

XXIII.—EXTRACTS FROM A REVIEW OF A. ANNANIASSEN'S VOYAGE TO ICELAND.*

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Mr. Annaniassen was sent to Iceland, in the summer of 1883, by the Society for the Promotion of the Norwegian Fisheries, in order to study the Iceland sea fisheries; and extracts from the report on his voyage, which was made during the months of June and July, are given in the annual report of the above-mentioned society for 1883.

He made his longest stay at Isafjord, where he visited the large fishing stations Bolungarvig and Alptafjord, at a time when the fisheries are not carried on with the same energy and results as during the principal fishing season, which comes earlier in the year. He also paid hasty visits to the stations where the mail-steamer calls, staying from six hours to two days; and thus had occasion to visit the West-manna Islands, Reykjavik, Eskifjord, Husavik, Seydisfjord, Ofjord, Siglefjord, Sandarkrog, Skagestrand, and Reykjafjord. Owing to his short stay at each of these places, he was not able to collect complete data regarding the fisheries; and in respect to the curing of fish he could not make many personal observations, as the time was much too short and as the curing of fish has generally come to an end about that season of the year. He was not able to see the Iceland fisheries as they are carried on during the fishing season, except, perhaps, at Eskifjord or Seydisfjord, where there are considerable summer fisheries. He did not see anything of the important fisheries in the Southland and Westland, which, during the period from March 1 to May 14, furnish about three-fourths of the entire quantity of fish exported from Iceland. Owing to the season of the year at which he visited Iceland, therefore, and the shortness of his stop at the fishing stations, several mistakes have crept into his report. I aim here to point out some of these mistakes, make corrections, and show the true state of affairs. I will first make a few observations on the manufacture of klip-fish, following the lettering used by Mr. Annaniassen and omitting such divisions as call for no remarks.

* "*Mr. Annaniassens Rejseberetning fra Island.*" From *Fiskeritidende*, Copenhagen, December 23 and 30, 1881, and January 6, 1885. Translated from the Danish by HERMAN JACOBSON.

a. The fish are generally cut across the gullet and killed as soon as they come out of the water; but unfortunately this rule is not followed universally. On decked vessels the fish are generally killed by making a cut near the gills toward the neck, or else by making a small wound in the head with the point of the hook. This last-mentioned method is generally employed in the boat fisheries, and even a small wound will cause the fish to bleed to death.

b. After the fish has been cleaned it is always washed, but not with a brush, except, perhaps, on decked vessels; but even there a brush is found to be less practical than a common mitten.

d. Mr. A. is nearly correct when he states that a barrel of salt is used for 160 kilograms of dried fish; the quantity of salt, however, is rather less than more, but rarely less than 3 bushels. The quantity of salt used varies somewhat with the season, the quality of fish, the time they are to lie in salt, and according to their being salted in barrels, boxes, or simply in piles. Fish that have lain in salt two or three days are not piled up in new heaps, at least not in the Southland and in the Westland; although this may possibly be done on decked vessels. It is my opinion that this is done only on French and other vessels, where the fish are kept on board for some time.

It is scarcely correct to say that fish which have lain in salt during winter are just as good as those that have been caught in the same year or after new-year's. We shall come nearer the truth when we say that such fish make a tolerably good article.

After the fish have been taken out of the salt they are often piled up in large heaps; generally, however, small heaps are preferred. The smaller fish are put at the bottom with the skin downward, and so on, one on the top of the other, all except the bottom layer having the skin upward, so that each layer is pretty well covered by the one above it. When the heap is sufficiently high (from 7 to 10 layers), one of the largest codfish is laid on the top to serve as a cover. Many people, however, pile the fish one above the other, all turning the same way (that is, with the tail turned outside) in a long row, making about 20 layers or more. There can be no objection to this, even if most curers of klip-fish prefer (especially when there is prospect of rainy weather) to lay the fish in isolated heaps of from 7 to 10 layers, when it is of course not necessary to relay them. The statement that in case of rainy or unfavorable weather the fish are laid in square heaps and repiled daily must be regarded as an unsafe method, of which, however, I know nothing.

It is very difficult to lay down any rules for pressing the fish, as the varying circumstances of each case should guide in this respect. The same also applies to the relaying when the pressing becomes too lengthy a process; and it may, on the whole, be recommended to use less pressure. No relaying should take place unless there is danger of the fish fermenting. Pressing is used to smooth the fish and in order to dimin-

ish the moisture which is retained in the flesh after a crust has formed on the outside, and which, by pressing gradually, works its way toward the outside where it evaporates, but it does not contribute "most largely to the drying of the Iceland fish." Too much pressing in the beginning makes the klip-fish tough and less delicate in flavor. The pressure should never be so strong as to make the water ooze out from the pile of fish or to make it gather inside the pile. During drying care should be taken that the fish are changed every time they are pressed. Those which were on the top should the next time be at the bottom, and *vice versa*. When the drying process approaches completion the pressure is increased. Much will also depend, of course, upon whether the weather has been very dry or not. If the weather is unusually dry greater pressure is applied, so that the moisture may be distributed as rapidly as possible; and as soon as damp weather sets in the pressure is decreased.

c. It probably is not true that during the season for the manufacture of klip-fish (May 15 to June 30) there is more cloudy weather in Iceland than in Norway, and that the drying process is more hastened on account of this. Nor are the fish in Iceland salted excessively. The great pressure used in Iceland is applied solely to smooth the fish and to drive the moisture toward the outside, where it can evaporate more readily. I am not sufficiently acquainted with the Norwegian method of curing klip-fish to pass an opinion, but I am inclined to think that the principal difference between the Norwegian and the Iceland methods is this, that in Iceland the fish are dried, as a general rule, with more air and less sunshine. In Iceland the best places for curing fish are those where there is much draft and some sunshine, but not much, at least until the drying process is nearly complete.

When the fish have obtained a degree of stiffness so that they do not bend when taken by the tail and held upright, and when held against the sun or a strong light no dark portions are seen in the flesh, they are considered sufficiently dried. When they have reached this state the fish should be so firm that when pressed with the thumb or the points of the fingers no impression remains.

I have studied this question of the proportion of fresh, salted, and dried fish for some time, without arriving at an absolutely certain conclusion. The proportion named by Mr. AnnaniasSEN may, however, be taken as approximately correct.

Until the year 1787, up to which time the fisheries were a monopoly of the Danish Government, I find that from the fresh fish about 25 per cent of klip-fish were obtained; and similar results are given in several reports from the eighteenth century. This cannot be supposed to be correct. I have been informed that in exceptional cases first-class fat sea-cod have given from 45 to 47 per cent of well-prepared dried klip-fish, while the usual percentage was 40, or more accurately from 38 to 40. Lean codfish, after the spawning season, and not very fat summer cod, will yield from 33 to 38 per cent, and in a few cases even less than 33

per cent. The highest percentage which, to my knowledge, fine fat but small summer cod have yielded, has been $42\frac{1}{2}$ per cent, and often it has been less. On the south and west coasts of Iceland the spawning season is generally the first half of April, and during the principal fishing season (from March 1 to May 14) the fish will be of inferior quality for fully a month. It should be remembered also that the sea-cod which come near the coast vary greatly in quality, the difference as regards fatness often amounting to 33 per cent or more. The average weight of the sea-cod in the Faxa Bay is such that from 120 to 160 fish make a *skippund* (1 *skippund* = 160 kilograms = 352 pounds).

The Norwegian *Tidsskrift* (1884, p. 131) states that 100 kilograms of fresh fish yield in Scotland 39.3 kilograms of klip-fish; in Norway, 33.3 kilograms; in Newfoundland, 36.4 kilograms. On the strength of this statement I venture to express the supposition—while believing that this statement itself is also more or less only a supposition—that the average yield of klip-fish in Iceland is about $36\frac{1}{2}$ per cent of the fresh fish, therefore about the same as in Newfoundland.

In the above-mentioned article in the Norwegian *Tidsskrift* an analysis is given of the klip-fish of different countries, among the rest of a well-dried Iceland klip-fish which weighed 1.5 kilograms, and is stated to have contained 5.4 per cent more water and 4.4 per cent more salt than a Norwegian fish. An analysis of one or two fish should be received with great caution, all the more as the quality of the fish varies greatly, and as the fish have often been in salt for a varying time. It must certainly be supposed that the fish which underwent this analysis had been in salt two or three months. The analysis of the Norwegian fish, moreover, was made in the place where it had been cured, while the Iceland fish had been shipped from Iceland to Norway. There is likewise little doubt that in a cargo of fish shipped to Spain changes take place which can be noticed very plainly, although we may not be able to explain them until an analysis of the fish has been made both at the place whence they are shipped and at the port where they are landed. As Spain is the principal market for Norwegian, French, American, and Icelandic fish, the analyses should be made there. In order that these analyses may be productive of reliable results, they should extend to a number of different specimens, and be made under the same conditions.

It is very difficult to state exactly the difference between salted and dried fish. Mr. Annaniassen states it to be one-third; but I am inclined to think that this is too low. From data which have been furnished me I think that it is from 37 to 39 per cent in sea-cod, and that it varies greatly. Lieutenant Trolle's figures (in *Fiskeritidende*, 1884, p. 132) are the lowest I have seen, namely, 28.2 per cent; but probably they relate to thick and fat small codfish, lightly cured for immediate consumption.

As regards some of these questions it will be exceedingly difficult to

arrive at any positive results which will serve as a basis for future calculations. As regards my statements I must say that they are based principally on the observations of other people, and that I had no means of ascertaining the special conditions under which they were taken. But considering the knowledge that I possess of the Iceland fisheries, I presume that they are tolerably reliable, and may under the circumstances deserve as much consideration as statistical data in general.

f. After the fish have been dried they are either kept in a pile under very light pressure, or if there is a large quantity they are placed in the house. If they are moist they should be laid for a short time in the sunshine before they are shipped.

h. The sounds or air-bladders of small fish are not used, because they have no value; but the sounds of the large codfish can always be used, and when properly dried they bring from 24 to 27 cents a pound. The usual treatment of the sound is not as stated by Mr. A.; but they are washed as soon as possible, cleansed from blood and all impurities, and are then spread out on the outside of the drying-shed where there is a good draft, or on stone fences, but so that they are not either in the rain or the sunshine. After they have become so stiff that they stay apart, they are drawn on strings and dried in the wind. The Iceland fishermen do not salt the sounds, nor should they be salted. If they cannot be dried immediately a little salt is sprinkled on them, they are soaked as soon as possible, and then dried in the usual manner. Only on vessels having a deck, and during rainy weather, are they treated in the manner described by Mr. A., and by this process a serviceable article is obtained, but by no means so good a one as when they are treated in the proper manner. To avoid the necessity of sprinkling the sounds with salt is a problem of great importance, and I am of the opinion that at the larger fishing stations and even on board the vessels suitable drying-ovens could be employed so as to obtain a really valuable article, such as the sound will always be when properly treated.

j. Those fish that are shipped to Spain are very carefully sorted over again. I do not know whether haddock are sent to Spain or not. The larger portion is sent to Great Britain or Denmark.

m. Mr. Annaniasen grants that the Iceland fish are fatter and thicker than the Norwegian fish; but he states that the liver of the Iceland fish is lean and does not contain much oil. Both in Iceland and in Norway the conditions under which the cod obtains its food vary greatly. Those fish which come to the banks from the ocean are generally very fat, but in some years they are lean. Their liver is generally of fine quality and contains as much oil as the liver of any codfish, furnishing excellent medicinal oil. Genuine fat summer codfish also have good livers. It is doubtful that haddock, as a rule, have larger livers than codfish, though this may be the case with many individual specimens.

I now pass to consider his miscellaneous notes, following his numbering and omitting the last, which has been referred to in the beginning of this review.

1. These statements are unreliable, being based on what was seen during the time of year when fisheries are not carried on very extensively, and on unauthentic information given in reply to his questioning.

2. In Iceland a distinction is made between the fishing season proper and other seasons of the year. During the fishing season, which lasts from March 1 to May 14, the fisheries are carried on with full energy and with all the hands that can be spared, many people who live inland leaving their homes to take part in the fisheries. During the other portions of the year fishing is carried on only by a few persons who are absolutely dependent on the sea for their living, or who occasionally go fishing, often simply for the purpose of getting a few fresh fish for their tables. The latter half of May and June the coast population is generally occupied in preparing klip-fish, digging peat, &c.; and during June and July many of them go farther inland to assist in the hay harvest. Farming and fishing go hand in hand in Iceland to such a degree that one must often give way to the other; and this is the reason why the summer fisheries are not carried on more extensively.

In most parts of Iceland the fishing season lasts two and one-half months (but never later than May 14), and furnishes the greater portion of the fish exported from Southland and the western fiords. Only of late years have there been considerable fisheries in the eastern fiords. Of the entire quantity of fish exported from Iceland during the four years' period, 1876 to 1879, inclusive, 44.9 per cent came from the south coast and the Faxe Bay; 39.7 per cent from the western fiords and Snæfellsnes; and 15.4 per cent from Northland and the eastern fiords. Along the entire south coast only large boats, with a crew of from 8 to 12 men each, are used during the fishing season. In the Faxe Bay, the Brede Bay, and the western fiords, besides the above-mentioned boats there are also employed smaller boats, with a crew of 6 or 7 men each; but this is only done in exceptional cases, when the fish come close to the coast. For the summer fisheries small boats, with crews of from 3 to 6 men each, are used almost exclusively. During the fishing season the codfish have often to be caught at a considerable distance from the coast, sometimes as far as 2 or 3 Danish miles [9 to 14 English miles], and even farther, as in the southern part of the Faxe Bay, where during summer I have often seen the fishermen go out as far as 4 Danish miles [about 19 English miles]; but of course when the fish are near the coast no one will think of going out any farther than is absolutely necessary.

3. As far as I have been able to learn, the food furnished to the Icelandic fishermen is of good quality and sufficient in quantity. They generally, but not always, have some brandy with them when they go out to sea. Nor should they be blamed for this when we take into

consideration the fact that the crews on these Iceland fishing-vessels are generally small in number, so that it becomes impossible for the men to relieve each other as is done on the French vessels. But during the boat fisheries the fishermen very seldom have any liquor on board, even if they stay out at sea for a considerable length of time (12 hours or more). This is especially true among the Westland and Southland fishermen.

4. It is difficult to give a form or type of a boat which is in general use throughout the island. Even in localities which are adjacent the form of the boat varies considerably, according to the local requirements. Thus the boats used on the south coast, in the Faxø Bay, the Brede Bay, and the western fiords, resemble each other in some respects and differ in others. Each of these localities has some peculiarity as regards the build of the boat. In the Northland and Eastland the forms of the boats vary still more, as the fisheries in these parts have been developed only recently, and as, especially on the east coast, the fisheries are carried on by foreigners or by persons from other parts of Iceland or from the Färø Islands, all of whom, of course, use the kind of boat to which they have been accustomed from time immemorial.

As a general rule, the Iceland fishing-boats are arranged in such a manner that they can be used both as sail-boats and row-boats, as occasion demands. The form of the boat is also adapted to the part of the sea where it is to be used, to the landing-place, &c. On the south coast of Iceland, and in some other places where the fisheries are carried on in the open sea and where there is rarely more than one landing-place, the boats are mostly row-boats. In the Faxø Bay the boats were formerly chiefly used as row-boats; but at present they seem to be in a transition stage toward sail-boats, with heavy ballast, because the boats are somewhat narrow, for which reason they can also, if necessary, be used as row-boats.

In most places in Iceland it will be necessary to have a boat which is adapted both to sailing and to rowing, as much as is possible, and which is suited to the sea and the landing-places where it is to be used. A boat which is arranged either exclusively for sailing or exclusively for rowing, even if absolutely perfect in either respect, will not prove so useful to the fishermen as a boat which combines both qualities. Wherever sails are introduced, care should be taken to adapt them to both stormy and calm weather. In Iceland there are no harbors for boats, and they must in nearly all cases be drawn ashore. On the south coast of Iceland only a mainsail is used, as a general rule. In the Faxø Bay a jib is also used, with two masts with staysails. In the western part of Iceland only a mainsail was used some years ago; but recently many fishermen have begun to use jibs. It is safe to assume that about two-thirds of all the Iceland fishing-boats have jibs. Objections made against the shape and rig of the Iceland vessels should be received with caution; and the criticism of Mr. A. seems unjustified.

5. On the south coast hand-lines from row-boats are almost exclu-

sively used during the fishing season, as long as there are any large codfish near the coast. If the cod are lean and if there are many haddock on the banks, as well as later in the season (especially after the spawning is over), long-lines are used. In the southern part of the Faxe Bay nets are used to catch the incoming cod; in March and April hand-lines are used as soon as the cod will bite, or as soon as haddock make their appearance. Long-lines are also used as soon as the codfish become inferior in quality. In the Westland no nets are used, and as a reason for this it is stated that when the cod approach the coast there are sharks among them, which are apt to injure the nets. Hand-lines without bait are used wherever there is a current, and long-lines with bait wherever there are fish to which this method of fishing is adapted. In the eastern fiords long-lines are generally used during the summer fisheries.

Making a rough calculation, it may be said that more than one-third, in fact nearly one-half, of all the fish caught are caught with hand-lines, and the remainder with nets or long-lines. The results of the net fisheries vary greatly. If properly cured, most of the fish caught with hand-lines will make the best klip-fish. The net fisheries yield the heaviest fish, but many of these make only a second or third-rate article, because the fish remain too long in the nets. The fish caught with long-lines are generally lean or small, and make only an inferior kind of klip-fish. In many places in Iceland hand-lines are preferred to the expensive nets. On rocky or stony bottom long-lines or nets could not be used at all. For catching the genuine large sea codfish, the long-line is rarely suited; while it is used a great deal for catching fish which have spawned, small codfish, and haddock.

6. Bait is substantially as Mr. A. has stated. Where lump-fish are caught, the roe of the female is very commonly used as bait, as well as the roe of other fish. In the entire southern portion of the Faxe Bay and in many other places a great many lump-fish are caught from April 1 to the end of June. To each fishing-boat belong at least from 3 to 5 nets, which during that period are set every day, not only to procure an article of food, but particularly because the roe, the sucking-disk, and the head make excellent bait.

7. It is true that crabs are found in the stomach of the codfish, but it must be said that the food of the cod is the same in Iceland as in other places, and that it is of so varied a character that it is difficult to enumerate it briefly. One of its favorite articles of food, when near the shore, is the sand-eel (*Ammodytes tobianus*) and different kinds of herring. The enormous number of sand-eels found near the coast of Iceland is the principal cause why the codfish and the haddock stay there not only during the spawning season but much longer.

8. The fishermen from the Färöe Islands do most of their fishing during the pleasant season of the year in the eastern fiords for small cod and haddock; and to call them the "best boat-fishermen at Iceland" is unjust to the Icelanders.