

**139.—SMOKING HERRING IN DENMARK.\*****By AUG. GARDE.**

Mr. P. Gräsböll, the representative of the Danish Fishery Association in Bjerget, under date of July 21, 1884, called the attention of the board of directors to the circumstance that, while formerly the chimneys of the houses in his neighborhood were built in such a manner as to inclose below the entire cooking-place, which made them resemble a funnel placed upside down and fitted them in a special manner for fish-smoking, they are now nearly everywhere replaced by ranges with so-called closed chimneys, which fact renders it impossible to smoke fish in them. The fishermen, therefore, are no longer able to smoke those fish which they cannot sell, and thus preserve them for their own use, which was often done when (especially in summer) unusually large quantities of mackerel and other fish had been caught. Mr. Gräsböll, therefore, thinks that in his neighborhood there is great need for small smoke-houses, either for one family or for several which go in partnership, and desires information as to how such smoke-houses, especially those for several families, can be constructed in the best and cheapest manner.

Inquiries regarding the establishment and management of smoke-houses, which have reached us from other parts of the country, seem to indicate that there is an unusual desire to preserve fish in this manner; and as smoked fish generally find a ready market, especially when experience has taught how to treat the fish so as to suit the tastes of the different consumers; and considering that it is best not to make the establishments too large in the beginning, but so that they can be gradually enlarged as occasion demands, Lieutenant Trolle has gathered information from different smoke-houses throughout the country. On the basis of his observations and some reports from Norway, he has prepared the following description, which is published in the *Fiskeritidende* in the hope that it will attract more general attention and produce some beneficial results:

There are two methods of smoking, namely, cold-smoking and hot-smoking. Which of these two methods is to be employed depends on the market for which the fish are intended, and on the length of time the fish are intended to be kept. These two different methods produce different articles. Cold-smoking produces smoked salt fish, as prior to

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the smoking the fish has been in brine for some time ; while hot-smoking produces a fresh smoked and cooked fish, which is salted very little, and in which the flavor of salt can scarcely be discerned.

In America, England, Holland, and Russia cold-smoking is generally employed for herring, salmon, haddock, and halibut. In Germany and in some parts of Sweden this method is employed only for salmon. As far as is known, hot-smoking is used in Germany, Sweden, and Denmark for all other fish.

As a general rule, an old-fashioned open chimney can be used for hot-smoking by arranging the poles on which the fish are hung 3 or 4 feet above the fireplace. These chimneys, however, have nearly everywhere gone out of fashion ; and for this reason the arrangement of the common Danish smoke-houses will be described.

The following description of a smoke-house on the island of Thurö, near Svendborg, is given by the owner, Chr. Julius Nielsen :

“The house has strong fireproof walls ; its length is 12 and its breadth 8 yards. One-half is occupied by the packing-room and office, and the other half forms a single room with a concrete floor. At the gable-end there is a chimney in which the fish are smoked. This chimney is 17 yards high and 4 yards square, and along its entire height is divided by a wall into two smoke-rooms. In each of these, two rows of herring can be hung, each row containing 850 large herring ; but as a general rule, in order to prevent the fat from dripping from the upper upon the lower, only one row is suspended. For smoking, beech or oak is used, split fine in pieces about a yard long, or oak or beech shavings from shipyards ; but common shavings are not so good. The expense of smoking and packing is about 8 cents per 80 herring. Below the chimney has two iron doors, one for each smoke-room.”

The following description of a smoke-house at Masnedsund is given by the owner, P. H. Löhmänn :

“The oven, with the fireplace below, is 6 feet broad, 5½ feet high, and 3 feet deep. In front there are iron doors. There is room in the oven for three rows of poles ; the distance from the fire to the lowest row is 3½ feet, and the distance between the rows 14 inches. At the top the oven can be closed by a lid, which opens outside, toward the back wall of the chimney. The chimney projects about a foot beyond the front of the oven, and therefore forms an opening for the escape of the superfluous smoke. The oven is about 6 feet high, and grows narrower toward the top, which is about 1 foot in diameter. The chimney is held together by a strong iron bar. When the fish have been dried in the air, smoking may be done on all three irons, therefore in three rows. The lid at the top is then kept closed. If, however, the oven is to be used for drying ; the two upper rows are used for this purpose ; and in that case the lid must remain open, and the opening is covered by bags or pieces of board. Gradually, as the two lower rows have been smoked, the two upper ones are put a row further down, and a new row is hung

on the upper iron. The best materials for smoking are pieces of beech wood or alder shavings; and in case of necessity, beech and oak shavings can be used. It should be stated, however, that oak is apt to impart a bitter flavor to the fish."

The two ovens described above are exceedingly practical and economical, and are more to be recommended than the so-called Flensburg and Ellerbek ovens.

A larger smoke-house in Svanike, on the island of Bornholm, is about 18 yards square and 4 yards high, while the chimney is 6 feet high and 4 feet broad. There are seven smoke-rooms, or ovens, for hot-smoking, and one for cold-smoking. The herring are hung in pairs over poles 3 feet long, one herring's head being stuck through the gills of the other and coming out at the mouth. If necessary, a thin stick of wood serves as a skewer. On each pole about 40 herring can be hung, which must not touch each other. The poles are arranged crosswise over square frames, 3 feet broad and 7 feet long, which are run into the oven on ledges. Each frame contains 26 poles, and about 1,040 herring can be smoked in it at the same time. The entire smoke-house can contain 22,400 herring, which are smoked by the hot method. The lowest frame is about 3 feet above the fireplace. In the cold-smoke chimney about 12,000 herring can be smoked. The fuel used is alder-wood, which is moistened a little so as to make more smoke, and oak and beech sawdust so as to keep the flames down when they blaze up too high. The price of sawdust is about 52 crowns [about \$14] per load at Hillerød, in Seeland. It is shipped from Copenhagen to Bornholm in sacks containing 40 pounds each. The total freight per 100 pounds is 15 cents. Alder-wood costs \$4.55 per cord. The quantity of fuel used for smoking 8,000 herring is about one-quarter cord of wood and one sack of sawdust.

The herring are smoked either cleaned or whole. In the first case they are cleaned, washed in fresh water, and then laid in strong salt brine for about half an hour. For the Danish market the herring are considered to be sufficiently penetrated by the salt brine when a small black spot appears in the eyeball, which at first became white when the fish were put in the brine. The herring are then dried (hung up on frames), if possible in the open air; but when the air is moist they are dried on the upper frames in the oven. The last-mentioned method takes from one-quarter to one hour. When the hot-smoking method is employed, herring are thoroughly smoked in from one and one-half to three hours, and in the cold method in about seven hours. The work in this smoke-house generally occupies twelve or fourteen women. The wages are 2½ cents per hour. One woman is needed to attend to each oven, the others are engaged in cleaning, salting, hanging, and packing the herring. Care should be taken that the oven is well heated and dried before the fish are hung in it, as the development of steam is apt to injure the fish. It requires some practice to attend to such an oven. The principle of hot-smoking is simply this, that the herring are cooked

and smoked at the same time. Until the fish are thoroughly dry, if this has not been obtained by their hanging in the open air, the smoke should not be too strong, and the lid should be kept open. The process is longer or shorter, according to the use of strong and hot smoke, which produces a better cooked but less durable article, or of weak and cooler smoke, which makes the fish keep longer. Before the fish are packed, they must be cooled off slowly. The larger the fish and the more water it contains, the more difficult it will be to smoke it by the hot process, which at any rate should be employed only after the fish has been pressed, as otherwise it easily falls to pieces.

We have received the following report of a smoke-house in Holbek, owned by Clausen Brothers :

"The smoke-house has four ovens, built from time to time as the demands of the trade required. From 16,000 to 24,000 herring can be smoked per day. In one of the three large ovens 1,600 herring can be smoked at the same time.

"The chimney itself should not be less on the inside than 1 yard square, as otherwise it is not capable of receiving the steam from the fish when they are dried in the oven. The top should be covered with a thin plate of cast-iron, so that the rain cannot fall on the fish. For supporting the front part of the oven it is best and cheapest to use an old iron rail; any other bar will scarcely be strong enough. The oven can easily be only half the size of one of the larger ones, but the larger it is the more profitable it will be as regards the quantity of fuel consumed. In front of the oven iron plates are hung on an iron pipe, and these plates are taken off when shavings are put on the fire. From these plates and up to the iron bar the opening is covered by a piece of linen cloth, as it is necessary to look into the oven frequently in order to see that the flames do not rise too high and burn the tails of the fish. If this should be the case the flames must at once be quenched by moist sawdust. The fuel used is exclusively oak and beech shavings, particularly from coopers who make large barrels, as the shavings must not be too fine; beech and oak sawdust are also used, but shavings and sawdust of pine-wood should never be employed, as it is apt to give to the fish a resinous flavor. As soon as the herring are brought in from the boat they are placed in a strong brine for three or four hours, or they are left over night in a weaker brine. Some people also use the dry-salting method. The fish are then washed and strung on round wooden sticks, three-fourths of an inch thick and 3 feet long. This stick is stuck through the gills and comes out at the mouth. According to the size, from 18 to 21 fish are strung on every stick, always in such a manner as not to touch each other. They are then hung in the open air and dried in the sunshine, if possible, and then put in the oven for smoking. The smoking process may take from three to six hours, according to the drying which the fish have undergone in the air. After the fish have been smoked they are generally allowed

to hang one night to cool off, and are in the morning packed in boxes holding 80 fish each."

In establishing a small smoke-house it will be sufficient to build about 8 yards of the west end with two ovens and make the house a little broader. The western chimney will then come to stand above the oven. The floor of the smoke-house should be solid, and it is best to have it made of concrete. First a bed of common stones about as large as a hand is made and well rammed down; and on the top of this, mortar (one part Portland cement and two parts gravel) is spread.

We give in conclusion a description of a haddock smoke-house in Grimsby, England, where the cold-smoking method is employed. The chimneys go through the entire building, and have only one door below and a window at the top. These chimneys are deeper than they are broad. They should not be too broad for a man to span them with his legs. Along the sides are ledges which the man who hangs the fish uses as steps, and upon which he places the poles on which the fish are hung. The fire is made on the bare floor; and for fuel oak shavings or shavings of other wood are used. The fish will keep according to the degree to which they have been smoked. In Yarmouth, England, herring are smoked and exported to India. For smoking, the haddock are opened in the same manner as in Denmark we open the salmon, and are packed in boxes. An English smoked haddock or herring is best fried or broiled. A large quantity of these fish also is exported to Hamburg.

Regarding the manner in which the haddock are prepared for smoking, a competent Norwegian authority says:

First, the head is cut off, the entrails are taken out, and the fish is well washed in tepid water. The abdominal cavity is well cleansed from all blood with a stiff brush, and after this has been done the fish is split, the backbone being left entire. After it has again been washed it is placed in the brine-box, which has a double bottom, the upper bottom being perforated, so that slime, &c., can gather. The haddock are left in the strong brine for ten or fifteen minutes. They are then hung for smoking on poles with hooks, which are arranged over a large fire which is lighted on the floor. For fuel oak and pine shavings are used (some writers state that peat also is used, but this is certain to impart a disagreeable flavor to the fish). During smoking the temperature is from 20 to 22° Celsius. The smoking process is completed in the course of one night. In cold weather the fish will keep eight days. Well-smoked haddock should be tender, and the inside should have a light, yellow-brown color. In cold-smoking the fish should not hang lower than 8 or 9 feet over the fireplace. In America halibut are smoked 8 feet over the fire. The temperature of the smoke should be about 20° Celsius.

Finally, we must mention a very simple and exceedingly practical method of smoking, which, though not to be recommended where smok-

ing is to be carried on as an industry, may often prove useful in everyday life. A fire is kindled somewhere in a field (the fuel should be green branches, heather, or juniper bushes), and the smoke is led through a trough or channel of boards to a barrel placed upside down from which the top has been removed. At the lower end an opening is cut to admit the boards, and the opening at the top is covered with mats or a sack, which allows some of the smoke to pass through. Sticks of wood are placed crosswise inside the barrel, and the fish are hung on these. For cold-smoking the channel is made 7 yards long, and for warm-smoking much shorter. In the latter process, in fact, the fire may even be made under the barrel.

139.—THE SAINT JOHN'S RIVER AS A SHAD STREAM.

By H. H. CARY, M. D.

I have just returned from Florida, and have been continuing my researches on the Saint John's River in investigating the habits of the shad in that stream. From the best information I can gather, it was not known that shad passed up the Saint John's at all until after the war, and I may say very few were captured until within the last few years. As there are no shoals in this river it has very much puzzled fish-culturists to ascertain where they cast their spawn. The Upper Saint John's has quite a number of broad, shallow lakes, beginning with Monroe and ending with Washington. These lakes have large areas of bottom consisting of clean sands. I am satisfied the shad casts her spawn upon these sands. It is somewhat difficult to gather up information in regard to the Upper Saint John's, as sometimes not an inhabitant can be found for 50 miles. The shad commence running in the Saint John's in December. Better appliances are now being used at Jacksonville for their capture than heretofore, and hence the catch is comparatively large. I was in Jacksonville on the 14th instant, and found a large supply of shad in the market, captured opposite the city. Upon investigation I found about an equal number of males and females, many of the females not quite, but very nearly, ripe. The river at this point is wide, so that the small nets used can capture but a limited number of the whole school that passes. And still at this point careful inquiry among the fishermen shows that from 2,000 to 2,500 are captured a day. Grown shad were selling in the Jacksonville market at 25 cents apiece. Now, if proper appliances were had in the Saint John's for capturing and artificially hatching, this river might easily produce an almost unlimited number of shad, as there is never any interference from ice; and as the watershed of the Saint John's is a sandy surface almost destitute of argillaceous matter, the water never becomes turbid, and there are comparatively no freshets.

DEPARTMENT OF AGRICULTURE,

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