United States from that island each year from 1851 to 1876, inclusive:‡

| Year. | Herring. | | Year. | Herring. | |
|---|---|---|---|---|---|
| | Barrels. | Value. | | Barrels. | Value. |
| 1851 | 2,538 | $6,134 | 1864 | 22,512 | $81,043 |
| 1852 | 9,259 | 15,000 | 1865 | 34,633 | 121,216 |
| 1853 | 6,640 | 18,326 | 1866 | 40,957 | 122,871 |
| 1854 | 2,166 | 4,939 | 1867 | 37,418 | 112,254 |
| 1855 | 8,904 | 29,968 | 1868 | 40,199 | 120,597 |
| 1856 | 6,652 | 22,824 | 1869 | 37,651 | 112,953 |
| 1857 | 18,478 | 55,430 | 1870 | 19,833 | 79,332 |
| 1858 | 21,247 | 63,739 | 1871 | 31,863 | 95,589 |
| 1859 | 30,123 | 72,299 | 1872 | 26,551 | 79,653 |
| 1860 | 27,460 | 65,904 | 1873 | 35,664 | 106,992 |
| 1861 | 22,550 | 55,120 | 1874 | 26,701 | 69,503 |
| 1862 | 13,251 | 31,800 | 1875 | 45,208 | 108,724 |
| 1863 | 35,736 | 120,072 | 1876 | 28,875 | 92,647 |

EXPORT TRADE.—For many years the fish dealers of several of the larger cities have been

*Sixth Annual Report of the Department of Marine and Fisheries of Canada, 1872–73. Appendix B, pp. 55–56.

†See Documents and Proceedings of the Halifax Commission, 1877. Vol. II, pp. 1509–1518.

‡In the original tables no mention is made of fresh or frozen herring prior to 1872, but they were probably included with the pickled fish up to that time. Since 1872 the pickled fish have been separated from the others, but we have combined them so that the table given here may represent all of the herring imported during the period mentioned.

accustomed, when sending cargoes of dried and pickled fish to the West Indies and other countries, to include a quantity of herring, though they have seldom sent cargoes composed exclusively of herring. This has been particularly true of Boston, and more herring have been sent from there than from any other port. There seems to have been no well-established trade in this particular fish, however, and the quantity sent has varied considerably from year to year, depending largely on the catch and the price, and none of the merchants seemed to exert themselves to secure a supply.

Our market has as a rule been restricted to our own continent, as most of the European countries have large and prosperous herring fisheries, which not only furnish an abundance for their own people, but supply many of the other countries with all that their markets require.

We can, therefore, not expect an extensive European trade so long as our own fishermen give so little attention to the fishery, unless the failure of some of the herring fisheries of Europe shall create a demand that will warrant our merchants in importing herring in considerable quantities from Nova Scotia, Newfoundland, and Labrador. Such a condition presented itself recently, when the failure of the spring herring fisheries of Norway for several consecutive seasons gave a favorable opportunity for our merchants to engage in the trade. The Norwegian herring fisheries are among the most important in the world, and her fishermen not only catch fish for their own country, but they supply Sweden with enormous quantities and send a good many to the countries farther south. The "summer herring," it is said, still put in an appearance along the north coast, but the supply is much below the requirements of the home and export trade.

The Gloucester merchants saw this opening, and with characteristic energy decided to try the experiment of sending cargoes of pickled herring to Sweden, Ireland, and even to Scotland.

The first cargo of herring exported to Europe from this great American fishery port was sent by Messrs. D. C. & H. Babson, who have from the first been more largely engaged in the trade than any other parties. The schooner Nulli Secundus, formerly of Gloucester, was the first vessel to sail. Having been sold to Capt. Caleb Lindahl, of Gottenberg, Sweden, in January, 1876, for the cod and halibut fisheries of Greenland, and being about to sail to Gottenberg to fit out, it was decided to load her with herring. She cleared from Gloucester on the 1st of February and from Halifax on the 14th, arriving in Sweden March 8. The venture proved a profitable one, and a new vessel, the Herman Babson, left Gloucester for the Magdalen Islands on the 27th of April to load with herring for the Gottenberg market. Other vessels followed in rapid succession, some of them belonging at Gloucester and others being chartered from other places on Gloucester's account until, by the 1st of February, 1877, thirteen cargoes had been shipped, Messrs. Babson alone, according to their statement before the Halifax Commission, having handled 28,208 barrels, of which 16,063 were caught on the American shore, and 12,145 came from the Provinces.*

*The statement of Messrs. Babson was as follows: We have been asked to make a statement of the number of barrels of herring caught in American waters on the coast of the United States, and the number of barrels of herring caught in foreign waters during the last year handled by us, and to state the relative value of each barrel in its green state, as it is when taken from the water. We find upon examination of our books that we have taken in our business during the last year 28,208 barrels of herring. Sixteen thousand and sixty-three barrels were caught on the coast of the United States between Eastport, Me., and Provincetown, Mass. The herring cost us for those caught on the coast of the United States from $2.25 to $2.75 per barrel; that is, for the herring, not including the barrel, salt, labor, &c.

Twelve thousand one hundred and forty-five barrels were caught on the coasts of Newfoundland, Cape Breton, Nova Scotia, Magdalen Islands, and Labrador, as follows:

| | |
|---|---|
| Caught at Fortune Bay, Newfoundland | 8,587 |
| Caught at Port Hood, Cape Breton | 200 |
| Caught at Nova Scotia (coast) | 348 |
| Caught at Magdalens | 510 |
| Caught at Bay of Islands, Newfoundland | 2,500 |
| | 12,145 |

More than ordinary care was taken in packing the first two or three cargoes, which met with a ready sale; but the fishermen soon became negligent, and not only gave little attention to their preparation, but even bought and shipped fish of inferior quality. The result was that the Swedes, who have always surpassed us in the methods of preparing herring, and who not only know good fish, but will use no others, on seeing the condition of the herring offered for sale, refused to buy them, and our vessels were obliged to seek a market in other countries at a greatly reduced figure.

The parties interested lost heavily, and as the American brands had come to be regarded with suspicion, the business was suddenly terminated, and for over a year no one ventured to make a shipment. In March of 1879, however, the Babson Brothers chartered the British brig Lapwing and loaded her with herring for Sweden. Again in the fall of 1880 the same parties chartered the Norwegian brig Triton and shipped by her 3,000 barrels of herring to Queenstown, Ireland.*

As already stated, on account of the limited extent of our own herring fisheries most of the stock for shipment necessarily comes from the Provinces, and our vessels have as frequently loaded in the Provinces as in our own country. Mr. Clark informs us that in the spring of 1886 Mr. Horatio Babson visited Newfoundland and bought several cargoes of herring for the European trade, chartering vessels in that locality for the work.

It is difficult to say just how fully this trade can be developed, but it is perhaps safe to assume that until our fishermen give more attention to the capture of the species and take more care in salting their catch the home business cannot become important, and if carried on to any considerable extent our merchants must either go to Newfoundland, New Brunswick, and the Magdalen Islands to buy and ship the fish, or they must import them from those regions and ship by their own vessels.

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Those caught at Fortune Bay in-paid 75 cents (gold) per barrel; at Port Hood, $1 per barrel; Magdalens, 75 cents per barrel; and at Bay of Islands, Newfoundland, $2 per barrel. These prices include what is paid for the fish, and does not include the barrels, salt, labor, &c.

All the herring which we put up in the provinces, as stated herein, we bought from the fishermen and paid them at prices as stated, and in no case whatever did we catch any in nets or seines, but always purchased the fish from the natives.

The above number of barrels does not include any herring which our vessels bought in the provinces during the year for bait.

We have taken from our books the number of barrels packed.

D. C. & H. BABSON.

Witness: CHAS. H. BROWN.

GLOUCESTER, MASS., U. S. A., *October* 17, 1877.

—*Documents and Proceedings of the Halifax Commission*, 1877, Vol. III, pp. 3344, 3345.

* Mr. G. Brown Goode has kindly furnished data from which we are enabled to compile the following list showing vessels engaged in the export trade, exclusive of those sent from Newfoundland by Gloucester parties in 1880:

| Name of vessel. | Date of departure. | Destination. | Remarks. |
|---|---|---|---|
| Schooner Nulli Secundas | Feb., 1876 | Gottenburg, Sweden | Sailed from Gloucester. |
| Schooner Herman Babson | Apr., 1876 | do | Secured her fish at the Magdalen Islands. |
| Schooner Dora S. Prindle | Apr., 1876 | do | Cleared from Boston. |
| Barkentine Ada G. Pearl | May, 1876 | do | Cleared from Gloucester. |
| Schooner Cornelius Stokem | June, 1876 | do | Went from Gloucester to fishing grounds; arrived in Gottenburg July 27. |
| Schooner Setagawa | July, 1876 | do | Cleared from Gloucester. |
| Schooner Centennial | July, 1876 | do | Do. |
| Schooner Setagawa | Oct., 1876 | Leith, Scotland | Met with disaster and changed her destination to Jamaica. |
| Bark Frigg | Oct., 1876 | Gottenburg, Sweden | |
| Barkentine Christiana Reedman | Nov., 1876 | do | |
| Schooner Eva L. Leonard | Dec., 1876 | do | Chartered on Gloucester account. |
| Barkentine Alice C. Dickerson | Jan., 1877 | do | Do. |
| Bark Norway | Feb., 1877 | do | Sailed from Halifax, Nova Scotia, on Gloucester account. |
| Brig Lapwing | Mar., 1879 | do | Cleared from Gloucester. |
| Brig Triton | Nov., 1880 | Queenstown, Ireland | Do. |

# 4.—THE SMOKED-HERRING INDUSTRY.

## *a.* Hard Herring.

### 1. ORIGIN OF THE SMOKED-HERRING INDUSTRY.

Nothing is definitely known of the man who smoked the first fish; in fact, so meager are the records that we cannot state with certainty either the country or the century in which he lived, and the origin of the method now so common throughout the world must forever remain a mystery. A recent writer, in referring to the herring fisheries of Norway, accounts for their small commercial importance prior to the fifteenth century by saying that the people were ignorant of the art of pickling and contented themselves with either smoking their fish or drying them in the air. The method of pickling fish in brine is thought to have originated in the fourteenth century, and smoking was practiced at even an earlier date. There seems little doubt that the preservative qualities of smoke were discovered independently in different countries, and not alone by civilized nations, but by savages as well. According to Webster, the word *bărbecue* was coined by the Indians of Guiana to denote the frame on which the flesh of beasts and fish was roasted or smoked, showing that this people must have been familiar with some method of smoking. The different tribes of Central and Southern Africa are said to cure flesh by means of smoke. All civilized nations smoke fish and meats either to be stored away for future use or to give them the characteristic smoky flavor.

The methods of smoking vary endlessly, though the principle is everywhere the same. In some countries the smoky products are so black and hard as to disgust a person of ordinary taste, while in others such care is taken in the preparation and such a delicate flavor is imparted to the products that they are in great favor with the epicures. Thus, though a comparatively simple process, great care must be exercised in smoking in order that the desired results may be secured; for two commercial products so wholly unlike as to command different prices, to sell under different names, and to be consumed by entirely different classes, may be made by the same person from similar individuals of the same species. The hard or red herring and the bloater—products totally unlike in flavor and in keeping qualities—are both made from our common herring (*Clupea harengus*).

Many kinds of fish are smoked, though some species are more desirable for this purpose than others. The principal requisite is that the fish should be fat and oily, as species of firm, coarse flesh when smoked are usually hard and poorly flavored. The various herrings are perhaps more generally smoked throughout the world than fishes of any other family, and next in importance come the mackerel. Salmon and haddock are also extensively smoked in different countries. Some fishes, however, though frequently smoked in one country, may, either from their restricted geographical range or the lack of information as to their value, be nearly or quite neglected by the inhabitants of other regions. Thus the "finnan haddie" trade was for some time peculiar to Scotland; smoked halibut and whitefish are prepared only in America; and codfish bellies (*rögerump*), as we are informed, are smoked only by the Norwegians.

Fish have probably been smoked in America for many centuries, and the first European colonists being familiar with the method of smoking at home, doubtless found it a very convenient way of curing fish on their arrival in this country when salt was not easily obtained. But the limited commercial demand naturally rendered the business of little importance, and for many

years it was carried on only in a small way, the work being done chiefly by fishermen who had rude smoke-houses near the shore, in which they prepared a sufficient quantity for local use. The New England, New Brunswick, and Nova Scotia fishermen smoke the sea-herring, and those along the southern coast smoke the alewife, or fresh-water herring, as it is more frequently called. As the northern fisheries grew in importance a trade sprung up with the West Indies, and large quantities of dried fish were exported yearly, a market being thus found for small quantities of smoked herring. A few of the Massachusetts and Maine fishermen, as well as those of the British Provinces, became interested in the work, and small smoke-houses might be seen here and there along almost any portion of the coast, though in no locality was there any extensive business.

## 2. LOCATION OF THE INDUSTRY.

The first town on the continent to become noted for its smoked herring was Digby, Nova Scotia, where a Scotch fishermen located about 1795, and turned his attention to the preparation of the fish by a method similar to that employed in his native country. His fish, being much superior to the ordinary brands, met with considerable favor in the markets of both Nova Scotia and the United States, where they soon came to be known as "Digby chickens," a name which they retained for many years. Later, some of the fishing-settlements along the coast of Maine became extensively interested in the smoking of herring, large quantities being put up annually and sent to Boston for distribution. The principal towns engaged in this work during the first half of the present century were Eastport, Lubec, Millbridge, Deer Isle, Lamoine, Booth Bay, Southport, and Westport. Some of these, after continuing in the business for a number of years, found that the margin of profit was so reduced that if they continued the business it must be done at an actual loss. One after another the fishermen of these places turned their attention to other branches of the fisheries, and since the Rebellion the business has been practically controlled by the towns of Eastport and Lubec; the latter at the present time putting up fully half of the smoked herring prepared within the limits of the United States.

DEVELOPMENT OF THE INDUSTRY AT EASTPORT AND LUBEC.—As these towns have from the first taken a leading part in the smoked-herring industry and are now the principal ones engaged in the work, it seems proper to give a more detailed account of the origin and development of the industry among their people. The historical facts relating to the smoked-herring business in this region were obtained during an interview with Mr. Jacob McGregor, who was among the pioneers in herring smoking at Lubec. As early as 1808 parties in the vicinity of Eastport, then a trading post of considerable importance, engaged extensively in the herring fisheries, smoking each season considerable quantities of herring, which they sent to Boston for a market. About 1812 the region came to be more thickly peopled, and a settlement was formed at Lubec Narrows for the purpose of trading with foreign vessels that came to the region. These narrows were at the time the favorite path of the herring on their way from the sea to the large salt-water bays, farther in. Finding large quantities of fish at their very doors the inhabitants engaged extensively in catching them, and occupied a considerable portion of their time in smoking and salting the fish. The year 1812 may then be properly considered as the time of the origin of the herring smoking at Lubec, from which time this place has taken the lead in this branch of the fisheries. In 1821, according to Mr. McGregor, there were about twenty smoke-houses, each curing 2,500 to 3,000 boxes of herring annually. The business gradually increased until 1845, when it occupied the attention of a majority of the inhabitants, and from this date to 1865 not less than 500,000 boxes of herring were cured annually within the limits of the town.

Owing to the increased demand, and to the difficulty of securing an abundance of fish at home,

Eastport and Lubec vessels, as well as those from other portions of the coast, visited the Magdalen Islands and secured cargoes of herring, which were salted in bulk, as described in the chapter on the Magdalen herring fisheries, and brought home to be smoked. During the war of the rebellion there was an unusual demand for smoked fish, and Magdalen herring came to be an important brand in the market. Since 1866 the herring have failed to visit these islands regularly, and vessels resorting thither have frequently failed to secure cargoes, and many that formerly made yearly trips to the Magdalen have filled their vessels from the other fisheries. The demand for herring has also greatly diminished, so that the market is satisfied with a much smaller quantity than formerly, and the price has been proportionately lower. These facts have had their influence upon the smoked-herring industry of the entire country. Many of the towns have suffered heavily, Eastport and Lubec being perhaps less seriously affected than the others, though the smoking of Magdalen herring has even there been practically discontinued.

## 3. THE FISHERMEN AND CURERS.

As already stated, herring smoking was, at first, confined to no particular class, for many of the fishermen living in the locality where the fish were abundant caught and smoked small quantities in the fall for their own tables. As the business increased certain ones became more extensively interested in the work. Some of these were professional fishermen, who followed hand-lining from small boats or vessels during the summer months and devoted their attention to herring smoking only in the fall, after the weather had become so stormy as to make their former occupation both dangerous and unprofitable. In many localities the farmers also engaged extensively in herring smoking; and, after spending their summers in tilling the soil, they resorted to the inner bays for the capture of herring, continuing the work till the close of the season. Some of them built smoke-houses and carried on the business independently, while others worked together, catching and smoking their fish in common, dividing them equally after the work had been completed. In some localities the business was followed chiefly by the professional fishermen, who secured extra help during the height of the season, the laborers taking herring in pay for their services. At the present time the smoking of herring is done chiefly by the semi-professional fishermen. These usually own small farms on which they raise sufficient produce for their own tables, and in addition a small surplus which they dispose of in the locality. They give some little attention to fishing during the early part of the season, but do not follow the business with any regularity until the time for herring-smoking begins. The herring are present in some localities during a greater part of the year, and the weirs are put in order about the last of May and fished occasionally from that date, though the fishing does not practically begin till September.

From this time till late in December the men give their entire attention to this work. Several of them usually own and fish a weir in common, dividing equally the herring, which they smoke on their own premises. In case a man is so unfortunate as to have no smoke-house of his own he usually arranges with one of his neighbors to share his, giving a certain quantity of fish in payment for its use.

## 4. METHODS OF THE FISHERY.

TORCHING.—Three methods are employed by the fishermen of the various localities for securing their supply of herring for the smoke-houses, namely, torching, weir fishing, and netting. The first mentioned has been fully described in the chapter on the shore herring fisheries. It is the oldest method and practically the only one employed to any extent prior to 1828.

BRUSH WEIRS.—The second and most important apparatus is the brush weir. This is also

described below in detail in the chapter on the sardine industry. It is thought to have been introduced into the fisheries of Quoddy River by Nova Scotia fishermen about 1828, since which time it has been quite generally adopted, and weirs have been built at various points along the entire coast of the State, though they have always been more extensively used in the region lying east of Penobscot Bay.

GILL-NETS.—Gill-nets are said to have been used in the fisheries of Digby, Nova Scotia, as early as 1795, but owing to the small size of the fish used for smoking they were not extensively employed along the coast of the United States until very recently. Most of the herring put up in early days were fish ranging from 6 to 9 inches in length, these being so small as to readily pass through the nets of ordinary mesh. Fish of this size have always been thought more desirable than larger ones, and have commanded a better price in the markets. The first large fish smoked were those secured at the Magdalen Islands, and it was not until this fishery had ceased to be important that the large herring along our coast were utilized for smoking. When these fish came to be used nets were very naturally employed in their capture, and the gill-net is now an important apparatus in the fishery.

## 5. THE SMOKE-HOUSES.

HERRING SMOKE-HOUSES.—The houses used for smoking herring vary greatly in size, according to the locality and the amount of business to be done. At first they were very small, some of the fishermen using ordinary barrels or hogsheads for preparing a sufficient amount for their own tables, while others used some old shed or other small building for the purpose. Those engaged more extensively in the business had larger houses, but as a rule these were mere huts made of coarse material and in the rudest manner. They were often so loosely put together as to be seriously injured or entirely destroyed by heavy winds.

It is not necessary that the houses should be at all elaborate or expensive, and few of the fishermen care to put much money in them as there is much danger of loss from fire, houses being very frequently burnt through the negligence of the person in charge. Some of the fishermen of late are building houses of a better class, but even now a majority of them are quite crude. As a rule a site is selected on the shore in the vicinity of some boat-landing, but the fishermen occasionally build on their own land near their homes on account of the greater convenience in caring for the fish. The houses are without floors and consist simply of rough board walls with a gabled roof of the same material, every crack being battened with slabs or sheeting, both to render the building water tight and to prevent the smoke from escaping. As a protection against fire, many of the larger houses are lined with brick or mud on the inside to a height of several feet. Each house is provided with board windows or longitudinal openings on either side, while in the more modern ones an opening is also made along the ridge-pole and covered with boards so arranged that they can be raised or lowered by means of cords attached to levers. These answer as ventilators, and it is often necessary to keep most of them open to prevent the fish from being ruined from excessive heat. The interior construction is very simple. It consists merely of a series of rows of "two by four" pine stringers or scantlings, one above the other, extending from near the ridge-pole to within 6 to 8 feet of the floor. These scantlings are 13 to 14 inches apart and are 38 inches distant from the rows on either side. The space between two adjoining vertical rows is called a "bay," and the size of the smoke-house is reckoned by the number of "bays" that it contains, these varying from 5 to 12. The capacity is in proportion to the size, small smoke-houses holding only 1,000 or 2,000 boxes, while the largest contain 8,000 or even 10,000. A smoke-house of average size is about 18 feet wide by 30 feet long, with the ridge-pole 25 to 30 feet from

the ground. Such a house holds about 4,000 boxes of herring. A fisherman will frequently own two or three smoke-houses, separating them from each other by a sufficient space to prevent the loss of all in case one should be burned. Where an extensive business is done requiring several buildings it is customary to have a small landing or wharf to which the boat containing the herring may be fastened. One or more small sheds are also necessary for the work of salting and stringing the fish and, in addition, a larger building is erected where the boxes are made and the fish are packed and stored until such time as they can be marketed to advantage. Single smoke-houses usually have a small shed attached, but they are seldom provided with packing-houses, the fisherman almost invariably using some portion of his own dwelling for this purpose. An ordinary smoke house, if we include the boat landing, costs, when new, about $200, but if provided with salting and stringing sheds and packing-houses it has a value of fully $400, which is increased to $450 or $500 if the land occupied is considered.

## 6. METHODS OF SMOKING AND PACKING.

The small fish used for smoking are taken either by torching or in weirs, as already mentioned, while the larger ones are caught in gill-nets. Several fishermen usually visit the weir at low tide and secure the catch by means of a small seine, which is hauled either on the "shore side" or in the "bunt" of the weir, the fish being transferred to the boat by means of large dip-nets made expressly for the purpose.

SCALING.—As soon as the herring have been secured the fisherman fastens his oil-trousers tightly about his boots and begins scaling the fish, or "treading them out," as he calls it, by moving his feet briskly back and forth through the mass without raising them from the bottom of the boat. By the motion of the fish upon each other, as well as by contact with the legs of the fisherman, the scales are readily removed, four or five hogsheads being easily scaled in half an hour. Another method of scaling is to move the fish among each other by means of a stirring stick, locally known as a "spudger." This instrument is simply a piece of board about a foot in length and 4 or 5 inches wide, which has been securely fastened to a long handle. By means of this the mass of herring is stirred until the scales have all been loosened. The scaling must take place at once upon the removal of the fish from the water, as when they become dry the scales set, and can then be removed only with the greatest difficulty. According to Mr. McGregor, no herring were scaled prior to 1820, when Mr. Samuel Myers, of Lubec, noticed the deciduous character of the scales and began an investigation of the subject, which led to the methods already described. He found that the appearance of the fish was greatly improved by removing the scales, and that scaled herring brought from 20 to 30 cents more per box in the market than those put up in the ordinary manner. From this time he scaled all of his fish before smoking them, and although he attempted to keep the process a secret, the fishermen watched him until they discovered his method, which was soon universally adopted. Great care must be exercised in scaling, as when the fish are not sufficiently stirred numbers of scales will remain, making an undesirable contrast with the scaleless portions of the body. Again, if the fish are stirred too long the texture of the flesh is injured, and they are less saleable, many of them being "belly-broken" and worthless.

SALTING.—As soon as the scales have been loosened the fish are washed in dip-nets for the purpose of properly cleaning them, after which they are transferred to large tubs, barrels, or hogsheads, where they are carefully salted. The amount of salt required varies with the size and condition of the herring, large and fat fish needing more than small or lean ones. The average quantity used varies from 1½ to 2 bushels to the hogshead. The small fish are allowed to remain in the pickle from twenty-four to thirty-six hours, while the larger ones, in order to be thoroughly

"struck," must remain about forty-eight hours. A good deal, however, depends upon the season, as the fish usually "strike" quicker in warm than in cold weather. It is also found that fish just from the water require a longer time in the pickle than those that have been caught a number of hours.

STRINGING.—When properly salted the fish are again washed and transferred to large stringing tables, where three to six persons are engaged in stringing or "spitting" them, as it is frequently called. The stringing sticks are bought at the saw-mills in the vicinity in a partially manufactured condition. When purchased they are simply long strips of wood $\frac{3}{4}$ of an inch square. They are cut into pieces 3 feet 4 inches in length by the fishermen, after which the sharp edges are taken off and one end is pointed. When ready for use they are worth from $3 to $4 per thousand, according to quality. In stringing the stick is held in the left hand by the blunt end while the fish is clasped by the right hand and held with its back away from the stringer. The left gill-cover is then raised by a movement of the thumb and the pointed stick is inserted and passed out through the mouth, the fish being moved down to its proper position. It requires some time to become expert in this work, but after one has the knack he can work very rapidly, as only two movements are necessary to complete the operation. The most rapid workers will string 1,000 sticks in from eight to ten hours, while an average day's work for a professional stringer is from 500 to 700. Each stick holds from 25 to 35 fish, according to their size, while a hogshead (5 barrels) of herring will make 80 to 90 boxes of herring when smoked. The stringing is usually done by boys and girls who are hired for this purpose, though when the fishermen have leisure they frequently string their own catch, or, in some cases, they hire men for the purpose.

DRAINING.—When properly strung the fish are again dipped into a trough of water for the purpose of removing the blood and dirt that has gathered upon them, after which the sticks are placed in position upon a rectangular frame or "herring-horse," as it is called. When the frame, holding from 25 to 30 sticks, has been filled it is carried to the open air and allowed to drain for several hours, the time depending upon the heat and dryness of the atmosphere. The object in exposing the fish in this manner is to dry and harden the gill-covers, as when tender they often give way, allowing the fish to fall from the stick, thus rendering it worthless for smoking purposes. When the sun is shining the moisture evaporates quite rapidly, and the gill-covers very readily harden; but during rainy or foggy weather a good deal of difficulty is experienced in drying them, and great quantities of herring drop off and become worthless. At such times the usual method is to allow them to drain for a few moments, after which they are at once hung in the smoke-house, all the doors and windows being opened to give a free circulation of air, while a good fire is kept burning beneath. In this way the gill-covers soon dry, and they are ready for smoking.

HANGING.—When ready for "hanging" the herring are brought to the smoke-houses, where two men are engaged in putting them up, one passing them to the other, two sticks at a time, the pointed end being held upward, so that the fish shall not slide off. The fish are placed in the bays already described, the ends of the sticks resting on the stringers, each being separated from the other by 2 or 3 inches, so as to prevent the herring from touching each other, as well as to allow a free circulation of smoke. The upper part of the smoke-house is usually filled first, though, when the house is to be but partially filled, one bay is often entirely filled before another is commenced. Two men can hang about 2,000 boxes a day, if the fish are brought to the smoke-house; but half that quantity is a fair average if they are obliged to go out for their supply. It seldom happens that the house can be completely filled in a day, as only a few fish are secured at a time, and these must be cared for at once to prevent them from spoiling.

As soon as the first lot has been placed in the smoke-house, the fires are started and the smok-

ing begins. When another lot is to be hung, the fires must be extinguished and the windows and ventilators thrown open to allow the smoke to escape and enable the fishermen to remain in the bays for the purpose of hanging the balance of the catch. This process is continued until the smoke-house is full, when the fires are again lighted and usually kept burning until the fish are thoroughly smoked.

FIRES.—The fires are differently arranged in different smoke-houses, their relative position depending largely upon the ideas of the particular fisherman that is interested in the work. The usual plan is to collect logs, 4 to 8 inches in diameter and 3 or 4 feet long, and arrange them, with the proper kindling, in heaps at equal distances from each other and a few feet from the side of the building. From six to twelve of these heaps are arranged in the average smoke-house, two or three logs being placed together with a quantity of smaller material. When all is in readiness the fires are lighted and kept burning day and night until the fish have been considerably affected by the smoke. Owing to the closeness of the air the fires burn very slowly, it being found desirable to keep the fish as cool as possible, and if allowed to burn briskly the heat generated by the flames would destroy every fish in the smoke-house in a few hours. When there is a tendency to burn freely the fishermen separate the logs and cover them with ashes, to a greater or less extent, to smother the flame; but ordinarily they are allowed to remain near together, some one visiting the smoke-house every few hours to care for them. At times some or all of the fires are allowed to go out, as, after the fish are partially smoked, the absence of fire for a day or two is not thought to effect their quality. Generally, however, the fishermen are anxious to smoke them as rapidly as possible, in order that the house may be cleared for another lot.

WOODS.—Different woods are used for smoking in different countries. Some claim that the selection of particular kinds is an important matter, while others insist that the quality of the wood has little if anything to do with the flavor or value of the products. In France, white birch is commonly used; in England, Scotland, and Holland, the chips and sawdust of oak are said to be favored; in Norway, heather and juniper are extensively used, though birch and alder are employed to a limited extent. In the United States various kinds are selected, pine logs that have been soaked in salt water being preferred by a majority of the fishermen. These are usually picked up along the beach by the fishermen, and are claimed to be superior to other wood, as the salt absorbed while in the water renders them less inflammable, causing them at the same time to last much longer and to give off a greater volume of smoke. When the smoking process is nearly complete some of the fishermen build a fire of oak, for the purpose of giving a higher color to the fish. In most localities, however, the question of woods is not considered important, the only point being to have a kind that will burn slowly and at the same time yield a large amount of smoke.

TIME REQUIRED FOR SMOKING.—The time required in smoking varies considerably, depending upon the size of the smoke-house, the size and condition of the fish, and the weather. Small fish in dry weather can be cured in two weeks, while large herring often require fully six weeks, and those put up for exportation to warmer countries are smoked for even a longer period. The time of curing is also affected by the position which the fish occupies in the smoke-house. Those nearest the fires and about the sides of the building, where there is a better circulation, are cured first, while those in the center are cured more slowly. It sometimes happens, when the fish are hung very closely, or when it is desired to hasten the curing, that the lower and outer fish are removed as soon as cured, thus exposing the central mass to the direct action of the smoke. Many claim that the best fish are those taken from the upper bays, as these are farthest removed from the fire and the smoke is thoroughly cooled before reaching them.

MAGDALEN HERRING.—The Magdalen herring, already referred to, are larger and, at the same

time, in poorer flesh than those taken along the American shore. Owing to the distance of the fishing grounds, they must necessarily be salted before being stowed in the vessel. They are usually salted in bulk, as already described in the chapter on the Magdalen herring trade, and on arriving at their destination are placed in floating cars or crates beside the wharf, where they are allowed to soak for some hours to remove the surplus salt which they have taken up. When sufficiently freshened they are strung and smoked in the ordinary manner, the only difference being that the time required in smoking is greater than for the smaller and fresher fish taken on our own coast.

KEEPING IN SMOKE-HOUSE.—If, for any reason, it is not thought desirable to market the fish as soon as they have been cured, they are usually allowed to remain hanging in the smoke-house, where a fire is built under them every two weeks to dry off any moisture that may accumulate. They keep better in this way than when packed in the ordinary herring-boxes.

PACKING.—When the packing-time arrives the fish are carried to the "shop," or packing-house, where they are removed from the sticks and placed in boxes made expressly for them. At the close of the eighteenth and the early part of the present century they were marketed in kegs holding about a bushel each.* Later, as the trade increased, boxes were substituted, their shape and dimensions being regulated by special legislation, that there might be a uniformity in size. The quality of the fish was also regulated by law, and an inspector was appointed to visit the smoke-houses in person or to send a deputy to cull the herring into grades and see that they were properly boxed and branded. The first boxes, known as the "half-bushel boxes," were 18 inches long, 9 inches wide, and 7 inches deep, inside measurement. When purchased they cost from $8 to $10 per hundred; but the fishermen frequently made their own supply, visiting the forests, felling the trees, and rifting out the material by hand. Later, as the saw-mills became more numerous, the sawed boards were purchased by the fishermen and cut into the proper lengths. Of late years the material for herring-boxes is usually made from refuse lumber and short pieces at the various saw-mills along the coast, and shipped in the form of shooks. These are made up by the fishermen during their leisure hours, and cost, when ready for use, about 1¾ cents each. The best workman can make five hundred of them in a day, while the average is not far from three hundred.

Certain States have repealed their laws regulating the size of the boxes, and in some others, though the laws still remain upon the statute-books, they are practically a dead letter, as they are seldom, if ever, enforced. Notwithstanding these facts, the boxes used in the various localities are still of nearly uniform size, being usually 15½ inches long, 7½ inches wide, and 4 inches deep, inside measurement. At Eastport, however, where large herring are extensively smoked, the boxes for the brand known as "lengthwise herring" are 15 inches long, 7½ inches wide, and 3½ inches deep, holding about the same weight of fish as the other.

The first law relating to smoked herring established two brands, namely, fish of the "first" and "second" quality. About 1822 this was modified to accommodate the newly-introduced scaled herring, thus making three brands; the scaled, number ones, and number twos. The scaled herring included all the best fish of medium size that were well scaled. The number ones were a good quality of fish, of small size, and such unscaled fish as were in good condition and of good color, while the number twos were the poor fish of various sizes, including those from the Magdalen Islands. Mr. M. H. Perley, in speaking of the smoked herring of Maine in 1851, at which time the laws had been again modified, says: "When sufficiently cured, the herrings are packed in boxes of the legal size in Maine—that is, 17 inches long, 8¼ inches wide, and 6 inches deep, measured on the

* It is said that kegs are still used by the French for marketing their fish, and that such care is taken in packing that each layer of herring is separated by a thin board.

inside of the box. The best quality of smoked herrings are called 'scaled herrings.' These are the largest and best fish. Those called 'number one' are herrings not scaled and small fish. A scaled herring must be 7 inches long, fat, and good. The number one must not be less than 6 inches in length, and larger but poor fish are also branded of this quality. All other descriptions of fish are considered refuse."

Sections 10 and 11, of chapter XI, of the Revised Statutes of Maine, passed in 1871, read as follows:

"SEC. 10. All smoked herring shall be sorted by the inspector, according to their quality, as follows: Scaled herrings shall consist of all the largest, fattest, and best-cured fish of not less than 7 inches in length; number one of well-cured fish not less than 6 inches in length; and in both cases all those shall be taken out as refuse which are belly-broken, tainted, scorched, slack salted, or not sufficiently smoked.

"SEC. 11. All boxes for packing smoked herrings shall be made of sound boards sawed and seasoned; the top, bottom, and sides, of boards not less than three-eighths of an inch thick; and the ends, of boards three-quarters of an inch thick, securely nailed, and 16 inches in length, 8 inches in breadth, and 5 inches in depth by outside measurement: *Provided*, That any change in the dimensions, above named, shall not operate to reduce their capacity, which shall not be less than 464 cubic inches in the clear for each box; and each box shall be filled with the same kind and quality of fish; and if the box contains Magdalen herring, that word shall be abridged if considered convenient; and no fish shall be considered merchantable unless salted and smoked sufficiently to cure and preserve them, which shall then be packed in boxes in clear dry weather."

Sections 6 and 7, of chapter CXXIV, of the General Laws of New Hampshire, approved August 6, 1878, give the following, governing the smoked-herring interests of that State:

"SEC. 6. All herrings or alewives intended to be smoked and packed shall be sufficiently salted and smoked to cure and preserve the same, and afterward closely packed in the boxes in dry weather.

"SEC. 7. All smoked alewives or herrings shall be divided and sorted by the inspector or some deputy, and denominated, according to their quality, 'first sort' or 'second sort.' The 'first sort' shall consist of all the largest and best-cured fish; the 'second sort' of the smaller, but well-cured fish; and in all cases all fish which are belly-broken, tainted, scorched, slack salted, or not sufficiently smoked shall be taken out as refuse.

"SEC. 8. Each box of alewives or herrings so inspected shall be branded on the top by the inspecting officer with the initials of his Christian name and the whole of his surname, the name of the town where it was inspected, with the abbreviation of 'N. H.,' the quality, whether 'first sort' or 'second sort,' and the month and year in which they were so branded."

Sections 48 to 52, inclusive, of chapter XLIX, of the General Statutes of Massachusetts for 1859, regulate the brands and boxes of herring in the following manner:

"Alewives or herrings intended to be packed for sale or exportation, shall be sufficiently salted and smoked to cure and preserve the same, and afterwards shall be closely packed in boxes in clear and dry weather.

"SEC. 49. Smoked alewives or herrings shall be divided and sorted by the inspector or his deputy, and denominated according to their quality, *number one* and *number two*. Number one shall consist of all the largest and best cured fish; number two, of the smaller but well-cured fish; and in all cases those which are belly-broken, tainted, scorched, or burnt, slack salted, or not sufficiently smoked, shall be taken out as refuse.

"SEC. 50. Boxes made for the purpose of packing smoked alewives or herrings, and containing

the same, shall be made of good sound boards sawed and well seasoned, the sides, top, and bottom of not less than half inch, and the ends of not less than three-quarter-inch boards, securely nailed, and shall be 17 inches in length, 11 inches in breadth, and 6 inches in depth, in the clear, inside.

"SEC. 51. Each box of alewives or herrings inspected shall be branded on the top by the inspecting officer with the first letter of his Christian name, the whole of his surname, the name of the town where it was inspected, with the addition of Mass., and also with the quality of *number one* or *number two*. Herrings taken on the coasts of Nova Scotia, Newfoundland, Labrador, or Magdalen Islands, and brought into this State, shall also be branded with the name of the place or coast where taken.

"SEC. 52. The fees for inspecting, packing, and branding shall be 5 cents for each box, which shall be paid by the purchaser; and the inspector-general may require from his deputies 1 cent for each box inspected, packed, and branded by them."

As has been already stated, many of these laws, though never repealed, are not regarded by the fishermen, who suit their own convenience as to the size of the boxes and the quality of the fish put up. Few are ever examined by the inspectors, and the returns of these officers are so incomplete as to render the statistics obtained from their reports utterly worthless. Few of the fish now seen in the markets are branded, but smoked-herring dealers have adopted various trade names for fish of different size and quality.

The following table gives a list of the names recognized, together with the number of fish contained in a box of average size.

| | Herring to the box. |
|---|---|
| Small scaled | 150 |
| Medium scaled | 120 |
| Scaled | 80–100 |
| Medium tucktails | 35– 40 |
| Large tucktails | 25 |
| Lengthwise | 30 |
| Magdalens | 30 |
| Number ones | 80–100 |

The principal brands are *scaled, tucktails, lengthwise, number ones*, and *Magdalens*, the others being less generally recognized.

## 7. MARKETS AND PRICES.

MARKETS.—When the Magdalen fishery was at its height the smoked herring were marketed by the same vessels that brought them from those islands. On arriving home the vessel proceeded to her wharf to unload her cargo, remaining until the fish were smoked and boxed, after which they were stored in the hold and she set sail for market. The principal dealers at that time resided in Boston, these handling the greater part of the fish prepared within the limits of the United States. Many of them were engaged in the export trade, and in addition sent large quantities of herring annually to the different portions of the South, a majority of those consumed there being purchased by the large planters for distribution among their slaves. The trade continued to increase until the close of the Rebellion, when the emancipation of the negroes interfered seriously with it, and for a number of years parties engaged in the business lost heavily, owing not only to the decreased demand, but also to the improper method of curing and the poor quality of the fish placed upon the market. During the abnormal demand the fishermen became anxious to realize the high prices, and for this reason they often put their fish upon the market in a half-cured con-

dition, the result being that many of them spoiled before reaching their destination. This in many cases resulted in a direct loss to the fishermen and dealers, as country purchasers refused to pay for them. But a greater injury to the trade was found in the fact that the former customers finding the herring so inferior in quality sought other articles of food as a substitute.

Several years of depression followed, many who had formerly engaged extensively in the business allowing their smoke-houses to remain idle rather than incur the risk of loss. Within the last few years, however, the trade has been somewhat revived, and a better feeling exists among the dealers, while the demand in New England and in certain portions of the West is gradually increasing. Boston, however, has lost much of her former influence, and New York now ranks as the important market, handling over half of the herring smoked in the Quoddy River region.

PRICES.—In the early part of the century, according to Mr. McGregor, the price realized by the fishermen for the regular half-bushel boxes varied from $1 to $1.25. From 1830 to 1850, according to the same authority, the average price was about $1.10 for *scaled herring*, 80 cents for *number ones*, and 35 to 40 cents for *number twos*. From this time the price was gradually reduced, though perhaps not in proportion to the size of the box, for during the "war-period" boxes no longer than those employed at present sold as high as 30 to 40 cents. From this date the price (taking the paper currency as a standard) decreased rapidly for a number of years, and fish of good quality often sold as low as 7 and 8 cents per box. Later, with the revival of the trade, it again improved, until, in 1880, it ranged between 12 and 25 cents, according to the quality of the fish, good scaled herring averaging fully 22 cents, while the lower grades usually sold at 15 or 16 cents.

## 8. FURTHER PREPARATION OF SMOKED HERRING.

EUROPEAN METHODS.—Most of the smoked herring are eaten with no further preparation than that received in the smoke-house at the hands of the fishermen; but recently attempts have been made by enterprising European houses to render them yet more palatable before finally placing them upon the market. In several European countries smoked herring are now packed in oil in small tin cans which, when properly filled, are at once hermetically sealed.

In Finland, according to Mr. Wallem, the round fish are salted just enough to give them flavor, after which they are lightly smoked. The heads, tails, and entrails are next removed, the roe being left in. They are then placed in tin boxes, just long enough to receive them and large enough to contain about twenty small fish, and covered with olive oil. When filled, the boxes are carefully sealed and sent to the bath, where they remain in boiling water for some time, and after venting and cooling are ready for the market. As far as known, nothing is done in this line within the limits of the United States, though other kinds of smoked fish are sometimes canned.

A less praiseworthy innovation, and one which we are glad to say is unknown among the dealers of the United States, has been made by European ingenuity, which, not content with the slow process of smoking, has at last discovered a way by which the fish can be prepared without the aid of smoke. Mr. Wallem alludes briefly to the subject, saying:

"There are manufacturers who injure the smoking business by manufacturing smoked herring which have not been near smoke. The mystery or humbug consists in covering the herring with a specially prepared yellowish-brown varnish or oil which imparts to the herring a little of a smoky flavor, and sometimes the imitation is so good as to deceive even experienced persons." This imitation, however, can hardly represent the hard herring of our country. It must rather be intended as a counterfeit of the bloater, which is discussed below in this chapter.

AMERICAN METHODS.—Little is done in the further preparation of the herring within the

limits of the United States after they leave the smoke-house. As far as known, but one attempt has been made in this direction. This was brought about by the growing demand for products in a state in which they could be placed upon the table. The idea occurred to Mr. George T. Peters, of New Jersey, that the herring might be skinned and boned, and arranged in neat and attractive packages before they were put upon the market. Accordingly, in 1878, he proceeded to Eastport, Me., and conducted a series of experiments that led to a method which he covered by a patent dated December 10, 1878. The following extract taken from his letter of specification will give a sufficiently accurate idea of his invention:

"The object of my invention is to pack herrings in such a way that they can be eaten directly upon their removal from the package—namely, without any further preparation; also, so that their flavor and moisture are preserved, and so that they are convenient for sale in small bunches or packages without weighing or counting the fish separately.

"It consists in salting, smoking, skinning, and boning the herrings, then tying them in bunches, and, finally, putting them up in a box, as hereinafter fully set forth.

"The box may be made of wood or metal, and I prefer to introduce a pane of glass in one of its sides, so that its contents are rendered visible from the outside thereof.

"In carrying out my invention, I salt and smoke the herrings in the usual way, then remove the skin therefrom and extract the bone in any suitable manner.

"By first smoking the herrings the subsequent operations of skinning and boning the same are greatly facilitated. I then arrange the same in bunches of one dozen each (more or less) by tying that number together with a cord, and pack a half dozen (more or less) of such bunches into a box of the proper size and shape. The herrings are thus packed up in such a condition that no further preparation thereof is needed, except, perhaps, to cut the same up on their removal from the package, wherefore they form a very useful article for tourists or travelers.

"By skinning the herrings and putting the same up in bunches their raw flesh is brought in close contact, and by this means their inherent moisture and flavor are preserved in the best possible manner, the effect thereof being also increased by packing the bunches in a box, and another advantage of the bunching being that no time is lost in counting the herrings singly, when a dozen or more are sold.

"I am well aware that the practices of salting, smoking, skinning, and boning fish have long been known, and I therefore do not claim any of them as my invention.

"What I claim as new, and desire to secure by letters patent, is—

"The new commercial package, consisting of salted, smoked, skinned, and boned herring, tied together in bunches, which are packed together in a suitable box, substantially as described."

In 1879 Mr. Peters engaged quite extensively in boning and packing the fish after the manner described, employing between twenty and thirty hands at his Eastport factory. For some reason, however, the fish did not meet with as ready a sale as he had expected, and it was found desirable to discontinue work at Eastport, though the same method is still carried on in Massachusetts and New York, where it is meeting with better success.

## 9. STATISTICS OF THE BUSINESS.

If we were to confine ourselves to trade statistics it would be difficult to give the exact quantity of herring smoked in the United States, for the different market reports include many fish as American that have been prepared by the fishermen of the British Provinces. According to Mr. W. A. Wilcox, Manager of the American Fish Bureau, there were 443,597 boxes of herring handled in Boston in 1880, 262,482 of which were received from home ports; the remainder coming from the Provinces. This statement is misleading, as shown by the statistics of Maine, which practically

produces all the smoked herring put up in this country. These statistics prove that only 307,300 boxes of hard herring were put up within the limits of the State during that year, over half of which were shipped directly to New York, while considerable quantities were sent elsewhere, leaving Boston a very much smaller quantity than is reported. The apparent discrepancy is easily explained when we remember that Eastport is located in the very center of the herring district, and that the dealers purchase annually many thousand boxes of fish directly from the New Brunswick fishermen. Besides this, many of the foreign fishermen land their fish at Eastport, where they are taken in charge by the steamboat officials, who treat them as domestic products. Others still ship their fish direct by the trading vessels of the locality that always find it convenient to clear from an American port, the fish carried by them being naturally considered as domestic products, though they may never have touched our territory until landed in Boston. Eastport is thus very naturally credited with all the herring received from the Passamaquoddy region, while actually producing only a small portion of them, the bulk, as has been said, being put up on the adjacent islands belonging to the Province of New Brunswick. In 1879, according to the New Brunswick Fishery Report, ninety-nine weirs were fished, 74,260 barrels of herring were pickled, and 683,530 boxes were smoked in the district tributary to Eastport, which includes the coast and islands lying between Beaver Harbor, New Brunswick, and the coast of Maine. A majority of these are sent to the United States, and are credited in the market reports as American fish. It is an easy matter to get from the herring smokers of New England the statistics of their business; but a trade has recently sprung up in smoked herring prepared from frozen fish after they have reached the markets of consumption. Of this business no exact statistics are obtainable, and the quantity prepared in this way can only be estimated. It seems that during the winter months when any market happens to be glutted with frozen herring, parties are in the habit of purchasing them at a low figure, and, after thawing, salting, and smoking them, place them upon the market. There is no regular business in this line, as the smokers engage in the work only when the price is peculiarly low, wholly neglecting the business when fish are scarce. Fish are prepared in this way in most of the larger sea-port towns and also in many of the principal cities of the interior, where one would scarcely expect it. Even in Washington, D. C., the business is carried on to a considerable extent, and in 1880, according to Mr. Gwynn Harris, city market inspector, the fish dealers of that city smoked 45,000 herring which they received from the north in a frozen state. The fish are also smoked to a limited extent by the retail dealers, who thus utilize any surplus that might otherwise spoil. Frozen fish, however, make an inferior quality of smoked herring, as the fiber of the flesh is injured, rendering it brittle and giving the herring a dull, bluish color along the back. These herring are much larger than the ordinary smoked herring, and, owing to a lack of suitable smoke-houses, they are only partially cured, thus resembling more nearly the bloater than the hard herring of Maine.

The smoking of hard herring proper is, as has been said, confined wholly to Maine, the fishery census returns of New Hampshire and Massachusetts failing to mention any products from either of these States. A careful investigation of this branch of the fisheries for Maine shows that there were, in 1880, 202 smoke-houses, valued at $33,700, and that 229 persons, exclusive of the weir-fishermen, were engaged in preparing 307,300 boxes of hard herring (in addition to 51,700 of bloaters), valued at $55,320. A detailed table of these facts will be found on page 488.

To form a correct impression of the smoked-herring business, it would be necessary to include those made from frozen herring, which may be as well considered here as with the bloaters; estimating these at 75,000 boxes, which is probably not far from the actual quantity produced, we have a total of 383,000, valued at $68,320 (exclusive of bloaters), put up in the United States.

## *b.* Bloater Herring.

### 10. ORIGIN, METHODS OF PREPARATION, AND STATISTICS OF THE BLOATER-HERRING INDUSTRY.

Origin and growth.—Smoked bloaters were prepared as early as the sixteenth century, for Shakespeare mentions the bloater in his writings. Just where the method originated is not known, but Scotland has certainly developed the business to a greater extent than any other country, and the town of Yarmouth has been the leader in this industry for more than a century. Bertram, in speaking of the herring fisheries of Scotland, says:

"There has always been a busy herring fishery at the port of Yarmouth. A century ago upwards of two hundred vessels were fitted out for the herring fishery, and these afforded employment to a large number of people, as many as six thousand being employed in one way or another in connection with the fishery."* He also claims that the origin of the name is derived from the peculiar roundish or bloated appearance acquired during the process of curing.

Notwithstanding the fact that the bloater has been generally known as an important article of commerce throughout Europe for many centuries, it was not known to the American dealers till within the last half century, and, according to the statements of prominent dealers, it is only thirty-five years since the first bloaters were put up in the United States. Mr. Wilcox informs us that Boston was the first city to engage in the preparation of bloaters in this country, and that they were first smoked about 1859. At this time considerable quantities of large fat herring were brought to the Boston market from the Bay of Islands, Newfoundland. Many of these were utilized for smoking, and the bloaters prepared from them were said to be of excellent quality. When it was found that there was a demand for the bloater in the markets, one of the enterprising Boston dealers attempted to secure a patent on the process of curing; but in this he was unsuccessful, as his opponents, by quoting from Shakespeare, showed conclusively that the idea was not a new one, and that bloaters were known hundreds of years earlier. The Boston business developed gradually, until, in 1868, as high as 10,000 barrels of herring were annually smoked and put upon the market as *Yarmouth bloaters.*

Shortly after the introduction of the bloater into the Boston market, parties in the vicinity of Eastport began preparing the fish in the same manner. The introduction of the method into this region is, according to Mr. J. F. Buck, of Eastport, the result of measures taken by the Dominion government to encourage its subjects in the careful preparation of fishery products. It seems that a thorough examination of the fisheries in 1849 revealed the fact that the larger part of the sea-products were improperly cured, and that, consequently, much of their value was lost to the fishermen on account of the low price realized for them in the different markets. Accordingly, a series of local fish-fairs were inaugurated and kept up for some time. These were usually held in the fall, and the people of the vicinity were induced to place their best-cured products in competition for money prizes that were given as premiums. Considerable interest was aroused, and the contest in many sections became quite exciting, the fishermen giving careful attention to the preparation of their fish. It was certainly an ingenious method of educating the people in a line in which they were sadly deficient. This rivalry led to the preparation of fish in different ways, and bloater herring were at this time first prepared by Scotch fishermen, who had been familiar with the method in the mother country. When first introduced into the region these fish met with little favor, and the business was consequently small, nothing of importance being done for same

* Harvest of the Sea, p. 194.

years. In 1867, as we are informed by Mr. R. C. Green, Richard Young, a native of Leith, Scotland, but lately residing in Portland, Me., removed to Eastport for the purpose of smoking haddock. Finding herring abundant, and knowing of the extent of the bloater business in Boston, he began curing them for shipment, practically on account of the lower price at which he secured his fish, driving the Boston dealers out of the field and compelling them to purchase their supplies from him and other parties who soon built smoke-houses in the locality. The business of the region has gradually increased from that time, until now Eastport puts up the greater part of the bloaters prepared in the United States. Several fishermen from three or four other towns have engaged in the work from time to time. A few hundred boxes were put up annually at Jonesport, Me., between 1872 and 1875, and the fishermen of Sutton's Island, near Mount Desert, smoked a few bloaters about the same time. Portland dealers soon began curing bloaters, and they have continued the business, until now they rank second to Eastport in the quantity prepared. The people of Lubec are just turning their attention to the business. These three towns are the only ones at present engaged in the preparation of bloaters in the State of Maine, and, as far as we have been able to ascertain, none are put up in other parts of the country.

METHODS OF PREPARATION.—We are indebted to Mr. R. C. Green, of Eastport, for the following description of the methods employed in the preparation of bloaters in that locality. During the months of October and November the supply of herring for bloaters is taken largely by the net-fishermen off the southern head of Grand Manan. Later the fish are secured in the same manner along the New Brunswick shore, between L'Etete and Point Lepreaux. They are usually brought to market as soon as they have been taken from the nets, but when not convenient to make the journey the fishermen salt them in bulk in the vessel until such time as it may be convenient to market them. The bloaters prepared from the fresh fish are known as "fresh-water bloaters," and are considered far superior to the others, which are known as "salt-herring bloaters." On reaching the shore the salt fish must be soaked for some time to remove any surplus of salt that they have absorbed, after which they are at once strung and hung in the smoke-house. The fresh fish on reaching the shore are immediately placed in strong pickle, where they are allowed to remain for two to three days, after which they are washed and strung on ordinary herring-sticks and placed in the bays with the others. Fires are then built and the fish are smoked for three to six days, according to the distance of the market for which they are intended. The method of smoking is similar to that employed in the preparation of hard herring, with the exception that the bloaters, though salted a little more, are smoked for a much shorter period. Hard wood sawdust and chips are mostly used as giving the best color.*

When the smoking is over and the fish have become cold, they are packed in boxes holding 100 fish each, equal to 30 to 35 pounds in weight, and shipped as soon as possible, it being necessary to market them at once, as they are so lightly smoked that they will not keep for any considerable period.

The box at present used is made of pine. It is 21 inches long, 11½ inches wide, and 6 inches

*According to Mr. Wallem, the French bloaters are smoked for a much shorter period than the American. His translator represents him as saying of the French fish:

"After the herrings have been 12 hours in the smoke, they are ready, and are in the north of France called '*bouffi*;' they do not keep long, and are intended to be eaten soon. After they have been smoked 24 hours they keep better, and are called '*prêt*,' i. e., 'ready;' but for the distant markets they are not yet 'ready;' they must be smoked 36 hours, and are then, strange to say, called 'half-ready' (*demi-prêt*), because after they are 'ready' they are moved higher up and smoked for a while longer. These last-mentioned fish can from the north of France be sent to the south, whilst the *prêt* herrings are principally intended for the Paris market. If the '*bouffi*' herrings do not have a ready sale, they are again put in the smoke-house and are made into '*prêt*' herrings."

deep, inside measurement. Half boxes are also used to a limited extent, these containing 50 fish in number.

STATISTICS OF THE BUSINESS.—The price of bloaters has changed considerably from time to time. The fish prepared in Boston in 1859 sold at $1.25 to $1.50 per hundred. In 1865 the price had increased to $1.80, but since that time it has gradually decreased, until in 1880 it ranged from 60 to 75 cents. The majority of the bloaters are consumed in New England, though a few find their way to the Middle and Western States. Boston receives fully two-thirds of those prepared in Eastport, distributing them to its trade in different parts of the country. Portland dealers received about 7,000 boxes of bloaters from Eastport in addition to the 7,000 prepared at home, giving that place a total of 14,000 boxes yearly. Two-thirds of this entire quantity are sold in Canada, the remainder going to different parts of New England and to New York.

When first introduced the Americans seemed to care little for the bloaters, not having acquired a taste for them. The bulk of the products were at that time sold to the Scotch and English. Of late, however, the Americans are coming to consume a fair proportion of the products, though even now a majority of the fish are consumed by foreigners.

As has been remarked, the only towns engaged in the preparation of bloaters are Eastport, Portland, and Lubec, named in the order of importance. According to Mr. Green, there were twelve firms engaged to a greater or less extent in the preparation of bloaters at Eastport in the winter of 1879 and 1880, these smoking 41,000 boxes, valued at $29,190. During the same period Lubec put up 3,000 boxes, worth $2,100, and according to Weir Brothers, the largest dealers in Portland, there were 7,000 boxes, valued at $4,900, prepared in that city, making a total of 51,700 boxes, valued at $37,800, prepared in the State of Maine.

## c. STATISTICS OF THE SMOKED-HERRING INDUSTRY.

### 11. STATISTICS OF THE INDUSTRY IN MAINE IN 1880.

The following table gives in detail the entire products of the smoked herring and bloater industry for the State of Maine in 1880; this being equivalent to the production of the entire country if we neglect the frozen fish that are smoked in the larger cities farther south:

*Table showing the extent of the smoked-herring business of the State of Maine in 1880.*

| District. | Persons employed, exclusive of weir-fishermen. | Smoke-houses. | | Additional cash capital. | Barrels of herring used for smoking. | Quantity of smoked herring put up. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Hard herring. | | Bloater herring. | | Total. | |
| | | Number. | Value. | | | Boxes. | Value. | Boxes. | Value. | Boxes. | Value. |
| Eastport district | 180 | 106 | $18,460 | $6,000 | 26,562 | 230,800 | $41,550 | 44,700 | $32,900 | 275,500 | $74,450 |
| Machias district | 3 | 19 | 1,380 | 300 | 420 | 6,300 | 1,135 | ..... | ..... | 6,300 | 1,135 |
| Ellsworth district | 22 | 62 | 4,980 | 1,000 | 3,667 | 55,000 | 9,900 | ..... | ..... | 55,000 | 9,900 |
| Castine district | ..... | 2 | 300 | 200 | 668 | 10,000 | 1,800 | ..... | ..... | 10,000 | 1,800 |
| Belfast district | ..... | 1 | 80 | 75 | 80 | 1,200 | 215 | ..... | ..... | 1,200 | 215 |
| Wiscasset and Bath districts | ..... | 5 | 500 | 100 | 267 | 4,000 | 720 | ..... | ..... | 4,000 | 720 |
| Portland district | 24 | 6 | 8,000 | 2,000 | 1,750 | ..... | ..... | 7,000 | 4,900 | 7,000 | 4,900 |
| Total | 229 | 202 | 33,700 | 9,675 | 33,412 | 307,300 | 55,320 | 51,700 | 37,800 | 359,000 | 93,120 |

# 5.—THE SARDINE INDUSTRY.

## 1. ORIGIN AND DEVELOPMENT OF THE BUSINESS.

THE WORK IN FRANCE.—The idea of packing small fishes in oil under the name of "sardines" seems to have originated in France, where for many years the people have been accustomed to catch and prepare small fish that would be nearly valueless for other purposes. But though the business began in a small way many years ago, it is only within the last few years that it has assumed important proportions. Mr. Frederick M. Wallem, of Norway, in his Report of the French Fisheries, as exhibited at the Paris Exposition in 1878, states that in 1850 France produced only 3,000,000 cans of sardines, and that eight years later the quantity had increased to but 10,000,000. At the time of writing (1878) he states that the business developed rapidly, and that there were between fifty and sixty establishments engaged in the work, quite a number of them producing several millions of cans each during the season.

THE BUSINESS IN OTHER PARTS OF EUROPE.—Seeing the advantages to be derived from this business other countries have interested themselves in the work, and at the present time many of the principal countries in Europe utilize some one or more of their small fishes for packing and sale under the name of sardines. According to Mr. Wallem, Italy, Spain, and Portugal, in 1878, produced considerable quantities of sardines in oil in addition to their large trade in "pressed sardines," and Sweden and Norway have for some time been exporting small herring in oil under the name of sardines. Japan also has recently begun to develop a sardine industry which seems destined to assume important proportions. Germany has also for some time been extensively engaged in packing small herring in barrels with various spices, and now exports large quantities of them under the name of "Russian sardines." From the above it will be seen that though France still leads the nations of Europe in the business she has by no means a monopoly of the trade; and it is only a question of a few years when some of the other countries will, on account of the abundance of some particular species and the readiness with which they can be secured, become formidable rivals in the business.

FIRST EXPERIMENTS IN THE UNITED STATES IN WHICH HERRING WERE USED.—The case with the United States is very different from that of the European countries. The latter have, from their nearness to France and their intimate relations with the French, been constantly coming in contact with the various phases of the sardine industry, and have had no difficulty in watching the new developments that have been introduced from time to time, while they have been more or less familliar with the methods and details of the business. Americans, on the contrary, have had little knowledge of the work beyond that obtained from the manufactured goods imported by the trade, and it was only recently that our people came to understand that fishes different from those used by the French were being put up in other countries under the name of sardines.

Having learned this much, the Americans were not slow in examining into the subject to see if some of our own fishes could not be utilized for the same purpose. The first to act in this matter was Mr. George Burnham, of the firm of Burnham & Morrill, of Portland, Me., who are among the largest packers of canned goods in the United States. In answer to a letter of inquiry Mr. Burnham replies:

"The idea of using the small herring as a substitute for the sardines occurred to the writer

in 1865. It was well known to me that myriads of little herring were annually caught at Eastport, Me. These were too small to be of use for smoking or pickling, and I thought that as they belonged to the same family as the sardine they might be used with profit as a substitute, and that if properly prepared they would be equally good. Acting upon this thought I visited Croissett, on the coast of France, where there were several canneries for the packing of sardines, and made a careful examination of their works. I also studied the methods of taking the fish and the different processes to which they were subjected before being placed in the cans. Later, I proceeded to Nantes, on the river Loire, for the purpose of inspecting the canneries of that region. Having made myself familiar with the French methods, I purchased a quantity of olive oil and other articles to be used in the packing of herring and returned home.

"In the fall of 1867 I proceeded to Eastport and secured suitable buildings for the work and began a series of experiments. I put up the fish in cans similar to those used by the French and used only the best quality of olive oil in preserving them. Great difficulty was found in properly drying the fish, and after a loss of considerable time and money I was obliged to abandon the business on account of my inability to get rid of the herring-oil flavor."

This failure to prepare a suitable article was but a single step in the line of progress toward an important industry. Had Mr. Burnham pushed his experiments a little further he would doubtless have been rewarded, as he well deserved, by the discovery of a suitable method of drying the fish, after which his way would probably have been clear. As it was, his failure had its effect upon those who were interested in the work and the result was, that parties began looking about for other fishes which did not possess the "herring-oil flavor."

AN ATTEMPT TO UTILIZE THE MENHADEN FOR THIS PURPOSE.—An attempt was soon made to utilize the common menhaden (*Brevoortia tyrannus*) for canning purposes. The parties engaged in this work met with fair success, and the canned menhaden were at first received with considerable favor, but for some reason the business is now of little importance, if, indeed, it has not been wholly abandoned.

Prof. G. Brown Goode, in his History of the Menhaden, gives the following account of the manufacture of sardines from menhaden:

"On the coast of New Jersey, near Port Monmouth, are several factories, which carry on an extensive business in canning menhaden in oil and spices. Mr. F. F. Beals, of New York, gives the following description of the methods in use in one of these establishments:

"'We aim to have our catch of mossbunkers in by 6 or 7 o'clock a. m., as the fish seem to be strongly impregnated with phosphorus and soon spoil in warm weather. As soon as the fish are landed, we put our entire force of men to cleaning, cutting, and scaling, for which we have machines adapted. When the fish are cleaned, they are at once put in hogsheads, and salted just sufficiently to keep and to remove their extreme freshness. They are then packed in cooking cans, which are a little larger than the packing cans, and put into the tanks, where they are steamed for the space of about two hours. After the fish are taken out, they are placed in the regular market cans, which are then laid upon zinc-covered tables, where they are filled with salad oil. They then go to the tinners, who solder on the lids, after which the can is again steamed and vented, and passed up into the cleaning and labeling room. Each day's work is piled up separately, each can being thoroughly tested to see that it is perfectly air-tight. For this we have an experienced hand. Not a can is packed until it has stood for at least a month. At the expiration of this time, after being again tested, the cans are packed in wooden cases containing two dozen each, and are then ready for the market. As we make all our tin cases, we

are able to secure good results, and it is a rare occurrence to have a swollen can. If there is one, it is at once thrown aside.

"'Our company was incorporated April 21, 1871, under the laws of the State of New York. Seeing the magnitude of the sardine business on the other side of the Atlantic, we were impressed with the idea that there was a large field for operations in this country alone. We at once set about to find a fish which would supply the place of the European sardine. After many experiments, we at last found one to suit the purpose, viz, the mossbunker, and commenced a series of experiments to find a means of extracting or softening the bones without the use of acids of any kind. After over a year of experiment, we at last found the desired process, which we secured under United States letters patent, dated May 21, 1872. This process consists of various modes of steaming until the bones become so soft that they can be eaten, like the flesh of the fish, without the slightest inconvenience. The first two years most of our time was consumed in experimenting, so that it was not until a year ago that we really commenced to manufacture, though prior to that we put up some goods. Last year, 1873, we packed and sold about 30,000 dozen whole cans or boxes. We have now capacity to turn out double that amount and we expect to be obliged to do so, as our trade is rapidly increasing. Our goods have received various awards, including a medal of merit at Vienna in 1873, and a silver medal at Bremen in 1874.'

"During the season of 1877, the works of the American Sardine Company were not in operation. Mr. Beals, the secretary, informs me that the manufacture will be pressed strongly in 1878. * * *

"There are other establishments near Port Monmouth which prepare menhaden in spices and vinegar under the trade names of 'Shadine,' 'Ocean Trout,' and 'American Club-Fish.' I have been unable to obtain statistics of this branch of manufacture. Hoope & Coit, of New York, contributed samples of these preparations to the Centennial collection of the United States Fish Commission, and I suppose this firm to be engaged in the manufacture."*

In speaking of the quality of these fish Professor Goode remarks:

"Many persons are incredulous with regard to the possibility of manufacturing sardines of good quality from the menhaden. It need only be said that they have been carefully tested by many unprejudiced judges in the city of Washington, and that the verdict has always been that they were almost equal to French sardines of the best brands. There can be no reasonable doubt that if olive oil of good quality were to be substituted for the cotton-seed oil now used in the preparation of American sardines, they would be fully equal to similar articles imported from abroad."†

EXPERIMENTS IN THE USE OF HERRING FOR "RUSSIAN SARDINES" LEADS TO THEIR USE FOR OIL SARDINES.—About the year 1872 the small herring that were being imported from Germany under the name of "Russian sardines" suggested the idea of using the herring taken at Eastport as a substitute, and experiments were soon under way. The "home-made Russians" were found superior to the imported ones, and their manufacture soon became an important business. This led to a better knowledge of the abundance of the small herring in the locality, and in the fall of 1875 Mr. Henry Sellmann and Mr. Julius Wolff, of New York, began experiments in putting up the herring in oil, under the direction of the Eagle Preserved Fish Company, of which they were both members. They were successful in finding a method by which a superior quality of sardines could be put up. As the result of their labor these gentlemen have had the satisfaction

* Report of U. S. Commissioner of Fish and Fisheries, Part V, 1877, pp. 137-138.
† *Ibid.*, p. 138.

of seeing the industry gradually develop to such an extent that it now constitutes the principal business of Eastport, and is rapidly spreading to other portions of the State.

MR. SELLMANN'S ACCOUNT OF HIS WORK.—Mr. Sellmann has furnished the following very interesting account of the causes that led to the experiments and of the methods employed in the work:

"The Franco-German war in 1870–'71 was the approximate if not the immediate cause of the origin of the American sardine industry, and it was brought about in the following manner: For about ten years previously there was imported from Hamburg, Germany, by a firm in New York, an article of merchandise known as 'Russian sardines.' These were put up in kegs of three different sizes, weighing, respectively, 4, 7, and 11 pounds gross. The fish used for this purpose were small herring taken on the coast of Norway, and were prepared as follows: After being suitably salted the heads and entrails were removed; the fish were then thoroughly washed, and, after draining in baskets, packed in layers in kegs, every other layer receiving a definite quantity of whole spices, such as cloves, pepper, mustard seed, bay leaves, allspice, red peppers, and capers. A pickle of slightly salted vinegar was added after the package had been filled up with fish. From a small beginning this article grew rapidly in favor, principally among the German population, and the demand for the goods became so extensive that by 1870 the importation amounted to not less than 50,000 kegs per annum, mostly of the larger packages. The price up to that time ranged, upon a gold basis, at from $1.10 to $1.25 for the larger, and at from 50 to 80 cents for the smaller sized kegs. When in the early part of the Franco-German war, in consequence of the blockade of German ports by the French navy, the importation of the article from Hamburg had to be abandoned for the time being, the price of the article advanced 50 per cent. in New York, owing to the small supply in market. It was under these circumstances that the writer, who for many years previously and at that time was engaged in the importation of other kinds of preserved fish, conceived the idea of finding a suitable fish taken in American waters for the purpose of producing the so-called Russian sardines in this country. The small smoked herring that are put up in boxes, and known in our markets as No. 1 and scaled herring, furnished a basis for investigation as to suitability of the fish under a different mode of curing and preparation for the purpose mentioned. As these fish were principally prepared at Eastport, Me., an order was transmitted to Messrs. Griffin Brothers, of that place, for a sample shipment of small salted herring, with full instructions as to the manner of salting and preparing the same. The shipment came to hand in due time, and the quality of the fish proved satisfactory. In the further development of the work considerable difficulty was experienced in procuring suitable kegs at a moderate price for putting up the fish; but this was finally overcome by Messrs. Kellogg & Ives, of Fair Haven, Conn., who were engaged in the manufacture of oyster kegs. This firm succeeded in making a good imitation of the foreign keg at a reasonable price. Next, the fish were put up carefully and in good style, and offered for sale to the jobbing trade. Notwithstanding, however, the continued great scarcity of the imported article, in connection with the high price asked for it, there was much prejudice and negative shaking of heads on the part of the dealers against the new domestic article, and the difficulty of finding a market for it was subsequently increased by the raising of the German blockade, thus restoring former facilities for importation.

"A further difficulty in the fight against prejudice and odds was encountered in the fact that it was late in the fishing season, and suitable fish were scarce at Eastport. However, with a moderate supply of material, the writer succeeded after awhile in interfering to a considerable extent with the foreign article, and in making valuable friends for the 'home-made Russians.' Objections were, however, soon made by some of the trade against the better appearance of the American machine-made kegs than of the hand-made imported ones. Stimulated by increasing success, the

writer decided to overcome this objection by putting up the fish in square and oblong tin cans, holding two pounds each, hoping at the same time that by ornamenting the cans with an attractive label they could be more readily introduced to the trade. It was by such and other means and devices that the domestic article was soon well introduced, and it took but a few years, on account of the excellent quality of the goods and the lower price at which they could be sold, to establish them so firmly in the market that the importation from Germany had to be abandoned by the parties who up to that time had made it a well-controlled specialty and had grown rich at the business.

"It may be well to add that a powerful help in the introduction of the domestic sardines presented itself in the fact that their keeping quality was found to be far superior to that of the imported sardines, which were very liable to spoil in a comparatively short time, especially in the summer season, during which and in the early fall the demand for Russian sardines is greater than at any other time. For years dealers had been much annoyed and in many instances had lost considerable money by the spoiling of the imported sardines after they had been shipped to the trade. Your correspondent took good care that the fish were immediately and thoroughly salted upon being taken from the water. The care taken in the preparation of the fish placed their keeping qualities beyond question, and justified the packers, after stipulating a reasonable time during which the guarantee should hold good, in making the following offer to the trade: 'Warranted to keep sound; if not so found, money will be refunded.' No such guarantee was given in regard to the imported sardines. This proved a great stumbling-block to the importers; it was, indeed, the death-blow to the imported article.

"The firm of Hansen & Dieckmann, of New York, who had so far controlled the importation of the article, at this stage of the introduction of the domestic article began to realize the fact that the importation of Russian sardines was a thing of the past; and they at once turned their attention to the preparation of the home-made goods in order to retain their hold on their American trade. Their efforts in the introduction of the domestic article had a very beneficial effect, and the sales were greatly increased. Later, when the supply of fish was found to be practically inexhaustible, other parties engaged extensively in the work, and the competition greatly reduced the price of the manufactured article. Fishermen and dealers in fish at Eastport were not slow in profiting by the demand for small salted herring, and they soon began to put up quantities of them. It was found profitable now to prepare the fish at Eastport and to extract the oil from the heads and entrails by means of presses, and to convert the residuum into pomace for manuring purposes.

"During my first visit to Eastport I had an opportunity of examining the quality of the little fishes before they were salted, and it at once occurred to me that they would answer other purposes than those for which they were then used, namely, for smoking, pressing, and preparing as Russian sardines. I dressed a few of them after the manner of French oil sardines, and, after frying them, was satisfied that the fish, if properly prepared, would be a good substitute for the imported oil sardines, and that by their use a new home industry of great promise might be opened up. For the purpose of personally conducting careful experiments, I found it necessary to temporarily locate at Eastport, after having associated myself with the firm of Wolff & Reessing, of New York, and with them, under the firm name of the "Eagle Preserved Fish Company," pushed the experiments very vigorously. I made it my business to inform myself as thoroughly as possible on the methods employed by the French in the preparation of sardines, and for this purpose spent many hours in the public libraries of New York in search of such information, with but little success. I

finally got hold of the French Encyclopédie—Roret on 'Conserves Alimentaires'—which contained a description of the process.

"The following is a translation of the article above referred to:

"'As soon as the fish are brought in by the fishermen the heads are cut off and the entrails are removed, and in some instances even the bones are taken out. They are then promptly salted. A skillful person may prepare a thousand fish in this manner in an hour. After the fish have been in contact with the salt for twelve hours they are washed clean in fresh water or in clean salt water, the latter being preferable. In order to prevent any deterioration of the fish the process is reversed by some manufacturers by first salting the fish for twelve hours and then removing heads and entrails. Whatever may be the most suitable process, immediately after the fish are washed clean they are spread out on willow or wire-work frames for the purpose of drying the same suitably in the open air, if the weather permits, or in a properly constructed drying-room, by means of an artificial current of dry and warm air. After they are sufficiently dried they are put into wire baskets and immersed for two or three minutes, according to the size of the fish, in olive oil, heated to 250 degrees centigrade. After the fish are thus cooked they are placed horizontally in the well-known little tin boxes, which are packed full, the fish being packed as snugly as possible, after which a fine quality of olive oil is added, enough being used to fully cover the top layer. This done the cover is put in, and the can is carefully sealed up with a soldering iron; after which the cans are placed in perforated low iron pans, and subjected to a water bath heated to 100 degrees centigrade, in which they remain from one and a half to two hours, according to their size. This process has the effect of expanding the air in the cans, which, upon being taken out, are convexed on top and bottom in consequence of the air-pressure from within. The cans are then vented by a sharp-pointed instrument, and the vent hole is promptly soldered up as soon as the air has blown out. The cans are then allowed to cool, after which, if found to be tight, they are rubbed clean with sawdust and packed in wooden boxes for shipment.'

"The instructions of the French encyclopedia appeared explicit at first sight, but when it came to carrying them out it was found that they were rather general. The apparently simple method of drying the fish 'suitably' I found to be a matter of extreme difficulty, and the problem has only been satisfactorily solved after many and patient experiments. The advantage in this respect of the Mediterranean climate as compared with that of Eastport, Me., is very great, and it is a matter of much importance in this industry. Fine drying weather at Eastport during the season of packing sardines is the exception, while on the Mediterranean it is the rule. Fish dried by an artificial current of dry warm air are far inferior to those dried in the open air in favorable weather. At times the percentage of moisture of the air at Eastport, resulting from the great fog factory of the Bay of Fundy, is so great that even our modern drying-rooms, provided with powerful blast blowers which supply a current of dry warm air, prove inefficient. I found that the most approved drying-rooms in use for drying wood, fruit, and other material were not suited to the purpose of drying the little fishes properly. The instructions of the French authority for salting the fish for sardine purposes, if applicable to the sardines of the Mediterranean, are certainly not suited to the nature of our small herring, experience having demonstrated that instead of salting the fish for twelve hours it is all sufficient to give them one hour's salting here, and if the fish are small one hour even is too much. Excessive salting of the fish not only spoils their flavor and deteriorates their quality generally, but it increases the difficulty of drying them promptly and properly. Now as the fish should be salted but slightly, it is a matter of much importance that the drying process should occupy as little time as possible in order to prevent decomposition. I learned at Eastport that an attempt had been made ten years earlier by Messrs.

Burnham & Morrill, of Portland, Me., to pack oil sardines, but that the enterprise had been abandoned owing to the fact that they failed to put up a merchantable article, even though the best materials, including first quality olive oil, were used, and that the firm had informed themselves thoroughly of the French methods, a member of the company having personally investigated the *modus operandi* in France. From my experience I am led to believe that this failure resulted from no other cause than that of prolonged delay in the drying process. The time for drying should not exceed two hours if the fish are but slightly salted; beyond that time they decompose very rapidly, and will then vitiate the finest quality of oil, while difficulty is experienced in properly frying them after decomposition has begun, as they are apt to break in pieces under the influence of the hot oil. The same effect also results from oversalting. For frying the fish I adopted strong sheet-iron pans about 6 feet in length, 2½ feet wide, and 6 inches deep. These proved perfectly suitable, and have been generally adopted by the different packers, with but slight deviations from the given dimensions. The wire baskets in which the fish are placed for immersion in the oil are nearly square and suited to the width of the pan, which rests over an open fire, while it is protected from the direct action of the flame by a piece of sheet iron of proper length and thickness. Wood is used for fuel in the furnace, which is built of common brick. The fire-place underruns the whole length of the pan. The oil for frying, when of proper heat, will evaporate the water from the fish, which will rise to the surface when sufficiently cooked.

"In the early spring of 1879 I dissolved my connection with Messrs. Wolff & Reessing, and associated myself with Messrs. Martin & Balkam, of Eastport, and with Messrs. Rosenstein Brothers, of New York. The new firm was known as the American Sardine Company, and property was at once purchased at Eastport, where our first factory was put up. I make mention of this change simply because under this new firm a very important change was made in the manner of preparing the little fishes for sardines by a method not previously employed in this country. This method, which has proved thoroughly satisfactory, is vastly superior to the old process of first drying the fish and then frying them in oil. It differs in many particulars from that employed by the French, and we have secured a patent for it. By our method the fish are placed on frames of wire-work and subjected to the action of live steam in a steam-box and then baked or broiled on the same frames in an oven furnished with a revolving reel. By this process, it will be perceived, we do away with the drying process altogether. The steaming requires but a few minutes, and can be performed as soon as the fish have been washed from the salt or pickle and spread on the wire frames. The whole process of steaming and baking the fish takes only 10 to 15 minutes, and we are thus enabled to pack fish perfectly sweet and fresh, while by the old process the drying of the fish takes up from 5 to 20 hours, according to the state of the weather and the character of the drying-rooms. The fish as taken from the weirs vary greatly in size, and generally but a small portion are of suitable size for oil sardines, although at times they run quite uniform for that purpose, while again, particularly in the spring, they run rather too small even for oil sardines. For the purpose of utilizing the larger fish, which, on account of their size, are not suitable for oil sardines, larger cans are made, and the fish are put up in a mustard or spiced sauce in handsomely decorated cans, and sold as mustard and spiced sardines. They are prepared in exactly the same manner as those to be packed in oil up to the time when they are ready for the cans. The demand for these fish preparations has so far rapidly increased, and they form quite a relish for the family table, picnics, excursion parties, &c. They, no doubt, if properly put up, will find their way to foreign markets; in fact, a few are now being exported."

OTHER SPECIES USED FOR CANNING PURPOSES.—From the beginning of the experiments in 1875 to the present time the different firms engaged in the sardine industry have kept constantly

at work and have succeeded in placing the business upon a permanent basis. But while they have been thus engaged they have not wholly overlooked the other fishes that are so abundant along our shores. When for any reason the supply of herring has not been regular, some of the more energetic parties have turned their attention to the preparation of eels and mackerel. They have been remarkably successful with their experiments in this line, and have succeeded in producing goods that find great favor with the trade.

THE CANNING OF EELS.—The canning of eels has thus far been carried on only to a limited extent by one firm, namely, the American Sardine Company, for the simple reason that eels are not sufficiently abundant on the coast of Maine to warrant any extended business. This firm has willingly taken all of the eels that could be secured, and even then have failed to fill their orders. By their process the fish, after being strained, are fried in the oven and packed in boxes, either plain or with a sauce made of vinegar and spices. The cans, which are similar in shape to those in which sardines are packed, after being neatly decorated with a pretty label, are placed upon the market as "Fried Brook Eels." It seems probable that with a cannery located on some portion of the coast where eels are more abundant, and where the demand for them is limited, an important business could be easily developed with profit to all concerned. The mouth of the larger rivers emptying into Chesapeake Bay would probably be found an excellent location for a cannery of this kind.

THE CANNING OF MACKEREL.—The canning of mackerel by different methods has been carried on by American capitalists for some time. The principal business in this line was formerly by parties engaged in the canning of lobsters. By their methods the fish are neatly dressed, and after their heads and tails have been removed they are placed in cans, which are at once carefully sealed. They are then immersed in boiling water and allowed to remain for about two hours. After cooling, the cans are branded and packed in cases for shipment to the trade.

Another method has been practiced to a considerable extent for several years. It consists simply of the packing of the ordinary salt mackerel in tin cans of a size convenient for family use, the object being to present the fish to the trade in attractive form, and by sealing the can to keep them in excellent condition until they reach the consumer.

The parties engaged in the sardine business have hit upon two new methods for the preparation of mackerel, either one of which is far superior to those formerly employed. The business began in the summer of 1880, at a time when mackerel happened to be plenty for several days about Eastport. The first method originated with Mr. Julius Wolff, of the Eagle Preserved Fish Company. By it the fish are treated in a manner exactly similar to that employed for the sardines. The mackerel are first carefully cleaned and dried, after which they are fried in oil and packed in cans with vinegar and spices.

The second method originated with Mr. Henry Sellmann, of the American Sardine Company. Fearing that the increased number of canneries at Eastport would result in a scarcity of herring, Mr. Sellmann established a branch cannery at Camden, Me., on the western shore of the Penobscot River, where small herring were reported abundant. Here, owing largely to the lack of interest on the part of the local fishermen, he failed to secure as many herring as were needed and was obliged to turn his attention to the mackerel, which are usually very abundant in the locality during the summer months. By careful experiment he found that the fish could be prepared by a method quite similar to that employed for sardines. The mode of treatment is almost identical to that already described for the preparation of eels. The fish are first eviscerated, after which the heads and tails are removed and the bodies, after being thoroughly washed, are placed in strong brine for a few minutes. When they have absorbed a sufficient quantity of salt they are taken out, and after

another washing are spread upon wire frames and placed on a revolving frame in a large oven, where they are allowed to remain until they are well broiled. They are then packed in large oval cans, holding about 3 pounds each, and covered with a sauce of tomatoes and spices. They next go to the sealers and later to the "bathing-room," after which they are labeled as "fresh broiled mackerel" and packed in wooden cases for shipment. These fish are far superior to any of the brands of sardines on account of the delicate flavor of the mackerel. From the first the demand was greater than the supply, and at the close of the busy season the firm began looking for a more suitable location for the erection of a larger cannery. They at length selected Gloucester, Mass., and in the spring of 1881 made extensive preparations in the way of buildings and apparatus, and during that season employed upwards of one hundred and fifty hands in the work.

For many years the mackerel fleet have been catching great quantities of fish which, on account of their size, are usually rejected by the fresh-fish dealers, and for the same reason are nearly worthless for salting. For lack of a market these fish were formerly thrown away after they had been taken. For canning, the small fish are preferred, and should the business become as extensive as present indications would lead us to believe, a market will soon be found for these fish. This will result in a great saving to the fishermen and will be a benefit to the masses, as it will render available for food small-sized mackerel which the fishermen have usually turned back into the sea.*

## 2. LOCATION OF THE CANNERIES.

EASTPORT AND VICINITY.—Eastport was the only American town engaged in the packing or canning of small herring, under the name of sardines, prior to 1880. The fish selected for ascertaining whether herring could be utilized in the manufacture of "Russian sardines," were purchased at Eastport and shipped to New York, where the experiments were made. When it was found that they could be made to answer the purpose the business was at once transferred to Eastport. There were several reasons that necessitated this change: In the first place, it was found that herring salted in the ordinary way for shipment were not all that could be desired for making a superior article, and it was therefore desirable to buy the fish fresh, and to prepare them expressly for this trade; it was also found that fish of a certain size and quality were best suited for the purpose, and these could only be secured by making the selection before they were salted; again, the saving in freights by the shipment of the manufactured article instead of the raw material, was an important item, and the saving in rent and labor was considerable.

When the preparation of sardines in oil began there was another and more important reason why the canneries should be located in the vicinity of the fisheries. Only the small fish can be used to advantage for canning, and these are so delicate that they must be used within a few hours, at most, after they are taken from the water. When sailing vessels are employed, as is usually the case at present, the fishery cannot be prosecuted at a distance much exceeding 8 or 10 miles from the cannery, and it often happens during the calm warm weather of mid-summer that the fish are spoiled on the passage. Steamers have recently been employed in towing the sardine boats to the cannery, or in gathering and transporting the catch, and in this way the distance to which the fish may be carried is proportionately increased. The first parties to use the steamboat for this work were Messrs. Wolff & Reessing, of Eastport, who, in the summer of 1879, bought a small tug for towing the fish-boats.

OCCURRENCE OF SMALL HERRING IN DIFFERENT LOCALITIES.—The fact that the business

* Since the above was written (in 1881) mackerel-canning factories have been established at Boston and at several places on the coast of Maine, and the industry has greatly increased.—A. H. CLARK.

was limited to a single locality up to 1880 is readily understood when we remember that this was the only district within the limits of the United States where small herring had been extensively taken during any considerable part of the year. True, herring 5 to 7 inches in length, locally known as "spurling," were caught in large numbers in Ipswich Bay, Massachusetts, for a few weeks in the fall, and they were also taken to a limited extent at various points along the coast of Maine. Still, the business had never been fully developed in any locality aside from Eastport, and many of the fishermen in various sections were ignorant of the abundance of the fish at their very doors, while others, though aware of the presence of the small herring, did not consider them of any value.

METHOD OF INTRODUCING THE GOODS.—The business was wholly under the control of New York parties, who had long been engaged in the sardine trade. These were doing an extensive business in French sardines, and were among the heaviest importers in America. Having a large business already established, it was not necessary for them to direct public attention to their home canneries, as it was thought that there would be a foolish prejudice against the American products. For the same reason it was thought necessary to disguise the herring under a French label, a practice that has been continued to the present time. Instead of calling attention to their growing business, it was natural that the interested parties should keep the matter as quiet as possible. It was for this reason that the value of the small herring for canning purposes did not become generally known, and that the business was so long confined to a single town.

DEVELOPMENT OF THE BUSINESS IN OTHER LOCALITIES.—Until 1880 only five canneries were in operation, and the preparation of the fish had been kept secret as far as possible. In the mean time, some of the Eastport merchants who controlled good fishing privileges had become thoroughly interested in the business, and, finding that the trade was fully established, a number of them decided to build canning establishments, and others soon followed their example. During the summer of 1880 eight additional canneries were located at Eastport. Fearing that the catch of herring would not be large enough to supply the additional demand created by these establishments, some of the original packers began to look about for new fishing grounds. On examination it was found that there were many localities along the coast of Maine where small herring were remarkably abundant, and before the close of the season canneries were established at Robbinston, Lubec, Jonesport, East Lamoine, and Camden.

Camden is situated on the west side of Penobscot Bay, considerably over 100 miles in a direct line from Eastport. This distance is increased to upwards of 500 miles if we follow the shore-line, which is very irregular, owing to the numerous bays, harbors, and coves that occur on this portion of the coast.

The region already described is thus far the limit of the sardine fisheries, and many of the localities within this district abound in herring during the entire summer, while others are frequented by large schools at certain seasons. To the westward of the above region small herring are known to occur in considerable numbers. In Ipswich Bay, Massachusetts, on the north side of Cape Ann, several thousand barrels are taken every fall, and among the small islands of Casco Bay they are reported to be very abundant. From our knowledge of the extensive spawning grounds between Cape Ann, Massachusetts, and Seguin Island, Maine, including those in the vicinity of Wood Island, and from the quantities of fish taken about Matinicus Island, we feel confident that, when the condition of the market will warrant it, large sardine interests may be developed at almost any point between Cape Ann and Eastport.

## 3. APPARATUS AND METHODS OF CAPTURE.

HERRING TAKEN BY MEANS OF LIGHTS AND DIP-NETS.—Two methods are now employed in the capture of small herring for supplying the sardine canneries of the United States. The first is the ordinary method of torching or "driving," as it is often called. This has already been described in the chapter on the shore-herring fisheries. Driving seems to have been extensively employed by the inhabitants in the vicinity of Eastport from the earliest settlement of the region, and up to 1828 it was the principal method for taking small herring to be used for smoking. It has always been more or less successful, though it involves considerable labor and exposure. At present boats frequently drive for herring to a limited extent during the summer and fall months. From twenty to thirty of them are said to be engaged in taking herring to supply the sardine canneries at Eastport or for smoking. In this locality a crew of four or five men frequently dip three or four hogsheads of fish in a single night.

As mentioned elsewhere, torching is extensively carried on in Ipswich Bay, where small herring called "spurling" are taken for supplying the shore fishermen of Gloucester with bait. From eighty to one hundred men are regularly employed in this work for about two months, beginning with the middle of October.

Torching is also carried on to a limited extent at various points along the coast of Maine, especially in the western portion of the State.

### THE FISHERY WITH BRUSH WEIRS.

THE BRUSH WEIR PECULIARLY ADAPTED TO THE CAPTURE OF HERRING.—Wherever the brush weir has been introduced it has been found to be peculiarly successful in the capture of herring, and has largely superseded torching, as it is found to take a larger quantity of fish than can be secured by the use of lights, and with much less labor and trouble to the fishermen.

At the present time the typical brush weir is used within the limits of the United States only on the coast of Maine, though modifications of it are employed in the river fisheries of numerous localities in other parts of the country. The weirs are more numerous in the vicinity of Eastport than in any other place.

THE TYPICAL BRUSH WEIR INTRODUCED FROM NOVA SCOTIA.—According to Mr. D. I. Odell, of Eastport, and Mr. Jacob McGregor, of Lubec, the fishermen of the United States owe their knowledge of the brush weir in its present form to Nova Scotia, where it was in use before the beginning of the present century. According to these parties, the date of its introduction into the United States was about 1820, when two or three small ones were built near the western end of Campobello Island and along the shores of North Lubec for the capture of different species. These were not sufficiently successful to warrant their extended use, and after one or two seasons' fishing they were abandoned. The first large weir exclusively for herring is said to have been built in 1828, by Mr. John McGregor and his son Jacob, at North Lubec. Mr. McGregor was a native of Digby, N. S., and had become thoroughly familiar with the brush weir as employed in the fisheries of that region before his removal to the United States several years earlier. Thus far during his stay in Lubec he had been engaged in the smoking of herring, depending wholly upon torching for his supply; but he soon found that the movements of the herring were very similar to those of the school that visited Digby, where the weir was successfully used. He therefore decided, on account of the labor and exposure in torching and the comparatively small quantity of fish taken, to build a brush weir for the capture of the fish. Accordingly he selected Rogers Island as a suitable location, and proceeded at once to construct his weir. It was built in shoal

water and was much smaller than the weirs of the present day. It proved very successful in the capture of herring, and other parties soon built weirs of similar size for the same purpose.

GROWTH OF THE WEIR FISHERY.—From this small beginning the weir-fishing gradually spread to the adjoining section, and Campobello, Grand Manan, and the various settlements along the American shore soon had extensive weir fisheries. In 1835 the weir was introduced into the fisheries of Grand Manan Island by Lubec parties. In 1836 the first one was built in West Quoddy Bay, which soon came to be the principal fishing-ground on the American shore, and within fifteen years from that date there were 30 weirs between Lubec and West Quoddy Head, a distance of three or four miles at most.

In 1849, according to Mr. M. H. Perley, there were 27 weirs at Grand Manan, 21 at Campobello Island, and 7 on the West Isles. We find no printed record of the number on the American shore at that time, but the older fishermen of the region informed us that there were about 45 in the town of Lubec, with 20 additional at Eastport and along the Maine shore between Lubec and Calais. This would give 65 for the American shore and 55 on the English islands, making a total of 120 at that time.

In 1878 there were, according to the New Brunswick Fishing Report, 86 weirs, valued at $25,740, in the British territory above described. In 1879, according to the same authority, there were in the same region 99 weirs, distributed as follows:

| | |
|---|---|
| St. Croix district | 6 |
| Inner Bay district | 1 |
| Lepreaux, Beaver Harbor, and L'Etete districts | 11 |
| Deer Isle | 32 |
| Campobello Island | 24 |
| Grand Manan Island | 25 |

During our visit to Eastport in the summer of 1880 we found that the American fishermen were still exclusively engaged in the fishing with weirs, located as follows:

| | |
|---|---|
| Outer shore of Lubec | 4 |
| American shore of West Quoddy Bay | 10 |
| English shore of West Quoddy Bay (owned by Lubec parties) | 7 |
| North Lubec | 10 |
| Eastport, and the small islands in the vicinity | 17 |
| West shore of Saint Croix River, between Eastport and Robbinston | 12 |
| Above Robbinston | 6 |

In addition to these, there were 7 weirs not fished during the season of 1879.

Prior to 1865 all weirs were built on the flats along the shore, some of them being dry at low tide, while the largest had but 2 to 5 feet of water at most. About this time the fishermen began building in deeper water, and within a few years their weirs were so arranged as to have 12 to 14 feet of water at low tide.

PRINCIPLE ON WHICH WEIRS ARE CONSTRUCTED AND THE DIFFERENT KINDS.—As the brush weir is so extensively used in the capture of sardine herring, it may be desirable to give a more detailed account of its construction. *It is built on a principle similar to that employed in all the* weirs, traps, and pounds along the shore, the plan being to direct the fish towards the bowl by the use of long leaders and funnel-shaped openings, and to prevent them from escaping by means of projecting curves or hooks that carry them beyond the opening or by stretching the net across the mouth of the weir after the fish have entered.

Several kinds of weirs are employed in the fisheries at Eastport. These have names depending largely upon their shape and the character of the shore and adjoining bottom on which they are built.

A "bar" weir is one that is located near a rocky ledge or bar that is usually exposed at half

tide. It is so arranged that the fish shall pass over the bar and into the pocket at high water, and shall be effectually prevented from escaping by its exposure as the tide falls.

The "shore" weir is usually built very near the land, which answers as one side. It has a long leader running obliquely out from the shore, which directs the fish to the entrance of the bowl or pocket.

A "channel" weir is built between two ledges or islands in such a way that all the herring passing between them are obliged to enter it.

The patent weir has recently been introduced into the Eastport fisheries, and is rapidly coming into favor among the fishermen of that region. It is much more effective than those formerly used, as the fish are readily taken during either flood or ebb tide. In shape it is similar to the ordinary pound-net. It has a long leader extending from near high-water mark to a depth of 12 to 18 feet at low tide, with an opening on either side of its outer end leading directly into the pocket, so that the fish may enter regardless of the direction in which they are moving.

A PROPER LOCATION FOR A WEIR.—Many fishermen devote considerable attention to the proper location of their weirs, and those poorly situated are usually unsuccessful. The best location is at the extreme end of some point of land that extends well out into the water or in a channel between two or more islands and ledges. It is usually desirable that the weir shall be placed where the tide runs with considerable force, as the fish are known to remain most frequently where the current is strongest, and they are often carried by it into the weir.

Many of the weirs are built so as to fish only when the tide flows in a certain direction, and are accordingly known as flood or ebb tide weirs, as the case may be. Most of them are so arranged that the mouth or opening is toward the west, as the best fishing is usually in the early morning, when, it is said, the herring, being attracted by the light, are moving toward the sun.

CONSTRUCTION OF THE WEIR.—The brush weir, as the name implies, is built exclusively of brush and poles. After the site has been selected, posts 6 to 12 inches in diameter are driven firmly into the mud at distances varying from 6 to 7 feet, to mark the outline of the weir and to hold it in position. Other smaller posts 2 to 4 inches in diameter are next selected, and after the lower ends have been pointed they are driven into the ground, the upper end being secured to a ribband of wood extending between the larger posts near the line of low water. These small posts are placed about 3 feet apart, and are carefully interwoven with fine brush placed horizontally, the branches passing over the first, under the next, over the third, and so on, each alternating with the next above or below it. The entire frame is woven with brush to within a distance of 3 feet of the pointed end of the stake, and in this way the frame is made very strong.

This frame of small poles and brush must be made on the shore, as it is to go below the surface of the water. The posts are therefore secured to the ribband, and the brush carefully woven in, and the completed section is taken out and placed in position between two of the larger posts, the lower side being firmly embedded in the mud, so that the brush shall reach to the bottom, after which the whole is carefully secured to the posts. The fishermen then return to the shore and build the next section in the same manner and place it in position as before. When all of the spaces have been filled the lower portion of the weir is complete. This extends from the bottom to low-water mark, and is much more carefully constructed than that higher up, as it must retain the fish at a time when they are most anxious to escape.

The upper portion, or that part lying between tide-marks, is more easily constructed. For this purpose small poles are placed horizontally between the larger posts, about 2 or 3 feet apart. Brush is then woven vertically among them to fill up the opening. It is not necessary that the

branches should be very close together, as the herring seldom attempt to escape unless the opening is large.

Formerly spruce posts were used in the construction of the weir, but these would last only two or three years, as they were soon attacked and badly damaged by the worms. At the present time white birch is extensively used, and if protected by bark it is said to last fully ten years.

It often happens that the site selected for the weir has a rocky bottom, into which the posts cannot be driven. In this case it becomes necessary to make a platform of heavy material, to which the posts and smaller poles are securely fastened. The whole is then placed in its proper position and carefully weighted with stones, which are lowered upon the platform. These weirs require considerable labor in their construction, and often many tons of stones are used in properly ballasting them.

COST OF BUILDING WEIRS.—The weirs vary greatly in size and strength, according to their location and exposure to the sea. Some are very small, and can be built of light material, so that the entire cost will not exceed $40 or $50, while those that are most exposed must be made of the heaviest material, and securely fastened, at a comparatively greater cost. The value of the average size mud weir is from $200 to $250, while that of the largest ballasted weir sometimes reaches $800 or $900. The posts and ribbands cost from 20 to 25 cents each—from three to four hundred of them being required. The brush averages from three-quarters to a cent a "spear," and for the ordinary sized weir 4,000 are needed. The spikes or nails cost from $10 to $15.

The labor forms a considerable part of the cost of construction, as it will take four men nearly a month to complete a weir under ordinary circumstances, though the time varies from two to eight weeks, according to the size and the condition of the bottom. The cost of labor is frequently neglected by the fishermen, as several of them usually own a weir in common, and build it during their spare hours; or, again, a number of "gangs" will assist their neighbors in building one without making any charge for their labor; they, however, expect their neighbors to return the compliment by assisting them whenever it becomes necessary to rebuild or repair their own weirs. Where help is hired, it usually costs from $20 to $30 a month for each man, making the total cost for labor about $100.

FISHING SEASON FOR THE WEIRS.—The fish taken in the early spring are usually quite small and have little value for smoking or for bait; they are also in such poor condition that they yield but little oil, and it therefore seldom pays to press them. For these reasons, during the early years of the fishery, the weirs were seldom put in order before the first of June, and frequently few fish were taken prior to the beginning of September, when the fishing began in earnest and continued till the close of the year. Now, however, owing to the demand for small fish by the sardine canneries, the weirs are usually repaired in the early spring, and the fishermen tend them regularly from the first of April till the following January.

THE WEIR PECULIARLY ADAPTED TO THE CAPTURE OF HERRING.—The success of the weir is largely due to the habits of the fish in feeding. The shores are quite abrupt in most places, and the weirs can therefore extend but a short distance into the channel, and at low tide a greater part of each is often exposed. During the hours of low water the herring usually remain in the channel, where the tide is strong, but at high water they approach the shore in search of the small crustacea that are so abundant in the region. The strong tides of the Bay of Fundy carry these minute forms from place to place, and the herring need simply remain with their heads toward the current and sift them from the water as it passes.

The weir owners claim that when feeding the herring usually head toward the current, and that they move forward or backward according as they swim faster or slower than the tide. In

swimming rapidly they often enter the weirs against the tide, when they are said to "stem in;" but when swimming slowly they are frequently carried or drifted into the weirs, when they are said to "drop in." On entering they are very apt to swim slowly about in a circle, keeping several feet from the brush, seldom attempting to escape through the numerous openings, which are often 2 or 3 feet in diameter. Many of the openings in the lower part of the weir are partially or wholly closed by the muscles and algæ that grow very rapidly in these waters and soon nearly or quite cover the brush, making it much more compact than it would otherwise be.

THE CATCH AFFECTED BY THE TIDES AND MOON.—All agree that the fishing is best at night, as the fish seem somewhat timid about entering the weir in the day-time, or even when the moon is full. The best fishing is therefore during the new moon or when the nights are peculiarly dark, and the fishermen speak of "the darks" as something particularly desirable.

The time of night during which the weirs will fish is thoroughly understood by the fishermen. For some weirs it occurs when high water is between 8 p. m. and 2 a. m., and for others when it is between 1 and 4 a. m. Others still fish best when high water occurs about sunrise.

When the conditions are favorable the tides "serve" or "the tides are on," as the fishermen say. At other times "the tides are off," and the fishermen frequently neglect to visit the weirs, as they expect nothing. On this account the catch is very irregular.

METHOD OF FISHING THE WEIR.—The services of three to five men are required in fishing a weir. Just before low water one of the number rows out to see if there is a sufficient quantity of fish to pay for the trouble of seining. If it is night a torch is lighted and held over the edge of the boat in order that the fish may be drawn to the surface, where they may be readily seen. From one to two hogsheads are considered enough to warrant them in using the seine. If the weir is to be fished the men arrive at low water with two or three boats, one of them proceeding to the reel near by, where the seine is kept. This is usually from 15 to 25 fathoms long, 10 to 20 feet deep, and when new is worth about $50. Two men enter the boat to stow the seine, while one remains on the platform to unreel it. The gate of the weir is now opened wide enough to admit the seine boat, after which it is again closed and securely fastened, that the fish may not escape. This gate is built in the pocket or "bunt" of the weir, for the purpose of admitting the boats and of liberating any small or worthless fish, or any surplus catch that for some reason cannot be utilized.

Two methods of seining are practiced by the fishermen of Eastport, as follows:

By the first method the fish are drawn by the net into shoal water near the beach, after which they are "rolled" into the boat and secured. It is not desirable to land them upon the shore on account of the dirt that would adhere to them, but when they are confined within narrow limits they are easily taken by means of large dip-nets.

By the second method the fish are drawn together in the "bunt" of the weir where the water is deepest, and secured in a similar manner. In seining, one end of the net is fastened to the side of the weir and the net is "paid out" within a few feet of the brush, until the "hook" is reached, when a small boat is sent to drive the fish into the bunt. This is done by splashing, or by striking the side of the boat with the oars. After the fish have been driven in, the seine is rowed back to the weir on the opposite side. The herring are thus confined in a space bounded by the weir on one side and by the netting on the other. One end of the net is now fastened to the bow of the boat and slowly carried along the weir until it meets the other, after which the staffs are firmly planted in the mud. The circle inclosed by the seine is now slowly reduced until the mass of fish is sufficiently compact, when the dipping begins. The dip-net, which is 3 or 4 feet in diameter and 5 or 6 feet deep, will hold about 5 or 6 barrels of fish. It is attached to a short wooden handle, by

means of which it is slowly moved about among the fish until it is nearly full, when the lower rim is brought over the gunwale of the boat; it is then "righted up" and two or three men begin pulling on the upper part of the net, until the fish are brought out of the water and begin sliding into the boat. The process is called "rollin' 'em in." When fish are plenty two men can easily roll 20 hogsheads, or 100 barrels, in an hour. If the catch is large several boats are brought alongside and quickly loaded by their respective crews, but when few herring are secured all are taken into one boat and the others return to the shore empty.

The boats used for this purpose vary both in size and number, from two to five belonging to each weir. These are from 18 to 25 feet long, 7 to 10 feet broad, and are valued at from $75 to $300. The more expensive ones are used for general purposes at other times, and are therefore much better than would be necessary for ordinary fishing purposes unless the weir happens to be in a position where it is exposed to the sea. The average boat is valued at about $150.

QUANTITY OF HERRING TAKEN IN WEIRS.—The catch is very irregular and uncertain. The fish are not caught every day, and sometimes an entire month, or even more, may pass during which not a herring may be taken. Again, when the "darks are on" and "the tides serve" they may sometimes be caught in immense quantities for several consecutive nights.

The following tabulated statement, kindly furnished by Mr. Benjamin Green, of Eastport, shows the catch of his weir, located at Flye's Island, during the seasons of 1878 and 1879:

SEASON OF 1878.

| Month. | Number of days in which fish were taken. | Total quantity. |
|---|---|---|
| | | *Hogsheads.* |
| June | 2 | 3 |
| July | 10 | 40 |
| August | 20 | 99 |
| September | 10 | 104 |
| October | 10 | 123 |
| November | 8 | 36 |
| December | 7 | 144 |
| January | 2 | 32 |
| Total | 69 | 572 |

SEASON OF 1879.

| | | |
|---|---|---|
| May | 7 | 17 |
| June | 5 | 7 |
| July | 2 | 9 |
| August | 10 | 47 |
| September | 11 | 95 |
| October | 4 | 7 |
| November | 6 | 128 |
| Total | 45 | 303 |

We learn that enormous quantities have been taken at different times. Four hundred hogsheads, equal to 2,000 barrels, were secured at one tide by one of the weirs on Grand Manan, and frequent catches of 200 to 250 hogsheads in a day are reported to have been made at Treat's Island weir, near Eastport, in former years. During our stay at Eastport, a weir at Flye's Island is said to have taken 150 hogsheads at a single tide. The largest quantity taken by any weir in 1880 was secured by Mr. McLain from his weir, located at L'Etete Passage. Prior to the middle of September, he had realized over $5,000 on fish sold fresh, while large numbers of small fish had been

"turned out" during the early part of the season, and frequent lots of larger ones were liberated at intervals during the summer, when the catch was greater than the demand. The best part of the fishing season still remained, and it was thought that the weir would stock as much more before the end of the year.

The instances already cited are, of course, exceptional, and the average catch is very much less. It depends largely upon the location of the weir and the character of the surrounding bottom. Some weirs may be very successful, while others within a few rods of them will take almost nothing. There are, however, certain places that herring seem to frequent in large numbers, and in such localities most of the weirs, if properly constructed, are fairly successful. At Lubec, according to Mr. Jacob McGregor, the catch averaged fully 300 hogsheads yearly for each weir prior to 1865. At the present time the largest quantities are taken at Grand Manan Island, where, according to Mr. J. W. Fisher, the catch in 1879 averaged about 225 hogsheads, and in 1880 it was fully as large. Deer Island, New Brunswick, ranks next to Grand Manan in the quantity of fish taken, and according to Mr. J. K. Wetmore the catch at that place was about 100 hogsheads to the weir in 1879, and a trifle larger in 1880. The American fishermen seem to have been less successful, and from a careful examination of the subject it seems probable that the average weirs along the American shore will not secure more than 75 hogsheads, and at Lubec, where the herring were formerly so abundant, only 60 to 65 hogsheads will be captured.

DIFFERENT WAYS IN WHICH THE WEIR CATCH IS UTILIZED.—Until 1855 a larger part of the catch was "turned out," and most of those saved were smoked for shipment to the principal markets of the United States and to the West Indies. From that date to 1876 about half of the fish were pressed for the oil and pomace, and thousands of barrels were smoked annually. Since 1876 a large percentage of the herring taken have been sent to Eastport to be put up as sardines.

Before the practice of pressing the fish for the oil was adopted the greater part of the catch, as has just been mentioned, was turned out; but as soon as it was found profitable to utilize the herring in this way, the majority, especially of those taken in the summer and fall, were saved for this purpose. The business was found to be a very remunerative one, as with oil at $9 per barrel the fish would pay an average of $3 per hogshead after deducting the cost of labor in pressing. During the spring months, according to Mr. Green, it requires 5 hogsheads of fish to make a barrel of oil; but in the fall the fish are much fatter, and 2½ or even 2 hogsheads will yield an equal quantity. It is said that during a single season Mr. U. S. Treat, of Treat's Island, near Eastport, made $24,000 worth of oil and pomace from herring taken in his weirs. About that time nearly all of the more thrifty fishermen owned screw presses and made a regular business of cooking their fish, and not less than 10,000 pounds of pomace were marketed in Eastport yearly.

ARE THE SARDINE-HERRING BEING EXTERMINATED?—For a number of years prior to the establishment of sardine canneries the weir-fishing was less important than formerly. This was by some thought to be due to the scarcity of fish, but it seems more probable that it was owing to the low price both of oil and smoked herring, which made the prosecution of the fishery unprofitable. Many fishermen claim that the herring are rapidly decreasing, and they cite the large quantities taken in former times, and the present small catches at Lubec, as proving their theory. The fish are undoubtedly less abundant in the vicinity of Lubec and in the waters of Cobscook Bay than formerly; but this seems to be explained by the peculiar method of fishing at that place. Though the weir-fishing had been extensively prosecuted for many years, the catch had not perceptibly diminished up to 1865, when the building of deep-water weirs, which extended so far out into the channel as to nearly meet from the opposite shores, effectually shut out the herring from their usual entrance to Cobscook Bay, which seems to have been a spawning ground. The herring,

thus practically debarred from this entrance, seem to have moved a few miles farther east, and are now more abundant in the vicinity of Deer Isle. In other sections there is no sufficient evidence to show any permanent decrease, though the catch of one year, for various reasons, may vary considerably from that of the following or preceding one.

LAY OF THE FISHERMEN.—The financial arrangement between the owners of the weirs and the fishermen varies with the locality. Several methods are commonly adopted for regulating this matter. Many of the weirs are built and owned by a number of men, who fish them in common, all sharing equally in the proceeds of the catch. Others are owned by a capitalist and tended by the regular fishermen. This is the case at Grand Manan, where, according to Mr. Fisher, the weir is built and kept in repair by the owner, who also furnishes the seine; as a return for this he receives one-fifth of the smoked herring after they have been prepared for market. The fishermen furnish the boats, dip-nets, scoop-nets, wash-nets, smoke-houses, boxes, and the labor in catching and preparing the fish, and receive four-fifths of the products of the weir, which in this region average about 16,000 boxes of herring annually.

In the vicinity of Lubec the weirs are owned by the men who fish them. These have an agreement among themselves whereby only those who are on hand to help fish the weir on any particular occasion shall have a share in the catch. Thus a man who absents himself when his services are required loses his portion of the catch as long as he continues to be absent.

ADVANTAGES AND DISADVANTAGES OF THE BRUSH WEIR IN ITS RELATION TO THE SARDINE INDUSTRY.—In order that the apparatus may be adapted to the herring fisheries of Quoddy River it should be strong, inexpensive, easily kept in repair, and capable of retaining the smallest fish; it should also fish at all seasons and with regularity. Most of these conditions are met by the brush weir, which, though seemingly primitive, answers the purpose for which it is intended better than any apparatus with which we are familiar. It resists the strong tides of the Bay of Fundy and the pressure of the drift material that is frequently abundant in the region. It costs little in proportion to its durability and can be easily repaired at a slight expense, though repairs are seldom needed other than those required for putting it in order for the season's work each spring. It retains the fish admirably, and even the smallest will not attempt to escape through the openings in the brush, which soon becomes well covered with muscles and algæ; on the contrary, they seem to avoid the brush and do not approach within a foot or more of it unless they are frightened, and even then they will seldom attempt to escape. In this particular the weir is far superior to a net, for unless of the smallest mesh most of the fish would pass through or become gilled and by their weight tear it from the posts and carry it to the bottom.

In the canning of sardines it is found very desirable that there should be a constant supply of fish; and as the business increases the question of a regular supply will be one of the greatest importance. The thirteen canning establishments at Eastport already employ over one thousand hands when running, and this entire number thus become wholly dependent upon the daily catch of herring, and any lack of fish therefore occasions much loss. The total capacity of these canneries when working on full time is 375 barrels, equal to 62 hogsheads, daily; and it is quite important that this supply should be constant; otherwise a large amount of capital remains idle and hundreds of people are thrown out of employment.

ADDITIONAL WEIRS BUILT TO INSURE A REGULAR AND CONSTANT SUPPLY.—To overcome this uncertainty of daily supply, many new weirs have been built, in the hope that some of them might be successful in taking fish each day; but when one has good fishing nearly all are apt to be equally successful, and when one fails most fail, so that there is usually either an over-supply or there are no fish. Even with these additional weirs the canneries often lose from one-fourth to

one-third of their working time in the spring and early summer and an occasional day in the fall, and they are often obliged to run day and night when the fish can be obtained, in order to supply the trade.

The men fishing for the canneries must be able to make enough when "the tides are on" to pay them for waiting when "the tides are off"; and for this reason the canneries are often obliged to buy a larger quantity than can be put into cans, the surplus being cut into Russian sardines.

The weir, as has already been mentioned, is not fished with any regularity, as there are weeks and even months together when there are not fish enough to pay for hauling the seine. The herring seemingly avoid them in the day-time, and even on light nights, fishing being best when it is darkest. Again, they enter the weir in considerable numbers only at or near high-water. We have, therefore, two varying conditions that greatly affect the catch; it being largest when high-water occurs at a particular time and the night is peculiarly dark. The record furnished by Mr. Green shows that during the season of 1879, which lasted one hundred and seventy-three days, herring were taken forty-five times, or an average of one day in four, the total catch being 303 hogsheads. In 1878 the same weir was fished about one day in three.

Formerly the daily irregularity of the supply was no serious drawback, and if the total catch of a season was good the fishermen were satisfied. Now, however, since the sardine business has grown to such large proportions, it is important that the fish should be taken regularly, as they cannot be kept from day to day, but must be used within a few hours after they come from the water, and when there are no fish the canners must stop work.

THE INTRODUCTION OF THE POCKET FOR RETAINING THE FISH TILL NEEDED.—Another method of overcoming the seasons of scarcity is proposed by Mr. McLain, who owns a large weir at L'Etete. He intends building a pound or pocket just outside and connected with his weir, into which he can turn any surplus to be kept until needed. This seems an excellent plan and deserves to come into general favor.

THE INTRODUCTION OF SEINES INTO THE FISHERY.—A fisherman at Deer Island recently purchased a 75-fathom haul-seine for surrounding the fish and hauling them upon the beach, but he found the herring so scattered that the seine could not be used to advantage in this way. He has since cut the seine in pieces of 25 fathoms each, these being set across the mouths of small coves to retain any fish that may chance to have entered at high-water. In this way he is meeting with only moderate success.

PROFESSOR BAIRD'S SUGGESTION THAT FISH EGGS BE EMPLOYED AS BAIT IN THE FISHERY.—Knowing of the use made of fish eggs as bait in the French sardine fisheries, Professor Baird suggested that they might be employed in the herring fisheries at Eastport, and that the difficulty of obtaining a constant supply might be overcome in this way. He requested the writer, while conducting his investigations at Eastport, to make a number of experiments in this line to ascertain whether the spawn of fishes could be successfully employed in this fishery. Accordingly, a quantity of salt cod-roes were obtained in Gloucester, and in company with Capt. J. W. Collins I visited the localities most frequented by the fish and made such experiments as were thought necessary for settling the question. From these experiments* it seems probable that fish eggs

*The young herring are occasionally seen at the surface, but seldom in schools of any considerable size, except during the calmest weather. They are, however, often seen "breaking" in small numbers in the numerous tide eddies and in places where two currents meet. This is most noticeable on the "young flood," when the fish are most frequently in the channels. Accordingly, the flood-tide was selected as a suitable time for testing the matter, and when the desired locality had been reached the boat was "hove to" and allowed to drift with the tide while the bait was being thrown. The eggs separated nicely and sank slowly as they were carried away by the current until they were finally lost to sight. The work was continued for nearly an hour, but the fish refused to "rise to the bait."

Thinking the locality unfavorable, Casco Bay Eddy, a favorite resort of the herring, was visited, and another

cannot be successfully used in the sardine fisheries of the United States, as the herring refuse to follow them to the surface, so that they cannot be attracted in large schools and secured by means of the purse-seines, which would, of course, be a very desirable way of catching them. Again, the observations made during the experiments lead us to believe that the fish give so little attention to this food that it could not be profitably employed in connection with gill-nets, the method commonly employed in France. Some other method must therefore be adopted for overcoming the difficulty already mentioned.

THE LACK OF CONSTANT SUPPLY DUE TO DEFECTIVE METHODS OF FISHING RATHER THAN SCARCITY OF FISH.—Small herring are undoubtedly abundant during a greater part of the year in the principal channels, but weirs cannot be built for them on account of the deep water. The difficulty then is to find some way of taking the herring there, or of drawing them into the coves and harbors along the shore. If they could be attracted by bait and the purse-seine could be used in their capture there would be no difficulty, and the supply would be regular. Our sardine interests would then be on an equal footing with those of France. The experiments with fish-eggs, if properly conducted, show that herring will not rise to bait. Furthermore, the tides are so strong about Eastport that the purse-seine would be wholly unmanageable, except "in the slacks" or in the coves, and dip nets to be used without seines, in order to be serviceable, must be so large that the fish would be frightened away before any considerable number could be secured.

THE USE OF ELECTRIC LIGHTS SUGGESTED.—The method of torching suggests to the writer an idea that might be made practicable. The herring have long been known to be attracted by and even to eagerly follow a bright light. Perhaps an electric light, or some other of great brilliancy, might be made to answer the place of bait; it would certainly be less expensive, and would affect as large or even a larger area of water. After the fish had been drawn together they might easily be led toward the shore, where they could readily be surrounded by haul or purse-seines and secured, or, on the slacks, purse-seines could be successfully used in the channels. By the use of this method, together with the pocket suggested by Mr. McLain, there seems no reason why the seasons of scarcity may not be fully overcome and a regular and constant supply be furnished to the canneries, thus rendering the business more profitable, and enabling the manufacturers to give steady employment to their help.

## 4. PREPARATION OF THE FISH.

THE BUILDINGS.—The canneries are located on some convenient wharf, where they may be easily reached by the herring boats. They are usually large two-story wooden structures, built of ordinary material, and finished off only in so far as is necessary for the work. Each has a large

attempt was made as the boat drifted about, but with no better success. Again, in passing among the numerous small islands, with weirs on every hand, another trial was made, but with like results.

By this time the tide was nearly full, and leaving the vessel we proceeded in a small boat toward the shore, where herring were "breaking." Here the fish could occasionally be seen swimming about under the boat, apparently giving no attention to the bait that was being thrown. At high-water a large weir was visited. Here herring could be distinctly seen swimming about near the bottom, but they seemed quite indifferent to the bait, and, if they ate it at all, could not be induced to follow it to the surface.

The following day the ebb-tide was selected for the experiments, and proceeding in another direction from that previously taken we kept throwing the bait while under sail, and while lying to, both in the channels and near the shore. In neither case were the fish induced to "rise."

An hour before low water, one of the weirs, where several hogsheads of herring were confined, was visited, and the boat was "dropped down" over them by means of a long painter fastened to the shore, after which the bait was thrown out. Though the herring undoubtedly ate more or less of the food when they came in contact with it, they would not follow it to the surface, and even refused to remain long in its path as the tide carried it through the brush. In order to be positive that they had swallowed some of the food, a number were examined after the weir had been seined, and a small number of eggs, together with small crustacea and other food, were found in their stomachs.

platform on the grounds near the building, where the fish may be exposed in pleasant weather, and is also provided with a room for drying the herring by artificial heat when it is damp and rainy outside.

Some have several buildings, where the different branches of the work are usually kept separate; but the best arranged have all under one roof, with separate rooms for each particular class of workmen. The cutting, salting, pressing, and bathing rooms are usually on the first floor, while the drying, frying, packing, and soldering rooms are on the next above. The drying room frequently forms a third story, situated just below the roof, with one or more large ventilators, through which the damp air passes out; or in some cases a small addition is made above the main roof, which is in turn used as a place for spreading the fish during pleasant weather. With most firms it is customary for the boxes and cans to be made at the cannery, in which case there is usually a carpenter-shop and several tinshops—either in separate buildings or in some part of the cannery—in which this work is carried on.

The cost of the canneries depends wholly on the amount of machinery used and the extent of the business done. Those built at Eastport vary from $2,500 to $15,000, including apparatus and land, the average for each being about $4,000.

THE TRANSPORTATION BOATS.—The boats employed for carrying the fish to the canneries are usually small open sail-boats, 18 to 30 feet long and 10 to 12 feet wide. Each cannery has from two to four of them. They generally start out at half-ebb, visiting the weirs in the different localities to see what ones have fish in them, and these are visited at low water to get the herring when they have been seined.

As the fish are very delicate, it becomes necessary that they should be brought to the cannery within a few hours, at most, after they are taken from the water, and it is therefore desirable that no time should be lost, and the boats are usually on hand as soon as the fish are seined.

Care must be taken that the boat shall not be overloaded, for if too many herring are put in they are apt to heat and spoil, while the lower ones may be bruised from the pressure of the mass above, and when in this condition they soon turn red and become soft and worthless. It is also desirable that the fish should be distributed through different compartments, so that they may not slide about as the boat lurches in the trough of the sea. The largest boats carry about 10 hogsheads, while those of average size carry only 5 hogsheads. The quantity for each varies considerably with the weather, for when warm the load must be proportionately lighter.

The fish must also be carefully protected from the sun during the summer months, and for this reason the boats are usually supplied with a covering of canvas for the protection of the fish. In some cases the compartment that holds the fish is made light, and has a covering of boards in place of the canvas, thus giving a more uniform temperature.

The mode of transportation is still very crude, and it is very important that some one should build a boat that shall be adapted to the work, as many times the present quantity of fish can easily be brought in one that is suitably arranged. Large shallow trays would be very desirable for this purpose. These could be arranged on either side of the boat or in the bottom, so that the air would circulate freely among them. They could be filled full of fish, and in this way the weight of those in the upper trays would be kept from the ones below, and a much larger quantity could be carried than in the ordinary way, while the tendency to slide about as the boat labored in the sea would be entirely overcome.

As soon as the fish have been taken aboard the sail is set, and the boat starts for the cannery, but it often happens during the calm weather of summer, especially when the tide is unfavorable, that they are detained for many hours, and the fish frequently spoil before they reach the can-

nery. To overcome this difficulty, several enterprising firms have purchased steamers, which are used for gathering the fish or for towing the boats to the factory during the warmest weather. This gives a decided advantage in many ways. By the use of steamers the fish can readily be brought to the canneries in better condition, and the territory from which the fish can be gathered is greatly enlarged. By the ordinary sail-boat the fishery is limited to 12 or 15 miles, while there is often considerable difficulty in carrying small herring half that distance. With a steamer properly constructed with trays for holding the fish, we see no reason why the fishery cannot be extended to 25 or even 30 miles on either side of the canneries, and the quantity obtainable be proportionately increased. The herring taken at Grand Manan Island would thus be available for the canneries at Eastport, and the business could be carried on with a far greater degree of certainty. A firm at Camden already sends its steamer 20 or 30 miles to secure its supply, carrying the herring in barrels that have been filled with water. In this way the fish in the lower portion of the barrel are in a measure relieved from the weight of those above them; but it seems doubtful if fish that have remained in water for any length of time after they have been taken will have as good a flavor as those brought in a dry state.

The men owning their own boats are paid so much per hogshead for the fish taken, and they are, therefore, quite anxious to secure as many as possible. Those sailing the boats owned by the canneries are paid by the month, receiving an additional percentage on the fish secured as an incentive to extra exertions. In some cases the weir-owners own boats which they use for carrying the fish to market.

PRICE OF THE FISH.—The herring are purchased by the hogshead, which, according to the dealers, should hold 5 barrels. In most localities, however, the measure has been enlarged so that it is equivalent to 6 barrels, or to 15 baskets holding upwards of a bushel each. The price paid varies greatly, depending, not only on the supply, but on the amount of competition and other circumstances. When the business started, the herring were bought for $1 per hogshead, with 50 cents additional for bringing them to the canneries. Later, as competition increased, the price advanced to $5 and $6, and for a short time during the fall of 1879 it reached $10, and even $12. During the season of 1880, the price paid by the Eastport dealers averaged about $4.50 per hogshead, with $1 additional for "running" the fish. At other points, the price was very much less; in some cases being as low as $1 to $1.50, and contracts were made in the summer of 1880, with the fishermen of Millbridge, Me., to cover all fish taken by them during a period of five years, the price agreed upon being $1.90.

There seems to be a natural limit to the price for which the herring may sell; this being governed largely by the price of pomace and oil on the one hand, and by the demand for sardines on the other. The fish ought seldom to have a value of less than $3 at the weir, for the fishermen can realize that price for them, even in the spring when the fish are poor, by boiling and pressing them, and selling the oil and pomace. During the late summer and fall, when they are usually very fat, they are worth $4.50 per hogshead for the same purpose. Again, every hogshead of the larger sized herring caught in the weir is worth $10 to $14 when smoked, and if the fisherman has any leisure time he will prefer to prepare his fish rather than to sell them at too low a figure. The average price to be paid by the canneries must, therefore, under present conditions, range from $4.50 to $5 per hogshead at the weir, in order that a full supply may be insured.

THE METHOD OF CUTTING AND DRESSING.—When the boat nears the wharf, the cannery whistle or bell is sounded as a signal for the cutters, who are usually boys and girls from eight to fifteen years of age. These are presently seen brandishing their large knives as they rush through the street on their way to the building. On entering the cutting-room, each seizes his oil-cloth

apron and is soon at his place ready for work. The fish are at once "hoisted out" of the boat and emptied upon the cutting table. A lively scene now presents itself, as all are anxious to cut as many as possible, since they are paid in proportion to the amount of work done. Each is provided with a box, holding a little more than a peck, into which the fish are thrown, while the heads, entrails, and tails are put into a barrel at one side.

The fish is taken in the left hand, while the knife is held in the right, and, beginning on the back at some distance behind the gills, the blade is driven downward through the body and the head is severed. The intestines do not cut so readily as the flesh, and therefore usually remain attached to the head, and are removed with it by one or two lateral strokes or scrapes of the knife. By a movement of the hand the fish is then reversed, and the tail is severed by a quick blow, and after being washed the body is ready for salting.

The children become very proficient in this work, and handle their knives with great rapidity. They will usually cut 3 or 4 barrels of ordinary-sized fish in a day, while a few of the most expert will cut fully a hogshead.

The price paid for cutting is 5 cents per box. When one has been filled it is removed and an empty one put in its place, a man being regularly employed for this work. The child receives a ticket or 5-cent check for each box cut. These are redeemable at the company's office on Saturday of each week, but it often happens that they are carried regularly to the stores of the town before pay-day arrives and exchanged for candy, fruits, or merchandise, the merchant presenting them for redemption when the proper time arrives. As it is desirable to have the fish cut as soon as possible, a large force is employed and the work is completed in a few hours, after which the children return to their homes. A smart boy will often earn over $1 a day when he has steady employment, but, on account of the small number of hours during which he has work, the average wages do not exceed $3.50 per week.

THE MANNER OF SALTING.—As soon as the heads, tails, and entrails have been removed the fish are emptied into a small car, which is rolled into the salting room. Here they are thoroughly washed and placed in the strongest brine. The time required for salting varies greatly, being dependent on the size of the fish, their freshness, and the weather. Large and fresh herring should be salted for fully an hour, while smaller ones, and those that have been kept for some time, will be sufficiently "struck" in thirty to forty minutes. In cold weather, owing to their firmer flesh, they must be salted longer than in summer. When a larger quantity is received than can be used for canning, the balance are at once salted in large hogsheads and allowed to remain until such time as they can be cut into Russian sardines. These have no value for canning, as they become so salt as to injure their flavor.

FLAKING.—As soon as they have been sufficiently "struck" the herring are taken from the salting troughs and thoroughly washed in spring water. They then go to the "flaking" rooms, where boys and girls, and occasionally grown people, are engaged in arranging them upon frames made of wood or galvanized wire. These frames, technically known as "flakes," are 30 inches square, and hold about 175 fish each. The "flake" is simply a square frame, with small triangular strips of wood, or small galvanized iron wires, stretched across it. These are separated from each other by 1 or 2 inches, so as to give a free circulation of air, and to touch the fish at only a few points, in order that evaporation may go on from all parts of the body.

The fish are arranged in rows with their tails in the same direction, so that when placed in the drying room the anterior portion shall be lowest, in order that the moisture may the more readily drip from the herring.

THE VARIOUS DRYING PROCESSES.—Up to this point the fish go through the same prepara-

tion in all the different canneries, but the next, or drying process, is managed differently in different places. The object is simply to remove the moisture from the herring before placing it in the oil. The prompt drying of the fish is a matter of great importance, and in the moist atmosphere of Eastport it is a much more difficult operation than in France. The small herring, being so delicate, require considerable attention during the drying process, and unless great care is taken they soon begin to decompose; and experience proves that if they remain until the first stages of decomposition begin, the oily matter of the fish will turn rancid and destroy the flavor of the oil in which they are packed.

The most desirable method for drying is to place the fish in the sunlight in the open air, where the moisture readily evaporates in a few hours; but, on account of the prevalence of fogs and the great humidity of the atmosphere in the region where the sardine industry is prosecuted, drying in the open air cannot be depended upon. When the weather is unfavorable for sun drying the moisture must be removed by artificial heat.

Drying rooms are usually located on the second floor or near the roof of the cannery, with racks arranged for holding the "flakes" obliquely, so that the moisture will readily drain from the fish. The racks in which the "flakes" are inserted are movable skeletons or frames, so constructed as to hold forty to fifty "flakes" each, these being placed about 3 inches apart and directly over each other. The room is supplied with a constant current of warm, dry air, which is brought from stoves or furnaces in the lower part of the building by means of large pipes, and after passing upward among the fish is allowed to escape through a ventilator in the roof. It usually requires twelve to twenty-four hours to dry the herring in this way under favorable circumstances. During the dampest weather a considerably longer time is required, and the fish frequently spoil in the process, while their flavor is often greatly injured and they are rendered nearly worthless.

To overcome this difficulty a number of different plans have been resorted to. One company has secured a large patent fruit drier, in which the "flakes" of herring are placed. The hot air is carried through a long pipe from the furnace room to near the roof, where it terminates in a funnel-shaped opening situated just above the top of the fruit drier. The drier, or box, as it might be called, is a tight compartment, about 4 feet square, extending from the ground floor to the top of the building. It contains a series of endless chains, with cleats at regular intervals of 3 or 4 inches. The chains are made to revolve slowly by means of machinery, and the flakes, after being covered with fish, are put in at the bottom and carried slowly upward, being taken out a half an hour later at the top. The hot air from the pipes is drawn down through the box and carried away by means of large fans worked by machinery, the temperature of the current being regulated by means of dampers in the air pipe.

In the fall of 1879 Eastport parties decided to construct a large oven in which to dry the sardines. A description of this, in the Eastport Sentinel of December 10, 1879, is as follows:

"The oven is 18 feet high, 14 feet wide, and 16 feet deep, with walls from 2 to 2½ feet in thickness. Its capacity to retain heat, which can be raised to above 600° Fahrenheit, is such that it will bake articles thoroughly two days after all fire has been withdrawn from the furnace. The whole is inclosed by a two-story building, the lower part of which is used as a boiler and furnace room, while in the upper story the process of preparing the fish is carried on. The flues and dampers are constructed to regulate the fire and heat to a nicety, and the heat can be reduced or increased more than 200° in a few minutes, according to the requirements. The machinery consists of eight skeleton iron frames attached to a cylinder, and remaining in a horizontal position while revolving in the oven. Notwithstanding the ponderous weight of the machinery, it works so accurately that, although arranged for steam-power, it may be revolved by a mere boy without difficulty."

The oven above described is simply an ordinary baker's oven of large size. It serves the purpose of not only drying, but at the same time cooking the fish. After the herring have been cut, salted, and thoroughly washed they are placed on "flakes," when they are taken to the oven room and placed in a small chest, where they are subjected to the action of steam for several minutes. This opens the pores and breaks up the fiber of the flesh, so that evaporation will go on very rapidly. After being steamed for two or three minutes the "flakes" are transferred to the revolving arms in the oven, where the fish are subjected to a heat of about 250° Fahr. for from five to twenty minutes, according to circumstances. As soon as they have been removed and allowed to cool they are ready for the cans without the additional cooking which is required by the other methods. The process of steaming has been patented by the American Sardine Company of Eastport, which originated the idea.

By the method above described the time necessary for preparing the fish is greatly reduced, and it often happens that the herring are placed in the cans within two hours after they are brought to the cannery, while by the old method during foggy weather they are not unfrequently kept two days. Another advantage of the new process is found in the reduction of expenses; as boiling in oil, which is a large item in the expenses of the other canneries, is entirely done away with. The baked fish are considered equal in every particular, and by some they are even pronounced superior, to those prepared in the old way.

In France, various methods of drying have been resorted to, the principal one being that of exposing the fish to the sun and drying them by natural heat; but though this method is preferred, when the weather will not permit of sun-drying, the moisture must be evaporated by artificial heat. The driers used in that country are different from those employed at Eastport; from descriptions which have been seen of them it would appear that they resemble, in some particulars, the fruit-dryer, and, in others, the regular baker's oven.

Mr. Frederick M. Wallem, of Norway, gives the following description of the drying process employed in the sardine fisheries of France:

"When the weather does not permit of drying them in the open air, an oven especially constructed for this purpose is used; but this way of drying sardines does not answer the purpose so well and is more expensive. Sometimes, however, it cannot be avoided, and the point is to furnish a sufficient quantity of warm air which can be brought to bear upon the sardines quick enough to make them dry rapidly.

"The drying ovens which are commonly used resemble a long and narrow brick baker's oven, with a fireplace at both ends and a drying place along its whole length. It depends on the heat and dryness of the atmosphere how long the sardines must be kept in the oven, and in order to regulate these two essential conditions a special drying apparatus has recently been invented. The model of this apparatus, which has been patented, has been exhibited in the French Department of Cooking and Distilling. It looked like five large closets placed side by side. The end closets contained ventilators and fans for distributing the warm air. The center closet was closed and the sardines were put in and taken out through the second and fourth closets. From the patentee I learn that this apparatus is constructed on the principle of the American cooling apparatus used in the slaughter-houses of the West; the main difference being that in the latter dry cold air is used, whilst the former requires dry hot air. Just as the fanning apparatus first pumps the warm air out of the bodies of the hogs and then exposes them to a strong current of cold air, thus in the French sardine drying apparatus a current of hot air is brought to bear upon the sardines after the cold damp air has been expelled. The sardines are kept on frames set

on a movable stand, and are thus rolled into the apparatus through door number two. They are kept there for a certain time under a certain degree of warmth, are rolled through the center closet, and finally out through door number four. As the stands move on rollers the whole process is done quickly and with great regularity."*

FRYING THE FISH.—After the fish have been dried to a suitable degree they are taken to the frying room and arranged on small wire trays or baskets before they are immersed in the oil. The frying pans are made of sheet-iron and are five or six feet long, two feet wide, and six inches deep. Two of these are usually placed on a large brick furnace, being protected from the direct action of the fire by sheet-iron plates. Oil is poured in the bottom of these pans until it covers them to a depth of about two inches. After it has been raised to a temperature of a little over 200° the wire frames on which the fish have been arranged are immersed in it. These frames are made of galvanized iron wire and have long handles on either end by which they can be readily lifted.

The frying requires from one to two minutes, according to the dryness of the fish. During the frying any water that may remain in the herring is readily converted into steam, when it at once ascends and escapes, its place being supplied by particles of oil.

The oil generally used for frying is a superior grade of cotton-seed oil, though in some cases the oil of different species of nuts is used. It can be used only a short time, as small particles of fish are apt to remain in it, and these soon settle on the bottom of the pan, where they form a crust which largely destroys the action of the heat, and by burning also injures the flavor of the oil. On this account the pan must be frequently scraped to remove the coating, and a greater or less quantity of new oil must be introduced.

When the fish have been sufficiently cooked they are taken out and emptied on a table, where they are allowed to drain and cool before they go to the packing room. In some instances they are allowed to remain on the frames on which they have been fried until a greater part of the oil has dripped from them, as the drainage is more perfect when they are left in this way.

BOILING IN CLOSED VESSELS WHERE ADDITIONAL HEAT IS OBTAINED BY THE USE OF SUPERHEATED STEAM.—The method of frying employed by the French in their sardine canning is very similar to that already described; but a new method of boiling where steam is employed has recently been introduced and deserves mention in this connection. Mr. Wallem, after describing the methods of boiling in open pans, gives the following:

"In order to save oil, and at the same time to accelerate the boiling process and make it pass off in a cleaner and more even manner, new apparatus have recently been constructed, which are heated by steam of an atmospheric pressure of 14 (in some even of 25). In this way the oil can be kept at an even degree of temperature (+160°—170° C.), and about 9,000 sardines can be boiled in an hour in thirty to forty-five boilings. The quality of the sardines of course depends on a careful and clean way of boiling them and on the quality of oil used. * * * In using the steam apparatus a great deal of oil is saved, but only if the manufacture of 'sardines in oil' is carried on on a large scale, for otherwise the expense for apparatus, boiler, &c., will swallow up all that is saved in oil, and modern apparatus, with drying apparatus, steam-boiler, &c., having one to forty kettles for boiling, costs 3,500 to 9,400 crowns [$938 to $2,519.20]. If, as is the case in large factories, 10,000,000 to 20,000,000 of sardines are boiled yearly, a steam apparatus will save 60 to 70 per cent. of oil. Instead of using $2\frac{2}{10}$ kilograms of oil per 1,000 sardines, only 850 grams are used, which, for 15,000,000 sardines, would be a saving of 20 kilograms of oil, valued at 19,000 to 21,000 crowns [$5,042 to $5,628], not counting the higher price obtained for a better article."

* Rapport fra verdensudstillingen 1878 i Paris. | Om de franske fiskerier | og | nogle fiskeri-industrielle forholde | samt | skibsfartsafdelingen på udstillingen. | Af Fredrik M. Wallem. | Kand. jur. Rapporter for Norge ved verdensudstillengen i Paris 1878. | Christiania, | 1880. | Translated by Herman Jacobson.

SORTING AND PACKING.—On reaching the packing room the fish are emptied upon long zinc-covered tables, with sides sloping toward the center, in order that any oil that may drain from them or that may be spilled in filling the boxes may collect and pass out through a small opening into a receptacle to be again used in the frying process. The table is surrounded by a number of girls and women who sort the herring into sizes, packing the smallest in the small-sized cans, and the larger ones in those of proportionately larger size. All of the fish having been treated exactly alike there is no difference in quality between the large and small, the rule for sorting being simply that those of like size shall be placed together in cans of suitable dimensions.

Nearly all of the smaller fish are packed in oil in small-sized cans, known to the trade as "quarter cans." These are 4½ inches long, 3 inches wide, and 1 inch deep, and hold from 9 to 12 herring, according to their size. The fish most suited for this purpose measure about 6 inches when whole, and when cut they have a length of from 3½ to 4 inches.

Fish measuring 8 to 9½ inches in length when whole are usually cut so that they shall have a length of 4 to 4½ inches. A small percentage of these are canned in oil; but by far the greater portion are put up in mustard, spices and vinegar, tomato sauce, or other condiments. The cans used for these fish are known as "half cans," usually holding from 10 to 16 fish each. They are 4½ inches long, 3½ inches wide, and 2 inches deep.

A few full-grown herring, measuring from 10 to 12 inches in length, are put up in vinegar and spices in large oval cans and sold under the names of brook-trout, sea-trout, or ocean-trout. There is only a limited demand for these fish, however, and the quantity packed is usually very small. Under these brands the canneries utilize the few large fish that may be found among the others, though they seldom purchase any lots of uniformly large herring for canning purposes.

As the fish are being sorted they are packed in boxes of proper size. The oil in which they are packed is usually flavored to the taste by adding lemon, sugar, and various spices. Some canneries adopt the practice of supplying the cans with a definite quantity of oil before the fish are introduced, while others pack the fish first and then pour the oil over them until the box is completely full. Some of the firms which have adopted the latter method immerse the cans in a bath of warm oil as soon as they have been filled and the cover has been placed in position, allowing them to remain until they go to the solderers in order that they may be completely filled; others do not consider it necessary that the can should be absolutely full. As the price of the oil is usually greater than that of the fish there is no disposition to pack light-weight goods, but the cans are filled as full as possible without subjecting the herring to too much pressure.

KIND OF OIL USED FOR FILLING THE CANS.—The oil used for canning varies greatly in quality in the different establishments. Occasionally the best olive oil is used. This usually comes from Bari, Italy, and costs about $1.40, with $1 additional duty, per gallon. A common practice among the packers is to mix a small quantity of olive oil with a larger amount of cotton-seed oil; and for several years, since the competition has been considerable, the use of olive oil has been largely done away with, and cotton-seed oil has been secured from the manufacturers at Providence, R. I., and Cincinnati, Ohio, at a cost of about 52 cents per gallon. Some of the canneries are now using other oils made from various seeds and nuts of foreign countries. The question of the quality of oil used is one of growing importance, and it seems likely to seriously affect the trade in the home-made products. We are not prepared to discuss the relative merits of the different oils or even to say that cotton-seed oil, carefully prepared from the best material, is inferior to the average grades of imported oils; but when so much depends on the flavor of the oil used, and the tendency to reduce the cost of the manufactured products under the pressure of competition is so great, it seems highly important that some parties shall take a decided stand in

this matter and put up a superior quality of goods which shall be sold upon their merits. The use of poor oils is perhaps the greatest drawback to the extension of the sardine business in the United States; but we are treated little better by the French canners, who have for a number of years been using the cheaper grades of oil in the preparation of those goods that are intended for exportation. Nearly all of the larger French establishments have certain brands which are put up in the very best quality of olive oil, but most of them also put up inferior and cheaper brands in which they use only the poorer grades of olive oil, and others pack in oil from the seeds of plants of that and other countries. Very few of the best brands of French sardines are imported into the United States, so that the fish obtained from abroad are little, if any, superior to the average grades packed in this country.

SARDINES IN VINEGAR AND SPICES.—Besides oil sardines a large quantity of herring are put up in vinegar and spices under the name of *sardines royales* and *sardines marinés*. Before the vinegar is poured on the fish it is boiled with spices of various kinds. In addition to the liquid, mustard seed, cloves, peppers, bay leaves, and frequently a small piece of lemon, are placed in the can. A good many fish are also put up in mustard, which is mixed with the best quality of vinegar that has been spiced to suit the taste. The spiced sardines and those put up in mustard are received with great favor by the trade and are coming into general use in certain portions of the country. By many they are preferred to the ordinary oil sardines. They are usually sold at a much lower figure for boxes of the same size. A few herring are also packed in tomato sauce, but thus far the demand for them has been very limited, and as there has been some difficulty about their keeping qualities the dealers and even the manufacturers are a little shy of them.

BONELESS SARDINES.—Thus far no one in this country has attempted to put up boneless sardines after the French method, though the imported goods are said to find ready sale in the American markets. We see no reason why some enterprising firm should not begin experiments in this line, as there would probably be no more, if indeed as much, difficulty in removing the bones from the herring than from the smaller fish used by the French. The method of preparation after the bones have been removed is exactly similar to that to which the ordinary sardine is subjected, and it will only be necessary to describe the boning process. Mr. Wallem gives the following account of the method employed by the French in this work:

"The so-called boning process, which by many people is considered very difficult, is, in reality, very easy. When the sardines are about half dried in the sun (if dried in an oven they can only be boned with great difficulty and loss), they are subjected to the following treatment. With one crack the backbone is broken close to the root of the tail. Then, by evenly and tightly squeezing it with the fingers it is loosened along its entire length. During this manipulation the whole bone system is loosened, and, commencing at the neck, the backbone and all the bones with it can be pulled out with two fingers or with a pair of small pincers. For breaking the backbone near the tail a pair of pincers is also sometimes used. When the bone has been taken out the sardines are set in the sun to dry in the usual manner."

THE SOLDERING PROCESS.—After the cans have been filled with fish and the proper condiments, and the cover has been inserted, they are sent to the soldering-room, where they are hermetically sealed by men who make a specialty of this work. In the Eastport canneries each man has a small revolving stand, which is turned by means of a treadle and leather belt. The top or surface of the stand has a small groove for holding the box, and as the soldering proceeds the whole is gradually turned so that the work may be more conveniently done. Soldering-wire is used for this purpose. In other places the revolving stand is entirely done away with, and a large board with longitudinal strips for holding the cans is substituted. This, when filled, holds 100

cans. By the use of the board it is thought that the work can be done more rapidly, as the men do not have to lay aside their iron and wire, as soon as a can has been sealed, for the purpose of removing it and inserting another, but they can continue their work without interruption, stopping only occasionally to change irons and, again, when all have been sealed, for the purpose of emptying and refilling the board.

The sealers working on wages receive from $1.50 to $2.50 a day, while those working by the piece usually get about forty cents per hundred cans for their work. At Eastport the ordinary workmen will seal from 500 to 600 small cans, or about 400 of the larger ones, in a day of ten hours. At Lamoine it is said that 1,000 cans is considered a fair day's work.

Great care must be taken that the cans are perfectly tight, as any leak causes no little trouble and often occasions considerable loss. Where the men are doing "piece-work" they often work so hurriedly that many of their cans are not properly sealed. To guard against loss from this source most of the firms hold each solderer responsible for his work and require him to scratch his number upon the cans which he has sealed. In case of leakage he not only does not receive any pay for the faulty can but must pay two cents to make good the loss occasioned by his negligence.

There are several methods of heating the irons, the principal ones being the ordinary charcoal pot and the gasoline burner. By both of these methods the iron must necessarily be quite large in order to retain a high temperature for any considerable time. But in the sealing process, where a large iron is used, especially if the work is slowly done, the sardines are frequently considerably heated, and in this way, it is said, their keeping qualities are affected to a greater or less degree, and their flavor is often considerably impaired. The methods employed in the French canneries are much superior to those adopted by the American packers. There the irons are heated with gas supplied by means of a rubber tube which passes through the handle and is introduced into the inside of the iron near its pointed extremity. Another tube connected with a bellows furnishes air to the flame. By this arrangement the heat is rendered very intense, and, as the flame is kept constantly burning at the exact point where it is needed, the tip of the iron is always very hot and the other parts are proportionately cooler. The iron can thus be used continuously, and the heat being applied to so small a surface the fish are only slightly heated during the soldering process.

BATHING AND VENTING.—When properly sealed the cans are sent to the bath-room, where they are placed in small iron frames or baskets, which are lowered into and lifted out of the bath by means of ropes and pulleys. The time required in boiling varies considerably, according to the size of the cans and the kind of bath used. Other things being equal, small cans are cooked more quickly than those of larger size. A good deal depends, however, upon the contents; for fish prepared with spices require considerably more cooking than those put up in oil, in order that their keeping qualities may be the same.

The common method of boiling is by means of the "open bath," or by ordinary boiling water in an open vessel. This is the oldest and by many it is considered the best method, the principal objection to it being that by it a considerably longer time is required than by the other methods. The medium-sized cans are subjected to the influence of boiling water in the open bath for from one and a half to two hours, while the larger ones must be boiled considerably longer.

Another method of boiling recently adopted is that known as the chemical bath. This consists simply in the raising of the boiling point by the use of chloride of lime or other chemicals, and if a proper quantity is used water can be heated to upwards of 250° in the open air. By subjecting the fish to this increased heat they are cooked much more quickly and considerable time is saved, while any life-germs that might remain to pollute the mass are more easily destroyed. Another way of accomplishing the same results is by means of the closed bath. In this case the

steam is confined in a tank, and the fish are subjected to any temperature desired by its pressure upon the surface of the water, which raises the boiling point. By these last-named methods the time of boiling is reduced to about half an hour.

When the can comes from the bath its sides are usually bulged out by the pressure of the expanded air within. A small hole is at once made through the tin for the purpose of allowing this super-heated air to escape, after which it is immediately closed by a drop of solder, and the process of bathing and venting is completed. If the can is perfectly tight the sides become concave as soon as it has cooled. The fact that the can does not "concave" is considered sufficient evidence that there is a defect in the soldering, and it goes at once to the mending room for examination. When the hole is found it is closed, after which the can must be reboiled and vented before it can be packed. Where the bathing is not properly done a can will keep but a short time, and it often happens that many swell and spoil within a few months. Those properly packed, however, should keep for three or four years at least. Some of the importers of French sardines claim that the loss from "blowers" or spoiled cans received direct from the French canneries is very considerable, showing that they are as careless in their work as the Americans.

CLEANING AND BOXING.—After the fish leave the bath-room they must be carefully wiped and cleaned, to prevent them from rusting before they are boxed. In some canneries each can is handled separately, being first rubbed in sawdust and then wiped dry with a cloth. In other canneries the work is satisfactorily accomplished by inclosing the cans in a large barrel, which has been partially filled with sawdust. The barrel is fastened to a frame, and is made to revolve on a longitudinal axis by means of a crank. In this way the cans are thoroughly dried by contact with the sawdust as they are tumbled about by the motion of the barrel. They are then packed in common wooden cases, the size of which varies with the different brands of fish. For the small sizes cases holding 100 cans are invariably used, but for the medium size 50-can cases are employed. A case differing in size from either of the others is made for the sea-trout and other brands that are packed in the larger cans. These usually hold about two dozen cans each.

As soon as the cans have been properly packed with a quantity of sawdust in properly-branded cases they are shipped at once to New York parties, who handle them on commission for the canneries. The object in sending immediately is that the agents may be drawn upon for a portion of the value of the shipment. An arrangement of this kind between the agents and the canners enables the latter to carry on their business with much less capital than would otherwise be required.

## RUSSIAN SARDINES AND ANCHOVIES.

DEVELOPMENT OF THE AMERICAN RUSSIAN-SARDINE INDUSTRY.—The various brands of sardines already mentioned are the only ones put up in cans in the United States; but another grade of goods referred to by Mr. Sellmann as Russian sardines, under which name they are known to the trade, are extensively packed by the Germans, and fish prepared in a similar way are put up in France, England, and other countries. As will be seen by referring to Mr. Sellman's account of the origin of the sardine industry in the United States, the entire business as it at present exists in this country is the outgrowth of experiments to find a fish that would answer as a substitute for the Russian sardines that were being imported in large quantities from Hamburg. From the time that the home-made "Russians" were first well introduced, they have grown in favor among the foreign population residing in the United States, and the trade has increased so rapidly from year to year that the importation has long since entirely ceased. As has already been mentioned, the first herring used for this purpose were salted at Eastport and shipped to New York, where they were packed in kegs for distribution to the trade. As the trade increased it was decided to transfer the business to Eastport, since it was found necessary to select a certain grade of fish for the purpose,

and a considerable saving could be made in the shipment of the manufactured goods instead of the raw material. When this change was first made the herring were put up in small kegs ready for the trade, after which they were packed in crates and shipped to New York for distribution. Later it was found desirable to simply salt and cut the herring at Eastport and to pack them in barrels for shipment to the dealers in New York, who in turn should repack them in small kegs before they were put upon the market. This method has given excellent satisfaction, and has been universally adopted.

METHOD OF PREPARATION.—The manner of preparing the Russian sardine is very simple. The fish utilized for this purpose are similar in size to those packed in mustard and spices, under the name of *marinés*, *royales*, and sardines in mustard. They vary in total length from six to nine and a half inches, and when cut measure about five to six inches. Being of proper size for canning, and having a greater value for this purpose, they are, of course, canned when practicable; but when the catch is too large for immediate use at the canneries the surplus must necessarily be salted at once if they are to be preserved; and after a sardine has been salted for any length of time it becomes unfit for canning. The natural result is that nearly all of the surplus fish are prepared as Russian sardines.

As soon as they have been landed from the weir they are at once salted in large butts or hogsheads, where they are allowed to remain in strong pickle for several days or until they are thoroughly "struck," after which they are taken out and their heads and entrails are removed by children employed for this purpose, in a manner exactly similar to that employed in the preparation of sardines for canning. This method has already been described and need not be repeated. After the fish have been cut they are thoroughly washed in fresh water, and are carefully packed in fish barrels, each layer being well sprinkled with dry salt. After the barrels have been filled new brine is added and they are set aside and allowed to remain for several days, in order that the fish may settle. More fish are then added in order that the barrels may be well filled, after which they are headed up and are ready for shipment. In shipping long distances it is found desirable, especially during the summer months, to remove the pickle from the fish, because, when this becomes heated, it often sours and injures their flavor.

After reaching their destination the barrels are at once opened and the fish are then packed in kegs of uniform size. These are neatly made of a good quality of poplar or bass-wood, each holding about four or five quarts. As the fish are being packed each layer is well covered with a variety of whole spices, including cloves, peppers, mustard seed, and allspice, together with a quantity of bay leaves, to give them a rich flavor. When the keg has been filled a pickle of vinegar is added, after which the package is headed up and is ready for the trade. It is desirable to have the fish prepared some time before they are eaten, in order that they may be well flavored by the seasonings with which they are packed. For this reason old stock is preferable to that recently packed.

THE USE OF HERRING AS ANCHOVIES.—As soon as it had been ascertained that the herring could be utilized in the preparation of Russian sardines, certain houses who had been engaged in this line of trade thought it possible to prepare anchovies from the smaller individuals of the same species, and for several years many of the small herring were utilized for this purpose. The first fish that appear in the spring, locally known as brit, are usually too small for canning purposes, and as many of these are taken in the weirs each season, considerable numbers of them have been salted from time to time to be prepared as a substitute for the anchovies that had been formerly imported from Sweden and Norway.

After numerous experiments, it is said that the business is not as successful as had been

expected, and most of the firms have already given up the idea of utilizing the herring in this way. Very few fish are now put up, and during the season of 1880 the total quantity did not exceed 200 barrels, many of these being spoiled in preparation. This business, however, should not be pronounced a failure until it has been more thoroughly tested, and future experiments may prove that under proper treatment the herring may be used for this purpose and that the anchovy trade of the United States may become an important one.

## 5. EXTENT OF THE BUSINESS.

STATISTICAL RECAPITULATION OF THE INDUSTRY FROM ITS ORIGIN TO THE PRESENT TIME.—From the time of the first experiments in 1875 the American sardine industry has gradually increased in importance, though, as has just been stated, it was confined within comparatively narrow limits till 1880. At this time many of the Eastport merchants went into the business and canneries were built at various other points along the eastern coast of Maine. By the close of the season there were 18 canneries in operation, with a total capital of $484,950 dependent on the business, including that invested in fishing apparatus by the New Brunswick weir fishermen, who market their catch at Eastport. The business furnished employment to 1,328 factory hands, and to 196 American and 372 Provincial fishermen.*

The following list of the sardine canning establishments in the United States in 1880, with their location, date of establishment, and city agents, has been carefully corrected by correspondence with Mr. Sellmann and Mr. Wolff, who have added a list of some of the new canneries that were to engage in the business in 1881:

| Name of firm. | Location. | Date. | Agents. |
|---|---|---|---|
| Eagle Preserved Fish Company | Eastport, Me | 1875 | Wolff & Reessing, New York City. |
| P. M. Kane | do | 1876 | Hansen & Deickmann, New York City. |
| Warren Brown | do | 1877 | Wolff & Reessing, New York City. |
| Hansen & Deickmann | do | 1878 | Hansen & Deickmann, New York City. |
| American Sardine Company | do | 1879 | Rosenstein Brothers, New York City. |
| C. H. Dyer | do | 1880 | Wolff & Reessing, New York City. |
| F. S. Buck | do | 1880 | Do. |
| McLean & Abrams | do | 1880 | Do. |
| H. Blanchard | do | 1880 | Do. |
| R. C. Green | do | 1880 | Rosenstein Brothers, New York City. |
| Young & Stimpson | do | 1880 | Hansen & Deickmann, New York City. |
| Thomas L. Holmes | do | 1880 | Do. |
| E. A. Holmes | do | 1880 | Do. |
| Frontier Packing Company | Robbinston, Me | 1880 | Rosenstein Brothers, New York City. |
| Lubec Packing Company | Lubec, Me | 1880 | Wolff & Reessing, New York City. |
| William Underwood & Co | Jonesport, Me | 1880 | William Underwood & Co., Boston, Mass. |
| Lamoine Packing Company | East Lamoine, Me | 1880 | Hansen & Deickmann, New York City. |
| Union Fish Company | Camden, Me | 1880 | Rosenstein Brothers, New York City. |
| Wolff & Reessing (2d cannery) | Eastport, Me | 1881 | Wolff & Reessing, New York City. |
| George O'Grady | do | 1881 | Do. |
| McCulloch & Co | do | 1881 | Hansen & Deickmann, New York City. |
| A. W. Brown | Lubec, Me | 1881 | Wolff & Reessing, New York City. |
| Pike & Gillis | do | 1881 | Do. |
| Cumstock & Co | do | 1881 | Do. |
| George W. Capen | Jonesport, Me | 1881 | Do. |
| Young & Stimpson | do | 1881 | Hansen & Deickmann, New York City. |
| Wolff & Reessing | Millbridge, Me | 1881 | Wolff & Reessing, New York City. |

*A petition from the sardine packers of Eastport and Lubec to the Secretary of the Treasury, praying for relief from certain customs duties, under date of May 28, 1885, states that this industry employs an invested capital of not less than $1,000,000, of which a large proportion is in factory buildings, machinery, fixtures, tools, and implements. There are said to be 18 factories in Eastport and 4 in Lubec now wholly engaged in sardine packing, and employing several thousand operators.—A. H. CLARK.

Mr. Wolff, who, from his intimate knowledge of the business from its beginning to the present time, is peculiarly fitted to do so, has kindly furnished an estimate of the quantity of sardines put up in the United States from 1875 to 1878 inclusive, which, though only as an estimate, is sufficiently accurate for all practical purposes. Adding to this the amount packed during the two subsequent years we have the following table showing the extent of the business from its origin to the year 1881:

| | Size of can. | 1875. | | 1876. | | 1877. | |
|---|---|---|---|---|---|---|---|
| | | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| Sardines in oil.....cans | ¼ | 50,000 | $5,000 | 500,000 | $50,000 | 1,000,000 | $90,000 |
| Do.....do | ½ | ..... | ..... | 10,000 | 2,800 | 25,000 | 6,500 |
| Sardines in spices.....do | ¼ | 5,000 | 800 | 25,000 | 4,000 | 75,000 | 10,500 |
| Sardines in mustard.....do | ¼ | 5,000 | 800 | 25,000 | 4,000 | 75,000 | 10,500 |
| Sardines in tomato-sauce.....do | ¼ | ..... | ..... | ..... | ..... | 10,000 | 2,200 |
| Brook-trout (large herring).....do | 2 lb | ..... | ..... | ..... | ..... | 12,000 | 4,000 |
| *Sea-trout (large herring).....do* | *3 lb* | ..... | ..... | *4,800* | *1,400* | *12,000* | *3,000* |
| Mackerel (prepared by a similar process).....do | 3 lb | ..... | ..... | ..... | ..... | ..... | ..... |
| Russian sardines.....barrels | ..... | 3,000 | 9,000 | 4,000 | 12,000 | 5,000 | 17,500 |
| Anchovies.....do | ..... | 200 | 600 | 200 | 600 | 300 | 900 |
| Total.....cans | ..... | 60,000 | 6,000 | 564,800 | 62,200 | 1,209,000 | 126,700 |
| Total.....barrels | ..... | 3,200 | 9,600 | 4,200 | 12,600 | 5,300 | 18,400 |

| | Size of can. | 1878. | | 1879. | | 1880. | |
|---|---|---|---|---|---|---|---|
| | | Quantity. | Value. | Quantity. | Value. | Quantity. | Value. |
| Sardines in oil.....cans | ¼ | 1,500,000 | $135,000 | 1,468,500 | $132,165 | 6,141,400 | $552,726 |
| Do.....do | ½ | 25,000 | 6,500 | 39,500 | 5,135 | 142,900 | 18,577 |
| Sardines in spices.....do | ¼ | 100,000 | 14,000 | 180,850 | 27,143 | 579,850 | 86,978 |
| Sardines in mustard.....do | ¼ | 100,000 | 14,000 | 96,700 | 14,505 | 538,650 | 80,797 |
| Sardines in tomato-sauce.....do | ¼ | 25,000 | 5,500 | 22,250 | 4,450 | 22,700 | 4,540 |
| Brook-trout (large herring).....do | 2 lb | 24,000 | 8,000 | 9,680 | 2,800 | 24,000 | 6,500 |
| Sea-trout (large herring).....do | 3 lb | 12,000 | 3,000 | 16,440 | 5,137 | 50,584 | 22,056 |
| Mackerel (prepared by a similar process).....do | 3 lb | ..... | ..... | ..... | ..... | 50,784 | 16,400 |
| Russian sardines.....barrels | ..... | 7,000 | 28,000 | 4,400 | 17,600 | 8,165 | 28,578 |
| Anchovies.....do | ..... | 500 | 1,500 | 265 | 795 | 200 | 500 |
| Total.....cans | ..... | 1,786,000 | 186,000 | 1,833,940 | 190,535 | 7,550,868 | 788,576 |
| Total.....barrels | ..... | 7,500 | 29,500 | 4,665 | 18,395 | 8,365 | 29,078 |

Messrs. Wolff & Reessing, Rosenstein Brothers, and Hansen & Deickman have thus far, with a single exception, handled the products of all the canneries in the country, and have also supplied a greater part of the capital. These parties have kindly furnished full and accurate information of the business from their books. Many of their statements have been given in detail; but, as there are good reasons why the business of individual firms should not be made public, it has been thought best to include all of the facts in one general table, which shall represent the entire sardine industry of the United States as it was in 1880. This table, though it exposes no private interests, will be found to answer all purposes for which it is intended.

THE DANGER THAT THE SUPPLY MAY EXCEED THE DEMAND.—Some of the manufacturers are already becoming alarmed at the future prospects of the industry on account of the large number of new canneries that are being erected and the enormous extent of coast-line along which it has recently been found that small herring may be taken. Mr. Sellmann writes: "There is much danger that the business may be greatly overdone. A considerable portion of the goods put up in 1880 remained unsold on January 1, 1881, and the combined capacity of the various canneries is already much greater than the present demand. Under the strong competition that must neces-

sarily follow, many of the smaller firms must go under, margins of profit will be reduced to a minimum, while the investment of capital under an accumulation of stock will involve much risk. As a result of this condition the standard of excellence will be lowered and many worthless goods will be placed upon the market at a low figure, and it will become simply a question as to the brands of one cannery or another." The above view of the situation is perhaps a trifle overdrawn, but it is still quite certain that the time has arrived when something must be done to increase the demand for the home production.

That the people of the United States have consumed large quantities of sardines and anchovies yearly for many years is clearly shown by the following table, kindly furnished by Mr. C. W. Smiley, under whose direction it has been compiled from the annual reports of the Bureau of Statistics:

*Table showing the yearly importations of sardines and anchovies from 1858 to 1880.*

| For the year ending June 30— | Value of those brought from France. | Value of those brought from all other countries. | Total value. | For the year ending June 30— | Value of those brought from France. | Value of those brought from all other countries. | Total value. |
|---|---|---|---|---|---|---|---|
| 1858 | $273, 109 | $1, 028 | $274, 137 | 1872 | $252, 612 | $370, 923 | $623, 535 |
| 1859 | 245, 090 | 6, 188 | 251, 278 | 1873 | 617, 359 | 555, 345 | 1, 172, 704 |
| 1860 | 293, 434 | 6, 245 | 299, 679 | 1874 | 804, 052 | 126, 978 | 991, 030 |
| 1861 | 222, 767 | 3, 867 | 226, 624 | 1875 | 445, 022 | 81, 157 | 526, 179 |
| 1862 | 170, 594 | 15, 823 | 186, 417 | 1876 | 498, 864 | 97, 037 | 595, 901 |
| 1863 | 368, 745 | 14, 478 | 383, 223 | 1877 | 685, 164 | 88, 167 | 773, 331 |
| 1864 | 472, 122 | 31, 957 | 504, 079 | 1878 | 587, 834 | 90, 076 | 677, 910 |
| 1865 | 257, 497 | 9, 975 | 267, 472 | 1879 | 796, 700 | 115, 685 | 912, 391 |
| 1866 | 744, 439 | 193, 481 | 937, 920 | 1880 | 786, 890 | 315, 520 | 1, 102, 410 |
| 1867 | 454, 149 | 24, 470 | 478, 619 | Total | 9, 487, 016 | 2, 169, 510 | 11, 656, 526 |
| 1868* | 450, 577 | 21, 130 | 471, 707 | | | | |

* Kinds and quantities of fish not given from 1869 to 1871.

From this table it will be seen that the United States imported from 1858 to 1880 $11,656,526 worth of sardines and anchovies exclusive of those received between 1869 and 1871, of which we have no record. It is further noticeable that though the quantity has varied considerably from year to year yet it has gradually increased; the value of those received during the year ending June 30, 1880, being considerably greater than that of the goods put up in this country during the same period. Even if we place the total products of the American canneries for the entire season of 1880 against those imported for the year ending June 30, it will be seen that the imported goods exceed those of home manufacture by $284,756. It will be further seen that of the entire importation of sardines and anchovies during the period covered by the above table, over 81 per cent. came directly from France, and without doubt a considerable portion of the remainder were put up in France and sold to other countries, which, in turn, sent them to America. If we consider only the sardines put up in oil it may be safe to say that over 95 per cent. of the entire quantity are prepared in France.

RELATIVE MERITS OF THE DIFFERENT SPECIES FOR CANNING PURPOSES.—It is often claimed that the American manufacturers are imposing on the people by putting up the common herring under the name of sardines, and that they are concealing the fact by using French labels. It is true that the fish commonly used in France are not the same as those used by Americans, but the two species are closely related to each other, and though they differ in many points, each having a flavor peculiar to itself, we are by no means willing to give the preference to the foreign fish. The mere fact that the French were the first to utilize small fish for this purpose, and that

they have always used a particular species simply because it chanced to be abundant in the waters contiguous to that country, is no proof that it is the only, or even the best, fish for the purpose.

Mention has already been made of several different species of fishes of even widely separated families, that have been prepared in this way, and some of them are considered superior to either the herring or the sardine. This is particularly true of the mackerel, which has a peculiarly rich and delicate flavor. But mackerel are usually too large for canning in oil, and, though prepared in a somewhat similar manner, the products are so different as to answer a very different purpose, and their manufacture will interfere but little with the demand for fish preserved in oil.

In order that a fish may be suitable for use in the sardine industry, it is only necessary that it should be of small size and of tender flesh; it should also be destitute of thick scales or of a tough skin. Little account need be taken of the natural flavor of the fish, unless this be much stronger than is usual with small fish, as the methods adopted in the preparation of oil and spiced sardines are such as to impart an artificial flavor, the quality of which depends in a great measure on the quality and kind of materials used, and the treatment to which the fish is subjected in canning.

THE QUALITY OF SARDINES LARGELY DEPENDENT ON THE OIL USED.—That French sardines of certain brands are superior to those put up in this country cannot be denied, for a few of the French manufacturers refuse to use inferior oils and take particular pains that their goods shall be first class in every respect. Many others, on the contrary, buy inferior and cheaper grades of olive oil, or are even doing away with this altogether and substituting in its place oil made from various indigenous seeds and nuts.

For some time the American packers used only the best imported oils, but on account of the cost of the same they soon came to use cotton-seed oil for cooking the fish. A saving of 80 per cent. on their oil bills was no small matter, and in a short time some of them, like their French brethren, began using the cheaper oils for packing also, and the quality of their goods has been proportionately impaired.

The average brands of imported sardines are in no way superior to those put up at Eastport, but there is a large class of consumers who insist on using only the best goods, and they are willing to pay the extra price charged for certain well-established French brands. In this way the importation of these goods continues, and with them come a large quantity of the cheaper grades, which find a ready market simply because they come from France.

AMERICAN PACKERS NOW IN CONDITION TO COMPETE WITH THE FRENCH NOT ONLY IN THE UNITED STATES BUT IN OTHER COUNTRIES.—Thus far the American goods have been put up with a French label, but the people are coming to learn that they are not only put up in this country but that when properly prepared they are equal in every respect to the best imported ones. The use of French labels might have been a help to the first introduction of the goods, but the time has now unquestionably arrived when the manufacturers should come out boldly with English labels, and, by the use of superior oils and additional care in preparation, win for their own brands a reputation that cannot but result in an increased demand. By adopting this course the imported goods can soon be driven from the American market, and when the supply shall have exceeded the demand there will be little difficulty in establishing a trade with other countries.

The question of our ability to compete with the French for the trade of other countries is one in which our packing-houses are especially interested. We are placed at a great disadvantage on account of the higher wages paid to American laborers. In the United States the sealers and can-makers receive $50 per month, and the average factory hand is paid $20. France also has an advantage in the saving of duty and freight on the olive oil used, while she is much nearer the principal markets for the manufactured products. The American packers, on the other hand,

have a decided advantage in the abundance of fish and the inexpensive methods of catching them. In France the fish are taken chiefly in gill-nets, which necessitates the handling of each fish separately, and in addition a large quantity of bait must be used in "tolling" them to the surface and in keeping them near the nets. The cost of the bait used for this purpose is equal to a large percentage of the value of the catch, and the price at which the fish sell is necessarily much greater than that paid by American packers. Again, the supply of fish on the French coast is by no means regular, and there are seasons when the fishing is a failure. Such was the case in 1880, when all parties interested in the business lost heavily.

That we may easily have the home market wholly to ourselves without fear of competition, provided our packers put up a quality of goods equal to the best French brands, seems quite certain, for our Government has levied a duty of $4 per case on all sardines brought into the country. It also seems quite probable that we will be able to compete with the French for the trade with other countries. At present the packers must pay $1 per gallon duty on all olive oil imported by them; but it may be possible that in the hope of benefiting a large number of its people, and of placing our sardine interests on a more substantial footing, the Government may be induced to remit the duty on that part of the oil used for the preparation of sardines, as they have already done on the salt to be used in the curing of fish in the cod and mackerel fisheries.