

VII.—AN ACCOUNT OF THE FISHERIES OF NORWAY IN 1877.

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A.—INTRODUCTION.

The fisheries of Norway are of considerable importance, whether studied in a general point of view or in the more limited sense of a source of prosperity to Norway alone. The methods employed, which approach nearer perfection every day, equally deserve our attention. They have, then, a triple interest—commercial, economical, and technical—which we trust will justify the publication of the present notices. Derived from the most competent sources, and resting upon very accurate official statistics, they will furnish to persons interested in the subject information which can be relied upon as perfectly exact and authentic.

B.—THE COD-FISHERY.

The different species of *Gadus*, or those constituting the family of the codfishes, give rise in Norway to fisheries of varying importance, but under the heading of the codfishery is generally understood the pursuit and capture of the true *Gadus morrhua* (skrei, cabillaud).

The inhabitants of Northern Scandinavia, from the most distant period, have applied themselves to this fishery; and at all times where it has been carried on, it has furnished the principal means of subsistence, and is to-day almost the only source of their income. This is all the more true as the cod-fishery is carried on to the greatest extent in the northern part of the country, where agriculture is little developed, and where the population from time immemorial has been accustomed to consider fishing its dominant occupation; in the north, in fact, agriculture is extremely unremunerative, and even in the south it furnishes but a secondary revenue. Fishing, too, is carried on in a season when the snow covers everything, when agriculture is necessarily at a standstill.

Fishing for cod has, then, a good claim to be considered the principal means of subsistence of the inhabitants; never in the memory of man has it failed for a single year upon the coast of Norway, though this has unfortunately been the case quite frequently with the spring herring. It has, of course, like everything in this world, undergone variations; in certain years, during certain periods, it has been less productive than ordinarily. This was the case in Söndmøre from 1714 to 1717, and in 1735, 1760, and 1775. At the latter date fishing failed almost entirely in the Loffoden Islands. In Finmark (Norwegian Lapland), too,

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in 1627, 1628, and 1629, the suffering was extreme, the cod having failed completely. There are also periodical variations in the richness of the yield. During a stormy winter tempests have succeeded in injuring the fisheries more or less, and at certain points the fishermen will tell you of periodical migrations of the cod from one bay or ledge to another, but tradition has never told us that the cod has at any period whatever ceased to visit the coasts of Norway; on the contrary, one may consider as assured the great fisheries of the Loffoden Islands and Söndmöre; this is more than can be said of the spring herring.

The cod is found all along the coast, but the best places for its capture are found in certain special regions. These, as before remarked, are principally the Loffoden Islands and Söndmöre, but the cod occur in other places in such quantity that they ought to be mentioned also. We may therefore mention the entire coast of East and West Finmark, where sometimes the fishing is as abundant as in the Loffoden Islands, especially when their favorite food, the capelan, (*Malotus arcticus*) occurs in abundance along the coast; several points off the coast of Helgeland, and the two prefectures of Drontheim, from Brönö to the mouth of the Gulf of Drontheim, on which points, however, the fishing is of less importance, a large part of the population preferring the Loffoden Islands; and finally the coast of Nordmöre and Romsdal. Formerly, the cod was sought more to the south, even beyond the coast of Jaederen, and especially toward Skudesuaes, as far as Bergen, but the product of this fishery has diminished gradually since 1796, and it may be said to have entirely ceased since the return of the spring herring; it appears, however, to have increased again since 1869, the epoch when the spring herring again diminished.

At the Loffoden Islands fishing is not generally in operation until the beginning of February.

The cod, having passed the extremity of the group of the Loffoden Islands, press in innumerable legions between Moskenaes and Vaerö, or between Vaerö and Röst, to get into the Vestfjord. They follow this fjord until they meet the coast of Eastern Loffoden, and there fishing is most profitable. Fishing, however, is prosecuted also at the same time more to the west among these islands, where the fish shows itself before reaching the coast, that is, Eastern Loffoden. After this, fishing continues between Moskenaes and the most retired point of Eastern Loffoden until the 14th of April, the period when all the fish should be hung up for drying, and when the engagements of the hired fishermen generally expire. In general, after this date the fishermen return home, but in Western Loffoden even up to the end of the month, they carry on a subsidiary fishery during the retreat of the fish. The product is, however, very meager.

As soon as the Loffoden fisheries close, and, for several years back, before they have entirely ceased, a great part of the fishermen betake themselves to Western Finmark, where at this time the fishing generally commences. In the fisheries of Finmark we must distinguish

between the "*godtfiskeri*," which takes place early in the spawning season, and the "*loddefiskeri*," or capelan fishing, which occurs later. Although in Finmark also the cod seek the coast every year, especially after spawning time, the fisheries are very uncertain, and have often in late years caused losses to buyers and to the fishermen who have come from a distance.

The extent of the coast of Finland, where the fish come to seek the shores, is so great, and the weather generally so tempestuous, that it is difficult for the fishermen to arrive at the proper time at the most advantageous localities, especially as precisely at this portion of the year the means of communication are very defective. The capelan, too, whose presence is indispensable to success, is very capricious in its proceedings; it appears sometimes at one point, sometimes at another, and sometimes not at all. It follows that the fisheries of Finmark, as far as outsiders are concerned, are generally of a doubtful character, sometimes very lucrative, sometimes quite the opposite, while the home fishermen can always work them to advantage. The principal banks (*fiskevaer*) are Bredvig, Midfjord, Ingö, Gjaesvaer, Hjelmesö, Havösund, Horningsvaag, and Kjeldvig.

The same instinct which drives these incalculable masses of fish toward the coasts of the north to spawn, sends also to the coast of Söndmöre all the right wing of the same army. From the end of January or the beginning of February the cod commence to rush in by three or four openings (Vanelvsgab, Bredsundsdyb, Boddyb, Griphölen); and it is claimed that this movement continues until the 12th of March. Here, as in the Loffoden Islands, fishing closes toward the middle of April. These fisheries have always been very important, and particular attention has been paid to their development in the last half century; the inhabitants of the district all take part in it, and the benefits have not ceased to increase since Aalesund has become a fair and sure market for the products. Even here, howmuchsoever assured the product of the fisheries of Söndmöre may be, there are great irregularities of distribution. As an illustration, the fishery of Borgund, after passing through the different extremes of great richness and extreme poverty, disappeared almost entirely in 1830; and it is only in the last two or three years that it has shown signs of returning animation; in 1877 the fishing there was pre-eminently abundant.

The yield of cod in 1877 was the most abundant of which we have any record. According to official reports it amounted to—

	Cod.
In the Loffoden Islands	29, 500, 000
In other fisheries of the north	4, 500, 000
At Finmark	17, 500, 000
And at Söndmöre, Römsdal, Nordmöre	8, 500, 000
Adding the yield of the various little fisheries along the coast, estimated at	7, 500, 000
We have in all.....	70, 000, 000

The cod, including liver and roe, or just as it is before dressing, may be estimated at 45 centimes (9.72 cents), and the catch of this fish represented in 1877 a value of about 31,500,000 francs* (\$6,300,000) on the fishing-grounds.

The returns from the different localities were as follows :

In 1873, 49,500,000 cod, worth	\$4,240,000
In 1874, 47,500,000 cod, worth	4,060,000
In 1875, 53,000,000 cod, worth	4,300,000
In 1876, 38,000,000 cod, worth	3,600,000

In 1877, 4,567 boats, manned by 21,287 men, took part in the fisheries of the Loffoden Islands. The average gain of each fisherman during the season may be valued at \$120, or about 96 cents a day. The number of boats employed was—

In 1876.....	4,911
In 1875.....	3,905
In 1874.....	3,966
In 1873.....	3,713

The principal cause of the increase of the vessels employed since 1873 is doubtless the disappearance of the great herring of the North, those employed therein now seeking their living in the Loffoden fisheries.

The codfishing of the districts of Nordmøre, Romsdal, and Søndmøre is carried on by about 2,500 boats, and that of Finmark by 4,000 boats. The principal fishing-banks of the Loffoden Isles are Hennigsvaer, Hopen, Svolveaer, Kabelvog, Stamsuud, Balstad, Stene, Ure, Vaerö, and Röst.

1. APPARATUS USED IN THE COD-FISHERY.

The apparatus employed is the same in every country, and is essentially of four kinds: hand-lines, trawl-lines (palanques) or bottom-lines, nets, and seines or bottom-nets; and the fishermen themselves are classed according to the nature of their implements. Very often, however, a boat is provided with both lines and trawls (palanques) or trawls and nets.†

* In reducing francs to dollars, the value of the former has been taken at 20 cents; it really is worth only 19.45 cents, which involves an error of a little more than half of one per cent.—TRANSLATOR.

† According to Mr. Hermann Baars, *Die Fischerei Industrie Norwegens*, Bergen, 1873, the cod-fishery is prosecuted at the Loffoden Islands in three different ways: with hand-lines, with trawls, and with nets.

Hand-lines, as a general thing, are used only by the poorest fishermen, who are without the means to obtain the more expensive trawls and nets. The hand-lines usually yield about fifty fish per day, but sometimes as many as one hundred or one hundred and twenty. For hand-lines, fresh or salted bait is made use of. If these are not to be had, then a portion of the cod or its roe is employed.

A vessel fitted out for trawl-fishing is provided with at least six gangs, or twenty-four lines, each line carrying one hundred and twenty hooks, which are fastened to

a. The hand-line.—The hand-line is the least complicated of all the apparatus. It can be used everywhere as soon as the fish appears and establishes itself on the banks. Herring, when procurable, is used for bait; otherwise, simply roe. The best of all baits, however, is the capelan. In the Söndmöre they fish also with the line, and often without bait, by putting above the hooks a little tin fish, intended to attract the cod, which they catch, when it tries to bite, by raising and lowering the hook.

Fishing with the simple line is gradually disappearing before the improved methods, but it is carried on in the following manner: The boats, manned in the Loffoden Islands by from three to five men, in the Söndmöre by about eight, betake themselves to the open sea, provided that the weather offers no obstacle, and begin by seeking the fish upon the banks at a depth of 30 to 40 fathoms, and at distances of six miles or more, sometimes in the Söndmöre of 20 to 25 miles. The product of this fishing is very variable, the fish not always biting even when on the banks. The fatter it is the less likely it is to bite; and experience has shown that line-fishing is especially productive in years when the fish is thin and toward the end of the season. In the Loffoden Isles the daily catch of a boat with five men is estimated at 250 fish, but it sometimes amounts to 500, which is all that the boat will ordinarily hold. In the Söndmöre, where the boats are manned by eight men, the average daily catch is rated at from 180 to 250 fish, but it sometimes attains to 500.

b. The palancre or trawl-line.—The palancre or trawl-line is an immense line of hemp or cotton, 16 or 20 inches long, and 6 or 8 feet apart. The bait used is the same as for the hand-lines.

According to the number of the crew and the local circumstances, the trawls are set in lengths of 500 to 2,400 hooks, and usually in the afternoon. When the fish swim at some distance above the bottom, the trawls are kept at the proper height by means of glass floats. The trawls are taken up the next morning.

When the fish are sufficiently near the coast to make it possible to reach the trawls quickly, they are sometimes taken up on the same day. The yield of the trawl varies. On the average, however, it may be estimated at 15 or 20 fish to the line of 120 hooks.

The fatter the fish the less it is attracted by the bait; and during the spawning season it scarcely ever takes the hook at all. For this reason the well-to-do fisherman is usually provided with nets as well as trawls.

The vessels fitted out for the use of the gill-nets generally carry sixty or seventy of these, of a length varying from ten to twenty fathoms, and twenty-five to sixty meshes wide, which are from three to three and a half inches between the knots. These nets are held upright in the water by means of floats of hollow glass, the invention of merchant Christopher Faye, of Bergen. Sometimes, however, wood or cork is used. The glass floats are almost exclusively in use in all the Loffoden Islands. From sixteen to twenty nets are generally fastened together and set in the sea in the afternoon in one length, care being taken to avoid their being mixed up with the trawls and hand-lines. When the weather permits the whole of these are taken up the next morning. A yield of four or five hundred cod is considered satisfactory. If it exceeds this to the number of six to eight hundred fish, the fisherman is obliged to allow a portion of the nets to remain undisturbed until afternoon, as the boats will seldom carry the larger number with the nets and equipment (p. 10).—TRANSLATOR.

provement of the simple hand-line. It has for a long time been almost the only engine employed, and now it may safely be said that nearly half of the vessels engaged in cod-fishing are provided with this alone.

In fishing by this method the Loffoden boats are equipped with six men and a cabin-boy; in Söndmöre, as in other cases, with eight men. The complete equipment, without counting that reserved for contingencies, consists of six gangs (of four lines each), or 24 lines in all, each line provided with 120 hooks at a distance of four to six feet apart, and mounted upon cords of hemp or cotton 15 to 20 inches long. The bait employed is the herring when on hand; but this is kept especially for night fishing. They employ also, and above all for day fishing, the roe remaining in the fish after spawning, or else ordinary roe.

A setting consists of from 500 to 2,500 hooks, according to the abundance of the fish; and at certain fixed hours the fishermen proceed to set their trawls at very variable distances, from 7 to 12 miles at the Loffoden Islands, and 18 to 25 in Söndmöre. The trawls are set in the water according to the position of the cod, sometimes all on the bottom, sometimes just under water in a depth of 40 to 60 fathoms. They are hauled up in the morning, a duty which generally falls upon the captain of the vessel, assisted by some one to lift the fish into the boat and detach them from the hooks. The product is variable; and it may be said of this method, as of simple live-fishing, that the fish do not bite always equally. Trawling succeeds best in years when the fish are very fat, as also at the commencement of the season before the fish have had time to become thin, and during the spawning period, when they do not bite at all. At these times fishermen rich enough to possess both trawls and nets employ the latter. When the fish do bite the catch may be very productive, and each gang (bac), containing 480 hooks, may yield as much as 120 fish, which would amount to 720 cod for a vessel of six gangs, but in the event of so large a catch the boat is so heavily laden that during rough weather it is found necessary to clean the cod on the way and throw away the heads and entrails, keeping only the marketable products—the body, liver, and roe. This, however, is an exceptional case; two hundred and eighty to three hundred and fifty cod to a boat (40 to 50 a gang) is considered a good average.

Besides the night settings, day-lines are sometimes used when the fish bite well. These are generally put down just under water, but produce less than in the night, and can only be employed where the banks are sufficiently near the coast.

c. The *gill-net* is an engine of recent introduction, and as its use does not extend back beyond 1685, it took a long time to come into general use, though it is quite indispensable when the cod does not bite.

A boat when complete carries six men and a boy. Each man has generally 10 nets, making 60 nets to a boat. These nets are from 18 to 20 fathoms long, 10 to 13 feet deep (25 to 60 meshes), and the meshes are from 2.80 to 3.20 inches square. Formerly they were maintained verti-

cally in the water by means of floats or buoys of cork, juniper, or willow, but lately, and especially in Loffoden, they use glass balls, invented some thirty years ago, covered with knotted, tarred cord as a protection. These balls or floats are attached to the nets and replace to great advantage the old buoys, which failed to prevent the nets from settling on the bottom. The nets are joined together in lines of sixteen to twenty, forming thus fences or walls of 300 to 400 fathoms in length and 10 to 12 feet in height. The apparatus is dropped in the water in the evening simultaneously by all the fishermen, and, according to the position of the fish, they extend the nets to the bottom or above it. The distance from the coast varies very much; it is sometimes 5 or 6 miles; in Western Loffoden it is 10, and in Söndmöre 20 to 30 miles. It is evident that the nets should not be set at the same place as the trawls. Every morning, when the weather permits, the nets are raised; and if everything is favorable 600 cod to a boat may be gathered in, though they will not take the hook, and the trawl cannot be used. This is all that a boat can carry without too much labor when the weather is stormy. If the catch be still more prolific, the raising of some of the nets is deferred for a time. A haul of 350 cod per boat in a night is considered satisfactory and a good average.

d. Seines or bottom-nets.—These engines have been introduced in later years with success in the fisheries of the Loffoden Islands. The seines are formed by nets joined together by an ingenious system of cordage, fastened at the bottom by anchors, and at the surface by boats. At a given signal, and by the assistance of a tackle and cords, the lower edge of the seine may be raised, thus encircling the part of the surface comprised between the boats, and imprisoning all the cod contained therein. For one seine 30 to 40 men and 6 to 8 boats are generally required.

2. THE DAILY FISHING.

In the heart of winter, in the dark and stormy days of January, early or late, according to the length of the route to be traversed, the fishermen set out in their covered boats, so as to be at their destination as soon as the season commences. To the more southern fisheries from Söndmöre to the prefecture of North Drontheim, the course is never very long—at the most 45 to 55 miles—the fishermen coming from the bays of Northern Söndmöre. But it is quite different as regards the Loffoden fisheries, where the route for most of the fishermen is at least 250 to 350 miles, whether at open sea or through the gulfs, where the sea is often very rough; and at the last part of the voyage, the passage of the Vestfjord, the navigation is far from being good. These thousands of vessels, however, many having a crew of but two or three men apiece, generally arrive in safety at their destination.

Upon arrival the fishermen, both those working on their own account and such as are hired, proceed to the cabins rented to them by the proprietor of the soil, and there install themselves for the winter. These

cabins are relatively quite comfortable, and the food, fresh fish and liver, with coffee, is comparatively good. Several crews are often established in the same cabin. The air is not always very pure, but fishermen are not hard to please.

The trawls as well as the nets are thrown over board in the afternoon; all the apparatus at one fishery being set simultaneously to prevent it from becoming tangled, though sometimes this is unavoidable, owing to the tempests and tides.

The next day, at dawn, if the bad weather does not make it impossible, all go back again, at a given signal, to raise the apparatus. The trawl-fishermen take the fish off the hooks at once, but those having nets wait to empty and clean them until they have regained the land, except in Söndmöre, where the nets are immediately dropped again in the water. The fish are never killed on the spot, but as soon as the engines are taken from the water the fishermen return to the land and the fish are dressed, the catcher reserving for his own use the liver and roe. The cod is sold to the boats of speculators, of which there are always several in each fishery, and which transform it into *klipfisch*, or salt fish (*morue plate*), or else the fishermen cure them on their own account, to make *stockfish* or dried fish (*morue en bâton*). The entrails are thrown away, and the heads are sold to fish-guano manufacturers, or reserved as food for the domestic animals. The tongues and bladders are sometimes taken out and salted for sale. The fish cleaned and hung up, the fishermen arrange their implements for a new cast, proceed to the proper point and throw over the trawls and nets. Their day's work is then finished.

The hand-line fisherman remains on the water all day; in the evening he dresses his fish and sells it, generally fresh, to the salters.

This work is, unfortunately, too frequently interrupted; sometimes the storm hinders the fisherman from putting his implements in the water, and his time is then lost; and sometimes during several days it may prevent him from raising them, and expose him to the danger of losing at the same time his apparatus and catch of fish. The misfortunes, however, sometimes become frightful, and hundreds of lives become destroyed when one of those sudden storms comes up which seem to be the lot of such regions. Those who get off with the loss of their machinery esteem themselves happy if, after having been tossed about on the deep and undergoing incredible fatigue, they arrive finally on land alive, but famished and paralyzed with cold. It is not rare that in such a storm boats have been thrown from one coast to the other of the Vestfjord. Cases are mentioned where inhabitants of Söndmöre have been driven in this way to Scotland. The annals of the country speak of many winters when a multitude of fishermen have lost their lives. To mention one year only out of each of the last three centuries: in 1634, the year when the island of Nordstrand, in Slesvig, disappeared, and when the church of Röst was blown over by the tempest; in 1743, when Sönd-

möre lost in a single day 174 fishermen; but, above all, the 11th of March, 1821—fatal Monday—when hundreds of lives were lost simultaneously all along the coast of Norway. The parish of Haram lost on this day nearly 300 men. In April, 1875, a similar catastrophe took place in Finmark, 100 boats perishing in one day, with 200 to 300 fishermen, who, having set out in the morning under fair auspices, were soon after assailed by a northeast storm and a terrible fall of snow.

In Söndmöre and Ramsdal fishing is carried on a little differently. The peasants are nearly all fishermen, but, besides this, the merchants of the city and country fit out one or more vessels. All require workmen to aid them, and it is necessary to seek them in the most distant fjords and valleys, where the peasant does not live ordinarily by fishing. Lately the number of vessels equipped has increased so much that it has become impossible to find the necessary hands.

The Söndmöre fisherman sets out toward two o'clock in the morning. The vessels, manned by seven or eight men, are provided with nets, trawls, or hand-lines. The latter are employed, as before stated, often without bait, but provided with a tin fish.

The trawl and net are used here as in the Loffoden Isles, always with this difference, however, that the route being much longer, the apparatus is immediately returned to the water. If the weather is fine enough the fishermen remain till it is time to draw up the second cast, for the boats are large enough to carry the product of two successive hauls. A catch of 350 to 450 cod is considered good. The fish, turned over to the women on reaching land, are generally prepared into *klippsich* or salt fish.

The product of this fishery has never been as abundant as in the Loffoden Islands, and they consider the catch good when the winter campaign reaches 5,000 to 6,000 cod to a vessel. This fish is generally large, weighing about 1,100 grams (36.6 ounces). Manufactured, as it is, into dried fish, it brings in recent years a very high price; as, furthermore, the Söndmöre fisherman can devote himself to this fishery without leaving his home, cod-fishing in Söndmöre is generally considered a very lucrative occupation.

3. QUALITY OF THE COD.

We have seen that the largest and fattest cod do not bite at the hook, and must be sought after with gill-nets. It follows that the latter implement furnishes a very superior article of merchandise. It requires sometimes but 210 cod caught in a net against 360 taken with the hook to furnish a hectoliter (about 26½ gallons) of liver, and 1½ to 2 hectoliters of liver taken from the former against 2¼ to 2½ of the latter, to furnish a hectoliter of oil. In unproductive years, and toward the end of the season, 500 to 600 cod are sometimes required for a hectoliter of liver; the livers taken at this time are relatively still less rich in oil.

When a fish has passed more than three days in a net it can no longer be made into *klippsich*; up to five days the livers may still be

used, and in case of necessity the fish may be converted into stockfish; after five days, however, the fish are good for nothing, and they are obliged to throw them in the sea. In the Døggerbauk fisheries, and those of Iceland and Newfoundland, where they do not use nets, and where the fish is caught alive, they kill it immediately and thus obtain a finer and whiter article. With us in Norway the fish is never killed at the moment when it is drawn from the water, and the blood accumulating in the entrails is always detrimental to its appearance. When the fisherman has reached land with his fish, he prepares it; that is, he does not sell it just as caught, which is done sometimes. The liver, roe, and head are taken from it; the liver is put aside, but the roe is salted immediately; the heads (as stated) are thrown to one side, and the entrails as well. The cod is then made either into salt fish (*klipfisch*), or perhaps stockfish (*stockfisch*). Its manufacture into *klipfisch* was introduced into Christiansund by Englishmen toward the end of the eighteenth century.

4. PREPARATION OF THE COD.

*a. Salted fish** (*klipfisch*) or *flat cod*.—The cod is delivered to the buyers, who have to split and dry it. In Lofföden these buyers are generally coasters, sometimes speculating for merchants, or, what is rarer, trading on their own account. In Nördmøre, Romsdal, and Søndmøre, where all the fish are converted into *klipfisch*, the fishermen sometimes deliver the fish fresh to the neighboring cities, as Aalesund and Christiansund, so advantageously situated for this purpose, or to the country merchants, but often the fisherman prepares them himself. The amount of salt employed is generally $4\frac{1}{2}$ hectoliters ($12\frac{3}{4}$ bushels) to a thousand cod. The best salt is that of Liverpool, used generally in the fisheries of Scotland, Iceland, Newfoundland, and Labrador. Cadiz salt is good, too, and is generally employed in Norway. The gray salt of Western France (Croisic Vannes, St. Martin, de Ré) preserves the fish very well without salting them too much, but requires careful washings to give to the fish a fine appearance. With us the salting is done principally in the holds of the vessels, often in the store-houses, and sometimes on the shore, so that the fish may become soaked in the brine; in the latter event it becomes salted more effectually, but it is necessary in this case to press more strongly at the time of drying. As soon as the weather permits, the cod is washed; that is, all the superfluous brine is removed, and the fish stretched upon the rocks, where the fresh land-breeze and the sun dry them. Much care is required to produce a good article, and when snow or rain falls they must be gathered together as quickly as possible in heaps. In this way the outside fishes only suffer. When the weather becomes clear they again stretch the fish upon the rocks, and if the sun darts upon them they must be turned over and over continually, that they may not burn. The fish deteriorates when the sun's

* This is what is known in Massachusetts as Kench-cured fish.—TRANSLATOR.

rays are too strong, or when exposed for too long a time. Finally, after weeks of work, of watching, and of patience the cod is dried and becomes "dried fish" (*klippfisch*). Generally two pounds of dressed fish are necessary to make one pound of *klippfisch*. Thin fish also lose more than fat. The *klippfisch* obtained weighs on an average from $1\frac{1}{2}$ pounds to $2\frac{1}{4}$.

b. Rundfisch or *stockfish* (*morue en bâton*).—This is generally prepared by fishermen on their own account; speculators, however, are beginning to take an increasing interest in it. This preparation is scarcely made except in the Loffoden Islands and in Finmark. The fish not salable for *klippfisch* are usually employed for this purpose. The preparation of each species depends very much on the price at foreign places, or rather at Bergen, of which the fishermen are regularly informed.

As soon as the head and entrails are removed, the cod are tied together by the tail, two by two, and placed thus a-horseback, so to say, on a bar resting at each end on supports. The work is then done, for the wind and sun attend to the rest.

The fishermen go away leaving the fisheries and their establishments, after having generally engaged a man, at a cost of 60 cents a crew per day, to watch the fish and to replace upon the dryers those knocked off by the wind or by birds of prey. The fish is thus left to itself until the 12th of June, before which no one can take away his *rundfisch*. It is very rarely that the owners of the fish have to complain, and police ordinances have assisted in increasing the security. It is rare, too, in the Loffoden Islands that the fish spoils, because generally in the spring north winds and dry weather prevail there. In Finmark, on the contrary, it happens frequently that the weather is moist, and the article is rarely so good as that coming from the Loffoden Islands. The *rundfisch* is generally reckoned as weighing about 720 grams ($1\frac{1}{2}$ pounds).

C. Morue salée, or salt cod (*Laberdan*).—This article, so much used formerly, has now nearly disappeared before the manufacture of *klippfisch*. It is still prepared in Finmark by the Russians during the very hot weather, when the other methods of preparation are inapplicable. The cod is given to them in exchange for other objects of consumption, principally flour.

5. PREPARATION OF THE OIL.

Formerly the extraction of the oil was performed by the fishermen themselves, and only after the fishing was ended, but now the liver itself constitutes an article of merchandise, being sold by the fishermen to dealers who have the oil extracted.

As the cod is cleaned the liver is placed in water-tight casks, where it passes several months, until it can be boiled. Before proceeding with the boiling, all the oil is drawn off that will come easily, and this, under the name of pale oil (*huile pâle*), is used principally in medicine. The oil procured while the livers are fresh is naturally the purest and best (*huile médicinale naturelle*).

After taking away the natural oil the livers are put to cook, and they extract successively the "brown pale oil" (*huile brune pâle*), and the "brown oil" (*huile brune*). The latter is an inferior product, employed principally by tanners, and is shipped away in oak or fir casks. The residuum is employed as manure, and is much sought after.

The extraction of the medicinal oil is carried on by separate manufacturing factories. They use always fresh livers, carefully washed and dried. They are placed in tin-plate boxes with double walls, with a circulation of steam or warm water between. The oil is then drawn off and filtered, as fast as it is produced, through paper filters, then shipped away in tin cans or oak barrels. The residuum, by further cooking, furnishes common oil (*huile brune ou verte*), which is likewise used in the arts.

6. ROE.

A third product of the cod-fisheries is the roe, which, in the eighteenth century, was used for the first time as bait for sardine-fishing upon the coasts of France and Northern Spain. The roe is prepared, to some extent, by the fishermen themselves, but it is often sold fresh. Part is used at the place of capture as bait for the cod; the rest is salted for exportation. For salting the roe the gray salt from France was formerly used, but they now employ white salt from Cadiz. The salting is done in barrels with holes bored in them to permit the brine to run out, so as to leave the roe always comparatively dry. The best roe is that gathered at the beginning of winter. Later it becomes less and less good, and after the spawning season there remains only the empty ovary. The high price of the roe in France has been the cause of their seeking to replace it by substitutes. Dr. Morvan has succeeded in part by the introduction of the African locust preserved in salt, as bait. But as these locusts are only procurable when there has been a grand invasion of them into Algeria, this product was not one that could be relied upon, and, besides, its price was not much lower than that of the Norwegian roe. The same Dr. Morvan and his associate, Mr. Delasalle, an old sea officer, had more success with the roe called *Donárnenez*; they manufactured it with the remains of meat and fish as well as cakes of an American ground-nut (*Arachide*) thoroughly mixed together. The product was compounded with the Norwegian roe in the proportion of 3 to 1, which caused a sensible saving, the price of the new mixture being 30 to 35 francs against 60. The success, however, of this preparation, has, it is said, been but temporary, and the diminution in value of the Norwegian roes in 1877, due to the abundance of the article, seems to have diminished its use.

7. OTHER SPECIES OF THE GENUS GADUS.

It is proper to add here some details upon other fisheries which form an important element of the work on our coasts, and which contribute toward maintaining the markets of the interior and exterior. Hitherto

we have only spoken of the great annual fishery of the *skrei*, or true cod, which takes place nearly simultaneously upon all points of the coast during the first months of the year. This is the sea-cod, properly called, that is, the adult fish, which at certain periods seeks the coast to spawn there.

But outside of this fishery there is maintained, through the entire year, in the Loffoden Islands, and one may say the whole coast from Eastern Finmark to Söndmöre, a considerable fishery of the other species of the genus *Gadus*, which, though far behind that of the *skrei*, occupies a number of hands and is a notable source of revenue for some localities.

Let us consider first the summer-cod fisheries. The shore-cod (*Gadus morrhua*), like the herring, presents, in different periods and localities, different forms. It is impossible to define exactly these forms, but they are simply varieties of the cod which has not yet attained its maturity, or sometimes modifications connected with the nature of the bottom where the fish live. Fishermen, as well as merchants, embrace them under the general denomination of "cod" (*torsk*), or little cod; it is only in the classification of the merchandise for sale in bulk that different names are given, which we will indicate further on. The pursuit of this fish takes place in various localities during the whole summer, principally with the simple hand-line, but also with the bottom-line. The population, in many places, passes nearly the whole day on the sea when the weather permits it, and catches, according to the season, all the varieties of fish which approach the coast, above all cod, which is treated in different ways.

In the districts of Senjen, Salten, and Helgeland all the summer cod are hung up with the other cod, though sometimes they are split to the tail before being suspended; in this case they take the name of *rotscheer* (*rodskjaer*), or they are left round, when they are known as "*tittlings*." It is not the cod only which is sold under these denominations; all the summer fish receive the same names; so we have cod, cusk, or haddock made into *rodskjaer* or *tittling*.

In Namdal, and further to the south, besides the desiccation of the fish upon rods or horizontal bars, recourse is also had to drying upon the rocks. The fish is generally cut open, but sometimes left whole, and the process of drying is left to the sun and wind. It is turned now and then with the hand, or by means of a rake, like hay. This method is evidently very simple, and saves a considerable expense for the bars and scaffolding, but it is little to be recommended, and ought even to be prohibited, for the fish not only wrinkles and becomes twisted, presenting a bad appearance, but it often spoils, either on account of the too ardent rays of the sun, which cook it to a certain extent upon the rocks, or by rainy weather, which hinders thorough drying out. This method, consequently, produces a far less valuable article of merchandise than that of laying out on scaffolding or flakes.

Besides the real cod, many fish belonging to the species of the same family are caught every summer and autumn upon the west coast, though their importance would be much greater if prosecuted in a more rational manner, and the product satisfactorily utilized.

The principal species coming under this head is the green cod, or *gade-sey*, or pollack (*Gadus virens*). When less than a year old the *sey* bears the name of "*mort*," and is caught upon the west coast of Norway, and, above all, between Stavanger and Cape Stat, in innumerable quantities.

The pollack-fishing is carried on in three different ways:

1. By the line. The fish is attracted to the vicinity of the hook by throwing in the water a bait composed of mussels and crabs cut up very fine. While the fish is amusing itself in picking up these bits it perceives the baited hook, and bites at it in preference. This method is especially characteristic of the vicinity of Bergen.

2. By trailing behind a boat one or two lines with baited hooks.

3. But the special and habitual manner of catching the *mort* consists in placing upon the shoal bottom (it is there always that this method is prosecuted) a round-bottomed net in the form of a bag attached by the upper part to a large hoop of 2 to 3 yards in diameter. This net or *glip* being let down by the aid of a pulley, they throw above it bait cut up fine, and raise the bag by the pulley when a swarm of *mort* have been attracted to it. The product of this fishery is very variable, but sometimes twenty-five and more are caught in a single cast. *Mort* is eaten in the country, fresh or salt.

At the age of one, two, and three years, the *sey* or pollack takes the name of *pale*, and furnishes an esteemed article of food. Its liver gives good oil. It is at the age of four years that the fish becomes *sey gris* (*Gråsey*, in Sweden), and takes its full importance in the fisheries. It is met on the whole coast, but in schools less considerable than the true cod. It is a very voracious fish, and consumes an enormous quantity of herring, especially when these are in the form of fry.

The *sey* is caught especially in Eastern Finmark, Nordland, Söndmöre, the fiords of Bergen and Ryfylke; and is taken in every possible fashion. It is very easily caught, sometimes being captured from the shore with hooks. It is also taken by jerking up quickly a baited line. Finally, and above all, it is caught with seines, especially when it is enjoying itself among swarms of herring newly hatched. An ingenious process for catching the pollack with seines was invented in Söndmöre, and is employed in Finmark and Nordland as well. This fish, in fact, always seeks the bottom as soon as it perceives the net. It is on a larger scale the same process as that employed for taking the *mort*, or young pollack. A large, square net is let down to the bottom, and its four corners attached by cords to as many boats. When the *sey* comes above the net, as soon as it perceives it, it makes for the bottom, and

the net is then raised by the crews of the four boats. This method is very profitable, and can be prosecuted on a large scale.

The liver of the *sey* is worth a great deal; in midsummer one hectoliter (26½ gallons) per 200 fish may be obtained.

In Nordland, Finmark, and farther to the south the *sey* is cut open and dried by the same process as the *rotscheer*. The *sey*, when cut open and dried, is called peasant *sey* (*sey de paysan*); that caught and prepared in the south is more sought after than that of Nordland and Finmark. Attempts have been made to prepare the *sey* into *klippfisch*, but with little success, owing to its dark color. Perhaps if the fish were killed as soon as taken, washed thoroughly, and submitted to compression, a better product would be obtained.

In commerce the *sey* bears the name of large *sey*, medium *sey*, and little *sey*. The first two are exported especially to the east, to Sweden, and to Russian Finland, principally by way of Bergen, but also through the cities of Finmarken, of Aalesund, and of Christiansund. The little *sey* purchased in the markets of Nordland is sold again, principally at Levanger, to the dealers of Jemteland (Northern Sweden), and is distributed thence throughout all the north of Sweden; it is also exported by the same cities as the great *sey*.

By the side of the pollack may be placed the ling, conger, or molve (*Gadus molva*). It is sought after only in summer, and between Nordland and Cape Stat, and even more to the south in the exterior islands of Söndfjord toward Bremanger and Kinn. This fishery is carried on for the most part upon the banks or shoals with lines or trawls, baited with herring, *mort*, or little *sey*. The Swedish fishermen also take part in this at a certain distance from the coast.

To this list we must also add the brosmie or cusk (*Gadus brosmius vulgaris*, Cuv.). It is taken in the same manner as the molve or ling. From Bergen to Finmark, like the molve, it is converted into *rotscheer* or tittling, but is less profitable. *Klippfisch* is another product of it. We may finally mention also the haddock (*kyse*, *kolje*, or *Gadus aeglefinus*), the *Gadus pollachius* (*lyr*), and the merlin.

The services of steam and the telegraph have been largely drawn upon in the interest of the cod fisheries. For a long time regular and frequent communication by steamer has existed between the places of the south and the Loffoden Islands, which facilitates greatly the correspondence, the transmissions of money, and the transport of fishermen. The hired fishermen often prefer to take the steamboat, so as to arrive at the day agreed upon. The continuation of the lines of boats to Vadsö has produced the most favorable results for the Finmark fisheries, the fishermen of the Loffoden Islands being in the habit of using these steamers to go to Finmark to finish their season. As to the telegraph, its network embraces all the Loffoden fisheries, and the greater part of those of Finmark, which thus find themselves put into communication with native and foreign telegraphic stations.

8. THE CODFISH TRADE.

Bergen is the principal market for the cod. The arrivals of salt and dried fish take place at two fixed periods, or in two distinct shipments. The first shipment reaches Bergen in the end of May. It comprises fish-oil, roe, autumn *tittlings*, and autumn *rotscheers*. The second shipment, which arrives at the end of July or the beginning of August, brings *klipfisch* (morue plate), *rundfisch* (*stockfisch*), and spring *rotscheers*, and such oil and roe as has not been able to leave by the first convoy.

a. *The klipfisch or salted cod trade.*—The time of shipment of the *klipfisch* (kench-fish) varies according to localities. In Söndmöre it is ready to be shipped from the city of Aalesund in the course of May; vessels take it thence for transportation to Spain and Portugal. Toward the same epoch the fisheries situated at the south of Cape Stat carry their products to Bergen, and those of Romsdal and Nordmore bring theirs to Molde and Christiansund. As to the Loffoden and Finmark *klipfisch*, it is sent to Drontheim, Christiansund, Aalesund, and Bergen, and exporters re-export it to Spain, Portugal, Italy, Cuba, and South America. Christiansund is the principal market of *klipfisch*. For shipment to Europe, they pile up the *klipfisch* in the hold of vessels; for countries beyond the sea it is pressed into wooden boxes, which permits its preservation for several years. Molve (ling), brosmé (cusk), and haddock are prepared the same, whether designed for Spain or Scotland, and weigh as follows: Molve (ling), made into *klipfisch*, about $2\frac{1}{4}$ pounds, sometimes 7 to 11 pounds; brosmé (cusk), made into *klipfisch*, about $2\frac{1}{4}$ pounds; haddock, made into *klipfisch*, about $\frac{3}{4}$ pound.

b. *Tittling.*—Autumn cod, dried and transformed into *rundfisch*, are divided into four classes:

1. Autumn *rundfisch*, weighing about 800 grams (26 ounces).
2. Holland *tittling*, weighing about 320 grams (10 ounces).
3. Bremen *tittling*, weighing about 170 grams ($5\frac{1}{2}$ ounces).
4. Ordinary *tittling*, comprising that which has not been placed in the first three categories.

c. *Rotscheer.*—This is divided into—

1. Holland *zartfisch*, about 900 grams (29 ounces), for Sweden, Denmark, and Holland.
2. *Wackerfisch*, about 530 grams (18 ounces), for Denmark, Holland, and Italy.
3. *Hökerfisch*, of 210 grams ($6\frac{3}{4}$ ounces), for Holland and Germany.
4. Winter *Rotscheer*, which is frequently frozen and shipped to Sweden, Denmark, and Germany.

Molves, or ling, are divided into—

White or diaphanous molves, $2\frac{1}{4}$ to $4\frac{1}{2}$ pounds, for Holland.

Great fine ling, about $4\frac{1}{2}$ pounds. . . } For Holland, Sweden, and Ger-

Small fine ling, of about $2\frac{1}{2}$ pounds } many.

Common molve, for Sweden and Italy.

The *seys*, or pollack, embrace three classes:

Large <i>seys</i> , of about 29 ounces	} For Sweden and Finland, and a little for South Italy.
Medium <i>seys</i> , of about 17 ounces..	
Little <i>seys</i> , of about 10 ounces	

Brosmes, or cusk, are separated into—

White brosmes, weighing about 13 ounces, and common brosmes shipped especially to Holland.

d. *Stockfisch* (*morue en bâton*).—The *stockfisch* is divided as follows:

1. Great lob, weighing about 4½ pounds.	} For Holland, Germany, Belgium, and Italy.
2. <i>Rundfisch</i> , Bremen assortment, 2½ pounds	
3. <i>Rundfisch</i> , Dutch assortment, 20 to 23 ounces	
4. <i>Rundfisch</i> , Italian assortment or mixed, about 29 ounces	} For Italy especially.
5. <i>Rundfisch</i> , not classified	

The *rundfisch*, like the *rotscheer*, bears transportation to the most remote countries; every year some ling or molves are sent as far as China.

Finmark *rundfisch* is for the most part exported from the ports of Tromsø, Hammerfest, Vardö, and Vadsö for the Mediterranean ports.

e. *Oils*.—As remarked before, the oils are classified according to their quality. The barrels are ordinarily oak, but sometimes fir or pine. A barrel of oil contains 116 to 118 liters (about 30 to 31 gallons), and weighs net about 100 kilograms (220 pounds). Before being exported the oil is carefully clarified and verified by the sworn trier. The oils are shipped to all the countries of Europe, principally to Holland, Belgium, and Germany; France also takes several thousands of barrels.

f. *Roe*.—The roe, too, is sorted by a sworn sorter into two grades. To prepare the roe for exportation, the barrels in which it has been kept since first being gathered are emptied and the roe is put in layers in others, taking care to put a little salt between each layer. They let the barrels stand five days before putting the head on, to give the roe time enough to settle and become closely packed. Holes are generally bored in these barrels so as to produce “dry roe.” Some, however, are not pierced, so that the brine may remain in; this last treatment produces pickled roe. The barrel of roe weighs 250 to 275 pounds gross. The net weight does not vary. France consumes seven-eighths of all our roe. Spain takes the remainder.

C.—THE HERRING FISHERY.

1. THE SPRING HERRING.

The herring (*Clupea harengus*) has from time immemorial been of great importance to the population of Scandinavia: The spring herring, so called from the season when captured, has in particular yielded the

most abundant products, and its capture has occupied to the present time the greatest number of hands.

The little we know of the spring-herring fishery in ancient times must be gathered from fragments in the works of different authors, of whom none intended to occupy himself with this particular subject. It may be inferred from these works, however, that this fishery has existed from the remotest periods as one of the principal sources of well-being for the inhabitant of the coasts, without, however, being of general interest to the rest of the population or of importance in a commercial point of view, since they were ignorant at that time of the art of salting the herring, and contented themselves with smoking or drying it in the air. After the art of salting herring became understood, this fishing assumed importance, and this is especially true since the fifteenth century. From 1567 to 1700 it was not kept up, or, at any rate, was extremely limited, but since that time it has continued to develop, except during the years from 1784 to 1808.

Since 1874 the spring herring has again disappeared from our coasts. Its previous disappearances coincided generally with a relative abundance of herring upon the southwest coast of Sweden, which, in its turn, lost the herring as soon as it reappeared in Norway. This year they have commenced to find upon the Swedish coast a herring which appears analogous to the spring herring of Norway, and one is tempted to believe, in view of this fact, that the spring herring in its migrations makes some stoppages upon the coast of Sweden. The savants do not agree about the migrations of this species of herring; some maintain that it remains all the year in the same latitude, but that it keeps more outside and comes to the coast only to spawn; others say that it undertakes long migrations to the Arctic seas. The Norwegian Government has made great efforts to throw light upon this question. Let us hope that our naturalists and naval officers, who, braving every danger, have gone two summers in succession to explore the depths of the Atlantic, will be able by the comparative study of currents and water-temperatures to contribute to a great extent in giving us more precise ideas upon the herring in general, and the spring herring in particular. That portion of the coast comprised between Capes Lindesnaes and Stat is the true home of the spring herring. To the east of Cape Lindesnaes it showed itself but exceptionally in 1760 and 1833. From 1736 to 1756 only were the fisheries at the north of Cape Stat as far as Nördmöre of importance. The most successful fishery is generally in the vicinity of Karmö, and going up the coast as far as the island of Hisken; but from 1808 to 1833 it was also good in the archipelago situated to the southwest of Bergen, with a renewal in 1864. To the south of Jaederen these fish have been caught only occasionally, especially from 1833 to 1837, toward Farsund and Flekkefjord, and in 1839 and 1840 near Egersund. Since 1860 this fishery has been carried on upon a great scale in Söndfjord (Bremanger and Kinn), and in the Nordfjord (Moldö). Söndmöre (Herö) has also

had several profitable years. In the northern fisheries, work begins ordinarily in the latter half of January, at Fröiö (parish of Bremanger); thence it is carried on toward Kinn and Batalden, and ceases generally in the beginning of February, to continue if possible in Nordtjord.

The Karmö fishery formerly began earlier than the preceding; the contrary has taken place toward the end of a more recent period. February was considered the best period.

The fishery is carried on either with nets or with seines. The net fishery is conducted by means of 20 to 25 nets to a boat, with 4 or 5 men. In the north they use 15 to 18 nets per boat. The nets are usually 10 to 12 fathoms in length. The old nets were made with meshes of $1\frac{1}{4}$ inches on the side; but the herring being counted at the time of sale, they have decreased the size of the meshes from 1.12 to 1.20 of an inch. The depth of the net was formerly calculated at 80 meshes, about eight feet deep; but since bottom-nets have come into use they are made with a depth of 12 to 15 feet.

To maintain the nets in a vertical position they at one time used floats of juniper or willow; now cork is employed exclusively. The glass floats, introduced in the cod-fishery at the Lofföden Islands, have not been tried for the herring. The nets are joined by threes and are put in the water in the evening, either near the shore or far out and near the bottom, according to the places where the fish are seen. The nets are raised in the morning, and give a result that is very variable. Sometimes one set of nets will produce as much as 20 hectolitres (50 and more bushels) of fish. A single net has been known to bring up 10 to 12 hectolitres (28 to 33 bushels). One boat has generally several combinations of nets out at the same time; but one of these sets is often more than sufficient to fill the boat.

Besides the night-fishing, one is also prosecuted in the daytime, but especially when the herring is pursued by the whale or *sey pollack*; the more virulent the pursuit, the more productive is the fishing and it is sometimes extremely profitable.

It is considered desirable for net-fishermen to be provided with reserve nets, as they are liable to lose those in use by the currents or by becoming entangled with other nets. The situation is a little ameliorated since the law has introduced more order into the fisheries. The losses are, however, still very serious, and the masses of nets are sometimes so considerable that they form floating islands, and support without sinking the weight of a great number of men. Every year are brought to the authorities hundreds of stray nets that are sold later at public sale for the benefit of the state. The product of the net-fishery is always sold in the south of Bergen to the collecting-boats which come to the spot to serve as middlemen between the fisherman and the salter.

Seine-fishing is carried on in quite a different manner. A complete equipment is composed of three seines, a large one of 100 to 150 fath-

oms long and 15 to 20 fathoms deep; a medium seine, 75 to 100 feet long by 15 deep; and a small seine (*orkastenot*), 35 to 40 fathoms long by $7\frac{1}{2}$ to 10 deep. To each of these seines there belongs, in addition, a boat (that for the large seine should have a capacity of 420 to 560 bushels), several baskets of lesser dimensions, and a quantity of rigging, tarpaulins, kegs, anchors, hand-nets, painted boards, boat-hooks, fishing-glasses (water-telescopes), compasses, &c. Finally, for each series of seines a dormitory-boat is provided for the crew of 25 to 30 men, of which the chief is called "*notbas*." The cost of the equipment of such a set of seines amounts to \$1,700 or \$2,300.

By means of these nets the herring is taken in the following manner: When the herring is observed to reach the coast, or to penetrate into a cove or strait (sometimes it is driven there by the whale or pollack, but more often goes of its own accord), seines are extended around the mass of herring that they intend to capture; during the day the fish are generally followed by a crowd of sea-birds, but in the night they are usually alone. The entrance of the fish is ascertained by the aid of a sounding-lead suspended by a cord, which, being more or less impeded by the resistance of the school, permits an experienced hand to ascertain whether the fish is coming in. As a rule, the result of the catch depends upon the ability of the skipper, not only in recognizing the presence of the fish and in knowing how to gather them in the circle of seines, but in taking them in and detaching them from the nets—operations where the presence of mind and the quick perception of the skipper are constantly put to the proof. He cannot always choose the place to throw his seines, as this depends much on localities and various other circumstances. Frequently it is necessary to make a long sweep with ropes; they then attach boats to the two ends of the seine and frighten the fish, forcing it to remain within by means of boards painted white which are continually raised and lowered in a manner to make them see the reflection of themselves until the two ends of the seine are brought to the shore. After the herring is caught sight of, the result still depends very much on the nature of the bottom, on the force and direction of the currents, which very often disturb the nets, and on storms, which not unfrequently destroy the nets and their contents; it is under such circumstances that the commander has the most occasion to show his talent.

The product of seine-fishing is still less certain than that of the gill-net. Every year seines are heard of which have taken nothing at all, but in return there are some which make magnificent captures. It is not rare to see a single seine take 3,000 to 5,000 bushels, on some occasions 50,000 to 75,000 bushels of herring.

The seine is especially made use of south of Bergen; more northward the weather is usually much rougher, and coves favorable to this kind of fishing are rarer. Seine-fishermen have, however, been known to attain great results, permitting them to cover the deficit left by net-fishing. In Nordfjord, above all, this fishery is prosecuted with success.

The fishermen are classified according to the apparatus they employ. They live and work under very different conditions.

As to net-fishing, the boat, with all its equipment, belongs generally to a crew composed of four or five men. The boats rarely carry hired fishermen; when they do, however, these receive as their share half of the fish caught, or rather they get half their pay in catch and half in wages, the latter amounting to 6 or 7 francs a week. It is the same when a city merchant fits out a vessel, except that the compensation of the commander is higher. In every case the fishermen have with them a dormitory-boat, where as many of the crew as the boat can contain are assembled, not to separate during the continuance of the work. On board of this dormitory-boat are kept their provisions, beds, and changes of clothing.

In general, every man performs in turn the cooking for all the rest. Fifty years ago the fishermen had no dormitory-boats, but had to seek shelter anywhere in the neighborhood of the fisheries. Few found shelter, and the greater part, chilled to the bone, took refuge in boats turned over for the purpose, or passed the night exposed to the rain and tempests on some desert rock. Those considered themselves favored who could sleep under a roof, erect, supported one against the shoulders of the other. At present, even when all this hardship is considerably lightened, the lot of the fishermen is very little to be envied. Whatever the weather, it is necessary morning and evening to go to sea and cast or draw in the nets that the current has often carried away, or which have been disturbed and carried to the bottom by the interference of other fishermen. It is not rare for fishermen to return empty-handed after a profitless work and after having lost all their implements. If, on the contrary, the herring-fishery is successful and the nets are full, the fishermen must return by the aid of the oar to the nearest port where the collecting-boats are anchored, make their discount, and return to the dormitory-boat. It is necessary in the evening to set the nets again; then the fisherman has finished his fatiguing day of work, to continue day after day so long as the fishing lasts, and as soon as the weather permits him to go to sea. The herring caught are, as we have said, delivered to the collecting-boats, which transport them to the salters, but sometimes the fishermen themselves transport them thither. During this transfer, especially if it lasts long, the herring, being heaped up, is in danger of becoming spoiled, but the principal causes of loss occur in the manipulation at the salting-establishments.

As soon as the herring arrive at the salting-establishment, they are given to the dressers and salters. These in the cities are generally women; in the salting-establishments by the shore fisheries, they are more frequently girls who come from the neighboring country, and often, further, to participate in the general activity. They are usually arranged in threes, two to clean the fish and one to salt. The cleaning consists in burying a pointed knife in the throat of the fish, which allows

the drawing out of the gullet and bleeds at the same time the fish. After this operation, the herring is placed in layers in the barrel; two or three layers above the top. A barrel thus filled contains about 480 herrings. After having remained so several days, the herring being by that time saturated with salt, the barrel is filled anew and closed by special workmen (*dixelmænd*), and stored away to be examined anew, and filled again at the moment of exportation. For each bushel of herring is used one-fourth of a bushel of salt from Setubal, Cagliari, or Trapani.

The spring-herring fishery formerly occupied a large number of hands, and produced in February or March an extraordinary movement all along the length of the coast comprised between the city of Stavanger and Cape Stat. Thousands of vessels and sail of all kind continually furrowed the fjords. In every cove innumerable quantities of herring were seen hemmed in by seines (*notebrug*), and in process of being loaded on collecting-boats, which were to conduct them to the salting-establishments. Clouds of sea-birds hovering around, plunged here and there, and mounted in the air, a herring in their beaks, while numberless whales, not far from the coast, chased before them schools of herring. With the herring all this life, all this movement has disappeared. Let us hope that a near reappearance of this fish will soon revive it.

The product of the spring-herring fishery has in some years attained to a magnitude of from 600,000 to 700,000 barrels per year, and about 6,000 boats have been occupied in it. Sweden, Russia, and the German ports of the Baltic Sea are the principal countries consuming it.

It is, as stated, along the coast between Stavanger and Cape Stat that the spring-herring fishery had its seat, principally at the islands of Utsire and Karmö, at Skudesnæs, at the islands of Fæö, Rövar Espevær, at Bömmelfjord, and at Kvalvog, all situated to the south of Bergen. To the north it was at Bremanger, Fröiö, Batalden, Kinn, Tanso, and Bueland.

2. THE GREAT HERRING IN NORDLAND.

The great herring is a peculiar species which from 1851 to 1875 visited the coasts of Nordland and Southern Finmark, but has again disappeared. Old documents relative to Nordland sometimes speak of a large kind of herring used in the kitchen, but only in the last twenty years has public attention been turned to this excellent species, and since then arrangements have been made for taking it on a large scale. Up to 1865 and 1866 the product of this fishery was without importance, but since then and until 1875, several hundreds of thousands of barrels have come to increase the prosperity of Nordland. Since then, as before remarked, the large herring has followed the example of the spring herring, and departed without any one knowing whither. Will it ever return? It is impossible to say.

The pursuit of this species, which used to begin in the beginning of the month of September, was prosecuted with bar-nets or seines, so as to inclose all the herring entering into such a cove or inlet. The great herring contained roe and milt like that of the spring herring.

As sold by the intervention of city dealers it was first examined and stamped by the sworn inspector; the brine was then taken away and the barrel filled up again, several handfuls of salt being added, and the merchandise was then ready for export. The spring herring was similarly treated.

A barrel of spring herring contained thus 500 to 550 fish, 12 to 12 $\frac{3}{4}$ inches in length. A barrel of great herring contained about 450 herrings, 14 inches in length; its net weight was 240 to 255 pounds. The countries consuming them are the same as those receiving the spring herring; that is, Sweden, Russia, and the German ports of the Baltic and North Sea. The districts where the great herring was especially found were Langnæs, Fleinvær, Fuglevær, Aasvær, Skibotvær, all situated in Nordland.

3. THE SUMMER HERRING.

The summer herring, which was formerly still more uncertain in its appearance than the spring herring, has in late years become a regular visitant to our coasts, and the product has attained dimensions quite as considerable as those of the spring herring in the best years.

The fisheries are extended over a very long line, from the heights of Bergen to Southern Finmark. The pursuit commences in July and continues to December.

The size and the quality of the fish improve toward autumn and diminish again toward winter. The implements of capture employed are similar to those used for the spring herring, with some modifications imposed by the differences of weather and place. The supply of fishermen for this work is not nearly as considerable as it was for the spring herring; most frequently the fishermen of the locality prosecute it. It is true they cannot pass their nights at home, but they are so few in number that the neighboring farms can accommodate them. The dormitory-boats thus become superfluous, especially as the fishing takes place principally during the fine season.

The summer herring are caught with the seine or net. To the south the seine is used exclusively; in the Romsdal, but, above all, in the environs of Drontheim, and more to the north, the net is employed. In the Gulf of Namsos and other places they use floating or drift nets, with which, when the nights become dark, they catch quite considerable quantities at the mouth of the Gulf of Namsos and in the Gulf of Fjorden. The reason that toward the south they employ gill-nets less frequently is probably that the intestines of the herring are so filled with undigested food (*aat*) that they cannot be salted before removing this substance, without which the fish would soon burst. It is with this object in view that the herring are left for three consecutive days in the

seine, the contents of the stomach becoming digested in that time; after this they are ready for salting.

Whether performed with the net or seine, nearly the same process is used as for the spring herring; but, owing to the inferior dimensions of the fish, smaller meshes are required.

The summer herring, as to size, is always more varied than the spring herring; it is necessary, too, each time that the seine is raised, to proceed to a minute assortment into four categories: large merchantable herring; small or medium merchantable herring; large Christiania herring; small Christiania herring. The two first kinds are the largest and fattest, with a little head and very large gill; they are used principally for exportation. The latter two varieties, on the contrary, smaller and not so good, are used principally in interior consumption, above all, in the diocese of Christiania; in latter years, however, they have been exported in comparatively great quantities to the Baltic ports.

When our summer herring is fat and large, that is to say, of the first quality, which, by the by, does not take place every year, it is quite an exceptional article of merchandise, which, when well prepared, far surpasses the most desirable foreign sorts, even the Flemish herring, since this latter which contains a good deal of spawn and milt has used up all its substance in their production, while our summer herring has neither spawn nor milt, but is full of fat.

The summer herring as soon as caught is divided into four classes, that is, as already stated, into merchantable herring, K K, of about 10 inches in length; great herring (merchantable), medium herring or small merchantable herring, K, of 9.40 inches; large Christiania herring, M, of 8 inches; and small Christiania herring, C, of 7.20 inches.

The salting is done on shore; the barrels being headed, they put them on board one after the other, when they are shipped to the great ports of exportation. The fatter and more tender the fish, the less closely are the barrels packed. The qualities K K and K are generally worth five or six francs more, and the quality C, five to seven and a half francs less, than the quality M. The greater part of the summer herring is shipped on account of the Norwegian dealers in the Baltic ports, Denmark, Sweden, Hamburg, and Russia. That shipped for foreign ports receives at first the official stamp of a sworn controller (*sildevrager*). Austria takes a certain quantity of M and C, from which the head and entrails are removed.

A barrel of summer herring prepared for exportation contains the following number of fish: of K K, 800 herrings; of K, 1,000 herrings; of M, 1,200 to 1,400 herrings; of C, 1,800 to 2,000 herrings. The net weight of the barrel is rarely more than 220 pounds.

D.—THE BRISLING FISHERY.

The brisling or sprat (*Clupea sprattus*) is not a mere variety of the ordinary herring, but is a distinct species. Though smaller than the

ordinary herring, it much resembles it, and often accompanies it, especially in the summer. The sprat is easily distinguished, however, by its belly, which is sharp or serrated. Like the ordinary summer herring, it seeks the coast in nearly all our fjords, from the frontier of Sweden to Romsdal, from spring to the end of autumn, and it comes usually in large schools. It is most abundant in the deep fjords of the prefectures of Stavanger and South Bergenhus. The spring brisling is distinguished from that of the autumn; the former is poor and not of great value, while the latter is a fine, fat, and good fish, so that many persons prefer it to the summer herring itself. It is taken almost exclusively with very small meshed seines. These seines are very expensive, but need not be so long as those required for the herring fishery. Generally in commencing to fish an ordinary summer-herring seine is placed in the water. This startles the brisling and serves to drive it in, but before the fish is completely inclosed a seine with fine meshes is cast outside of the large one, when the first seine is withdrawn.

In the autumn, when the brisling is pursued by the tunny, of which it is the favorite food, it comes near our coast, and is then easy of capture. With a seine of moderate dimensions several hundred barrels may often be taken. Like the summer herring, it is well to leave it three days in the seine to give it time to digest the mass of food it has swallowed.

The brisling is frequently prepared into anchovies; that is, it is pickled with different kinds of spices. The summer herring cannot be prepared in this way, but it is as applicable to the spring as to the autumn brisling; the latter, however, gives a much better product. The operation is performed in kegs of different sizes, but containing rarely more than 8 or 10 quarts. The anchovy is consumed in this country, but it is also exported to a great extent to Denmark, Hamburg, and England.

E.—THE MACKEREL FISHERY.

The mackerel is found in great quantity upon the whole coast from the Swedish frontier to the eminence of Söndmöre. It is distinguished; according to the period when sought after, into summer and fall mackerel. The summer catch is alone of importance, although furnishing a poorer article. The autumn catch is rarely productive, and then in but few localities, so that few fishermen are occupied by it. The summer fishing commences toward the 20th of May, provided the weather be not too cold.

1. APPARATUS AND METHODS IN USE.

It is not long since this fishery was prosecuted with trailing or trolling lines, but recently drift-nets have come into use. As it is very lucrative, above all since the English have been in the habit of buying the mackerel for shipment to England in ice, all the maritime popula-

tion of the south and west has thrown itself with avidity upon its development, especially as it takes place at a period when the land requires few hands for working. The mackerel is taken by the following methods:

a. Drailing or trolling.—A fast sail-boat, of greater or less size, manned by four to six men, proceeds out to sea, sometimes to the distance of ten or twelve miles from the shore, in a good breeze and under an overcast sky. A long line is used with an oval lead at the end, weighing a couple of pounds, and provided with two hooks fixed at different heights. When the school of mackerel shows itself (it usually keeps at the surface), 6 or 8 lines, or even more, are placed in the water, which drag behind the boat, this going with full sails. The lines are baited with pieces of red cloth or with portions of the lips of the mackerel. The mackerel being very voracious, bites excellently, and the product is often considerable. A boat thus equipped can in one day capture 2,500 to 3,500 mackerel.

b. Fishing with drift gill-nets.—This is the most reasonable and advantageous method, but it requires some capital. The method of procedure is the same as for the herring, but it is necessary to proceed far from the shore, and the size of the meshes must be suitably modified. A mackerel net is 36 fathoms long and 80 meshes deep, with meshes of 1.60 inches; it is made of very fine thread (hemp, flax, or cotton). A complete set consists of 25 to 50, generally, however, 40 nets, forming about 1,300 or 1,400 fathoms by a depth of 10½ feet. This line of nets is maintained in a vertical position by a series of cork-floats on top and a lot of little stones at the bottom, and by the assistance of a boat the line is kept stretched out. The mackerel is easily taken, especially at night and under a cloudy sky. The average catch per boat is from 600 to 700 a night, perhaps 20,000 in a whole season; but there are cases when one boat can take by itself double this quantity. The boats vary in size; at the north of Cape Lindesnaes they are the same as are used for the spring herring and have a crew of three or four men; to the east of the cape the boats are larger, but have only two or three men, and only half as many nets, these being much more likely to be entangled and mixed by the numerous sail which frequent the coasts of the Skager Rack.

It may be safely said that 3,000 boats are employed in this fishery. The vessels leave the coast in the evening, visit the nets during the night, and return in the morning. The best season is from the end of May to the end of June. It may be easily imagined that the product is very considerable, for, from each port and cove in the two dioceses of Christiania and Christiansund mackerel fishermen set out, and they are stimulated still more by the high prices due to the English.

Drift-net fishing is prosecuted especially in the vicinity of Cape Lindesnaes; many boats manned in each of the ports of the country pursue the mackerel without losing a night until the middle of July.

c. Fixed nets, seines, and bar-nets.—The mackerel is caught, too, with fixed nets (*sættegarn*), seines (*rykkenot*), and bar-nets (*kastenot*). The fixed nets are cast either just under the water or at the bottom, but this method is not very productive, the nights being too clear. It is more successful when the mackerel is pursuing schools of newly-batched herrings, because then they approach the coast. The seines and bar seines give place sometimes to a productive fishing when the fall mackerels enter the fjords; 20,000 have been taken in one night.

2. PREPARATION OF THE MACKEREL AND THE TRADE.

Formerly the mackerel was salted and exported in barrels. Its principal market was Eastern Norway, Sweden, and a small portion of England. The roe furnished besides 4,000 to 5,000 barrels a year. More recently they have begun to send to England in suitable vessels almost all the production, which for this purpose is preserved in ice.

F.—THE LOBSTER FISHERY.

The lobster is the largest and most useful of the European crustaceans. It is found on all the coast of Norway, and as far north as the Arctic Circle, in the sea and in the fjords, but above all between Christiansand and Söndmöre.

In winter the lobster remains in deep waters; it returns to the coast in the spring and resorts to rocky bottoms, covered with sea-weed. It has always been the object of an active pursuit, but it would have remained without importance if the exportation and certain sale in England of the living lobster had not stimulated the ardor of our fishermen. It employs a considerable number of hands, and has become very general and lucrative, so much the more as it is accessible to the poorest and most infirm, requiring very simple and cheap implements, and to manage all merely the experience necessary to handle an oar.

The most primitive tool consists of a pair of wooden tongs 3 to 4 yards long, with which the lobster is sought for (preferably in the morning), in quiet, clear weather, the lobster at such times loving to resort to the sea-weed, nourishing itself with the little animals that infest it. This method of capture is only practicable when it comes sufficiently near the shore, and when the weather is tranquil; sometimes, too, the lobster is pinched so strongly that it dies.

Hardly anything is used now for taking the lobster but *tines* or barrels. These are made of slender rods nailed at considerable intervals on small hoops. The intervals are filled with cords of hemp stretched across so as to form a sort of net. At each end is a funnel with a large enough mouth to permit the entrance of the lobster. On top of the barrel is a cover closing by a bolt, and in the middle is hung another bolt or peg to which the bait is attached. Under it is attached a flat stone to make it descend, and to one of the upper bars is a cord permitting the barrel to descend to the bottom at a depth of two to four fathoms.

The lobster, which creeps on the bottom, sees or smells the bait, and seeking to get it goes round the barrel until he finds the funnel; he enters it and finds himself caught. Sometimes in drawing up the barrel a lobster is found lying upon it. The fishermen tend these pots ordinarily in pairs. They use all sorts of fishes for bait, but employ neither mackerel nor herring, experience having shown that the lobster taken with such bait does not live long.

The barrels (or pots) are placed in the water in the morning and evening, and the fishermen can, in the interval, procure proper bait, as cod, pollack, &c. As soon as the lobster is taken from the *tine* his claws are bound with pack-thread; otherwise they would destroy each other. The fisherman then unbinds his prey and places it in a special box, which he keeps submerged at the bottom of the sea, until he can carry to the collecting-boat the product of his catch; left in the water near the surface it would soon die. Each pair of fishermen has ordinarily as many pots as the boat can contain, perhaps 30 to 50, and this is enough to give them plenty to do, the day hardly being long enough to provide the necessary bait. As long as the fishing lasts they wander in their boats from one shore, or fjord, to another, regulating their movements by the chance of meeting the lobster.

Anybody is allowed to take lobsters, except from July 15 to October 15, which constitutes a close time, during which this fishery is prohibited. Nearly all the lobsters are disposed of to the English, who have made contracts with the fishermen, and come to seek the product in small vessels built specially for the purpose.

To the same class as the lobster belongs the crab (*pagure*), which inhabits nearly the same places, and is found in incredible quantity in some of the fiords of our west coast, especially where it is rocky and perpendicular. They are taken, like lobsters, in *tines* (except that these are larger and the bars are closer together); the *tines* are baited in the same manner as for the lobster. The crabs, which are often 10 or 12 inches long, are so abundant that 40 or 50 are sometimes taken in a single *tine*. Unfortunately, the profit on this fishery is very moderate, the crab not being eaten by the maritime population, and its price being very low in the markets of Bergen and Stavanger. Cut up fine it is used as bait for catching the little *sey* or pollack, and sometimes the autumn mackerel.

Lately they have commenced to preserve the crab in hermetically-sealed boxes; specimens of this new product figure at the Paris Exposition, and there is ground for the hope that, thanks to this preparation, the crab will in time find a foreign market.

The prawn is caught also in great abundance, especially in the east. The Svelvig prawn (*Pandolus borealis*), which is distinguished by its red color and is two or three times as large as the ordinary prawn, is caught exclusively at Svelvig, and sold at Drammen, where it is much sought after.

G.—THE WHALE FISHERY.

Eight or nine years ago a bold speculator, Mr. Svend Foyn, of Tönsberg, commenced to capture the whale on the coasts of Finmark by means of a special steamer. The whales are chased with harpoons thrown by cannon expressly constructed for the purpose. This harpoon is charged at the lower part with an explosive ball which bursts as soon as the harpoon has penetrated into the flesh of the animal, and kills it instantly. The result is very lucrative, Mr. Foyn having captured in certain years as much as forty and odd whales.*

Admitting that a Finmark whale furnishes about 2,100 gallons of raw oil, worth 32 cents a gallon, and \$40 to \$60 worth of whalebones, it represents thus a value of \$600 or \$700.

A company for catching the whale has been established, and another is in process of formation.†

H.—THE SEAL FISHERY.

The seals which are the object of this fishery are the Greenland seal (*Phoca grænlandica*) and the hooded or bonnet seal (*Cystophora cristata*). The Norwegian sailors pursue them in the icy sea between Greenland, Spitzbergen, and the island of Jan-Mayen. Formerly, they occurred even upon the coast of Finmark.

The ship-owners engaged in the seal fishery belong principally to the city of Tönsberg. Steamers are now almost exclusively employed. The expeditions set out in March, April, and May, and the annual product has reached about \$300,000. The cost of the seal-fishery equipment has reached about \$300,000. The crew averages 46 men to a vessel, and is comparatively expensive; the crew averages 46 men to a vessel, and their pay is very high; the product is therefore rarely very lucrative. The vessels, sheathed with wood and iron, carry eight or nine canoes that are lowered into the sea when the pursuit is about to begin. The seal is killed with the gun, and after being taken on board is flayed and the fat gathered in the raw condition in large casks.

The city of Troimsö, from April to September, mans several boats to go to the island of Jan-Mayen to hunt adult seals. As to the spring fishery, the seals are attacked when they have just brought forth their young, which causes the loss of a great number of the latter and frightens the females, who take refuge in places inaccessible to vessels. This fishery has been prosecuted in an equally barbarous manner by the sailors of all nations, assuming, indeed, the character of a war of extermination, until Norway took the initiative in international measures for the protection of the animals. Norwegians are prohibited to go in pursuit of the seal before the 3d of April, the period when the young can look out for themselves, in the area extending between 67° and 75° north latitude, and 5° east and 17° west of the meridian of Greenwich.

The capture of the gulf or harbor seal (*Phoca vitulina*), dolphin or por-

* Nearly ninety in 1877.—TRANSLATOR.

† The whales taken are for the most part finbacks.—TRANSLATOR.

poise (*hvidfisk*), and the walrus, gives rise to several different industries, but their importance is secondary.

I.—THE SALMON FISHERY.

The salmon and trout are also sea-fishes, but they are principally caught at the entrance of rivers at the time when they endeavor to ascend to spawn. The salmon fishery has a certain importance; it commences in April, and lasts until September. The salmon is taken for the most part by nets, and is very much sought after on account of its succulent flesh. It is exported almost exclusively to England, fresh, preserved in ice. The salmon smoked is equally esteemed; it is consumed for the most part in Norway, but a certain quantity is exported to Denmark and Germany.

The salmon seemed to be on the decrease several years ago; but in the last two or three years, since fishing during the spawning period has been prohibited, it has apparently increased in numbers. The price has gone up considerably; ten years ago a pound of fresh salmon was rarely worth more than 6 or 7 cents, while now it brings from 12 to 14.

J.—MISCELLANEOUS FISHERIES.

Oysters are found, too, on the coast of Norway. Although attempts in oyster-culture have been made in the neighborhood of Stavanger, the oyster becomes rarer and rarer, and its importance as an object of export is continually decreasing.

The fresh-water fisheries, of which the importance in a general point of view is very secondary, and of which the product is estimated at \$240,000 a year, comprise the different genera of *Coregonus*, pike, perch, bream, eel-pout, &c.

In addition to the principal and secondary fisheries may be noted here different species which occur more or less frequently, and are caught for their flesh or liver. These are, first, the *Hippoglossus*, halibut (*Kveite*); then, in the great family of the sharks, the *Selache maxima*, barking or bone shark (*Brygde*), the *Squalus acanthias*, dog-fish (*Pighai*), and the *Scymnus borealis*, *Somniosus microcephalus*,* or nurse-shark (*Haak-jaerring*).

The census of 1865 gives as employed in the fisheries 78,703 individuals—about 4.6 per cent. of the entire population of Norway.

* Mr. Hermann Baars in, the *Fischeri-industrie Norwegens*, Christiania, 1873, goes into rather more detail than Mr. Friele, in regard to the capture of sharks for their livers. The species which he calls *Scymnus borealis* is better known on our own coast as the Ground, Sleeper, or Gurry shark, *Somniosus microcephalus*, Bloch, and is found in great abundance along the coast of Western Norway, and especially along certain banks of the Polar Sea. These banks lie at a distance of 15 to 20 miles from the land, at a depth of 250 to 300 fathoms. Decked boats are used in their capture, although they seldom exceed fifteen tons burden, with a crew of five or six men.

The mode of capture is by means of a line, about four-tenths of an inch in diameter,

K.—VALUE OF THE PRINCIPAL PRODUCTS OF THE NORWAY FISHERIES.

1. VALUE AT PLACES OF EXPORT.

1876.

19,683,700 kilos. (43,394,685 pounds) dried fish, at \$9 per 100 kilos.*	\$1, 771, 533
33,038,050 kilos. (72,835,685 pounds) <i>klipfisch</i> , at \$11 per 100 kilos	3, 634, 200
91,428 barrels salted cod, at \$5.80 per barrel	530, 282
12,176 barrels large herring	} at \$5.60 per } barrel. } 5, 023, 805
23,607 barrels spring herring.	
861,325 barrels summer herring, brisling, &c. }	

to which a lead of six to nine pounds is attached as a sinker. This line ends in a tinued or galvanized-iron chain, of about three fathoms in length, so that it cannot be injured by the familiar habit of the fish, hereafter to be described.

The hooks are made of strong iron or steel, nearly four-tenths of an inch in diameter. As soon as the boats reach the bank, they are brought to anchor, and the cord let down; before this, however, a perforated box, filled with rancid or putrid seal blubber, is fastened about two fathoms above the hook. This substance escapes through the holes of the box, and is carried along by the water, thus attracting the fish to the hook, which is also baited with seal blubber.

The fisherman holds the line in the hand, as in cod-fishing, and as soon as it is observed that the animal has taken the hook, by a sudden jerk this is forced into the mouth. As soon as captured, the shark rolls himself round and round in the chain, which is not injured by the rough, file-like skin, as would be the case with a line. The animal is then hauled up, sometimes by the use of a windlass. As soon as it appears above the surface, it is killed and held fast until the belly is opened, and the liver removed. The swimming bladder is then filled with air by means of a pipe, so that the carcass will not sink. It is then fastened to the stern of the vessel. Sometimes other sharks follow the carcass of the dead one, and are occasionally caught by means of gaffs.

When the boats leave the banks, a buoy is generally fastened to each carcass, so that it may remain at the surface without sinking. Otherwise it would be eaten by its fellows, who would neglect the baited hooks.

The yield of this fishery is not only dependent upon the wind and weather, which are so inconstant in the Arctic seas, but also upon the variation in the size of the fish and their abundance. Some of the fish furnish a liver weighing only 25 to 30 pounds, while from others livers of 220 to 450 pounds are obtained.

Of late years the carcasses of these sharks have been brought ashore, for the purpose of being manufactured into manure or guano; especially when they are taken inshore near the land, as is the case sometimes in the winter on the coast of Finmark, where they are sometimes taken with trawl lines. These trawls usually carry thirty hooks, six or seven fathoms apart, and are kept immediately above the bottom by means of glass floats.

The annual yield from this fishery amounts to eight to ten thousand barrels of livers, worth one hundred and fifty thousand gulden.

The oil of this animal, obtained by steam heating, is extremely fine, and is used for purposes of illumination. The undissolved portions of the liver are then boiled, and furnish the brown tanner's oil.—TRANSLATOR.

*The equivalent of the kilo. (kilogram) is 2.2046 pounds. The values originally given in francs have been reduced to dollars of five francs each.—TRANSLATOR.

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45,203 barrels cod roe, at \$12.....	\$542, 436
95,345 barrels cod-liver oil, at \$16.....	1, 525, 520
4,989,450 kilos. (10,999,741 pounds) fish guano..	} 400, 000
1,754,800 kilos. (4,068,632 pounds) fresh fish...	
1,270,348 pieces of lobster.....	
Total.....	13, 427, 776

1877.

21,080,000 kilos. (46,472,968 pounds) dried fish, at \$9.20 per 100 kilos	\$1, 939, 360
45,870,000 kilos. (101,135,002 pounds) <i>klipfsch</i> , at \$8.20 per 100 kilos	3, 761, 340
5,100 barrels of large herring.....	} at \$4.70 per bar- rel. }
16,600 barrels spring herring.....	
661,200 barrels summer herring, brisling, &c..	
53,700 barrels cod-roe, at \$6.00.....	408, 120
130,600 barrels liver oil, at \$14.80.....	1, 932, 880
80,000 barrels salted cod, at \$5.40.....	432, 000
Fish and lobster guano, valued at.....	360, 000
Total.....	12, 043, 330

(The official detailed lists of 1877 are not yet published.)

Adding for the production of the small daily fisheries and the consumption in the country itself of about \$5,000,000 a year, the total value of the Norwegian fisheries amounts to, for 1876, \$17,427,776, and for 1877, \$16,043,330—a large amount for a country having hardly two millions of inhabitants.

2. VALUE AT THE FISHERIES.*

Winter and spring fisheries:	
Cod	\$3, 022, 000
Summer fisheries:	
Pollack, ling, molve, &c.....	560, 000
Herring (including brisling or sprats)	2, 188, 000
Mackerel	174, 000
Salmon.....	128, 000
Lobster	100, 000
Total	6, 172, 000

3. STATISTICS OF THE WINTER AND SPRING FISHERIES.

a. Fishermen.

Total number.....	\$62, 757
Those using nets exclusively	19, 790
Those using lines exclusively.....	16, 525
Those using bottom lines or palanques (trawls).....	6, 804

* Five francs considered as a dollar.

Those using hand-lines and both lines and nets.....	\$2, 830
Those using trawl-lines and net-trawls.....	7, 388
Those using hand-lines and trawls.....	9, 300
Those using nets, lines, and trawls.....	110

b. Boats.

Total number.....	15,135
Provided with nets alone.....	3, 501
Provided with lines only.....	5, 052
Bottom lines or palanques (trawls).....	2, 033
Lines and nets.....	557
Trawls and nets.....	1, 253
Lines and trawls.....	2, 719
Nets, lines, and trawls.....	20

c. Quantities of fish.

Total catch.....	fish..	40, 101, 400
Caught with the net.....	fish..	20, 723, 200
Caught with the line.....	fish..	16, 060, 300
Caught with palanques or trawls.....	fish..	3, 317, 900
Quantity of liver taken.....	barrels..	93, 482
Quantity of roe taken.....	barrels..	38, 025
Heads sold.....	pieces..	10, 679, 000

d. Value on the spot of the catch.

Total value.....	\$3, 022, 018
Fish without liver or roe.....	2, 142, 988
Liver.....	516, 408
Roe.....	345, 563
Heads sold.....	13, 470
Cold sold whole.....	3, 538

4. STATISTICS OF THE SUMMER FISHERY.

a. The herring fishery.

Total number of fishermen.....	48, 831	Total product of catch.....	bbls..	617, 859
Fishing with nets.....	23, 015	Caught with the net.....	bbls..	216, 612
Fishing with seines.....	23, 816	Caught with seine.....	bbls..	401, 247
Boats furnished with nets.....	12, 463	Total value.....		\$2, 094, 709
Companies provided with seines.....	1, 862			

b. The mackerel fishery.

Total number fishermen.....	3, 436	Quantity caught.....	fish..	4, 191, 561
Fishing with the net.....	3, 113	Caught with the net.....	fish..	4, 034, 661
Number of boats.....	1, 047	Total value.....		\$174, 000
Boats furnished with nets.....	943			

5. PRODUCTS OF OTHER FISHERIES.

The brisling fishery.....	bbls..	109, 021
The salmon fishery.....	kilos..	411, 570
The lobster fishery.....	pieces..	1, 140, 514

