

105.—KLIP-FISH AT THE SHETLAND ISLANDS.*

By ADR. ANNANIASSEN.

Cod, ling, and bream fisheries are carried on all round this group of islands; the ling and bream fisheries, however, principally on the east coast from Sumburgh Head to Haroldswick, at a distance of from 10 to 50 miles from the coast. The cod fisheries are mainly found on the west coast, principally in March, for which reason the inhabitants of these islands generally call them the "winter fisheries,"† while the ling and bream fisheries are carried on during April, May, and June, until the herring fisheries begin. The most important fishing stations on the east coast are: Lerwick, Whalsay, and Skerries; and on the west coast: Fethaland, Stenness, Papa-Stour, Vaila Sound, and Scalloway. Natives of the islands are engaged principally in these fisheries.‡ Sometimes deck-boats are employed, but more frequently open boats, having one mast and a lug-sail, and generally a crew of from 4 to 6 men. They are good sea-going boats. The deck-boats likewise have one mast, and are rigged like a sloop, and their crew generally numbers from 5 to 7 men. As a general rule lines with hooks are used, the hooks, however, being somewhat larger than those used in Norway. The distance between the hooks is 3 or 3½ fathoms. A cork buoy is used, through which passes a pole from 9 to 12 feet long. The cork buoy is in the middle of the pole, which has a sinker at the lower end to keep it in a perpendicular position. As the lines are always hauled in while the boat is under full sail, six to ten extended and painted ox-bladders are fastened to the cork buoy at intervals of one foot. When the line is to be hauled in the bladders are drawn in with the boat-hook. The lines are placed in baskets which on the inside have an upper edge of fine cork in which the hooks are fastened. Each basket holds generally 150 hooks, or from 450 to 500 fathoms of line. As a general rule from 16 to 20 baskets are used, so that the entire length of the lines is nearly 10 geographical miles. Each line-fisher, moreover, carries from 16 to 20 nets, which are cast every evening to obtain the necessary bait. If the weather is favorable for net-fishing, a sufficient quantity of bait is always procured. If one of the boats happens to be less successful, one of the more fortunate boats renders assistance, without any pay, which is a very general custom among the fishermen of these islands. The nets are generally hauled in about midnight, and immediately

* "*Fiskeriet og Tilvirkning af Klipfisk paa Shetlandsøerne.*" From *Norsk Fiskeritidende*, vol. iv, Bergen, April, 1885. Translated from the Danish by HERMAN JACOBSON.

† Of the fish caught in winter 800 to 1,000 generally yield one barrel of liver, while of the fish caught during summer 1,000 to 1,200 are needed to make up that quantity.

‡ In 1882 the number of fishermen was 2,981, and the number of boats 629.

afterwards the lines are set. This is always done while the boat is under way, and the hooks are baited as the lines are being set, by 2 or 3 men who stand round the basket and put the bait on the hooks. As the hooks are arranged in order along the cork-band round the upper edge of the basket, each man takes one in his turn, so that the baiting is done easily, even if the boat is in rapid motion. An entire small herring is attached to each hook by passing the barb through the vent.

At the beginning of the fisheries each fisherman makes a contract with the dealer whom he furnishes with fish. If a boat stays out more than three days a reduction is made in the price, according to the appearance of the fish and the time the boat was out.

The board furnished the fishermen is generally good, consisting principally of wheat bread, cheese, butter, and nearly every day pudding, besides various canned goods. Tea and coffee are the usual drinks, liquor being used but very rarely. When in port the men live on shore, generally with the merchant who buys the fish.

As the fisheries are almost exclusively carried on with lines, the fish are rarely killed, as they are generally dead before they reach the boat. All fish, however, which are taken with hand-lines are killed, either by a cut across the throat or by driving the knife into the heart.

The fishermen of the Shetland Islands clean the fish in the same manner as the Färöe and Iceland fishermen, so that the backbone remains in the left side, while in Norway it is usually left in the right side. It is cut through 1 or 2 vertebræ, from 18 to 24 vertebræ from the tail, according to the size of the fish. The knife used generally has a length of about $31\frac{1}{2}$ centimeters and a breadth of $5\frac{1}{2}$ centimeters. The blade has an upward curve, and the point is semicircular. Those made by blacksmiths on the spot are preferred to machine-made knives. According to my opinion the Shetland fishermen cut too deep, often down to the skin, which weakens the consistency of the fish; and several of the fishermen agree with me on this point.

As soon as the fish has been cleaned it is washed. The washing is done in boxes. The side at which the washer stands is somewhat slanting, while the other, alongside of the cleaning bench, is straight. The fish are pushed into the box from the bench. The water is pumped out of the sea and is led into the boxes through troughs. Most of the boxes have over the bottom a grating, under which that portion of the dirt which sinks to the bottom can gather, whereby the water is kept clean for a considerable time. When the water is to be changed, the dirty water is allowed to flow off through a hole in the bottom. The washing of the fish is generally done by women, and brushes are used. There is generally one washer to each cleaner. All impurities are carefully removed, especially all blood, while at present people are not very particular about the thin black skin. After the fish have been washed they are placed in boxes made of laths placed at intervals of 2.2 centimeters, so that the water can flow off.

The salting is generally done in tubs, and but very rarely in boxes. As a general rule Liverpool salt is used, but occasionally one-third Lisbon or Setubal salt is mixed with it. One counts 1 barrel of salt to 4.5 barrels of raw or 2 barrels of cured fish. No difference is made in this respect between fresh fish and fish which have lain some time. Experiments relative to the weight of the fish showed the following results:

Twelve hundred pounds of raw fish, when taken out of the salt-brine, weighed 800 pounds; therefore the loss of weight in the salt was 33.3 per cent. After having been dried for seven weeks the same quantity of fish weighed 533 pounds, making the loss through drying 22.3 per cent. The total loss was, therefore, 55.6 per cent, which corresponds to the proportion given above, namely, 2 barrels dried from 4.5 barrels raw fish. After the fish have lain in salt from four to seven days they are taken out. If there is no opportunity to begin the drying process, the fish are piled up in heaps, with a little salt between each layer. There is no absolute rule as to how much salt is to be used; generally, however, one-fourth barrel of salt is counted to 1 barrel of salted fish. The fish remain in these piles until the drying process can begin, and the winter fish generally remain until the first part of April.

The washing which precedes the drying is done in boxes with salt-peter, like those described before, with the only exception that both sides are slanting. During the washing the necks are cleaned with special care, and the thin black skin is completely removed. Brushes with a handle are used. After the fish have been washed they are laid in small heaps, all turned the same way, and if possible in places where the ground slopes a little. If the weather the next day is dry, the fish are exposed to the air; if not, they are covered with mats; but the heaps are not rearranged. When the fish have had one good drying-day, they are arranged in square heaps, each containing at most one-half ton (500 kilograms); thus they remain two or even three days, when they are again spread out. After they have had two or three good drying-days they are arranged in larger heaps, each containing 3 or 4 tons, when the pressing begins, the fish remaining in these heaps two or three days between each spreading. As the drying progresses, the heaps are made larger, containing 5 or 6 tons, and the fish are spread out only every third or fourth day. When the fish are arranged in these heaps, care is taken that those which were at the bottom when spread out are put on the top. The heaps are always well covered with mats. In no case are stones placed on the top of the heap. The time occupied in drying is generally from five to seven weeks, sometimes more. As a general rule the fish are dried on natural banks of stones or pebbles. In some places a scaffolding is used, consisting of props two feet high across which laths are laid (three to the foot). Such scaffoldings are preferred to stone banks. During the drying season the sun is seldom warm enough to hurt the fish. Sometimes, however, this will happen; and in that case the fish are, as with us in Norway, placed on edge, always

two and two together. The fish in that case are also washed in strong brine, the heaps are frequently changed, and the fish are pressed.

The principal difference between the Shetland and the Norwegian method of drying is this: That in the Shetland Islands the fish are not pressed so much. The fish which are called well dried, are, however, according to my idea, moist and contain too much salt. Those fish are called first-class which, when held against the light or the sun, shine, and which on the flesh side have a fine white crust of salt. In Norway such fish would be considered salted too much. The Shetland fishermen do not use more salt than we do; but, as the fish are pressed less, more salt remains in them in proportion to the water and the solid parts than is the case in our method of drying. With us some of the water is pressed out, and thereby also a corresponding quantity of salt, and the superfluous water is removed more by evaporation, while in the Shetland Islands the drying is done by having a current of air strike the fish on both sides.

While the fish are lying in heaps waiting to be shipped they are covered with mats and sails. The packing-sheds are constructed partly of stone and partly of wood. If they are frame, the sides, both inside and outside, are covered with boards.

Besides cod, ling, and bream, coal-fish are also cured as klip-fish. The refuse is packed in barrels, and either sent to Scotland or to the various guano factories on the Shetland Islands.

The principal markets for the Shetland fish are Spain, Ireland, and Scotland. Well-dried fish also find a market in London. A considerable amount of well-dried fish, not too strongly salted, is put up in tin-cans, packed in wooden boxes, and shipped to Australia.

106.—POUND AND NET FISHING AT ERIE, PA.

By M. E. DUNLAP.

Two methods of fishing are practiced at this place. About 200 miles of gill-nets are fished from this port. Eight pound-nets have been fished about 10 miles west of the entrance to our harbor. Over 100 tons of dead fish from the gill-nets have been thrown away annually, most of them back into the lake where they were caught, thus fouling the whitefish grounds. The gill-nets are fished all the year when the ice does not prevent. The pound-nets are set only three months in the year, and all of the fish taken in them are alive and fresh and without spawn, and all of them of full marketable size, none of them having to be thrown away on account of size or because of their being stale. Which of the two methods is best: (1) for the protection of the fish and the continuance of the supply; (2) for furnishing good, sound fish