

20.—THE PRESERVATION OF FRESH FISH.**By Prof. J. COSSAR EWART.**

[Transmitted to the State Department by the United States consul at Leith.]

The "chemical powder" used by the Norwegians for preserving herring is a mixture of boracic acid and common salt. From our greatest authority in antiseptics I have learned that boracic acid has been used in Norway for at least fourteen years for the preservation of articles of food, &c. Those acquainted with Norway can well understand how necessary it is for the farmers and others who live far removed from the towns—by the margins of the long winding fiords or on the slopes of the great mountains—to provide themselves with various kinds of pickling agents. It seems that boracic acid, after a long trial, has proved a most valuable preservative, chiefly because it keeps fish and other food stuffs in a perfectly fresh condition for several weeks, and, without being hurtful, it often tends to improve the flavor.

Recently a mixture of boracic acid and salt has been used with so great success for preserving herring in a fresh condition that it is now possible for Norwegian herring to compete successfully with absolutely fresh herring in the English market. Thousands of people in England have consumed Norwegian herring a week or more after their capture, believing they were fresh from Yarmouth or some of the great Scottish fishing stations. I need not say that herring rapidly become unfit for food when taken out of the water. In summer they are often useless twenty-four hours after they are captured, and in winter the process of disintegration is not long delayed. What is true of herring is to a great extent true of other fish. Often in summer the fish landed at Newhaven from fishing boats becalmed at sea is almost putrid, and were it thoroughly inspected, as it should be, it would often be at once condemned as unfit for food. It is, as already pointed out, this extreme perishableness that necessitates the rapid dispatch of fresh fish, and affords an excuse for the high rates charged for carriage. Hence the boracic acid will be welcomed as a great boon, if it preserves fish in a fresh condition for several weeks. On learning some time ago that the Norwegians were sending us herring preserved in a chemical powder, I succeeded in getting a sample and had it analyzed. After an elaborate examination, Dr. Atkinson, assistant to the Professor of Materia Medica in the University, reported that the substance submitted to him was a very pure preparation of boracic acid. Mr. David Murray, of Anstruther, who takes a keen and practical interest in all questions

relating to the fish trade, was good enough to pickle several samples of herring according to the Norwegian plan. Some of these samples I have examined with the most satisfactory results. Herring pickled on the 19th of January are as fresh and sweet to-day [January 28?] as they were when introduced into the mixture, and when cooked they can scarcely be distinguished from herring only a few hours out of the water. I understand that equally good results have been obtained by Mr. McCombie, of Peterhead, with haddock.

Let us now indicate how the boracic acid should be applied. For preserving herring, the best plan seems to be to make a mixture of powdered boracic acid and fine salt, taking two pounds of salt to every pound of boracic acid. This mixture having been made, the fresh herring should be arranged in layers in a barrel, in exactly the same way as cured herring are packed, and each tier covered with a thin layer of the mixture. When the barrel is full it should be tightened down in the ordinary way, and then "pickled" with a weak solution of pure boracic acid. For treating a barrel of herring in this manner, 2½ pounds of acid and 5 pounds of salt are required for spreading on the tiers of herring during packing, and about 10 ounces of pure acid for dissolving in the fresh water used for pickling. After further experiments it may be found advisable to alter somewhat the proportions here given. The barrels when packed should be kept in a cool place where there is a nearly constant temperature. The expense of pickling a barrel of herring (a barrel holds from 800 to 1,000 herring) in this way need not be great, for boracic acid can be purchased under 6*d.* per pound. A barrel of herring, which cost originally 8*s.*, might be preserved in boracic acid and delivered in London for 14*s.*; this is supposing the pickling to cost 3*s.* and the carriage 3*s.* If sold for 20*s.* (*i. e.*, three or four for 1*d.*), a considerable margin would be left for profits to the curers and others.

In addition to preserving fish, boracic acid might be of use for preserving fishermen's bait. Often the fishermen (or more often the fisherwomen), at a considerable expenditure of time and money, bait their lines in vain. All arrangements are made for a night's fishing, when a change of weather prevents the boats reaching the fishing ground. Before another night arrives the bait has usually lost its catching powers, and the tedious process of baiting the lines has to be repeated. Whether boracic acid will preserve bait the fishermen only can settle. If at Anstruther, or some other fishing station, two or three fishermen use bait which has been preserved for some days in an equal mixture of salt and boracic acid, and compare its catching power with fresh bait, they will be able to ascertain whether this preservative will in any way lessen their labors. The United States fishermen often have wonderful success when they use frozen herring as bait; the herring are usually frozen and exported from Labrador.

It may be hoped this system of treating fresh fish will be useful. It ought at least to enable our curers to compete with Norway, for in ad-

dition to other advantages they have better material to work with, our herring being undoubtedly superior to those taken around the Scandinavian coast; even the Norwegians prefer Scotch-cured herring to their own. Further, if curers preserve herring with boracic acid they will to a great extent be independent of the railway companies; it will no longer be necessary to dispatch fish by express trains, and pay for their carriage two or even three times their value. Whether the herring take a day or a week to reach London, Manchester, and other large towns will make no difference, and in many instances curers may with advantage forward parcels of fish by the ordinary coasting steamers. The saving made by sending fish by sea will be evident when it is stated that it would probably cost less to send a barrel of herring twice round the world by steamer than to send it once from St. Andrews to London by rail. We must, however, not expect too much from boracic acid. Something more will be required before the fishery industry recovers from its present state of collapse and begins to assume the importance it deserves.

When referring to the boracic acid method of preserving fish, I ought to have mentioned that it is enabling Norway to drive Scottish herring out of the English market. Over 20,000 barrels of herring reached England last winter, and nearly 30,000 barrels have arrived during the present winter. The consignments from Norway have reduced the prices so far that a barrel of Scottish herring sometimes scarcely brings enough to pay its carriage to London. This will be better understood when I mention that from most of our fishing stations it costs 75s. to send a ton of fresh fish to London. There are five crans (ten barrels) in a ton, hence each cran costs for carriage alone 15s. When to this portorage and other charges are added, the large sum of 18s. or even 20s. may be reached for conveying a cran of herring to Billingsgate. A parcel of herring sent recently from Anstruther to Manchester were sold (as shown by bills of sale in my possession) at 10s. per barrel 20s. per cran). Each barrel cost for carriage, &c., 7s., which leaves 3s. to be divided between the curer and the fishermen; parcels sent to London sometimes yielded little over 1s. per barrel, owing to the market being "overdone" with herring from Norway. I am now able to state, from definite information received from Peterhead, that Messrs. McCombie have preserved during January several barrels of haddock and about 1,000 barrels of herring in boracic acid. It must be borne in mind that Norway is not likely to rest satisfied with sending us fresh herring; she is doing her utmost to develop her fisheries, and especially to compete with Scotland in the English market. If this competition leads to the railway companies lowering their rates for fish, and causes our fishing industry to be carried on in a more intelligent and systematic fashion, it will undoubtedly do good. Hitherto the fisheries have been allowed to take care of themselves; we have neither attempted to establish

large fishing stations in the vicinity of the rich fishing banks around Shetland and the Hebrides, nor have we constructed suitable harbors; and we are only beginning to recognize the necessity of providing the fishing stations with telegraphic communication. The fishing industry is to a great extent carried on by men who seldom do more than make a living—not by capitalists who can invest large sums in harbors, boats, &c., and the State, which is virtually the landlord of the fishermen, has not yet fully realized its responsibility in providing such accommodations (harbors) as will admit of their harvest being satisfactorily reaped. It will be admitted that little progress has been made for years towards placing in the markets all over Britain a good supply of cheap fresh fish, and that the curing of herring for exportation (the only branch of the industry which has been energetically carried on) has resulted in all but complete failure, the curers having lost during the last two years nearly a million pounds sterling. This being the case, instead of continuing to cater chiefly for the continental market, we should rather aim at supplying the home market with fresh fish. I am convinced that unless this is done the fishing industry will remain in an unsatisfactory condition, and we shall fail to utilize the latent energy of the Western Highlands and Islands, and deprive ourselves of the riches of the waters which wash our western shores. In order to increase the supply of fresh fish little more than organization is required. It will be necessary (1) for the fisherman to land the fish in good condition, and (2) for the receivers to preserve them by ice or otherwise, and dispatch them rapidly and cheaply to the various centers of population throughout the country. What is absolutely necessary before a step can be taken in the right direction are fast steamers, adapted for carrying fresh fish from the chief fishing stations along the east and west coasts to the southern markets. When lecturing in Fraserburgh last February I ventured to say “that a few swift steam fish-carriers, provided with refrigerators, or simply with pens and ice, would revolutionize the distribution of fish.”

Before pointing out in detail what organization is required, I ought, perhaps, to refer to the alleged diminution of the fish-shoals around our coast. Suppose we take for granted that the territorial waters (and some of the off-shore banks) that lie between Peterhead and Berwick-on-Tweed no longer yield the takes they did a generation ago, it does not follow that the waters off the coast of Caithness and around the Orkney and Shetland Islands are to a great extent exhausted; far less does it prove the exhaustion of the waters that surround the Hebrides, and flow between them and the mainland. If the banks off the east coast are beginning to fail, it should be remembered the signs of failure are only appearing after many abundant harvests have been reaped, and that even now they yield weekly many tons of fish. If fish are still captured—sometimes in large quantities—in waters over which fishing vessels have sailed for centuries, how much more likely

are they to be taken in the waters around the Northern and Western Islands, which are relatively as rich as the unplowed prairies of the Far West! It may be said that large fishing fleets visit Barra and Stornoway and other stations on the west coast every summer, and that fishermen are constantly at work around the Orkney and Shetland Islands. It ought, however, to be remembered that the only fishing of any note around the Western Islands lasts but eight or ten weeks, and that nearly all the fisherman are in search of herring, to be cured for the foreign market. During the rest of the year comparatively little fishing is carried on, so that the shoals of cod, ling, and halibut are practically undisturbed. At Shetland, however, in addition to the summer herring fishing, there are a number of boats engaged in capturing cod, halibut, turbot, &c., which are sent in ice to the English markets. But it is well known that the fresh fish now sent (under 500 tons in 1884) from Shetland do not represent a tithe of that which the waters, if more thoroughly fished, would readily yield.

It may be asked, how is it that the fisheries of Shetland and the Western Islands have not assumed greater magnitude? For two reasons, I think. In the first place, because the curers, in whose hands the development of the fishery industry to a great extent lies, have practically devoted their whole attention to curing herring for the continental markets; and in the second place, because the native fishermen of the Western Highlands and Islands have had little encouragement to engage in fishing. In the absence of appliances for preserving fresh fish, and without fast steamers to carry them to Liverpool and other large towns, fishing could not possibly pay, even if suitable harbors and large boats were provided. As an illustration of this, it may be mentioned that large turbot, which could not be purchased under 20s. or 30s. in London, are often cut into slices, and used as bait in the Hebrides. The present condition of the fishing industry in the northwest of Scotland is due to the unfavorable surroundings of the inhabitants rather than to anything connected with national characteristics. It might be pointed out that on the west coast of Norway (where the inhabitants have in some respects fewer natural advantages than the west coast of Scotland can boast of) there is the large town of Hammerfest, within the arctic circle, further south is Trondhjem, and nearly opposite Lerwick, in Shetland, is the old busy town of Bergen, with a latitude of 60.23 degrees—nearly 120 miles north of the Butt of Lewis, and twice that distance north of Barra. Bergen, which has about 35,000 inhabitants, is one of the chief towns in Norway, and is the great center of the fishing industry. How is it that there is not in Lewis Island and still more in the Shetlands a town of the same importance as Bergen, with a large fishing fleet and numerous trading vessels passing to and fro? Some might point to the difference of the two races, and endeavor to show that the absence of prosperity in the north and west of Scotland was due to the predominance of the Celt, while the success on

the west of Norway resulted from the indomitable perseverance of the hardy Norseman. This may be partly true, but it should be remembered the inhabitants of Shetland and of the north and east portion of the Long Island are as nearly pure Scandinavians as are the inhabitants of Bergen and other towns on the west of Norway; and, further, that the fishermen in Lochfyne, who are pure Celts, are as energetic as they are hardy and prosperous. As far as I can judge, the conditions on the two seaboard have been entirely different. Putting aside the traditions inherited from the time of the vikings, the Norwegians have long had a direct interest in the soil, and an excellent service of boats around the coasts. By being to a great extent their own landlords, and by reaping all the advantages of their labors, they have come to treat their barren mountain sides in much the same spirit as the Italian cultivates his vine-clad hills. But (what is of more importance from our point of view) owing to the all but impassable nature of the inland districts and the absence of railways, a wonderfully complete system of communication has been established around the coast, which has fostered the fisheries and led many of the natives to devote their undivided attention to reaping the harvest of the sea. But Bergen is not entirely the product of the Scandinavians. Its commercial importance resulted to a great extent from the influence of the Hanseatic League which, during the sixteenth century, monopolized the whole of the trade along the west coast of Norway. Nothing could be more encouraging than the manly way in which the fishermen in certain parts of the Lewis struggle against their hard lot. In the absence of harbors they must rest satisfied with boats that can readily be beached. In these small boats they often brave the full force of the Atlantic, and return from their fishing expeditions knowing that but small recompense can be obtained for their labor, and grateful if, in the absence of harbors, they escape having to drag their boat ashore through an angry surf. The want of success for generations has had a depressing effect, but this would, to the benefit of all concerned, undoubtedly disappear if a Hanseatic-like League was to carry capital and organization into the Hebrides.

Let me now conclude by stating shortly what is required before an abundant supply of fresh fish can be placed in the market. Nothing need be said now about fishing boats; they have been gradually increasing in size, and they will continue to increase until we are able to send, if desirable, a large fleet to take part in the Farøe, Iceland, and Lofoden fisheries. This increase in size will go hand in hand with the increase in number of deep-water harbors. Unfortunately the harbor question is in an extremely unsatisfactory condition. Many of the existing harbors want improving and extending, and there are many fishing villages around the coast that have been struggling for harbors for years in vain. Some villages on the east coast that once had flourishing curing establishments are (for want of harbors for the large boats now required) becoming poorer and poorer, and unless harbors are built the

fishermen must either remove to ports with good harbors or starve. The harbor question must be considered as a national one. Even if the State is unable to grant large sums to build harbors, it ought, in addition to lending at a small rate of interest, to ascertain which of the fishing harbors ought to be extended, and where new harbors should be erected, the position of the fishing banks, abundance of bait, &c., determining to a certain extent the sites. This information could, perhaps, best be obtained by means of a small committee of experts as suggested by the harbor committee which recently reported—the committee to include some one able to advise as to the value of the fishing grounds in the vicinity of the proposed harbors. Given suitable harbors and all the necessary appliances for capturing and landing fish at the fishing stations, the question then arises as to how the fish are to be conveyed to the consumers. If we take Shetland, for example, I would suggest that at the outset a large station be formed, provided with stores, in which fresh fish could be packed in ice or other preservatives, and, if necessary, frozen—where, in fact, by icing, freezing, or other means fish could be maintained in a perfectly fresh condition until placed on board the fish-carriers. In addition to the one large station in Shetland it would be necessary to have a number of small ones, from which the fish could be sent in ice or other preservative to the large station by small steamers or otherwise. From the central station the steam fish-carriers should run two or three times a week, taking in or leaving consignments on the way until London or some port on the east coast of England is reached. Each steamer would, in all probability, require to be provided with a refrigerator in order to preserve the fish. The steam fish-carriers on the east coast might call on the way south at one or more points in Shetland and Orkney, at Wick, Buckie, Fraserburgh, Peterhead, Aberdeen, Montrose, Anstruther, Eyemouth, and Berwick for parcels of fish, and leave them at various ports along the English coast as they proceeded on their way to London.

The Orkney Islands would require at least one central station, and similar stations might be formed at all the fishing centers called at. On the west coast, stations might be formed at Stornoway (perhaps later at Ness and Port-na-Gurin), Gairloch, Bracadale, Loch Boisdale, Castle Bay, and Tiree. Fish could, if necessary, be carried from the smaller stations in the vicinity of these ports by means of small steamers. From the stations named, and perhaps from others in addition, steamers would carry fresh fish to Liverpool and other ports on the west coast. The managers of the various stations on both coasts might be in direct communication with fish salesmen and, if possible, with fish retailers throughout the country, so that few middlemen would be required.

As soon as the fishermen on the west coast were assured that their fish, by being carried regularly to market, would bring fair returns, they would devote themselves to their calling with renewed energy, and

the whole fishing industry would take a new lease of life. As a natural result of the formation of large fishing stations, the refuse of the fisheries would be utilized for the formation of fertilizing agents, oils, &c., and thus lead to a considerable increase in the annual value of the industry. There probably never has been a time when there was greater necessity for energetic action being taken, and everything points to the present time as being especially favorable for a new departure being made in the development of our fisheries.

My previous communications on this subject called forth a number of letters. Some of the writers, naturally enough, were anxious to be assured of the safety of the "chemical powder" recommended, while others contributed exceedingly valuable information. One writer endeavored to point out not only that boracic acid was a poison, but also that it was a cumulative poison. The all but universal creed of our fishermen is, "What our fathers did, that shall we also do." This being so, the advice to stand still is little needed; and in this case it might have done injury had Professor Hay, of Aberdeen, not come to the rescue. On the subject of the physiological action of salts we have few authorities equal to Dr. Hay; hence, when he tells us that he is "satisfied that no one needs fear any bad effects from the eating of fish preserved by the Norwegian method," we may consider the matter as settled. Dr. Hay pointed out that 90 grains of boracic acid have been taken daily for weeks without producing any bad effects, and, further, that in some cases when from 30 to 50 grains were taken daily with the food, the appetite and the weight increased, and the general nutrition was improved. As a matter of fact, boracic acid is practically as safe as common salt, and the only evil likely to result from taking, say, half an ounce of boracic acid, is a slight disturbance of digestion. I have known men return from Norway in excellent health, who, in the absence of other food, subsisted for months almost entirely on fish preserved in boracic acid. If ninety grains of boracic acid can be taken daily with impunity for weeks, and if half an ounce causes only slight indigestion, there is little chance of any harm resulting from the small quantities stored up in the tissues of fish preserved in a mixture of boracic acid and salt. Professor Hay thought that in all probability only 2 or 3 grains would penetrate into the substance of a herring left from ten to fourteen days in the mixture. This conjecture was verified by Mr. Miller, of Wick, who found that herring preserved from the 2d to the 11th of February contained on an average 3 grains each of the acid. Similar results were obtained by Dr. Aitken, who examined, at my request, two herring which had lain in the acid and salt mixture for three weeks. The two herring (which together weighed 279 grams) were steeped in water and then boiled. The water in which they were steeped contained 0.368 gram of boracic acid, the boiled water contained 0.594 gram of boracic acid, and the flesh when analyzed was found

to contain 0.348 gram of boracic acid. The total amount of boracic acid in the two herring was therefore 1.310 grams, equal to about 20 grains. Three-fourths of this acid was extracted by cooking (the acid being more soluble in hot than in cold water), so that only about 5 grains were left in the tissues likely to be eaten, or about $2\frac{1}{2}$ grains in each herring. This being the case, judging from the experiments referred to above, three dozen herring preserved in boracic acid might be eaten daily for months without any injury resulting from the *acid* taken along with them. I ventured originally to call attention to the use of boracic acid as a preserving agent in order, if possible, to enable the herring taken off the Scottish coast to compete successfully in the English markets with those sent from Norway. Hitherto, owing to the perishable nature of herring, it has been necessary to send them by fast passenger trains, which necessitates a high rate for carriage. For the same reason it has been necessary, however large the take, to throw the whole at once into the market, even when the supply far exceeded the demand. By a careful use of a mixture of boracic acid and salt it is possible, with a fairly low temperature, to keep herring and other small fish perfectly fresh for several days—long enough to allow their being sent by slow trains, and to admit of the supply being regulated by the demand, and prevent prices fluctuating from 2s. or 3s. one week to 20s. or 30s. the next. Boracic acid has, however, many other uses than this. If a curer has more fish on hand than he can sell profitably in a fresh state, by using boracic acid he can preserve them until he has an opportunity of smoking or drying them. Herring that have been preserved in boracic acid make excellent bloaters. Haddock, in the same way, when split can be preserved for a considerable time in boracic acid before they are converted into "findons." Cod and ling may also be treated advantageously with boracic acid before they are dried. The millions of dried cod found in the Bergen stores are all (as the ancient and fish-like smell indicates) undergoing, however slowly, putrefactive changes. This would, to a great extent, be prevented if boracic acid was used during the early stages of curing.

None of the methods above referred to, however, absolutely arrest putrefaction. They fail in two important respects. In the first place, the organisms already in and on the fish are not completely destroyed; and, in the second place, no effective steps are taken to prevent the entrance of new organisms. At the best, it can only be said that most of the original organisms are killed, while the tissues of the fish are rendered more or less unsuitable for nourishing the surviving germs and the new organisms that may be introduced.

In preserving fish, flesh, vegetables, &c., the battle is with invisible but ever-present organisms, which, as they live and multiply, break up the organic molecules of which the tissues are composed, and lead to the formation of noxious by-products. This breaking up of the tissues we call putrefaction. Just as the yeast plant, by breaking up grape

sugar, sets up fermentation, and gives rise to by-products (alcohol and carbonic acid), so bacteria, by breaking up the muscles of the fish, &c., set up putrefaction, and lead to the formation of by-products—sometimes harmless, sometimes extremely poisonous. With the organisms of putrefaction surgeons and food-preservers have long waged war. The surgeon at last has won the victory by means of Lister's antiseptic system; the food-preserver, guided by the discoveries of Pasteur and Lister, has also been successful to a very large extent. In some cases, after arresting putrefaction by boiling, he prevents the germ-laden air entering by hermetically sealing; in other cases he arrests putrefaction by the use of ice. How may we further extend antiseptics to the preservation of fish? A surgeon, in order to render a wound aseptic, first endeavors to destroy all the organisms that exist in the disintegrated tissues, and then does his best to prevent the entrance of new organisms or their germs from the atmosphere. The antiseptic fish-preserver must, as far as possible, proceed on the same principle; he must get rid of the organisms that exist in and on the fish when it reaches his hands, and either render the tissues unfit for the growth of a new crop of organisms, or prevent the organisms reaching the tissues. For hundreds of years fish-curers have endeavored to render the tissues of fish unsuitable for the growth of organisms by saturating them with salt. Those acquainted with the process adopted for the curing of herring know how primitive it is. Not only is the flesh rendered less nutritive, but the delicious flavor of the fresh fish is completely lost, and the delicate albumens are decomposed. So much is this the case that there is practically no sale for salted herring in this country; they are in demand only on the Continent, where fresh fish are scarcely known. When lecturing at Fraserburgh last winter I directed the attention of the curers there to a process of curing herring invented some years ago by Mr. Sahlström. Mr. Sahlström's process, first tested in Norway, has been recently carried out in Aberdeen. It consists first in driving out the air from the newly-caught fish, and next in saturating the tissues with a preservative solution. The fish are introduced into a closed cylinder, and there subjected to a pressure sufficient to drive out the air. Into this cylinder the preservative solution is then introduced, and, by applying a pressure of from 60 to 100 pounds to the square inch, it is forced into all the tissues. The fish can be either slightly or completely salted, and either pure salt or a mixture of salt and boracic acid can be used. This method requires fewer hours for curing herring than the ordinary method requires weeks, and, owing to the tissues being thoroughly penetrated by the preserving fluid, they are rendered quite incapable of forming a suitable soil for the growth of organisms. Herring cured in this way can be exposed to the air for weeks without deteriorating in value or losing their original flavor and freshness. Another way of treating fish antiseptically is by Roosen's method. This plan is at present under trial here for the preservation

of salmon. Experiments made in Norway and elsewhere have shown that fish can be kept in a perfectly fresh condition by the Roosen process for an indefinite time without any steps having been taken to get rid of the infected air. The fish are introduced into a steel barrel containing a solution of salt and boracic acid. The cask, after being completely filled with the solution, is sealed, and a pressure of from 60 to 90 pounds to the square inch is maintained until the fish are required for use. Large fish preserved in this way are said to remain fresh for several days after being removed from the liquid. Herring might be kept for a time under pressure at the fishing station, and then forwarded in ordinary barrels to Billingsgate and other markets. Further, all the necessary preserving appliances can be carried on board the fishing boats. A boat provided with the Normal Company's (Sahlström's) appliances could cure at sea large parcels of herring and other fish, and carry them (or send them by fish-carriers) direct to either home or foreign fish-markets. Sahlström's process, it should be remembered, admits of fish being either simply treated with common salt or with a mixture of salt and boracic or some other acid. [From the Scotsman, Edinburgh, Scotland, January 29, February 2, and March 9, 1886.]

21.—SCARCITY OF COD AND HADDOCK ON THE COAST OF MAINE.

By N. V. TIBBETTS.

[Letter to Prof. S. F. Baird.]

I resided for fifteen years, from 1855 to 1870, near the coast of Maine. Most all farmers, like myself, were fishermen at times, and relied on catching our yearly supply of fish of various kinds, especially codfish and haddock; but these fish have long since deserted Penobscot Bay and Eggemoggin Reach, and few are left but young herring, which are caught and converted into "sardines."

If the fish do not come back themselves, and it is evident from their long absence that they will not, the fishermen and farmers along our coast must look to you to coax them back or give us a new supply. If you will do so we will try to have a law passed, if there is not one already, that may protect them from being driven away by the fishermen, as the original supply was. In my opinion, the reason why the fish left our shores was because the fishermen took to using troll-lines. Some say the steamboat was the cause, but I don't think that is so. Codfish know no more what is going on at the surface than we know about the bottom. I have caught haddock and cod where the steamboat had been over the water every day for years, and in not over ten fathoms of water at that.

We used to row out on the Reach two or three hundred yards from shore, and in a few hours were as sure of catching a few hundred pounds