91.—THE ICELAND SHARK-FISHERIES.*

The kind of shark which is called in Danish *havkal* (Greenland shark, *Scymnus microcephalus*) is found throughout the entire Arctic Ocean, near Greenland and Iceland, and, though in smaller numbers, in the North Sea, and even in the Cattegat, where nearly every year some are caught near the coast of Bohuslän, and on the so-called "Great Banks," where the depth is from 30 to 110 fathoms. In Norway important shark-fisheries have been carried on from time immemorial, particularly in winter, from the beginning of September to the end of February, from Tromsöe to the Varanger fiord, and in some other places, such as Storeggen, on the coast of Romsdal. Most of these fishing places have a depth of from 100 to 300 fathoms, and are generally at the distance of several miles from the land. Many Norwegian vessels also catch sharks in the Arctic Ocean between Beeren (Iceland) and Spitzbergen, where these fish are called *haakjærring*. On the Danish coasts the shark is very rare. Occasionally some have been seen as far south as the Kullen promontory, at the northern entrance of the Sound; near Hou, in the Cattegat; and near Sonder-Nissum, on the west coast of Jutland. There are, therefore, on the Danish coasts no regular shark-fisheries.

There seems to prevail some uncertainty as to the size of the Greenland shark; near Iceland, for instance, it is said to reach the length of 24 feet. This statement is probably based on the account of Gunnerus. There has certainly been some misunderstanding as regards a statement made by Eggert Olafson, who says, "The largest Greenland shark can reach the length of 10 yards, Iceland measure." A yard, Iceland measure, however, is 18 inches, and according to Danish measure, this would be only 7½ Danish yards. We shall be about right when we say that the size of the Greenland shark rarely exceeds 6 Danish yards, or 12 feet. Lieut. C. Trolle states that he caught one measuring 23 feet in length.

The Greenland shark is caught principally on account of its liver, but in Iceland the meat is also frequently used as food, after it has been allowed to hang for some time, or, having been put in the ground, has undergone a process of fermentation. When fresh the meat is indigestible and unwholesome; when dried it has a peculiar but by no means disagreeable flavor, somewhat resembling old cheese. When fermented the meat is slimy and jelly-like, but it is stated that at present it is not much used for food when in that condition. The yield of oil, of course, differs very much, according to the size of the liver, which corresponds to the size and fatness of the fish. A good liver will yield about 66 per cent oil, while others will only yield about 50

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per cent. The data relative to the average yield of oil from the liver of the Greenland shark vary greatly. When a Norwegian writer states that a single large Greenland shark yielded 7 hectoliters [about 185 gallons] of oil, this must be of course an exaggeration; but other data, which make the yield of the shark's liver from one-fifth hectoliter to 3 hectoliters, will not give us a correct idea either, as a shark having 2 barrels [a "barrel," as used in this article, contains about 44 gallons] of liver will always be a very large fish. Kröyer gives the average yield of a liver as 120 *potter* [1 *pot* equals 1 quart, about]; while Rosted says that 1½ barrels of fat liver will produce a barrel of oil, therefore 160 *potter* will be obtained from 2 barrels of liver. In Iceland the livers are not counted, but measured with a peculiar Iceland measure, the *kútur*. On the west coast of Iceland, 18 *kúturs* of liver make a barrel, and at Ofiord 15 *kúturs* make a barrel. At present one generally calculates on getting from one barrel of liver three-fifths of a barrel of oil, therefore about the same quantity as given by Rosted. It should be remembered, however, that at present much greater care is taken in extracting the oil from the livers, that the apparatus has been greatly improved, and that steam is frequently employed.

In 1884 the shark fisheries near Iceland were exceedingly productive. On the west coast not a single vessel got less than 600 barrels of liver during a period of six months. The price was about $6.70 per barrel of liver and $11.25 per barrel of oil.

The fisheries are carried on partly with open boats, which are principally used in the Faxe Bay and in the Isa fiord. In the southern part of the Faxe Bay the fisheries with open boats do not amount to much, but some such fisheries are carried on in the other parts of the bay, while extensive open-boat fisheries are carried on in the western fiords, in the Stranda district and on the coast of Nordland. Fisheries with open boats are, of course, carried on in winter, when the fish come near the coast. These fisheries, however, are connected with many dangers, and many boats are lost. If the circumstances would allow it, or if the fishermen had the necessary means, they would certainly get larger vessels. Here is a chance for the Iceland Government to do a good work by advancing some money to the poor fishermen, so that they could buy sea-going vessels. The tonnage of the schooners used on the west coast of Iceland from the Brede Bay to the Isa fiord, varies from 20 to 85 tons (costing from $2,680 to $6,332); and the total number of these schooners is about 30. There seems now to be a tendency to employ small vessels of from 20 to 30 tons, because the larger vessels require three times as expensive apparatus.

The fishing season generally extends from January to August. In winter the Greenland shark keeps in shallower water than in summer (in from 40 to 50 fathoms); and the young sharks go in still shallower water and within a few miles of the coast, while in summer the sharks must be sought at a distance of 20 [Danish ?] miles from the coast, and

at a depth of from 200 to 300 fathoms. In August they are found at a depth of 100 fathoms, and in September at from 40 to 50 fathoms. On the west coast the fishing season lasts from April to September, and the outfit costs from $1,340 to $1,608. A single line generally measures 120 fathoms in length; sometimes three lines are tied together. To the line is fastened the weight (weighing from 8 to 10 pounds), and underneath this there are 4 feet of a small chain, which runs in a swivel on the hook, which is about 10 or 12 inches long, the distance between the point and the main part of hook being 3 or 4 inches. The line is carried out over a block whose disk must fit exactly, so that the line does not get between. The block is open at the top, and has a bolt which can be fastened to the railing.

As soon as the fishing place has been reached the boats cast anchor. The anchor generally weighs from 112 to 160 pounds, and has 15 or 16 fathoms of chain attached to it as a protection. A deep trough or valley at the bottom of the sea with muddy or light-clay bottom is the favorite haunt of the Greenland shark. From this trough they like to go along the slopes of the valley and into shallower water to seek food, and to return again to the depths. The Greenland shark is said to scent its prey at a long distance, and the fishermen say that it will go a long way for its food. After a vessel has cast anchor it may sometimes lie for some time before sharks will approach and bite. The small fish generally come first, and are followed by the larger and fatter fish, whose appearance marks the approaching end of the fisheries.

For bait seal-fat and horse-flesh are used. Horse-flesh should first be kept for some time in a mixture of blood and salt until it is half decayed. Smoked horse-flesh and young seals, kept in spirits of wine, are also used for bait. The hook should be entirely hid by meat and fat. During a fishing season there are used on an average 1½ barrels of meat, 1 barrel of seal-fat, and 2 or 3 young seals. These are cut in pieces, and these separate pieces may, of course, be used several times. A single seal-head has occasionally been instrumental in catching enough fish to yield 20 or 30 barrels of liver.

When the weight has reached the bottom, a few fathoms of the line are hauled in, holding it firmly outside the block, so that one can notice readily when a shark is beginning to play round the hook. A piece of the line is then slowly hauled in and let go again, thus enticing the shark to seize the hook and get caught. It is easy enough to haul in the fish, for it offers no other resistance than to turn round; but this does not interfere with the hauling in, as the hook will turn on its swivel. As soon as the fish has been brought to the surface of the water, a knife with a long handle and a blade about 2 feet long is driven into its back; after the knife has been firmly inserted in the body of the fish, the head is raised high enough to insert a large iron hook, instead of the pieces of chain used in former times. Some ten years ago the fish were attached to the vessel by means of chains, while now they are

allowed to drift after the liver has been cut out. The liver is cut to pieces in the water; and the pieces are taken up with a dipper and placed in a barrel with a perforated bottom, so that the water and blood can flow off. The livers are then packed in boxes or placed loose in a compartment of the hold.

On the west coast of Iceland a shark vessel has generally a crew of 8 men, beside the captain. The crew of the Ofiord vessels generally numbers 10 or 12 men. Three or four hooks are used at the same time, but when the fish bite well fewer hooks are used.

On the coast of Nordland the fishermen share the profits, while in Vestland the fishermen hire themselves out to owners of vessels. The captain of the vessel then gets $4.28 per week, the mate $3.21, and the sailors (or fishermen) from $2.14 to $2.68 each. A premium, moreover, is paid for every barrel of liver, namely, 53 cents to the captain, 26 cents to the mate, and about 13 or 14 cents to each fisherman. When the fisheries are conducted on the share system the liver is (for 9 men) divided into eighteen parts. The owner of the vessel gets one-half, but he pays extra for one part for the captain, who therefore gets two parts. Frequently, however, different arrangements are made among the persons engaged and having a share in the fisheries.

The crew receive the following rations per week for each man: Six pounds bread, 2 pounds butter, 3 pounds meat, ½ pound coffee, and ½ pound rock candy. For each trip (lasting about one month) each vessel is furnished with 20 quarts of brandy, a half-barrel of peas or rice, a proportionate quantity of sugar or molasses, and 2 barrels of coal.

After the close of the shark fisheries the vessels are either laid up or employed in other fisheries. In the Ofiord there is an insurance company for these vessels, which has done a great deal of good.

92.—ABUNDANCE OF FISH IN THE GULF OF MEXICO.

By L. H. SELLARS.

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

In 1881 the fish came on this coast in such numbers that the Pensacola Ice Company bought a steamer with intent to purse-seine them. From that time till now there have but few fish come north of Cape San Blas. This year there is a glut, and it seems that the Atlantic markets are full also. Lake fish are shipped to points contiguous to here. Even the deep-sea fish, such as snappers and groupers, are more abundant, and bite at the hook more freely.

Now, is there any meteorological phenomenon upon which to base this superabundance of fish? We have been noticing the catching of fish many years, but can see no reasons for this irregular periodical rush of fish from their hiding-places to the coast.

PENSACOLA, FLA., *May* 4, 1885.