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FISHERIES.

BY

E. W. H. HOLDSWORTH, F.L.S., F.Z.S.,

AUTHOR OF "DEEP SEA FISHING AND FISHING BOATS;"

AND THE

LAW RELATING TO FISHERIES.

BY

EDMUND ROBERTSON,
BARISTER-AT-LAW.

Montreal:
LOVELL PRINTING AND PUBLISHING COMPANY.
1879.
PREFATORY NOTE.

Some account is here given of the Sea Fisheries which are carried on in the colder waters on both sides of the Atlantic Ocean, the methods of working and the productive character of those around the British Islands being more particularly described. The various conditions under which the Fisheries are worked in the British seas are to be met with also in the waters of British North America, and there is no apparent reason why the same methods should not be used in both. In the belief, therefore, that the people of the Dominion have a special interest in the subject, the following details of the working of the beam-trawl, and other methods in use on the British coasts, are now offered to their notice.

London, January 21, 1879.
UNDER the heading Sea Fisheries, which form the particular subject of the present article, may be included the various operations engaged in for the capture of the different forms of marine life, which, in some manner or other, minister to the wants or convenience of man. The most important of these fisheries—those only, in fact, to which the title strictly belongs, and which have more or less widely occupied attention from probably the earliest times—are carried on chiefly by hook and line or net, with the object of obtaining fish for the purposes of food; and this main division of the general subject will be here considered.

Although little or nothing is known of the methods of fishing on our coasts in very early times, there can be no doubt that in England, as in all maritime countries, fish has always been eagerly sought after as an easily procurable article of food. The abundance of herrings and mackerel, for instance, on the coasts at regular seasons of the year, could not have failed to attract attention; and Swinden, in his History and Antiquities of Great Yarmouth, expresses his belief that the herring fishery began there soon after the year 495. In Scotland also there is evidence that the herring fishery was systematically carried on from a very early date. Precise records of other fisheries do not go back so far as that of the herring; but there is no reason for believing that cod and kindred fishes were not taken by the hook and line very many centuries ago, and, like the herring, were subjected to some ready mode of curing either with salt or by drying in the open air. In comparatively recent times all the fisheries have been largely developed, and some more than that known as beam-trawling, a method of fishing which had probably attracted little notice a hundred years ago, but is now the most regularly productive and important on the English coast.

Many circumstances have combined to encourage the working of sea fisheries as a national industry. The great extent of coast-line surrounding the British Isles provides ready access to the sea to a numerous population who become familiar from their youth with seafaring pursuits; and to such occupations large numbers betake themselves with instinctive aptitude, either as fishermen or sailors. In many cases early associations lead them to devote themselves to such fisheries as are within reach of their native villages; in others, they may become alternately sailors and fishermen, spending for a few months every year on a trading voyage, and returning home in time to take part in theOTTIMING or some other temporary but profitable fishery; whilst in the case of the deep-sea trawling or cod fishery, they learn to become as good sailors as they are fishermen, for they have often to remain at sea in decked vessels for weeks at a time in all kinds of weather—they must keep on their fishing ground, and must trust to their knowledge of seamanship to battle with the furious gales to which they may be at any time exposed when thus far away from shelter. Inducements to become fishermen are not wanting to this coast population. Nowhere are the best kinds of sea fish more abundant than in temperate and moderately high latitudes; and in this respect the British Islands are most advantageously situated, the seas surrounding them being frequented throughout the year by a variety of fishes always in request for the market, besides producing countless shoals of other kinds which only come within reach of the fishermen at particular seasons of the year. And great

as sometimes the supply of fish during the continuance of favourable weather, it is rarely that the demand for it is exceeded at the present day; for all the markets of the country are brought within reach by the facilities provided for rapid transport from the fishing ports by the extensive system of coast and inland railways now in operation. Fishermen, therefore, always find a market for their produce, and although it is to be feared that many of them obtain but a small proportion of the price for which their fish is ultimately sold to the consumer, the majority of them are enabled to live more comfortably than formerly, and to save enough to keep their fishing gear in good working order, and in many cases to pay for improved and larger boats.

There is no doubt that the fisheries fluctuate a good deal from year to year; and it is often the case that they may be good on one part of a coast when they are bad on another. The important herring fishery on the coasts of Scotland is a marked example of this, as must be familiar to all persons who have given any attention to the subject. Thus it not unfrequently happens that when the fishery on one coast is particularly successful, a scarcity occurs on the west coast, or vice versa. Again, in some years the fish are equally abundant or scarce on both costs. These fluctuations are observed in even small districts of a line of coast, and one part of a season may be good and another bad in the same locality. Precisely the same variations occur on all the coasts of the British Islands, and with all kinds of fishes. Undoubtedly, weather is one of the most important elements in the question of success; and generally by the end of a season has a marked effect in the diminished quantity of fish landed. It tells both in reducing the number of fishermen at work, and in driving the fish from their usual haunts. It is only quite recently that attention has been directed to the subject of temperature as affecting the movements of certain fishes towards or from the surface of the sea, and this will be further noticed when we speak of the herring fisheries. Apparently trifling circumstances may in some cases materially affect the catch of fish. Thus the seine fishery for pilchards on the coast of Cornwall has fluctuated exceedingly during the last 50 or 60 years for which returns are in existence; but however abundant these fish may be on the coast, the seine cannot catch them unless the schools come quite close to the land in localities where these nets can be worked. Numerous counts of pilchards have been made in particular years, whilst in others the fishermen have waited week after week without a chance of wetting their nets, although the drift-net fishermen at some little distance from the land have been meeting with fair success. The large apparent element of chance in the success of our fisheries cannot be better expressed than by the general hope of the fishermen for "good luck."

Great changes have taken place in the fishing trade within the last 20 or 30 years, more especially in that for fish sent fresh to the market. Excluding herrings and cod, which to a great extent were consigned to the currier as soon as possible after they were caught, a large proportion of the fish formerly taken on our coasts was disposed of within a short distance of the place where it was landed. A good many trawlers and soles were forwarded by light carts or coaches to the nearest railways as these gradually extended in different directions from London; but the people near the coast were, a generation or two ago, the principal consumers of fish, and the supply was comparatively scanty, for the fishing boats were small, and there was little inducement to fish on a large scale when the

1 This does not include Cods, Puffin, Salmon, Sponges, and Whale Fisheries.
markets within reach were so few. All this has been comparatively changed, and the main agent in the work has been the great extension of railways throughout the length and breath of the land. Next to railways as a means of facilitating the transit of fish to all the markets, the use of ice for packing the fish has become of great importance, so much so in fact that without its employment it would be impossible to carry on the North Sea trawl fishery during summer from the distance at land at which it is generally worked, and where some of the most productive grounds are situated. Its special importance in this fisheries will be further noticed when we speak of the general system of beam-trawling; but we may here mention that without the use of ice a large proportion of the fish now sent long distances by railway would never reach their destination in a condition fit for the table. The idea of using ice in connexion with the fish trade was first put into a practicable shape by Mr. Samuel Hewett. At the present time about 30,000 tons of ice are imported annually from Norway into Hull, which is only one of the large North Sea trawling stations, for the sole purpose of preserving fish, either on board the fishing smacks or during its transit to market. With the exception of herrings, pilchards, and sprats, a large proportion of the fish now caught on the English coast is put into ice almost as soon as taken out of the water. In some cases it is sent away packed on the trawlers; it is brought on shore sometimes after several days, and sold in the wholesale markets; it is then re-packed in ice and forwarded to other markets, where it is purchased by the fishmongers, who have a stock of ice at home ready to receive it; and there it remains, if properly taken care of, till wanted, sufficient only to make an attractive display being laid out at one time for sale.

The extent to which our present supply of sea fish is likely to continue is one of much interest, and the answer to it depends on whether or not our fisheries are carried on in such a manner as to cause more destruction of fish life than can be compensated for by the vast reproductive powers of those fishes which escape the nets and hooks of the fishermen. For more than fifty years past the cry has been heard that our fisheries are being ruined. The general complaint has been of the wasteful destruction of spawn and very young fish by beam-trawling and seine nets; and in 1863 the outcry was so loud that a Royal Commission was appointed, not only to examine this question, but also to inquire into the general condition of all our sea fisheries—the special objects of inquiry being the state of the supply of fish, and the questions whether the methods of fishing in use involved a wasteful destruction of fish or spawn, and whether existing fishery restrictions operated injuriously on the fisheries. On these points the commissioners, after taking evidence all round the British Islands, were enabled to give a very decided opinion. They reported that the supply of fish generally had largely increased, that the methods of fishing involved no waste of young fish that could be prevented without interfering with the general fisheries, that spent spawn was not destroyed by the nets, and that all fishery restrictions should be removed except such as were desirable for protecting and keeping order among the fishermen. The recommendations of the commissioners were embodied in an Act of Parliament known as The Sea Fisheries Act 1865, by which, with one or two small exceptions relating to herring fishing on the west coast of Scotland, previous Fishery Acts were repealed, and fresh regulations were made having reference to the registration of fishing boats, keeping order among driftfishermen and beam-trawlers, and providing a close time for oysters in the English Channel. The main object of the Act was to carry out a convention between the British Islands and France, for the better ordering of the fisheries in the seas adjoining the two countries. The Act came into force in England on the 1st of February 1869, but circumstances have hitherto prevented any date being fixed for carrying out the convention on the part of the French. Great advantage has undoubtedly been gained by British fishermen from the substitution of the present simple fishery regulations for the numerous Acts previously existing, many of which had long been obsolete; but the Royal Commission, which was issued virtually to inquire into the alleged destruction of fish spawn on the ground by beam-trawlers, would probably have existed had the facts then known which have since come to light about the spawning habits of most of our edible fishes. These facts are so important that a short notice of them may be given here.

Fishermen are in the habit of asserting with perfect confidence that fishes of almost every kind they are accustomed to catch have certain grounds which they frequent at particular seasons for the purpose of depositing their own. The herring is known to spawn on the ground—at all events the spawn is found there in irregularly shaped lumps adhering to the bottom. It has therefore been concluded that all kinds of fishes have the same habits in this respect. Yet no one has been able to speak positively of having ever seen any fish spawn taken from the ground and reared on the surface. It is certain that the substances brought on board by the seine nets commonly go by the name of spawn among the inshore fishermen; but that they are not fish spawn is perfectly well known to any one who has given attention to the variety of curious animals inhabiting the sea.

It was stated by Professors Huxley and Allman in 1867, before the select committee of the House of Commons, that Mr. Sars, in his investigations, had shown that fish ova had been found floating at the surface of the sea, and that the ova they had met with were in all cases alive, and some of them in an advanced state of development. Reference was at the same time made to the observations then recently recorded by Norwegian naturalists on the spawning habits of the common cod, leading to the belief that ova in the surface was as common a phenomenon with our sea fishes. These investigations have been systematically carried on during the last ten years, under the direction of the Swedish Government, by Professor O. O. Sars of the university of Christiania, and have resulted in some unexpected discoveries. The sea in the neighbourhood of the Lofotes Islands on the coast of Norway had long been known to be a great place of resort for cod during the spawning season; and in 1864 Professor Sars commenced his work there, and by means of a small surface towing net he obtained plenty of the ova of the common cod (Gadus morhua) floating at the surface; examples in various stages of development were procured, the young fish were successfully hatched out, and the species identified beyond a doubt. Subsequent observations fully confirmed the accuracy of the conclusions previously arrived at that the cod spawn was not deposited on the ground but floated freely at or near the surface. In 1865 the same observations were made on the ova of the haddock (Gadus aeglefinus), and it was satisfactorily proved that they went through all their stages of development while floating at the surface, in precisely the same manner as in the case of the cod. Sars was at first inclined to believe this development of the ova while floating was peculiar to the members of the Gadidae or cod family, in its restricted sense; but in the summer of 1865 he visited the southern coast of Norway during the season for mackerel, and found abundant evidence of the same rule obtaining in that widely distant fish. In the case of the mackerel, the spawning actually
takes place at the surface; but with the cod family we believe the operation has not been so distinctly observed.

The ova, however, are undoubtedly met with at the surface and at a short distance below it. Entirely submerse as these discoveries of Professor Sara are of the popular notions about fish-spawning, it is even more unexpected to find that both he and M. A. W. Malo of Gothenburg have independently ascertained that the ova of that essential ground-fish the plaice (Pleuronectes platessa) follow the same rule of floating at the surface. Other kinds of floating ova were also obtained by Sara, some of which he succeeded in hatching; and he has completely identified the gunnard (Trigla) and the gurnard (Belleone), in addition to those before mentioned. It is evident, then, that the floating of fish ova during the development of the embryo must be taken as the general rule in several large and distinct families of sea fish. Sara has pointed out that the development takes place at the bottom in the case of those fishes especially whose ova are cemented together by a glutinous secretion, or fastened in lumps to foreign bodies, such as Algo, Hydrocles, &c. He mentions as examples of this, among others, the herring (Clupea), the capelin (Boreus), the horse mackerel (Trachurus), the whiting, pollack, hake, and that northern species, the tusk, all belonging to the same family. Again, the cod, haddock, flounder, brill, sole, plaice, dab, and flounders are all closely allied, and there can scarcely be a doubt that the same rule applies to all which Sara and Malm have established in the case of the plaice, one of the most typical of this group of fishes. The gunnard family must also be included in this category; the spawn of the red mullet, we believe, has been observed floating in aquariums; and the dory, from its close affinity to the mackerel, may be expected to follow the same rule. On the other hand, we know that the spawn of the herring is found only with the appearance of the herring and although it by no means follows that the parent fish is there when the ova are excluded; for the full herring is frequently taken in drift nets which are very near the surface, and these nets are often covered with small lumps of spawn. At the same time the specific gravity of herring spawn is greater than water, and it sinks to the bottom sooner or later if nothing intercepts it. There is no evidence of its ever floating at or near the surface as is the case with that of the cod. In fact, the aggregation of the ova into masses of various sizes, and the glutinous substance in which the ova are embedded, by which they are enabled to adhere firmly to anything with which they may come in contact, point to their remaining in a fixed position during the process of development. It might have been anticipated that the other members of the herring family—the pilchard and sprat, for instance—would also have spawned on the ground, but, so far as we are aware, their ova have never been found there. Indeed, nothing is known of the spawning habits of the sprat, although this little fish has the roe well developed in December or January, when it is found in the greatest abundance on our coast, and comes nearest to the shore. The spawning of the pilchard is a matter of some little interest. The late Mr. Jonathan Couch, who probably devoted more time to the study of the habits of this fish than any other ichthyologist, states his belief that the pilchard spawned at the surface, and the ova became mixed with a large quantity of tenacious mucous which spread out like a sheet on the water and kept them floating. If this should be confirmed, it will prove that even in the case of agglutinated masses of ova, development may naturally take place in them far away from the bottom. There appears to be little doubt that the pilchard spawn far out at sea, as they are on chance occasions taken in spawning condition in the mackerel drift-nets early in the year; and when, some months later, the schools of pilchards approach the land the roe shows no signs of development. These circumstances favour the idea that pilchards are surface spawners, as believed by Mr. Couch.

There are several other kinds of edible fish of whose spawning habits we have no definite knowledge, but enough has been discovered of the habits of most of the fish which are valuable for the purposes of food, to show that there need be no anxiety about their spawn being destroyed by any of the methods of fishing in ordinary use. The only apparent exception to this statement is in the case of the herring, whose spawn is alleged to have been destroyed by the beam-trawlers. But if the beam-trawlers wish to avoid tearing their nets in pieces, they must work where the ground is smooth; and in the few precise localities where its been positively ascertained that the herring does spawn, the general character of the bottom is rough. That is the ground specially worked over by the line fishermen for haddock, cod, turbot, and other fishes, which come there in numbers for the sake of feeding on the herring spawn. There is a popular idea that all fish spawn is of a most delicate nature, and quickly loses its vitality if taken out of the water for a short time, or at all knocked about. This is probably true in those cases in which the ova are separated from each other after exclusion, and float freely in the water; but it is not so with the spawn of the herring, or probably of other fish whose ova are embedded in a tenacious mucous. The experiments of Professor Allman and of Dr. M'Bain have shown that herring spawn does not readily lose its vitality under rough treatment, and may even be hatched out after having been exposed to most unnatural conditions. Professor Allman states in his Report to the Board of Fisheries at Edinburgh that some stones covered with spawn were taken from the sea by Dr. M'Bain, and were exposed on the Island of May. Some of this spawn was forwarded to him and came into his possession after being kept in only a small quantity of water for two entire days. He says:—

"With the view of determining whether development would proceed in confinement, I placed some of this spawn in a glass jar with sea-water, exposing it in a wind and looking to the east. The several stages of development were regularly passed through, and on the 16th of March the embryo was fully formed, energetic movements were performed by it in the ovum, and it seemed ready to escape into the surrounding water. On the 18th some of the embryos had actually escaped, and were now about four-tenths of an inch in length. They were of crystalline transparency, and spawn about with great activity, and with the remains of the yolk, reduced now to a very small volume, still adhering to them. The specific characters had, of course, not yet become established, and the little fish affected no further evidence beyond what we already possessed, to enable us to identify it with the young of the herring."

The young fish lived nearly a month in confinement, but the specific characters were not even then sufficiently perfect to identify the fish with certainty. There could be no reasonable doubt, however, that the spawn was that of the herring. After some account of other discoveries of spawn, he thus concludes his report:—

"It was shown by these experiments that the vitality of the spawn was in no way injured by detaching it from the spawning

1 History of British Fishes, vol. iv. p. 81 (1865).
bed, so that if it be returned to the sea before it suffers any prolonged exposure to the air, development will proceed apparently unchecked. Those specimens, indeed, which underwent development in my possession, had not only been removed from the ground, but had been kept for many hours in a scanty supply of water before I received them; and even after they came under my care, they were necessarily placed in conditions very different from those to which they would have been exposed if they had been allowed to remain in their natural habitat, and yet, with all those disadvantages, development proceeded uninterrupted.

Registration of Fishing Vessels.—Under the Sea Fisheries Act, 1869, all vessels and boats engaged in fishing for the purpose of sale must be registered at the customs-house, and must be marked on the bow with letters denoting the port to which they belong, and their registered number. Thus, Grimby is represented by the letters G Y. Peterhead by P D, and Galway by G. The fishing boats are divided into three classes,—the first class including everything of 15 tons and upwards, the second all boats under 15 tons navigated otherwise than by oars only, that is, sometimes by sails and sometimes by oars, and the third class those with which oars only are used. The last class is supposed to include only small boats used for harbour fishing; but as there are very few boats in which a sail of some kind is not sometimes hoisted, the customs have a discretionary power to put very small boats into the third class, notwithstanding their occasional use as a sail. The registers for each port are sent to the registrar-general of shipping, and appear in the annual returns published by the Board of Trade. There is great difficulty, however, in obtaining precise accuracy in the returns for many parts of the coast; new boats sometimes escape registration, and boats which have been lost or broken up sometimes remain on the list. But, imperfect as the returns undoubtedly are, they are of some value in giving an approximate idea of the number of the fishing craft, and of the average size of those in the first class. It must be remembered, however, that this class includes boats ranging from 15 tons to 70 or 80 tons. The tendency now is to fish farther from the land than formerly, and to use decked instead of open boats; the result is that there is a steady increase in the first class boats, and a diminution in the number of the smaller ones. The following table gives the total number of fishing boats in England, Scotland, Ireland, and the Isle of Man on the register for 1876 and 1877, arranged according to their classes:

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<td>195,668</td>
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We will now proceed to give an account of the several valuable fisheries carried on around the coasts of the British Islands, with some details of the appliances in use, and the manner in which they are worked.

ENGLISH FISHERIES.—On the coast of England the methods of fishing in general are more numerous than in the case of either Scotland or Ireland; the fishing grounds are more extensive, and the total supply of fish obtained is larger and more varied in kind. The principal modes of fishing are by the beam-trawl, the drift-net, the seine, the mow-net, and lines. Their relative importance varies to some extent, but trawling and drift-net fishing occupy by far the most conspicuous positions, and lines come next in order.

Trawling.—The most characteristic mode of fishing is that known in England as "trawling," or in Scotland as "beam-trawling," and consists in towing, trailing, or trawling a flattened bag-net, of 100 feet long, over the bottom in such a manner as to catch those fish especially which naturally keep close to or upon the ground. It is very desirable that the name "trawl" should be restricted to this net, presently to be described, as much confusion has been caused by the practice, general in Scotland (which has misled even such writers as Mr. Couch, see Fishes of the British Islands, iv. 105), of applying the name to that very different kind of net which has for centuries past been almost universally known as the "seine," "sames," or "seynes," and may be traced back through the Saxon seines to the Latin seines, a sweep-net. In the United States and Canada, the word "trawl" is still more misapplied, being given to what is in England commonly called the longline or gillnet.

The beam-trawl may be simply described as a triangular, flat, purse-shaped net with the mouth extended by a horizontal wooden beam, which is raised a short distance from the ground by means of two iron frames or heads, one at each end, the upper part of the mouth being fastened to the beam, and the under portion dragging on the ground as the net is towed over the bottom. The beam of course varies in length according to the size of the net, and depends to some extent also on the length and power of the vessel which is to work it. In the large "amas" the three boats have long been called, the beam ranges from 36 to 50 feet in length; and there is rarely anything less than this now used by the deep-sea trawlers. Elm is generally preferred for it, selected if possible from timber grown just of the proper thickness, that the natural strength of the wood may not be lessened by more trimming or clipping than is absolutely necessary. If the required length and thickness cannot be obtained in one piece, two or three pieces are scarfed together, and the joints secured by iron bands. When the trawl is being hoisted in, the first part of the apparatus taken on board is the large heavy beam, and this is very commonly done when the vessel is rolling and pitching about in a sea way. It is therefore necessary for the sake of safety that the beam should be secured as soon as possible, and in such a position as to be out of the way and at the same time conveniently placed for lowering again when required. All this may be easily effected by having the beam of such a length in proportion to the size of the vessel that when hoisted up, one end of it may come over the taffrail, with the iron head just clear of it, and the fore end in front of one of the shrouds. It then lies on the gunwale of the vessel, and the ends are secured by ropes, the foreginging preventing the beam coming on board, but the iron head passing in between the shrouds. The object or use of the beam is to extend the mouth of the net; but, in order to allow room for the fish to enter, the beam, and with it the back of the net which is laced to it, must be raised a certain distance from the ground. For this purpose the beam is fastened at each end to the top of an iron frame, shaped somewhat like an irregularly formed stirrup, which is fitted to it at right angles by a square socket at the top. By these "heads or irons" the beam is supported at a height of nearly 3 feet from the ground, and, contrary to the popular idea on the subject, never touches the bottom. It could only do so if the trawl were to reach the ground with its back undermined, and then the mouth of the net would close and no fish could enter. The lower part of the trawl head or iron is straight and flat, just like the corresponding part of a stirrup. It is called the "shoe," and is the part which slides over the ground as the trawl-beam and following net are towed along. There is a slight variation in the form of the trawl-irons, and one, known as the Barking pattern, from having been adopted at that old trawling station on the Thames, is shaped exactly like a stirrup; but generally the irons are preferred with the flat side straight. We
now have the long beam supported at each end by a more
or less stirrup shaped iron fitted at right angles. The next
thing to be considered is the net. This was previously
spoken of as flattened and purse-shaped. When the net is
spread out in the manner it would be when working, the
upper part or back has its straight front edge fastened to
the beam, but the corresponding lower part or belly is cut
cut away in such a manner that the front margin forms a deep
curve extending from the shoue of one trow-head to the
other, the centre of the curve or "bosom," as it is called,
being at a considerable distance behind the beam. The
usual rule in English trawls is for the distance between
the beam and the bosom to be about the same as the length
of the beam. In French trawls this distance is generally
much less; but in all cases the beam and back of the net
must pass over a considerable space of ground when the
trawl is at work before the fish are disturbed by much of
the lower margin of the net. This lower edge of the mouth
of the trowl is fastened to and protected by the "ground-
rope," which is made of an old hawser "rounded" or
covered with small rope to keep it from chafing, and to
make it heavier. The ends of the ground-rope are fastened
above to the yard of the trowl, while the back of the miller
heads, just above the shoe, and the rope itself rests on
the ground throughout its entire curve. The fish which
may be disturbed by it have no chance of escape at
either the sides or back of the net, and as the outlet under
the beam is a long way past them, and is steadily moving
on, their fate is sooner or later decided by their passing
over the ground-rope and finding their way into the funnel-
arrow away to nothing, as their upper end rests on the
generally smooth ground where the trowl can only be
worked with advantage. If in such a contingency the rope
were so strong and good as not to break, there would be
serious danger of the trow-rope snapping, and then the
whole apparatus might be lost; but the ground-rope giving
way enables the net to be cleared and hauled up with proba-
ably no more damage to it than the broken rope itself,
perhaps a dozen yards netting. The remaining part of
the trowl, extending from the bosom to the extreme end, forms
a complete bag gradually diminishing in breadth to within
about the last 10 feet, which part is called the "cod or
purse," and is closed by a draw-rope or "cod-line" at the
extremity when the net is being used. This is the general
receptacle for the various fishes which enter the net; and
when the trowl is hauled up and got on board the vessel,
the draw-rope is cast off and the fish all fall out on the
deck.

We must now say a few words about the ingenious con-
trivances for preventing the escape of the fish which have
entered the purse and reached the farthest extremity of the
net. It has been mentioned that the body of the net
tapers up to the entrance to the purse. It is here that
point the opening of the pockets are placed; and they are so
arranged that the fish having passed into the purse, and then
seeking to escape by returning along its sides, are pretty
sure to go into the pockets, which extend for a length of
about 15 or 16 feet along the inner side of the body of the
net, and then, the more they try to press forward, the
more tightly they become packed, as the pockets gradually
narrow away to nothing at their upper extremity. These
pockets are not separate parts of the trowl, but are made
by merely lacing together the back and belly of the net,
beginning close to the margin or side nearly on a level with
the bosom, and then carried on with slowly increasing
breadth downwards as far as the entrance to the purse. At
this point the breadth of the net is divided into three nearly
equal spaces, the central one being the opening from the
main body of the net into the purse, or general receptacle
for the fish, which must all pass through it; and those
on each side being the mouths of the pockets facing the
opposite direction. The central passage has a valve or veil
of netting called the "flapper," which only opens when the
fish press against it on their way into the purse. To under-
stand clearly the facilities offered to the fish to enter the
pockets, it is necessary to remember that the trowl, when
at work, is towed along, with just sufficient force to
expand the net by the resistance of the water. But this
resistance directly acts only on the interior of the body of
the net between the pockets and then on the purse; it does
not at first expand the pockets, but tends rather to flatten
them, because they are virtually outside the general cavity
of the trowl, and their openings face the further end of it.
The water, however, which has expanded the body of the
net, then passes through the flapper or valve, and enters
the purse, which, being made with a much smaller mesh
than the rest of the net, offers so much resistance that it
cannot readily escape in that direction; return currents are
consequently formed along the sides, and those currents
open the mouths of the pockets, which, as before mentioned,
are facing them; and the fish, in their endeavours to
escape, and finding these openings, follow the course of
the pockets until they can go no further. The whole of
the net is therefore well expanded, but is kept from the
pressure of the water in one direction through the middle,
and in the opposite direction at the sides or pockets.

The meshes of an ordinary deep-sea trowl vary in size
in different parts of the net, diminishing from 4 inches
square near the mouth to 1½ inches in the cod or purse.
The under part of the net, being exposed to more
water and chafing than the upper, is usually made with
rather stouter twine; and the purse, being especially liable
to injury from being dragged over the ground with a
weight of fish and perhaps stones in it, has some protec-
tion provided by layers of old netting called "rubbing pieces"
flaced to its under surface. The French fishermen
frequently fasten a stout hide to this part of their trowls
with the same object.

A deep-sea trowl, such as has now been described, is
therefore an immense bag-net, the largest being about
50 feet wide at the mouth and about 100 feet long. Many
of these nets are much smaller, some of them not having the
beam more than 36 feet or even less, and the net reduced
in proportion; but there has been a great increase in the
size of the trowl-vessels in recent years, and at the same
time there has been an enlargement of the nets, although
not quite in the same ratio. The trowl is towed over the
ground by the trowl-warp, generally a 6-inch rope 150
fathoms long, and made up of two lengths of 75 fathoms
each spliced together; one end of this warp is shackled to
two other pieces each 15 fathoms long, and called the
"spans or bridles," which lead one to each end of the
net, and are shackled to a twist-bolts in front of the iron
heads so as to give a fair pull on the whole apparatus.
The great development of the trowl fishery in recent
years has led to a vast improvement in the kind of fishing
vessels employed in it. Fifty years ago the only deep-sea
trowlers were in the west of England, and from Barking
on the Thames. They were not nearly the tonnage of
many of the vessels now used in the North Sea, but were
stout, heavy, seagoing craft of their time, capable of
standing almost any description of weather; and, although
comfortable, they were certainly not very fast. At that

FISHERIES
date, however, the fish went into consumption; at once, instead of being sent one or two hundred miles before it reached the consumer. The increased demand for fish of late years has led to the building of trawlers of the best description, as remarkable for their fast sailing as for other improved qualities. There is racing home now from the fishing grounds to catch the first of the market, and everything is done as quickly as possible to ensure quick distribution and delivery all over the country. The cost of the vessels has of course largely increased, not only from their greater size, but also because of the much higher price now paid for everything used in their construction. In 1862 a new trawl vessel, and what was at that time considered one of the larger class, could be built and fitted out ready for sea for £700 or £800; but it costs from £1200 to £1300 to turn out one of the vessels now commonly used in the North Sea fishery. This includes a supply of everything necessary for fishing, costing about £70 or £80. A proper fit-out consists of a double set of almost every part of the gear, so as to provide against accidents, and generally to save the time which would be lost if the trawler were obliged to return to port before he had done a fair quantity of work. A trawl-net will perhaps last from two to four months, according to the nature of the ground worked over and the amount of parts of it will have to be renewed. The back of the net, being exposed to the least wear, lasts the longest; the under part will generally require renewing twice, and the cod or purse five or six times, before the net is finally condemned. The additional size now given to the trawl-vessels has led to an alteration in the manner in which they are rigged. The term "smack" has been for a while applied to those trading and fishing craft which were cut-rigged, and until quite recent years all the trawlers were known as trawl-smacks. It was a convenient rig; the single mast was stepped well forward so as to allow of a large and powerful mainsail, at the same time giving plenty of free space on deck for getting in the net, and stowing it and the long trawl-beam on the top of the bulwark when not at work. But when the size of the vessel was increased to 70 or 80 tons, it was found that the mainsail, enlarged in proportion, wanted a good deal more looking after in bad weather than was convenient, and the heavier main-boom caused a great deal of straining. More hands became necessary on this account than were required for ordinary fishing purposes, and the increased expenses interfered with profitable working. The new trawl-boats were therefore built of greater length, so as to get room for a small second mast or main on which a gaff-sail could be carried, and thus something could be taken off the large mainsail. The result has been a very satisfactory rig: just as much sail is carried as before, but it is not so lofty, and being divided into smaller pieces, it can be handled with greater ease and safety. As a gaff-sail is carried on the mizen, the rig is that of a ketch; had a lug-sail been used instead of a gaff-sail, the vessel would have been what is called "dandy-rigged." The increased length of the vessel in proportion to her size gives many advantages. Space is provided for packing away a considerable quantity of ice, which is a very necessary article in the present mode of working the North Sea trawl fishery; the produce of many fishing days can be properly stowed away and preserved in good condition, and the crew have more roomy and comfortable accommodation.—a point of importance, since at certain seasons they remain at sea for several weeks at a time.

"Barking" the sails is a regular practice with the trawlers, as it is with most other fishermen in England and Scotland. The process consists in mopping them over with a composition of a solution of oak bark, tar, grease, and ocher, which acts as a good preservative of the canvas. This is done once in six or eight weeks, and a suitable place is kept for the purpose at all the important fishing stations.

Working the beam-trawl requires some little skill which can only be acquired by experience at sea. A knowledge of the ground and of the direction and times of the tide is essential; for the trawl is towed on the stream, a little faster than it is running, so that there may be just sufficient resistance from the water to expand the net. If it were towed too fast, the pressure of the water against the long transverse beam would tend to lift it from the ground, and then the fish would not enter the net. This important point is regulated by a nice adjustment of the length of tow-ropes to the force of the wind and state of the sea; and experience enables the fisherman to tell, by pressing the hand firmly on the warp between the vessel and the water, whether or not the trawl is working steadily over the ground. Lowering the trawl to the bottom is also a matter requiring great care, so that it may reach the ground with the beam above the iron heads and the ground-ropes in their proper position below. This can only be managed by first getting the whole apparatus in a proper position at the surface, and then keeping the vessel slowly moving through the water whilst the lowering takes place. If, as sometimes happens in spite of all precautions, the net and beam should twist round while being lowered, and the apparatus should reach the bottom with its back downwards, then the beam would be on the ground and the iron supports would overtake, the mouth of the net would close, and no good could be done with it. The only thing for the fisherman to do under such circumstances is to haul up the trawl and show it again. The popular idea that the beam is always dragging on the ground is therefore a mistaken one. The trawl is shot at the beginning of the tide, so that it may be towed for five or six hours, and during that time it will probably pass over from fifteen to twenty miles of ground. As trawlers when engaged in fishing are practically anchored by their trawls, they cannot readily get out of the way of vessels meeting them, and the law admits this view of the case by obliging them at night to carry a single mast-head light as an anchor light, instead of the regulation red and green side-lights for vessels under sail.

When the trawl has finished, or the smack has reached the end of its fishing ground, the trawl is hauled up by a winch or capstan. This seldom takes less than three-quarters of an hour in fine weather, and two or three hours if it be rough. The beam is got up and the trawl stopped, the net is gathered in, the cod or end of the bag being hoisted in by a tackle, and the cod-ropes closing the end being cast off, the whole catch of fish falls out on deck. The fish are immediately sorted and packed away, and the fishermen prepare for another haul, according to the state of the wind and tide. A

Trawl-fish are separated for market purposes into two great classes, known respectively as "prime" and "offal." Prime includes turbot, brill, sole, dores, and red mullet, the last being caught in large numbers in summer, especially by the British trawlers. Offal is the name given to plaice, haddocks, whiting, and other kinds of inferior fishes which are caught in great abundance, and usually sold at a low price. The term "offal" was applied to these fish at a time when railways had not come into existence, and purchasers frequented could not be found for the quantity of fish the trawlers would bring to market in one day. This was especially the case with plaice and haddocks when the newly discovered fishing grounds in

1 Fuller details of the mode of working the beam-trawl will be found in Deep Sea Fishing and Fishing Boats, London, 1874.
the North Sea were first worked. A good deal of fish was then taken, and thousands of haddocks were thrown overboard again as soon as caught, for the fishermen were under orders not to bring ashore more than were likely to be sold without fresh. Even then, however, the catches were very large, and in the course of a few years the haddock became of little value, until the practice of smoking them, which had long been done in Scotland, was adopted at Hull, Grimsby, and other places; and now not a haddock is thrown away if it is in good condition when landed. It may be mentioned that round-fish, such as haddock and whiting, always suffer more or less in appearance when caught by the trawl, and they are liable to be knocked about by the crowd of fish in the small end of the net, especially when the trawl is being hauled up. They do not therefore fetch a good price in the wholesale market, whilst haddock and whiting caught by the hook are always in demand, and it need hardly be mentioned that the Scotch haddock, so long famous for their excellence, both fresh and cured, are all caught with hook and line.

The trawling stations in the west of England are Plymouth, and Brixham in Torbay, and this method of fishing has been carried on from both places for probably upwards of 100 years, although the date of its commencement has been by no means accurately ascertained.† It is certain, however, for the last century the trawlers were comparatively few, and not half the size of those at work now. Plymouth does not appear to have progressed so steadily as Brixham, and this may be partly accounted for by the more frequent interruptions from bad weather at the western port. The south-west gales so common in winter are felt in all their violence on the fishing ground of Plymouth, and the heavy sea accompanying them sometimes puts a stop to their operations for two or three days at a time. The custom also at Plymouth of only fishing during the day and returning to harbour every evening, must materially diminish the catch had been made if the fishing being very spread and for some few years past the number of trawl vessels has not averaged more than about 60. At Brixham, where trawling is believe to have originated, and which has always been more than a part of the industry, much more enterprise is shown. The trawlers there go to sea on Monday morning and remain at work till the next morning, when they return and land their fish. After so much or so they again go off, and fish day and night till the next morning, and so on every day till Saturday comes, when, having landed their fish, they come to anchor, get their nets down, and spend the rest of the day in mending their nets and putting everything in order for the next week's work. Sunday is a day of rest for all hands.

The history of the Brixham fishery has a very important bearing on the charges that have been brought against the fishermen of destroying spawn and very young fish, and of gradually exhausting the fishing grounds on which they worked. The Brixham men, as a rule, keep to a particular stretch of fishing ground, extending from the Start Point, just eastwards of the entrance to the English Channel, practically about twenty miles long and of variable breadth, but mostly from three to eight miles off the land. There is no record of how long there were at Brixham before the beginning of this century, but it is known that they were few and less than half their present size. In 1832, however, there were 70 of them, 85 in 1834, and in 1872 their number was about 100, besides 20 others which worked on this home ground during the winter; and new vessels are being built every year, not only to make up for losses, but to add to the fleet. This small strip of fishing ground has certainly been worked for more than a hundred years; the fishing smacks have been steadily increasing in number and have more than doubled in size, and yet there is no sign of the ground becoming exhausted. The greater demand for fish has no doubt encouraged the fishermen in their work, for they have obtained better prices for their fish; but if the effects of trawling were the exhaustion of the fishing ground, the Brixham

† Fre未能, in his History of England, vol. xii. p. 397 (cabinet edition, 1870), speaks incidentally of trawlers at Brixham so long ago as the time of the Spanish Armada. In his description of the Brixham of Portland, — practically about twenty miles long and of variable breadth, but mostly from three to eight miles off the land. There is no record of how long there were at Brixham before the beginning of this century, but it is known that they were few and less than half their present size. In 1832, however, there were 70 of them, 85 in 1834, and in 1872 their number was about 100, besides 20 others which worked on this home ground during the winter; and new vessels are being built every year, not only to make up for losses, but to add to the fleet. This small strip of fishing ground has certainly been worked for more than a hundred years; the fishing smacks have been steadily increasing in number and have more than doubled in size, and yet there is no sign of the ground becoming exhausted. The greater demand for fish has no doubt encouraged the fishermen in their work, for they have obtained better prices for their fish; but if the effects of trawling were the exhaustion of the fishing ground, the Brixham

fishery should have come to an end many years ago. It has, however, never been so prosperous as during the last few years. Every one at Brixham is more or less interested in the success of the fishing; the actual copulation of the fishery is generally understood, and the savings of the fishermen and many of the trade-people of the place are invested in it year after year. The trawlers do not work for weekly wages, but on the share principle, and the master is generally owner or part-owner of the vessel. It is consequently the interest of every one on board to do his best to make a successful fishing, and the fact of the owner being in command insures due attention to economy in working, so that, whilst no unnecessary expense is spared in keeping the seals and in paying crew in proper order, everything is made to last as long as possible.

Brixham has been long considered the “mother-port” of the trawlers, the place where the system of beam-trawling originated; but although Brixham, once famous as a fishing station, disputes the honour with her, there is no doubt that Brixham men have led the way in developing this particular method of fishing to its large proportions. More than any other port, some of the Brixham vessels went to Ramsgate and fished the grounds at that end of the Channel. Others joined them and permanently located there, and now there are upwards of 100 men going fishing belonging to the port. Ten years later Hull was colonized from Brixham and Ramsgate, and Grimsby from Hull at a subsequent period; whilst as early as 1816, Brixham smacks and fishermen moved over to Dublin to commence deep-sea trawling in Irish waters. The important rise of Hull as a trawling station dates from 1846, soon after the discovery of the famous Silver Pit, at the south end of the Dogger Bank. Before that time the number of North Sea trawlers was very small; they were only of about half the size of most of the smacks at present; and not enough was known of the herring, which English fishermen so much looked on as vessels of such little power. For a long time, however, the line fishery for cod and haddock had been carried on in the neighbourhood of the Dogger, in vessels specially constructed for the purpose. The Great Silver Pit, so called to distinguish it from a smaller Silver Pit much nearer the land, was first worked over during a very severe winter,—we believe, in 1843. Two fishing grounds called the Well Bank and Buxton, about 100 miles to the north of the Silver Pit, were fished during that very cold season in almost incredible numbers; the nets were hauled up bristling with fish trying to escape through the meshes, and such enormous catches were made that the most experienced fishermen had never before thought possible. Of course it was not long before this remarkable discovery became known, and a migration of trawlers from Brixham and Ramsgate soon took place to Hull as a convenient station from which to work on this promising ground. With the breaking up of the cold weather, however, this extraordinary congestion of smacks dispersed; but soon the Silver Pit, which was not worked or fished generally, and in after years the Silver Pit has again been found very productive whenever the winter has been very severe, the trawlers call it, in “pit seasons.” The fact is, that, by affecting the distribution of many kinds of fish, shown in such a marked manner in this particular case, is now receiving systematic attention from the Meteorological Society of Scotland in connexion with the herring fisheries, and very important results have apparently been obtained from an inquiry into the same subject on the coasts of Norway.

The value of the North Sea fishery soon became established, and nothing in the history of our sea fisheries is more remarkable than the rapid and steady development of the system of trawling which has taken place from the Hummer ports. The Hull trawlers were 40 in 1845, and most of these were arrivals from the Channel ports, as previously mentioned; but in 1863 they had increased to 270, and in 1877 there were 410 first-class fishing craft, with an aggregate of 20,310 tons, on the Hull register—these, excepting a few shrimping boats, just over 15 tons each, being all trawls and smacks. Another port on the Humber, Great Grimsby, situated nearer the mouth of the River Humber, but farther from the Great Line, has made still greater progress. It had for some years been known in connexion with the North Sea cod fisheries; and the practice of bringing home the cod in its full shape to the market, and for preserving the fish by salting before and after the trawling had been carried on for some years. But it was only in 1863, that the Grimsby trawlers made Grimsby their headquarters, and in the following year the line was
opened to the town. The advantages of the port at once became evident, and the trawlers rapidly increased from 5 in 1856 to 70 in 1858; in 1872, only nine years later, the number was 248, and there were 82 cod smacks besides. In the return by the Board of Trade of the first-class fishing craft registered at Grimsby for 1877, the number of vessels, including trawlers, cod smacks, and smaller craft engaged in procuring whelks for cod bait, is officially stated as 635, with an aggregate of 29,924 tons, new measurement, which is more than one-third less than that known as Builder's measurement. This gives an average of over 98 tons, but many of these vessels are 70 tons, and even more.

By the courtesy of Mr. Reed, the dock-master at Grimsby, we are enabled to give the following return of the quantity of fish sent away by rail from that town in each of the years from 1856 to 1877:

<table>
<thead>
<tr>
<th>Years</th>
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<tr>
<td>1856</td>
<td>1,614</td>
<td>1864</td>
<td>11,138</td>
<td>1871</td>
<td>30,647</td>
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<td>1857</td>
<td>4,126</td>
<td>1865</td>
<td>10,276</td>
<td>1872</td>
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<td>1858</td>
<td>3,464</td>
<td>1866</td>
<td>10,682</td>
<td>1873</td>
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<tr>
<td>1859</td>
<td>2,722</td>
<td>1867</td>
<td>10,618</td>
<td>1874</td>
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<tr>
<td>1860</td>
<td>2,722</td>
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<td>10,721</td>
<td>1875</td>
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<tr>
<td>1861</td>
<td>3,841</td>
<td>1869</td>
<td>9,490</td>
<td>1876</td>
<td>40,054</td>
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<td>1862</td>
<td>5,541</td>
<td>1870</td>
<td>9,478</td>
<td>1877</td>
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<tr>
<td>1863</td>
<td>6,608</td>
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The only break in this increasing series is in 1875, and is readily explained by the fact the herring fishery in that year was a bad one, and that instead of about 4000 tons of herrings being taken by Lowestoft and other boats at Grimsby as had been the case for some few years previously, the quantity was very much smaller. Great, however, as has been the increase of fish sent away by rail from Grimsby, especially during the last two years, the returns above given do not represent all the fish landed at the fish-warehouse; for a new trade to the Continent has lately sprung up, and fresh fish is exported direct to the following places, the returns being given for the two years in which this trade has been carried on:

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<th>Years</th>
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<tr>
<td>1876</td>
<td>1857</td>
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<td>735</td>
<td>1871</td>
<td>211</td>
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It must be remembered that this great increase of the Grimsby trawl fishery has not been at the expense of Hull and other trawling stations, for, except at Plymouth, where, owing to local causes, the number of trawlers has remained about the same for several years, the others have also more or less largely added to their fleets. Grimsby is indeed comparatively new as a fishing station, but it is fast outgrowing in this particular trade the convenience which, at the time they were provided, were thought ample for anything that would be required. A special dock of 12 acres in extent was constructed for the use of the fishing vessels; another of 11 acres has lately been finished, as well as a graving dock capable of holing ten smacks at a time. The fish are landed on a covered pontoon 240 feet long and 80 feet wide; but so crowded is this landing wharf, became more abundant as another method of fishing in the same neighbour-hood, and who have no means of finding out where the lines are. The only fish landed is haddock, and not one is to be paid for the loss of fishing gear in the open sea if the owners leave it unguarded.

Drift Fishery.—The next in importance to trawling among the English fisheries is that carried on with drift nets for mackerel, herrings, and pilchards. It is undoubtedly the most common method of net-fishing on the coasts of the British Islands, but nowhere is it so general as in Scotland. There are, however, some consider-

1 The great increase of large trawlers within the last few years has naturally led to a more extended field of work, and many of them now go much further to sea than formerly.
able drift fisheries on the eastern and southern coasts of England, and the important mackerel fishery is mainly at the western end of the Channel. The value of that mode of fishing, technically known as "drifting or driving," will be understood when it is remembered that it is the only method by which much of our herring, mackerel, and pilchards, which generally swim at or near the surface, can be readily caught in the open sea, at any distance from the land, and in any depth of water, so long as there is sufficient for the floating of the nets in the proper position. The term "drift-net" is derived from the manner in which the nets are worked. They are neither fixed nor towed within any precise limits of water, but are cast out or "shoaled" at any distance from the land where there are signs of fish, and are allowed to drift in whichever direction the tide may happen to take them, until it is thought desirable to haul them in. The essential principle of the working of the drift-net is that it forms a long wall or barrier of netting hanging for a few fathoms perpendicularly in the water, but extending for a great length horizontally, and that the fish, meeting these nets, and trying to escape, become mangled; they force their heads and gill-covers through the meshes, but cannot go farther; and as the gill-covers catch in the sides of the mesh, the fish is unable to withdraw and escape. Whether it be mackerel, herring, or pilchard, the manner in which the nets work is the same; the variations which exist relate only to the dimensions of mesh and size of gill-covers.

We will first speak of the Yarmouth herring fishery, one of the most important English drift fisheries, and the one of which we have the oldest records. The thriving town of Great Yarmouth in Norfolk is said to have been the resort of fishermen during the herring season as early as the 6th century, and there is no reason for believing that the fishery with which its name has been so long associated was ever carried on by other vessels than the drift-nets. In the year 1108, the annual payment for this privilege being "ten millers of herrings." The fishery was then evidently recognized as being well-established, and herring as the special trade of the town. A quaintly written account also of the origin of Yarmouth, as given by Mansfield (who wrote in 1619), is quoted in the following note by Swinden in his history of the town:

"And now from the variety of this town, as from the landing of Saxon adventurers in 2054, 1124 years past, this sand, by the defluxion of tides, di by little and little lift its head above the waters; and so in short time after, many fishermen, as well of this kingdom, as of the Five Ports (being then the principal fishermen of England), as also of France, Flanders, and the Low Countries, yearly about the month of St Michael, and the month of November, set their nets in the fathoms for the purpose, by the space of forty days, about the killing, trimming, salting, and selling of herrings, to all the townsmen came for that purpose; whereas, till now, the merchants of London, Norwich, and other places to buy herrings during the season, and then departed. As those fishermen who kill fish at Whousehouse do to this purpose. So in short time after, as that sand became firm land, and that thereby traffic began more and more to be increased, men finding the same to be a commodious place to dwell and inhabit in, did for that purpose gather themselves, and have a continual seat therein, and began to build houses, of which came streets, and of those streets this flourishing township."

Without placing entire faith in Mansfield's conclusions, however, there is sufficient evidence of the antiquity of the Yarmouth herring fishery; and as it keeps up its reputa at the present day, and has indeed considerably increased in recent years, some details of its working may be acceptable. The nets used in the drift-fishing were formerly all made of hemp or flax, but for some years past cotton has almost entirely superseded these materials. Cotton nets are manufactured at Bridport, Manchester, Muscelburgh, and other places, and are about 30 yards long and 9 or 10 yards deep. One of the long edges of the net, called the "back," is fastened to a rope ascertained at regular intervals, whose purpose is to keep that part of the net uppermost. The number of such nets used by each vessel depends, chiefly on her size, and ranges from 80 to 130, or even more. They are fastened together end to end, and thus united form what is called "train, fleet, or drift of nets," often extending to a length of more than a mile and a quarter. The size of the mesh was at one time regulated by law, and the smallest dimensions allowed in herring nets were one inch square; but now, the legal meshes are varied, and the meshes of the drift-net are made so as to allow the fish to pass through the field, and their practical good sense does not often lead them astray in this matter. With herring of average size the inch mesh is found to do the most profitable work. An exception to this freedom from restriction is peculiar still mesh exists, however, on part of the west coast of Scotland, and in them shall direct attention when we speak of the Scotch fisheries. Twine nets are coarser than those made of cotton, and the material not being so flexible, machinery cannot be satisfactorily used in their manufacture; they are therefore netted by hand, and are made in narrower pieces called "deepings," which are laced together one below the other to make up the required depth. The labour of hauling in these nets is of course more severe than with cotton, on account of their greater weight and faculty of absorbing the water; and the comparative stiffness of the mesh is not so favourable to the capture of the fish when they strike the net. On the other hand, it was objected to the cotton nets that the thread was so fine as to cut through the fish, and to tear off their heads as the nets were hauled in. Whatever force there may be in this objection, the advantages in time and labour saved both in making and working cotton nets have practically decided in their favour, and cotton is now almost universally employed in all our drift-fisheries. The object of the cork-ropes, as we have said, to keep that edge of the net uppermost, but in the ordinary net the corks are only sufficient for that purpose, and will not prevent its sinking. This is provided against by the use of buoys, or "bowls," as they are called, one being attached by a rope to each net, and by lengthening or shortening this rope the net can be kept at any distance below the surface that may be considered best for catching the fish. It is always a matter of uncertainty at what depth the fish may be found, and it is good judgment needed in sinking the nets, if there are no signs of the fish being near the surface. It is found convenient to colour these bowls so as to mark the divisions of the fleet of nets. The first net, or the one nearest the fishing boat, is marked by a small white bowl, called the "pup," and at the end of the next four nets is a "dan," or buoy with a pole carrying a small flag. The rest of the nets are marked in four divisions; at the first quarter from the pop is a bowl painted one quarter red and three quarters white; the next is half red and half white; and at the beginning of the last division the bowl is three quarters red and one quarter white. All the rest of the bowls from the beginning to the
and of the train of nets are entirely black. The only part of the gear in connexion with the long string of nets is the warp, a stout rope to which each net is fastened by two smaller ropes called "seizings," and long enough to allow the warp to hang down near the foot of the nets. This warp has a twofold purpose: it prevents the loss of the nets in any storm, and it may chance a vessel should pass through among them when near the surface, an accident not unlikely to happen, as the nets are only used at night and extend a considerable distance, often in the course of trading vessels going up and down the coast; and it is by means of the warp the nets are hauled in, the strain being thus brought evenly, by means of the seizings, on each separate net. The Yarmouth drift boats are the largest used for this kind of fishing on any part of our coast. They are full-decked vessels of about 36 tons, the largest being upward of 52 feet on the keel, with about 17 feet beam and 7 feet depth of hold. The universal rig has long been that of a lugger, with two masts only, and they carry a jib, a large dipping fore-lug, and a mizen with a topsail. The mizen-mast is always kept standing, but the fore-mast is made to lower back when fishing is going on, so as to enable the vessel to ride easier, as at that time she is head to wind and without any sail that can steady her. The mast is not lowered on to the deck, however, but as is the practice with all large drift-boats, the head is supported on a wooden crutch 10 or 12 feet high, in the Yarmouth vessels called a "mitch-board." In this manner the mast lies very snug, and does not interfere with the room on deck. The interior of the vessel is fitted up with separate spaces for the nets, warp, fish, and salt, of which last a quantity is always taken to sprinkle the fish with before they are stowed away. These boats carry as many as ten or twelve men, as the labour of hauling in the nets is considerable; but more than half the crew are landmen who are mainly employed at the capstan by which the warp and fish are hauled in strength, and not nautical knowledge, is required for this work; and all the important part of the fishing—the deciding where to work and at what depth to place the nets—is the business of the experienced fishermen.

Drift-net fishing is with rare exceptions only carried on at night. The time for commencing is just before sunset, when the fish are then in the water by the time it is dark. When the vessel has arrived at her station, from certain indications, such as numerous seabirds or possibly fish playing at the surface, or even without any special signs to guide the fishermen—may be thought a likely place for fish, for there is a great deal of speculation in the matter, the vessel is sailed slowly before the wind, and if possible across the tide; then the net is shot or thrown over the vessel's quarter, the men being distributed at regular stations, some haul up the net from below, others throwing it over and taking care that it falls so that the foot is clear of the corked back; others, again, looking after the warp which has to be paid out at the same time, and seeing that the seizings are made fast to it in their proper places. When it is all overboard, and about 15 to 30 fathoms of extra warp, called the "swings of extra warp," given out, the vessel is brought round head to wind by the warp being carried to the bow; the sails are then taken in, the mast lowered, a small mizen set to keep the vessel with her head to the wind, and the regulation lights are hoisted to show that she is fishing. A few of the hands remain on deck to keep a look out, and the vessel and nets are left to drift wherever the wind and tide may take them. It is very rare that there is an absolute calm at sea; and if there is the faintest breath of air stirring, the fishing boat will of course feel it more than the buoys supporting the nets; she will consequently drift faster, and being at the lee end of the train of nets, will have a constant pull upon them, and so keep them extended almost in a straight line, so that every portion of the nets hangs clear and free from folds. If there is a great deal of wind more swing-rope is allowed, so that the nets may not be dragged through the water or any undue strain be thrown on the warp, as the more warp there is out the greater strain there is in it, and the less danger of its breaking. The first net in the train is called the "look-on" net, and frequently after an hour or so, that one is hauled in to see if any fish have been taken, and if so, in what part of the net. If it has been allowed to sink too low, that will be shown by the fish being only in the upper part of the net, or vice versa. Such an examination of one of the nets (called in Scotland by the name of "procing") also sometimes discloses the fact that dogfish are unpleasantly abundant, and this makes it desirable to haul in the nets very soon, as these pests of the fisherman do a great deal of mischief to both the fish and the nets if they are allowed to remain long in the water. The operation of hauling in the nets is carried on in the same systematic manner as in the case of shooting them. The work is now performed by the "capstan-men," whose duty it is to heave in the warp, the regular fishermen looking after the net as it comes on board, and shaking out the fish, which is at once sprinkled with salt and stowed away in the fish room.

After a day or two, depending on the success or failure of the fishing, the vessel returns to port; and the general practice since the opening of the extensive covered fish market by the side of the Yarmouth haven is for the luggers to go into the river and deliver their cargoes direct into the market. It is at times, however, a difficult matter to enter the haven, and then the old-fashioned practice of landing the fish on the beach in front of the town is resorted to. The hauling is effected by means of large "ferry-boats," which go off laden with baskets of a peculiar shape, called "swills," each one capable of holding 500 herrings, and put them on board the lugger which is anchored at a short distance from the shore. The fish are then conveyed rapidly into the baskets, which are placed, when full, in the ferry-boat, and as soon as she is loaded she returns and is laid broadside to the beach. A set of strong, active fellows, known as "beachmen," at once go to work, and two men taking each basket between them in their arms, soon carry up the fish to the carts waiting to take them either to the market or direct to the curing houses. The situation of the market by the side of the haven is very convenient; and, if required, more room can be easily provided by adding some of the vacant and immediately adjoining it, and with the same river frontage. The market was completed only in 1867, and although the Yarmouth fishery has been carried on continuously for many centuries, it is only since the opening of the new market that an accurate account has been kept of the quantity of herrings landed there.

The following statement shows the number of lasts of fish received at the market during each of the ten years 1868-77, and as a "last" of herrings contains 13,200 fish, some idea will be gained of the produce of the Yarmouth fishery, without taking into consideration what is landed elsewhere by Yarmouth boats:

<table>
<thead>
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<td>14,420</td>
<td>1871</td>
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The following is the mode of counting herring on almost all parts of the east coast of England:

- 4 herrings = 1 warp
- 33 warps = 1 hundred = 392 fish
- 10 hundreds = 1 thousand = 1,320
- 10 thousands = 1 last = 13,200

Only 80 warps or 120 fish, however, go to a "hundred" of mackerel.

It will be observed that considerable fluctuations have taken place in the produce of the Yarmouth fishery during the last ten years; and there is no doubt there has been an entirely cause by variations of weather during the herring season.
A few words must be said here about the manufacture of blotters and red herrings, which has made Yarmouth famous all over the world. The same mode of curing herrings is now adopted in many other parts of England and in Scotland, but the trade spent on the operation is not in all cases the same.

As soon as the herrings are brought to the curing houses at Yarmouth, the fish are all washed to get rid of the salt they were sprinkled with on board the fishing boats, and then, without being gutted, or any other preparation, they are again put into salt, which is generally brought from Liverpool. Their subsequent treatment depends on whether they are to be made into red herrings or blotters. The latter—Yarmouth blotters, per excellence—are generally salted fish, full, and of the best quality. They are made in October and part of November, when the herring fishery is going on, and they should be cured as soon as possible after they are taken out of the water. Strictly speaking, a herring is more than a herring that has been only saltily cured; it is kept in salt from twelve to eighteen hours, and then smoked about twenty-four hours. But as any herring can be made into what may be called a blotters, and there being always a demand for them, their manufacture is carried on throughout the season with the best fish that can be obtained; and we need hardly say that blotters are to be had all over the country, and cured in various places, which come far short in excellence of the selected Yarmouth fish. A properly cured blotters is ready for the market at once, and the sooner it appears on the breakfast table the better it is likely to taste. In the last few years some blotters have been prepared at Yarmouth with even less curing than that we have spoken of, but they will not bear keeping very long. It is the practice at Yarmouth to keep the fish in salt for fourteen days if they be made into "red, well-cured, or high-dried herrings"; they are then washed and hung in wood-smoke for another fortnight. The curing is mainly done by the fish escaping from the salt and being annexed, and after the fish have been washed out of the salt and washed, they are said "rived" or strung in "spits," or thin sticks, about 4 feet long, which are thrust under one gill-cover and out at the mouth. Twenty-five fish are put on each spit, and the small spits are then taken to the smoke-cottage, a lofty cottage, perhaps about 16 feet square, having a series of wooden frames reaching from floor to roof, with small transverse beams, called "loaves," beginning at a distance of six or seven feet from the ground, and running, one above the other, from one side of the room to the other. The frames are four feet apart, and the spits are placed in rows between them, the ends of the spits resting on opposite loaves. The roof is made of tiles, uncoated, so as to allow a good draught through the room, which when filled contains three fish. About sixteen fires are made on the stone floor of each cottage, generally being oak trees, which have a high colour to the fish. Ash timber, producing a different colour, is used in some cases, to suit the fancies of particular foreign markets. Where the room has been thus filled with spits of fish, the fires are lighted and kept burning for two days; they are then let out, and the fish allowed to drip for a day; the fires are again kept alight for a few hours, and the process of alternately drying and dripping is continued for a fortnight, when the herrings are considered thoroughly cured, or high-dried, and are fit for packing. For the export trade they are packed in barrels, each of which should hold 40 or 45, good-wood, fish, or a larger number of smaller ones. The manufacturer’s name and the number of fish are marked on each barrel. The export trade is to Italy, the Greek islands, and the Levant. The time employed in curing these herrings is longer than is given in Scotland, but in some cases only half the usual time is allowed, and such fish are sent by steamer to the Mediterranean, where they are then disposed of; but it is not considered safe generally to consign any but "well-cured" herrings to the foreign markets, especially in warm climates. For the home market both blotters and "reds" are packed as rule in flat boxes.

The drift fishery for herrings is carried on more or less along the whole east coast of England, throughout the English Channel, and to a small extent on the Welsh and western sides of England. The seasons for this fishery differ, however, on different parts of the coast. It commences in Cornwall on the first day of July, becoming later as we go southward; at Yarmouth, and Lowestoff the home fishery is in October and November; but a spring fishing has been made for some years past at Lowestoff, beginning at some distance from the land, and gradually coming nearer as the season advances. It is a fishery that has given rise to much complaint on account of the generally small size of the fish taken.

In the Channel herring fishing goes on during November and December, and at the extreme west in the early part of the year. It is not a very important fishery there, however, and the attention of the fishermen is soon entirely given to the more lucrative fishing for mackerel, which may be said to have its headquarters at the mouth of the Channel, although the fish gradually advance eastward as the summer goes on.

The mackerel drift fishery is worked practically in the same manner as that for herrings, but a larger mesh is of course required, and about an inch and a half square has been found most suitable. That, however, is not the only difference between mackerel and herring nets. It is the special habit of mackerel to keep near the top of the water, and the nets are consequently so well corked as to float at the surface. It is also unnecessary to have the same depth of netting as when herring fishing, and what is saved in this direction is added to the length. A full train of mackerel nets as used by the large Yarmouth drift-boats is as much as 2½ miles long, or double that of a herring fleet. Twine was long used in their manufacture, but cotton has taken its place generally whenever new nets were required. Mackerel first appear in deep water south of the Channel, or south-west of the British Islands, and sometimes are caught as early as January many miles west of Scilly, but the general Cornish fishery does not usually begin till towards the end of February, and it extends into June.

May, June, and July are the months in which the mackerel drift fishery is carried on farther up the Channel, and at the later part of that season in the southern portion of the North Sea. The important fishery for mackerel is, however, on the Cornish coast, and thither resort fishing boats from Yarmouth, Lowestoft, and the various Channel ports, and, in company with the famous Mounts Bay luggers, devote themselves to the ingathering of this great harvest of the sea. Many thousands of tons of mackerel are landed at the western ports during the season, particularly at Plymouth and Falmouth, and are sent away by rail to the London and other markets.

The pilchard drift fishery is worked in the same manner as that for herrings, but rather a smaller mesh is used, and herring nets which have shrunk too much for their original purpose are often usefully employed for the capture of pilchards. This fishery begins in July and continues till September. It is mostly worked on the coast of Cornwall, but during the last few years a great many of these fish have been taken along the coast of Devon. Pilchards may be regarded in England as essentially Cornish fish; there is very little sale for them out of their proper county, but there they are looked upon almost as one of the necessities of life, and every household likes to have a store of salted pilchards for winter use. These are all the produce of the drift nets, the fish taken by the seine being cured for export to the Mediterranean. A new industry in connexion with the pilchard fishery has been recently established at Newlyn in Mounts Bay, and at Mevagissey, further to the eastward. This is the manufacture of "sardines" in precisely the same manner as has long been carried out on the French coast. The so-called "sardines," caught so largely in the Bay of Biscay, being nothing but young pilchards, there seemed no reason why the Cornish fish if treated in the same way as the French should not turn out as good. Curing establishments were therefore set up at the two places named, and measures having been taken to ensure a thorough knowledge of the French mode of curing, "Cornish sardines," or "pilchards in oil," were prepared, and with so much success that orders for them are now received for more than the present limited means of manufacture can supply.

**See Fishery.**—Seal or seine nets are used on the English coasts chiefly for the capture of mackerel and...
FISHERIES

pilchards, but sprats and various other fish are occasionally taken by them. The particular fishery with which this net is most commonly associated is that for pilchards at St Ives, on the north coast of Cornwall, where seine nets are kept in readiness for working on a very large scale. For a long course of years St Ives Bay has been more or less visited by shoals of pilchards, generally during the months of October and November. These fish are found in abundance off the south-west of Ireland rather earlier in the year, and it appears as if the shoals were returning towards the Bay of Biscay, when they arrive on the north coast of Cornwall in October. In their course southwards some of them enter St Ives Bay and sweep around it, and if, in doing so, they come within a certain range of part of the shore, the seine are brought into play, and large captures of fish may be made. The seine ground is on the western side of the bay, and extends southwards for nearly three miles from the bar. It is divided into six stations or "seine," by marks or boundaries on the land, in positions fixed by a local Act. These seine have each a name, and no fishing boats besides those employed in the seine fishery are allowed to fish or anchor within the certain distance of the shore, and the seine is taken from before sunrise and the same period after sunset from the 26th of July to the 25th of December; and any passing boats must keep near the shore. Under favourable circumstances the fishery is likely to be so valuable and of such general advantage to the town that the Act of Parliament regulating the proceedings is strictly carried out with the approval of all concerned. For this reason also no seine below a certain size are allowed to be used, so that the danger of disturbing a large body of fish, and perhaps frightening them into deep water without having secured a good haul, may be as much as possible avoided. The smallest seine of legal size at St Ives is 160 fathoms along the cork-ropes, with a depth of 8 fathoms at the middle or to the wings of 10 fathoms in the middle of the seine and 6 fathoms at the ends or wings. Some of the seine are as much as 200 fathoms long, and the mesh in all is three-quarters of an inch square throughout the net. The object is not to mesh the fish as in a drift-net, but to inclose them. What we have described is the seine proper, but there is another of smaller size and different proportions which also takes part in the fishery. This is called the tack- seine, and is only 70 to 80 fathoms long, but it is 8 fathoms at the wings and 10 fathoms in the middle of the seine. Besides the seine called stop-nets, which are a practical addition which can be made to the principal seine, and which are so used when the seine is being worked. As there are about 250 seine at St Ives, and only six stations in which they can be used, some arrangement is necessary to prevent confusion and interference, and this and other details are the subject of special regulations. The seine are all registered, and many of them belong to companies. Several boats are employed when a seine is to be shot. The largest, called the seine-boat, is about 32 feet on keel, with plenty of room for carrying the seine; she has six men for rowing and two for shooting the seine. Two tow-boats about 24 feet long, and each carrying a stop-net, with a crew of six men, make up the working party; but besides these there is a small boat called the "volder" or "hark," from which the master seine-boat directs all the proceedings. The position of the shools of fish is pointed out by men called "huners," who are selected from the sharpest and cleverest of the fishermen. There are generally two of them on the hill above each station, and when they see the shools of fish, looking like the shadow of a cloud on the water, they signal with a large white canvas ball to the boats waiting below in the stations. These men remain on duty for three hours at a time, and receive 28s a month, and one hogshead out of every hundred hogsheads of fish landed. When the seine has come within a convenient distance of one of the stations, the boats containing the seine and stop-net, which have been previously joined together, commence shooting the seine at the same time, the larger net being thrown out in a direction parallel with the shore, while the seine-boat is shot in front of the seine as the boats are rowed towards the land. The two boats ultimately turn towards each other, and gradually bring the ends of the seine together, thus cutting off and surrounding as many fish as they can. The second stop-net is joined to the first if there is a probability of its being wanted. The seine are then fastened together at the point of meeting, and the circle gradually contracted until all the fish are inclosed by the single large seine. The seine being securely joined and the stop- nets taken away, the circle of netting with the inclosed pilchards is slowly hauled towards the shore, into some quiet place as much as possible out of the run of the tide, till the weel, tds foot of the seine touches the bottom, and there it is safely moored. The fish cannot now escape, and if the hogshead be a large one several days may elapse before they are all taken out. This is the first process, which is then performed with the tuck-seine, which we described as being very deep in the middle. It is shot in the ordinary way with one boat, but inside the other seine, and as it is hauled in, the foot of the seine is raised so as to bring the fish to the surface, whence they are dropped in large baskets and put into attendant boats to be carried on shore. This is of course the exciting moment of the day, and all the town is astir, and taking part in the proceedings. Landling and carrying the fish to the curing house is done by men termed "blowers," who are paid in proportion to the catch of fish. The seamen receive certain wages in money and a share of the fish, and every household does a little curing on its own account. The great bulk of the fish, however, goes into the houses of the large curers, who are generally the proprietors of the seine.

Women are employed in the curing, which consists in packing the pilchard in alternate layers of coarse salt and fish on the stone floor of the curing house, until the "bulk," as it is called, has reached a height of five or six feet. The fish remain here a mouth, and the oil and brine draining from the mass are carried off by gutters in the floor to a cistern. When the fish have been sufficiently salted they are washed and packed with the heads outwards in hogsheads, and a "tree" of fish in the head of the hogshead. Gradual pressure is now applied on top of the fish, until the content of the hogshead has been reduced one-third in bulk, and a further quantity of oil squeezed out; this excess of oil on the sides of the hogshead, the hoops not being at first very tightly driven. The cask is filled up three times before the pressing is finished, and then, after eight or nine days, the hogshead of fish should weigh four hundredweight. The average number of fish in each hogshead is 2500, and sometimes as many as 1000 hogsheads have been taken at one haul of the seine. The largest single catch recorded at St Ives was 5000 hogsheads actually landed, and on that occasion great numbers of fish were lost besides. The fluctuation in the sein-pilchard fishery at St Ives is very great from year to year; and it would appear remarkable, if the success of the fishery did not almost entirely depend on whether or not the shoals came into that part of the bay where alone the seine can be used. The St Ives seine has been unsuccessful for the last four years, less than 10,000 hogsheads having been cured in each of those periods: but in the "Pilchard Circular" issued by Messrs. G. C. Fox & Co. of Falmouth, giving an account of the fishery season of 1877, it is said that "considerable bodies of fish visited the coast, but did not come into the stems where the seine might have inclosed them." The

1 It is difficult to suggest any satisfactory explanation of the that, though large shoals of pilchards are every year observed the north coast of Cornwall, it is only in particular years that the numbers of these fish enter St Ives Bay and work inshore of the seiners. It might seem that the streams, containing drainage from mining works, which fall into the bay, would pollute the water, and tend to turn back the fish, but there is much less mining in the neighbourhood now than formerly. The fishermen's idea that the state and direction of the tide, when a shoal of fish is near the entrance to the bay, affects the course of the shoals appears more plausible, for it must
FISHERIES

The special sea fisheries for mackerel are along the Clewell Beach near Portland, and on the Sussex coast, at and near Brighton; but they do not call for particular notice.

STOW-NEt FISHERY.—This fishery appears to be entirely confined to the Solent, inside the Isle of Wight, the estuary of the Thames, and the Wash, between the Norfolk and Lincolnshire coasts. It is especially for the capture of sprats, although many young herring are sometimes caught, and it is worked most extensively at the entrance of the Thames. The stow-net is a gigantic funnel-shaped bag having a nearly square mouth, 30 feet from the upper to the lower side, and 21 feet wide. It tapers for a length of about 90 feet to a diameter of 5 or 6 feet, and further diminishes to about half that size for another 90 feet to the end of the net. The whole net is therefore about 180 feet or 60 yards long. The upper and lower sides of the square mouth are kept extended by two wooden spars called "balks," and the lower one is weighted so as to open the mouth of the net in a perpendicular direction when it is at work. The size of the meshes varies from an inch and three-eighths near the mouth to half an inch towards the end, where, however, it is again slightly enlarged to allow for the greater pressure of the water at that part. The mode of working the net is very simple. Oyster smacks are commonly used in this fishery, although shrimp-boats are also employed in it in the Thames. The smack takes up a position at the first of the tide where there are signs of fish, or in some parts of the estuary as are frequented by the sprats during that part of the season; she then anchors, and at the same moment the net is put overboard and so handled that it at once takes its proper position, which is under the vessel. It is kept there by a very simple arrangement. Four ropes leading, one from each end of the two balks, and therefore from the four corners of the mouth of the net, are united at some little distance in front, forming a double bridle, and a single mooring rope leads from this point of union to the vessel's anchor; so that the same anchor holds both the vessel and the net. The net is kept at any desired distance from the bottom by means of two ropes, one from each end of the upper balk to the corresponding side of the smack, where it is made fast. The open mouth of the net is thus kept suspended below the vessel, and the long mass of netting streams away astern with the tide. The strain of this immense bag-net by the force of the tide is often very great, but if the vessel drags her anchor, the net being made fast to the same mooring, both keep their relative positions. Here they remain for several hours till the tide slackens, the vessel's sails being all taken in, and only one hand being left on deck to keep watch. The way in which the fish are caught hardly requires explanation. The sprats, swimming in immense shoals, are carried by the tide into the open mouth of the net and then on to the small end, where they are collected in enormous numbers; from this there is no escape, as the crowd is constantly increasing, and they cannot stem the strong tide setting into the net. The first thing to be done in taking in the net is to close the mouth, and this is effected by means of a chain leading from the bow of the vessel through an iron loop in the middle of the upper balk down to the centre of the lower one, and by heaving in this chain the two balks are brought together and ultimately hoisted out of the water under the vessel's bowsprit. The net is then brought alongside and overhauled till the end is reached, and this is hoisted on board. The rope by which it is closed having been cast off, the sprats are then measured into the hold of the vessel by about three bushels at a time, until the net has been emptied. The quantity of sprats taken in this manner by many scores of fishing craft during the season, which lasts from November to February, is in some years simply enormous; the markets at Billingsgate and elsewhere are inundated with them, and at last they can only be disposed of at a nominal price for manure; and in this way many hundreds of tons are annually got rid of. The stow-boats do not generally take fish on shore, but market boats come off to them and buy the fish out of the vessel's hold, and carry it away. The mode of working is the same in the Solent and the Wash as that we have described in the Thames, and large quantities of sprats are landed by the Southampton boats.

WHITEFISH, or young herring, as they should properly be called, are caught in the Thames by a net which is practically nothing else but a very small stow-net, and it is worked in essentially the same manner.

LINE FISHERY.—Hand-lining and long-lining are worked more or less all round the British Islands, and various kinds of fish, such as cod, haddock, whiting, coalfish, pollack, bream, and conger are taken regularly on the English coast, some being more abundant in one part and some in another. The cod fishery in the North Sea, however, is the one specially deserving notice; it has been carried on in a systematic manner, and on rather a large scale for a great number of years. Welded smacks were in use at Harwich as early as 1712, and in them the cod were brought alive into port just as they are at the present day. The idea of keeping the fish alive appears to have been taken from the Dutch fishermen, and in the interval between 1712 and 1713 three vessels fitted for that purpose were built, but very inferior to those afterwards constructed. In the year 1720 the number had increased to 12, and in 1735 to 30. Of that number Mr Nathaniel Saunders, the progenitor of several generations of fish-factors and salesmen at Billingsgate, had six, and with four of these, which were very superior to the other two, he visited the coast of Scotland in the course of his fishing expeditions, and was at that time the chief medium for conveying goods to and from the north of Scotland in 1766.

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1 A fishery for pilchards has recently been established along the coast of Italy, and Spanish pilchards, cured in the same manner as the Cornish fish, are making their way in the Italian markets.

2 Previous season's fish.
a Mr Ordish, a fishing smack owner at Harwich, made the
first attempt to fish for cod with long lines on the Dogger
Bank; and although he was at first very unsuccessful, he
persevered, and was so fortunate that in 1774 the num-
ber of smacks had increased to 65, of which 40 went regularly
to the Bank and the tough dories afloat. In 1788 there were
78 smacks, and in 1798 the number had increased to 96.
About this time a few attempts were made at Gravesend,
Greenwich, and Barking especially became
an important station, not only for cod-boats, but also for
trawlers. Many cod vessels were likewise owned at
Gravesend and Greenwich, and these two towns for many
years had stores of live cod in chests floating in the river.
Great changes have, however, taken place in recent times;
the Thames water became so impure that the cod could not
be kept alive in it for many days, and ultimately the storing
of the fish there was altogether given up. The Harwich
river was still used for that purpose, and is now, although
there are but few cod-boats belonging to the place, but
the opening of the railways on the east coast gradually
brought Grimsby into notice, and its position in relation to
the fishing grounds was found so convenient that it gradu-
ally became, and there is every reason to believe it will re-
maintain, the headquarters of the North Sea cod fishery.

The special feature in this fishery which distinguishes it
from all other line fishing on the coast of the United King-
dom is the systematic use of welled vessels, in which the
cod are kept alive until they are brought into port. These
welled smacks are built for the purpose, the well not being
a tank fitted into any suitable vessel, but a part of the
original construction of the hull. Two strong water-tight
bulkheads are built entirely across the vessel from keelson to
deck, enclosing a large space just in the centre of the
smack, this is the "well"; and a constant supply and
circulation of the water from the sea is kept up within it
through large auger holes bored in the bottom of the vessel,
in that part of it between the bulkheads. The vessel is
in fact built in three compartments, and the water has
access to the central one through the holes made at the
bottom of it. The entrance to the well is on deck through
a hatchway, the four sides of which are carried down for
about three feet to what is called the well-deck, above the
level of the water-line, extending all round the hatchway to
the bulwarks and sides of the vessel. The lower deck is to keep the level of the water within certain limits when the vessel is rolling about or pressed down under sail. The cost of these welled smacks is about £300
more than that of the ordinary "dry-bottomed" vessels of
the same size. The working expenses of a cod smack are
also much heavier than in a trawler. Each of these line
boats carries from nine to eleven hands, of whom as many
as six or seven are apprentices of various ages; and the
system of payment by shares, so general with the trawlers,
is here only adopted in the case of the captain, who gets
9 per cent. of the proceeds of the voyage, the mate receiv-
ing 24s. per week, the men 22s., and the apprentices from
£5 to £12 a year, according to their length of service.

Provisions are found by the owner, entirely or nearly so.
Both hand lines and long lines are used in this fishery,
depending on season and locality. A complete set of long
lines consists of about fifteen dozen, or 180 lines, 40 fathoms
in length, each supporting 26 hooks on smaller short lines
called "snoods," which are fastened to the main line a
fathom and a half apart. A "string" of lines of this
description is 7200 fathoms long, or nearly eight miles,
and has 4680 hooks. Whelks or "buckles" are always
used for bait where they can be procured in sufficient
quantities, and in the regular long-line season each smack
takes about 40 wash1 of whelks with her for the voyage,
and about half that quantity as the season draws to a close
in March. The whelks are preserved alive in net bags, and
are kept in the vessel's well till wanted, when the shells are
broken and the tough fibres are freed from the bones. The
large number of hooks used gives plenty of employment to
the large crew of the smack. The lines are shot at sunrise
or earlier if the weather is fine and there is light enough to
see what is being done. The smack is put under easy sail,
and kept as much as possible with the wind free, so long
as a course can be sailed across the tide, which is im-
portant, as then, as the line is paid out, the snoods drift
clear of it. The lines are neatly coiled, and with the
baited hooks are laid in trays all ready for running, each
tray containing from 12 to 16 pieces of line, and as the
vessel sails slowly along, the whole length of line is
gradually put overboard. A small anchor at every 40
fathoms keeps the line steady on the ground, and its posi-
tion at the two ends and at every intermediate mile is
marked by a conical buoy or "dan," with a staff passed
through it and carrying a small flag. When after a few
hours the tide has nearly come to an end, the smack, which
meanwhile has been hove to in the neighbourhood of the
last buoy, gets the end of the line on board and works in
short tacks along its course, the line being hauled in, and
the fish taken off the hooks as she proceeds. When the
wind is very light a boat is used for hauling in the line,
and the fish are kept alive in the stern of the boat, which
is partitioned off so as to form a watertight division. In
any case the strong and lively fish are transferred as soon
as possible to the ship's well, and dead fish, or those which
do not appear likely to live in the well, are stowed away in
ices. The season for long-lining is during winter, and the
fishery is carried on both on the Dogger Bank and on well-
known ground off the coast of Norfolk. In April this
fishery comes to an end, and a few of the smacks go away
hand-lining to Iceland and the Faroe Islands, salting the
fish they catch there, and usually landing it at Shetland.

In July hand-line fishing for cod begins in the home waters,
and is continued till October, the commencement of the
long-line fishery of which we have just spoken. The July
fishery is at a distance of from 10 to 30 miles from the
cost, as the approach of the herring to the land at that time
causes a great gathering of cod in their neighbourhood. The
smack is hove to when hand-lining, and each man works with
his line; the seine is run for as long as possible, and is
then hauled in at a jump. The ship is soon at the end of
its line, and the crews haul in the fish in as short a time as
possible. The cod are then taken up, and when enough
have been got, the smack proceeds to sea, with her full
load of fish, and lies to the wind. In this way the fishing
of the season is continued, with its scenes of toil, and
ultimately its 'haul.'
purpose, and hoisted up just clear of the water; the top is then opened, and a man steps into the chest and lifts the fish out, seizing them by the head and tail, and throwing them on the deck of the hulk. It is often difficult work to get rid of the struggling fish, as they are built in soliders, but if they are headlong another they are taken out and handed over to the executioner on the deck of the hulk; he grasps the fish tightly behind the head with his left hand, holding it down on the deck, and giving a few heavy blows with a short bludgeon on the nose, kills it at once. The dead fish rapidly accumulate in a heap, whence they are taken on shore to be packed in bulk in the railway trucks waiting by the side of the market to receive them. The fish thus killed and packed reach Billingsgate early the next morning, and are known in the trade as “live cod”; they fetch the highest price; and there is something in the manner in which they are killed which enables them to be properly crimped many hours after their death.

Scottish Fisheries.—The important fisheries on the coast of Scotland are drift-fishing for herrings, and line-fishing for cod, haddock, ling, and other kinds. Besides these there are in particular localities sewer or “trawl” fishing for herrings, and for sprats or “garvies.”

Herring Fishery.—We will first speak of this special fishery, which from its profitable character, extensive range, and the employment it gives to vast numbers of the coast population, both ashore and on shore, ranks as one of the most important fisheries of the United Kingdom, as it is also one of the great harvests of Scotland.

The herring season on the Scotch coast does not commence everywhere at exactly the same time, although the principal fishing is always during the summer months, the winter fisheries being local and rather uncertain. The earliest herrings are taken on the west coast, and are generally first met with outside a line between the Butt of Lewis and Cape Wrath during April. In May the herrings come into the Minch and work their way southwards; but they sometimes enter the Minch at the south end of the islands, and in 1870 in particular, there was a large herring near South Uist and Barra, but mostly on the Atlantic side, some miles north-west of Barra Head. It is rarely, however, that herrings are taken on the western side of the outer Hebrides, and the great fishery may be said to lie between those islands and the mainland. The fish remain in the Minch in large numbers till nearly the end of September, but May and June are the most productive months of the season, and during that period a great number of boats from the east coast go to the western side to take part in this early fishery. As July approaches the order of proceeding is reversed: the time is near for commencing the great fishery on the east coast, and one by one the boats which had come from that side return to their own waters, and many others from the western districts accompany them. The eastern fishery begins about the middle of July, and continues until about the end of September, commencing at the north and extending gradually southwards as the season advances. Many changes in the importance of particular districts as centres of this fishery have taken place in the course of years. For a long time Wick was the leading fishing and curing station on the east coast, sending out 1000 boats daily during the best of the season; but recently the fisheries from Peterhead and Fraserburgh have been unusually successful, and they have taken the principal position on the east coast for the extent of their curing operations.

Drift-fishing is the method by which most of the Scotch herrings are taken, the use of seines or “trawls” being practically confined to a few localities on the west coast so far as regards the herrings, although they are employed on the eastern side for the capture of garvies. Cotton nets are now universally used, and the manner of working them is precisely the same as we have already described in our account of the Yarmouth fishery; but there has been a considerable increase in both the size and use of these nets worked by each boat. This has been due to several causes. The lightness of cotton nets compared with those of hemp formerly in use enables a larger quantity of netting to be easily handled by the same number of men, and thus more catching power is provided. Then it is desirable to make up a certain weight of nets in proportion to the size of the boats, that they may not drift too fast and drag the nets through the water; for all the strain that is needed on a fleet of nets is as much as will keep them extended in as near a straight line as may be. The fisheries have in late years been carried on far out at sea, and a remarkable change from open to decked fishing boats has taken place, a change that had for a long time been earnestly recommended to the fishermen for their own sakes, and to prevent the great loss of life which had so frequently occurred when the open boats were overtaken by bad weather. This change led to larger boats being built, capable of using an increased quantity of fishing gear. There are thus many reasons for the additional netting now generally employed, without resorting to the idea that it has become necessary owing to herrings having gradually diminished in the seas. We may here mention that the official returns of Scotch fishing boats have of late years shown a steady diminution in their number, but it will be found on examination that the falling off has been only in the second and third class boats, and that those of the first class have been increasing. In the last report issued by the Board of Fisheries, that for 1876, a decrease of 109 boats is recorded; but at the same time it is stated that there were 181 fishermen and boys more than in the previous year, and the estimated value of the boats, nets, and lines, had increased by as much as £35,719. The size of the fishing boats is limited unfortunately by the general absence of natural deep-water harbours where they would be most useful, so that no very great increase in their tonnage can be conveniently made; and although first-class boats are taking the place of those which were in the second, the change does not involve an addition of more than four or five tons in one of the larger craft. Fourteen tons was a common size for a large second-class boat, and as anything over 15 tons ranks in the first class, the new ones of 17 or 18 tons all included under that head. There is little difference at first sight in the appearance above water of most Scotch fishing boats, but there are many distinctions below the water-line in accordance with local ideas. As a rule, excepting on parts of the west coast, the boats are sharp at both ends and have a great deal of beam, but they draw much in depth and in the extent of rise to the floor. The Buckie boats have long been remarkable for their peculiar build and rig, having a low and broad midship section with a flat or rather hollow floor; they are very fine at both ends and have considerable rake of both stem and stern post. They are commonly known as “scally” boats. Another peculiarity in these boats was that they carried a mizen lug sail in addition to the large fore and main masts which were the usual working sails of the general run of Scotch fishing craft. Fishermen as a class are most unwilling to make any change in their style of boats or methods of fishing; but when decked boats were fairly tried on the Scotch coast, their advantages could not fail to be acknowledged; and as it was found that profitable fishing could be carried on with them in weather such as was dangerous

1 As evidence of the advantage of using large-decked boats, the following extract from the Fishery officer's report from Eyemouth is quoted by the Hon. B. F. Primrose, the energetic and obliging Secretary to the Lord of Fishe:ries, in his Annual Report for 1870—
for open boats, the change from undocked to decked fishing boats gradually gained favour, and is now very general. This alteration, however, involved an important change in the rig of the boats in the doing away with the main lug, a sail which for many years had given a distinctive character to the Scotch fishing boats. In our notice of the Yarmouth lug, we mentioned that when the vessel was fishing, the forecast was lowered on to a crutch on deck, so that the vessel might ride easier and not roll about, as the weight of the standing mast would be likely to make her do. This is the practice with all drift-fishing boats; but in decked boats there is a difficulty in doing this with a second mast, and if it were done there would be so much more hamper upon or near the deck and in the way of the fishermen as to cause much inconvenience. The mainmast has therefore been done away with, and the necessary after-sail is provided by means of a mizen, which, being outside the stern, has plenty of power when wanted, and is out of the way of the fishermen. The fore-lug is made larger than it used to be, so that there is still plenty of canvas, and the general rig of the boats is now just what has been for a very long time adopted by the English fishermen as the most convenient for drift-fishing. Steam-tugs have been proved advantageously used in towing the fishing boats towards and from their fishing ground; but such a system could hardly be generally applied to the vast fleet of boats which collect in certain years at some of the stations.

The fluctuations in the herring fishing are very remarkable, but they are not more so on the coast of Scotland than on that of Norway and elsewhere. Indeed, Norway and Sweden afford instances unparalleled in Britain of the disappearance of herrings from particular districts, and their return in the most unexpected manner after a long course of years (see p. 26). On the coast of Scotland, the changes which take place in the fishery consist in an increase or decrease at particular districts rather than a total disappearance from any one of them. The most marked failure in recent years is in the Firth of Forth, where the summer fishing has now been given up, only a small winter fishing being carried on. At Wick, also, for a great number of years the most important station on the east coast, the herring fishing has been more or less diminishing, whilst at the same time Fraserburgh, only about 70 miles distant from it, has gradually assumed an unprecedented importance. It is true that in 1875 there was an immense falling off in the quantity of fish landed at the latter port, but it is evident that the bad year at almost every station on the east and west coasts, and the almost general decrease arose not from any apparent scarcity of fish, but from the boats being frequently kept in harbour by a continuance of very bad weather during the fishing season, or being unable from the same cause to work their nets when they reached their regular grounds. There is some reason for believing the alleged scarcity of herrings near the land is not so great as has been supposed. Successful fishing many miles out at sea has attracted large numbers of boats from the home waters, and the catches inshore have been consequently much diminished; still the general opinion appears to be well founded that the fish have not entered the firths and lochs in the last few years to the same extent as they used to do. That the fisheries, taken as a whole, have been gradually increasing is shown by the carefully prepared statistics of the Board of Fisheries; and it is desirable to point out that the great increase in the quantity of netting now used is to some considerable extent counterbalanced by the shorter time the nets are in the water; for the boats go long distances to sea, and they have to leave off fishing earlier in order to bring in their fish in good time to the cutters. It may appear strange that after the lapse of centuries during which the herring fishery has been regularly carried on, so little knowledge should have been gained of the habits of this valuable fish; but it must be confessed that at the present moment we can say nothing positively about what brings the herring towards the land, why at one time they will "strike" the nets, and at another they will apparently not go near them—in short, what are the particular influences which regulate their movements. Of course, the old idea that these fish come into shoal water in order to deposit their spawn is the one still generally received, and we will not venture to say it is incorrect; but if it be true that the spawning fish come in for that purpose, that cannot be the inducement in the case of the "maties" or fish which show no development of the milt or roe. Yet both these herrings are as perfectly the same. Mackerel differ from herrings in spawning at the surface, and it has been abundantly proved that their ova float during the whole period of development; still we find that mackerel in full spawning condition, and half-grown fish also, are mixed up in the same shoals at the time when they approach the land. Thus we find the habits of surface-spawners and ground-spawners are alike in this respect, yet the common explanation of the visits of the spawning herring will not apply in the case of the mackerel, or even in that of the "matie." With respect to the causes which induce the herrings to keep near the surface, or to remain at some little depth, a step seems to have been taken in the right direction in the observations now being made of the possible relation of the temperature of the sea to the higher or lower movements of the fish. Good service was done by the late Marquis of Tweeddale when he provided a number of deep-sea thermometers for the use of the fishery officers and fishermen, whose observations are reported weekly to the Meteorological Society of Scotland, and come under the careful scrutiny of the secretary, Mr Alexander Buchan. It is early yet to expect any definite results from this inquiry, as it has only been carried on for four or five years; but the observations hitherto made point to a high degree of temperature in the spawning herring. Indeed, it is now stated that the sea is found to be colder in any one district than that on either side of it, the herrings are more abundant and the fishery is more successful in the colder than in the warmer water. It is also stated that the influence of thunderstorms had been perceptible in each year; and that if a thunderstorm of some magnitude had extended over a large portion of the east of Scotland, good takes of fish might be made on that day, but on the following day few if any fish would be caught over that part of the coast, unless at the extreme verge of a deep part of the sea, as if the fish were retreating thither. Observations on the influence of winds and the temperature of the sea have also been made by the Dutch fishermen; and Herr von Freedom of Hamburg believes, from an analysis of these observations, that a temperature of from 53° to 57° F. is most favourable for the herring fishery, and that the chances of success diminish with higher or lower temperatures. Should these conclusions be confirmed, it is quite possible that the fishermen may be enabled, by a trial of the temperature of the sea at different depths, to determine how far their nets should be sunk to give them a fair hope of a successful fishing, instead of working, as they do now, very much on the chance system, often finding that they have been too high or too low for the principal part of the shoal.
The important system of curing herrings in the wet state, or, as it is properly called, as "white herrings," is more completely worked on the eastern coast than elsewhere. The process of curing is carried on under the supervision of the Board of British and Irish Fisheries, which was established by the Act, 45 Geo. III. c. 110 (1810). The location of the positions and duties of the Board of Fisheries are the same as those of the Board of Agriculture and Fisheries, and have its chief offices at Edinburgh, Holywood, and at certain other places.

The Board of Fisheries is composed of two members, appointed by the Sovereign, and one member, appointed by the Lord Advocate, who is appointed by the Sovereign. The Board of Fisheries has the power to make regulations for the preservation and management of British fisheries, and the power to prevent the importation of foreign fish into British waters.

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FISHERIES

and consequently the system might be quietly got rid of by the

eaters who wish to make use of it. The roll has wholly reversed

the process, and the argument against the continuance of branding

on the ground of the expense in connexion with it has been consid-

erably mitigated by the fact that the system is now to a large ex-

tent self-supporting.

The following table shows the amount of fees collected in the

years 1859-77, in accordance with the Act 21 and 23 Vict. c. 89 (1862):

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<td>1860</td>
<td>8065 3 0</td>
<td>1867</td>
<td>6204 10 0</td>
<td>1874</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>2890 7 0</td>
<td>1866</td>
<td>6204 10 0</td>
<td>1875</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>1981 0 10</td>
<td>1865</td>
<td>6204 10 0</td>
<td>1876</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>8578 10</td>
<td>1864</td>
<td>6204 10 0</td>
<td>1877</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>8609 4 10</td>
<td>1863</td>
<td>6204 10 0</td>
<td>1878</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>5286 9 0</td>
<td>1862</td>
<td>6204 10 0</td>
<td>1879</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>3777 6 0</td>
<td>1861</td>
<td>6204 10 0</td>
<td>1880</td>
<td>6204 10 0</td>
</tr>
<tr>
<td>1860</td>
<td>7048 10</td>
<td>1860</td>
<td>6204 10 0</td>
<td>1881</td>
<td>6204 10 0</td>
</tr>
</tbody>
</table>

On the west coast of Scotland the herring fishery is also of great

importance, and, as we have previously mentioned, it begins earlier

than that on the eastern side. There is a good deal of oyster capturing

in the Stornoway district, but the brand is in little favour. It is

taught that the western fish, especially those caught early in the season,

are more delicate than those taken on the east coast, and will not

bear the salt packing required for preserving the property which

is carried in each barrel if it is to receive the brand. The real explanation

is doubtless that the curers are anxious to catch the market as soon

as possible and will not allow the shell to be packed for the drift

fishermen, pickle before sending them away that is necessary according to

the branding regulations. These early cured fish are maties or fat her-

ringers, and are chiefly sent to the Russian market. A very large

quantity of the fish caught in the season is sold to the curers and

sent to market in the fresh state; they are sprinkled with salt and

loosely packed in barrels, and quickly taken by special steamers to

Glasgow, whence they are shipped to Liverpool. The drift fisheries

are not given permission to “bulk” in the published returns by the Fishery

Board, and, being slightly salted, are included among the “cured fish,” although

not with which have been salted and sent through the regular preparations for

export. On arrival at the home markets they may be readily sold as fresh herrings, after the sprinkling of salt has been washed off.

On the west coast that the question of a close time for herrings

has been so much discussed, and unfortunately in 1860 an Act

(23 and 24 Vict. c. 92) was passed by which a close time was established

there. The bill was brought in at the instance of some of the curers

at Glasgow and other places, principally on the west coast. By this

Act herring fishing was entirely prohibited from the 1st of January

to the 28th of July on any part of the coast between Ardnamurchan Point

and the Mull of Galloway; and on the North. Not a herring was allowed to be taken during

the close season for the purpose of sale, or to be used as bait, to

prevent the fishermen from starvation; and it appears that this cruel

prohibition was to be enforced that the markets might not be supplied

with fish, and which were not of the best quality, nor yet were entitled
to good command and sale, and therefore flourish the prices the

curers would otherwise have obtained from the regular summer

fishery. It was provided that the early herring fish expected during

the month of March, and the Minch, and therefore diminished the

fish in June and July; and it was said that many of the fish caught

between January and May were unwholesome and unfit for food.

But an inquiry into all the circumstances of the case clearly showed

that the promoters of the Act for establishing close time were the

curers alone, who held meetings of their own body, and, without

consulting the fishermen, pressed forward a measure which affected

every one an interest to their own. It was one of the most unhappy

episodes in the history of the Scotch fisheries; but fortunately the

effects of the close time were soon made known, and after a short

experience it was found impalpable to enforce a law which would

prevent its misapplication to the houses of a population, many of

whom previously could only manage to obtain a bare subsistence

by hard and arduous toil. The sudden and unprovoked abandonment

in a time of famine, and the public were not hesitant to bring the subject before the Government, with the view to some relief being given before the question could be finally disposed of. This resulted in instructions being given to enforce

the law; and in the following session of parliament the bill was

passed by which close time was entirely abolished north of

Ardnamurchan Point. This included all the inner and outer Hebrides,

where the restriction had been so severely felt. South of that

part of the coast close time was continued as before, with the

exception of January, which has been.

By subsequent legislation (the Sea Fisheries Act, 1868), this close time

has been done away with beyond the three mile limit, so that at present there is no close time herring fishing allowed for the British islands except within three miles of that part of the

coast of Scotland which lies between Ardnamurchan Point and the

Mull of Galloway; and the difficulties of enforcing the law there

are so great that the close time has now entirely disappeared. Another commission which has been recently engaged inquiring

into the state of the herring fisheries of Scotland has also reported

against the necessity of close time.

The fisheries of the west coast of Scotland have unfortunately
given rise to much bitter feeling among those who are interested in them,

whether as fishers or curers, and nothing has caused so much social

disturbance as the quarrels between the drift-line fishermen and the

those who have been using the beam-net, or, as it is called in Scotland, the

"trawl," for catching herrings. The localities in which these disputes

have specially taken place are on the Firth of Clyde and in the Firth of

Forth, more particularly in the former famous waters. We

have already described the general mode of working the sean, when

speaking of the English fisheries, and we will now only repeat that

this method of fishing consists in shooting a long sheet of netting

in a semicircle, both ends of which are most commonly hauled on

shore until the whole net with the inclosed fish is landed; but some times a boat is used as the upper part of the net are made to meet, and into which the net is hauled as before.

In the former case the net is used as a ground-net, in the latter

as a beam-net. Both are equally fishy, and a trader who, until about the year 1888, had fished Lochee Fyne according to the old established method. The trawl was then introduced, and on several occasions a gill-net boat has been required to keep order between

the fishermen when the beam-net was being used. The effect of the tangle on Lochee Fyne, as we have said, was, the special scene of these disputes, and one common complaint by the drift fishermen was that the trawlers intercepted the fish to such an extent that the boats broke up the shoals, so that the herrings did not find their way to the upper water, where it was alleged there always used to be plenty of fish at the proper season. There were then said to be no more fish at all, and the herrings were caught by the trawl, those which were too small to be stopped by the drift nets and those too large to be meshed in them—the "mother fish," as some of the fishermen called them. Then it was said that the trawlers sometimes had that only a portion of the catch could be saved, and, besides other sins

dailed to their charge, it was finally stated as the crowning offence—

one that really explained the principle of a "trawl," and the trawl

that they lowered the price of herrings to a considerable extent by

the large supplies they could with little expenditure of time and trouble sometimes throw into the market, and so prevented the drift

men from obtaining the better prices they had commonly got from

their smaller catches.

The result of several complaints was that in 1883 an Act

(14 and 15 Vict. c. 20) was passed, prohibiting drifting on

herrings on the coast of Scotland; but that not proving effective,

more stringent measures were brought to bear on the fishermen

with fish. In 1885 (23 and 24 Vict. c. 92 Vict. c. 75), an in time which fishing and fishing with the trawl was completely suppressed. So strong a feeling existed, however, among a large body of the fishermen and others that the complaints against trawling were unjust, and the fishermen therefore diminished the effect of the new law, which

immediately affected by it, that in 1882 a royal commission was appointed especially to inquire into the subject; and in 1884 the question was independently considered by two of the members of the general Sea Fisheries Commission, the third commissioner being

purposely absent from the second inquiry, as he had taken part in

the proceedings of the previous one. The result of the

inquiries, after bearing a great deal of evidence from both sets of fishermen, were decidedly adverse to the opponents of

trawling, and were to the effect that the herring fishery in Lochee

Fyne fished by the "troll," and small trawls having to be employed to prevent the system of trawling had been discovered. . .

Trawling for herring has been an important means of keeping fish to

customer, by the herring net, and then taken into the market at an abundant supply of wholesome fresh fish at prices which

enable the poor to enjoy them without having to come in competition

with the curer. It is in this circumstance which, in our opinion,

has produced the demand for protection for the gains of the drift-net fishermen are much affected by the sudden

The careful labours of her Board of Fishery, is in a far more fortunate position than either England or Ireland; and the following tables taken from the last report of the Fishery Board will readily show, by the comparison of any two selected series of years, the gradually increasing importance of the Scotch herring fishery, notwithstanding the fluctuations arising from unfavourable weather and other natural causes. We may add that considerable quantities of herrings which are sold in the local markets and consumed whilst quite fresh, do not appear in the board's returns, but those which are slightly salted for transit by ship to the great markets are so included. The quantities are in barrels, as before.

Abstract showing the total quantity of White Herrings cured, branded, and exported, year by year, as brought under the cognizance of Fishery Officers, from the 1st of June 1809 to the 31st of December 1877; distinguishing the export to Ireland, to the Continent, and to places out of Europe. The periods for which each Return is made end on the 5th of April down to 1844; from that year to 1852, on the 5th of January; and afterwards on the 31st of December; hence two returns were published in 1852. These were no returns for England after January 1850, or for the Isle of Man after January 1869.

<table>
<thead>
<tr>
<th>Periods</th>
<th>Total Cured</th>
<th>Total Brand'd.</th>
<th>Exported to Ireland</th>
<th>To the Continent</th>
<th>Out of Europe</th>
<th>Total Exported</th>
</tr>
</thead>
<tbody>
<tr>
<td>1810</td>
<td>90,995</td>
<td>34,791</td>
<td>29,014</td>
<td>7,834</td>
<td>5,548</td>
<td>5,548</td>
</tr>
<tr>
<td>1811</td>
<td>97,827</td>
<td>40,988</td>
<td>35,912</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1812</td>
<td>111,519</td>
<td>48,493</td>
<td>35,912</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1813</td>
<td>135,408</td>
<td>62,977</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1814</td>
<td>110,542</td>
<td>48,184</td>
<td>35,912</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1815</td>
<td>100,181</td>
<td>45,378</td>
<td>34,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1816</td>
<td>102,934</td>
<td>46,434</td>
<td>35,912</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1817</td>
<td>102,934</td>
<td>46,434</td>
<td>35,912</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1818</td>
<td>124,351</td>
<td>61,872</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1819</td>
<td>129,129</td>
<td>61,376</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1820</td>
<td>130,130</td>
<td>61,376</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1821</td>
<td>130,130</td>
<td>61,376</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
<tr>
<td>1822</td>
<td>130,130</td>
<td>61,376</td>
<td>40,916</td>
<td>9,261</td>
<td>9,261</td>
<td>9,261</td>
</tr>
</tbody>
</table>

The averages for the two years 1857-1866 was much raised by the enormous catch of 79,893 barrels in 1862, whilst the number of 93,804 barrels only being taken in 1874 has materially lowered the average for the last ten years.

The average of the fishery on the whole west coast of Scotland for the last thirty years, taking the average in periods of ten years as before, we find the following:

<table>
<thead>
<tr>
<th>Years</th>
<th>Average Catch</th>
<th>Highest Catch</th>
<th>Lowest Catch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1847-1856</td>
<td>85,837</td>
<td>108,808</td>
<td>56,286</td>
</tr>
<tr>
<td>1857-1866</td>
<td>126,124</td>
<td>173,827</td>
<td>82,218</td>
</tr>
<tr>
<td>1867-1876</td>
<td>156,998</td>
<td>226,087</td>
<td>83,892</td>
</tr>
</tbody>
</table>

The quantities here given are in barrels, as usual; and the figures in this and the preceding return are taken from the statistics carefully compiled by Mr George Rees, assistant inspector under the Board of Fisheries, the dates in column 2 being the commission dates. He had been 27 years in the service of the board, and for the last 14 years the whole of the west coast fisheries had been under his inspection.

There is nothing that enables us to understand the actual condition of a fluctuating industry like our sea fisheries than accurate records of its annual produce. In this respect Scotland, owing to
Garvie or Sprat Fishing.—This is carried on to some extent at the upper end of the Firth of Firth, and in the vicinity of Findon. In the former locality the garvies are caught by the use of trawls (seams), and the principal fishing is on the western side of Inchtavaru. In the Beauty Firth drift-nets are used, and only fish of fair size are taken. Complaints have long been made in both places of the capture of young herring with the garvies, and the herring fishers have done their best to get the garvie fishery put on a footing; but fortunately they have not succeeded, for this fishery gives profitable employment to a good many fisherfolk, and there is not a particle of proof that the herring fishing farther out has suffered from the occasional capture of young herring with the garvies. Sprats are not in much demand in the Scotch markets, and almost all that are taken in the localities mentioned are sent by rail to London. We are sorry to say that the old fallacy of the sprat being nothing but a young herring still prevails among some of the fishermen and their friends.

Line Fishers.—The capture of cod, haddock, ling, and saithe or codfish is general around the coast of Scotland; and the tusk or torsk, a northern species of the cod family, and in shape like a short-bodied ling, is taken in some numbers at the Shetlands, and a few at the outer Hebrides. Lines long are in use for haddock, ling, and tusk, and also for cod on many parts of the coast; but at the Shetlands line longs are employed for cod, saithe, and haddock and codfish. In Shetland, and at Newhaven, Eyemouth, and other places in the neighbourhood in the Firth of Forth, two sizes of long line are regularly worked in the proper season. The smaller or haddock lines have from 800 to 1000 hooks each; or even more, on smocks 14 inches long and 23 feet apart, and muslins and lug worms are used as bait. Some little interest is attached to the state of this fishery, as it is an important one in Scotland, and a few years ago it was said to have fallen off very much. But it appears there are still plenty of haddock on the coast, and that larger and longer decked boats are used, and the fishermen are consequently more independent of weather, very large takes are not uncommon. In one week in January 1876, the Eyemouth boats were at sea six times, and landed 20,000 stones of haddock, which sold at 2s. per stone, producing in that short period no less than £2000. The season lasts here from October to April, and the average gain for the season by each boat usually ranges from £400 to £600. There is a considerable trade in smoked haddock, particularly from Eyemouth, and the curing consists in smoking the fish in pickets for half an hour, and then hanging them for about four hours in some hardwood smoke. The village of Findon, between Stonehaven and Aberdeen, has long been famous for first preparing the fish known as "Finnan haddies." Their peculiar flavour, which has made them so popular, arises from their being hung in picket smoke. They are cured in the cottages, and some little variation in the time in picklet and in smoke is made according to the time they are intended to keep. This manufacture is now carried on at many places besides Findon. The cod or "great lines" are of the same description as those used for haddock lines, but have longer smocks, and the hooks farther apart. It is unnecessary to speak of the manner in which these long-lines are worked, as we have fully described it in our notice of the North Sea cod fishery. A vast quantity of line fish is sent to the fresh market, but the great importance of this Scotch fishery is due to the large extent to which curing operations are carried on, and more especially in the distant districts such as the Shetlands and the outer Hebrides.

Curing is performed in two ways—dry and in pickles. The latter method gives a firm, flat, shining, white fish, and have very little smock and the hooks farther apart. It is unnecessary to speak of the manner in which these long-lines are worked, as we have fully described it in our notice of the North Sea cod fishery. A vast quantity of line fish is sent to the fresh market, but the great importance of this Scotch fishery is due to the large extent to which curing operations are carried on, and more especially in the distant districts such as the Shetlands and the outer Hebrides.

of salt in barrels; but when to be cured dried, these fish, perhaps caught as far off as the Faroe islands or Iceland, and landed at the Shetlands, are unloaded, washed, and spread out either on stages or on the beach, and exposed for some days to the sun and air, due ventilation being given to them to ensure proper drainage. When thoroughly cured, they are kept in a cool dry place, until wanted for shipment. The fish caught near the coast are salted as those, and afterwards treated as the others. The produce of the Shetland fishery is large in itself; but the return of fish cured in those islands is greatly increased by the supplies of fish in pickles landed there for curing by the Grimsby and Shetland smackers, which go every year to Faroe, Iceland, and other more or less distant fishing grounds.

A great deal of the cod and some of the ling go to the Spanish markets, and a little to Australia; but the ling and turbot are chiefly sent to Dublin, Glasgow, and Leith, and the saithe to Belfast, Leith, and Dundee.

Abstract showing the Total Quantity of Cod, Ling, Hake, Saithe, and Tusk, cured and exported, year by year, in so far as brought under cognizance of Fishery Officers, from the 14th of October 1820, when the system for encouragement and improvement of the Cod and Ling Fishery commenced, to the 31st of December 1877. The periods for which each return is made end on the 5th of April, 1844, and from that year to 1853 on the 5th of January, and afterwards on the 1st of December. Two Returns, therefore, appear for 1852 in the tables. The collection of Returns for England ceased from the 5th of January, 1850, when also the Punching and Branding of Cod and Ling came to an end; and there were no Returns for the Isle of Man after January 1860.

<table>
<thead>
<tr>
<th>Years</th>
<th>Cured Cod</th>
<th>Cured Ling</th>
<th>Exported Cod</th>
<th>Exported Ling</th>
</tr>
</thead>
<tbody>
<tr>
<td>1822</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1823</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1824</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1825</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1826</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1827</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
<tr>
<td>1828</td>
<td>1295</td>
<td>2041</td>
<td>7880</td>
<td>2041</td>
</tr>
</tbody>
</table>

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[2] Since the above was in type the Inspectors' Report for 1877 has been published. They state that there has been an apparent decrease of no less than 583 fishing boats and 3303 fishermen and boys since 1875; but, as in previous years, they have been split, gutted, and part of the backbone and the head removed, with layers of salt in barrels; but when to be cured dried, these fish, perhaps caught as far off as the Faroe islands or Iceland, and landed at the Shetlands, are unloaded, washed, and spread out either on stages or on the beach, and exposed for some days to the sun and air, due ventilation being given to them to ensure proper drainage. When thoroughly cured, they are kept in a cool dry place, until wanted for shipment. The fish caught near the coast are salted as those, and afterwards treated as the others. The produce of the Shetland fishery is large in itself; but the return of fish cured in those islands is greatly increased by the supplies of fish in pickles landed there for curing by the Grimsby and Shetland smackers, which go every year to Faroe, Iceland, and other more or less distant fishing grounds. A great deal of the cod and some of the ling go to the Spanish markets, and a little to Australia; but the ling and turbot are chiefly sent to Dublin, Glasgow, and Leith, and the saithe to Belfast, Leith, and Dundee. The best haddock, ling, and cod are taken in the district of Stonehaven, and are cured and exported; the same holds true for the ling and cod at the Shetlands. The fishery at the Shetlands is large in itself; but the return of fish cured in those islands is greatly increased by the supplies of fish in pickles landed there for curing by the Grimsby and Shetland smackers, which go every year to Faroe, Iceland, and other more or less distant fishing grounds.
The difficulty in ascertaining the precise number of boats and fishermen on some of the wilder parts of the coast is so great, however, notwithstanding the important fact that the coastguard is employed in collecting the information, that, as the inspectors tell us, the returns even at the present time cannot be taken as quite trustworthy. There was, however, an apparent increase of 46 craft and 585 fishermen, and this secure certainly the most encouraging report that had reached us for many years. But an analysis of the return shows that this increase is more apparent than real. The inspectors conveniently divide the boats with their crews into three classes independently of tonnage, and this plan enables us in some measure to understand who are included under the head of fishermen. The divisions come under the following heads, and we give the returns for 1875 and 1876 for the sake of comparison:

<table>
<thead>
<tr>
<th>Year</th>
<th>Solely Fishing.</th>
<th>Mostly Fishing.</th>
<th>Occasionally Fishing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1875</td>
<td>1341</td>
<td>6241</td>
<td>609</td>
</tr>
<tr>
<td>1876</td>
<td>1253</td>
<td>6105</td>
<td>644</td>
</tr>
</tbody>
</table>

The total number of boats and men in 1876 was—boats 5906, and fishermen 23,693, being a slight increase in both over the previous year. But there is a falling off in the number of regular fishermen, and the increase is only in those who devote part of their time to fishing. We have it on the authority of the inspectors that the men in the third division, or occasional fishermen, are not employed in that occupation on an average for more than one month in the year, and yet we find the boats in this division form more than two-thirds, and the men nearly the same proportion, of the total numbers in Ireland.

The history of the Irish fisheries shows that great fluctuations have taken place at various times, but the last great decline undoubtedly dates from the period of the famine in 1846, and those who have been long acquainted with the west coast fishermen in particular believe that their present depressed state is entirely the result of that disastrous time. Local assistance has been given time after time with only temporary improvement; and now the experiment is being tried of advancing money from the Irish Reproductive Loan Fund to enable the fishermen to provide the necessary gear for fishing. The applications for loans have been, as was expected, in excess of the amount available for the purpose, and in very many cases no security could be obtained that the money would be expended in the manner proposed. No doubt some good will be done by these loans, but much lasting advantage is not to be expected from the system. Emigration has carried off thousands from the country, and mainly from the west coast, where, however, the majority of the fishermen were little more so than in name, and fishing was never allowed to interfere with sea-weed cutting, farming, and any chance occupation. There is this to be said, however, that on very many parts of the west coast of Ireland the weather is frequently so bad, and the seas so stormy that fishing cannot be carried on with any regularity; and when favourable times arrive, the neglected boats and fishing gear are too often unfit for use.

On the east and south coasts things are in a better condition; important fisheries for herrings and mackerel in their seasons there provide profitable employment not only for Irish fishermen, but for large numbers of Cornish, Scottish, and Welsh fishing boats, which until the last year or two have far outnumbered the native craft. There is plenty of fish to be caught on the Irish coasts; and the

influence of the strangers is telling on many of the Irish fishermen, and leading them to improvement in their boats and all that relates to carrying on their work.

The principal methods of fishing in Irish waters are trawling, drift-fishing, and line fishing; there is also a little done with scows and trammel nets.

Trawling.—Dublin is the headquarters of the deep-sea trawlers, and possesses a fleet of about 50 smacks, ranging from 30 to 50 tons, and working chiefly from that station. Deep-sea trawlers were first used from Dublin in 1818, when, as previously mentioned, some Brixham boats and fishermen were brought over. The fishing was found to be profitable, and the fleet of smacks was gradually increased until it reached its present size. The trawlers work throughout the year when they can get sufficient hands, but the light summer weather is not very suitable for them; and the attractions of the herring fishery and profitable employment on board yachts take away a great many men for several weeks from their ordinary occupation. The principal trawling grounds lie within a triangular space between Dublin and Dundrum Bays and the Isle of Man, and consist of a number of patches differing in shape and extent, which are worked over, either on the inner or outer grounds, according to the season. The Isle of Man ground, lying in deep water, and a favourite place for seamen, is usually fished from March to July. In January there is a partial migration of the trawlers to the south of Ireland, and a very productive fishing place known as the Saltire ground, and about south-west from the Saltire lightship near Waterford, is worked by them with advantage. Further out at sea, at a distance of 30 or 40 miles from the land, and without any very clearly defined limits, is what has long been spoken of as the Nymph Bank. Extraordinary results have been anticipated from fishing this ground, and no doubt there is plenty of fish upon it; but there are difficulties in working it properly, partly on account of the many scattered rocks which interfere with trawling on it generally, and partly because of a want of organization for bringing in the fish and sending them to market. For a long time the greatest difficulty encountered was from the local fishermen, who would not work in a deep-sea trawler, or allow one to use her nets anywhere within the headlands, although the weather was too bad to go outside. Companies have been formed for trawling from Waterford harbour, but the determined hostility of many of the native fishermen, and the fears of others in consequence, have done more to discourage trawling there on a large scale than anything else. English crews have been tried, but it is not surprising that they should be unwilling to remain in a locality where the feeling against them was so strong. Matters seem to have improved of late, but a good deal of enterprise is needed to carry on the fishing in the way in which it might be done. Trawling is worked in the shoaler parts of Waterford harbour by the local fishermen; and the complaint made by them that the large trawlers did so much mischief in destroying the young fry, whilst the small boats habitually worked where the young fish were most abundant, was not too absurd to be listened to by the inspecting commissioner of fisheries a few years ago. A bye-law was therefore established (probably with the object of preserving the peace) to keep the large trawlers beyond a certain depth of water, and the small ones then had it all their own way inside. Under

1 Mr Fraser mentions that in 1726 a proposal was made by Mr William Doyle, hydrographer, for supplying the large English markets with fish preserved in well-boats, from the southern coast of Ireland, particularly from a fishing ground he states he had discovered, unto which he gave the name of Nymph Bank, from a vessel called the "Nymph," which he employed in the examination of this fishing ground.—Review of Domestic Fisheries, p. 4 (1818).
the present more enlightened system of inspection the
 tendency is happilyto remove restrictions to fishing rather
 than to make them; and the results of a systematic search
 for spawn in the Irish bays are reported to have been
 such as to refuse completely the charges brought against
 the trawlers of destroying it.

Drift Fishing.—Two of the most important fisheries in
Ireland are those for herrings and mackerel. That for
herrings is carried on more or less on many parts of the
coast, but its chief seat is in the Irish Channel, with
Howth, the northern point of Dublin Bay, and Ardagh,
opposite the Isle of Man, for its headquarters. The
fishery begins at the end of May or beginning of June, and
lasts well into September, or in some parts into October.
By July it is in full work, and the two stations above men-
tioned are then the scene of unusual life and activity, for
a very large proportion of the fish landed there is at once
packed and sent off fresh to the English and Scotch
markets. A little curing is done at Howth, but it better
answers the purpose of the Irish people to send their own
fish fresh to market, and to import cured fish from Scotland.
The question of introducing the branding system into
Ireland has recently been considered by the inspectors of
fisheries, and inquiries were held on various parts of the
coast in order to find out the general feeling about it. The
inspectors say, however, in their report for 1876:— "With
regard to branding, we felt it our duty to report that under
existing circumstances we were unable to recommend ex-
tension of the system to Ireland—there being, firstly, no
known desire for it existing amongst the Irish fishermen
or curers; and, secondly, that the fish can...in Ireland
and sold fresh realized a much higher price to the captors
than the price received by the fisherim in Scotland and
cured for the foreign markets, and that no material benefit
would therefore really be derived from such extension."

Ireland is in fact well off in having a market across the
channel for any quantity of fresh fish she may send over;
and a large proportion of the herrings and trawl fish caught
on the east coast, and almost all the mackerel taken in the
Kinsale fishery are at once despatched there. The drift
fisheries are, as before mentioned, by no means monopolized
by the Irish fishermen, but are taken part in by a large
number of strangers. The inspectors in their report for 1876
tell us that "the highest number of boats of each country
at Howth during the season was—Cornish 209, Irish 209, Scotch
224, Manx 133. At Ardagh the highest average number that
ditched during one day (23d July) was—Scotch 140, Manx 20, Irish 42, Cornish, 19." Those figures show a slight increase in the Irish boats
over those in previous years. The east coast fishermen
have of late shown many signs of improvement; and the
better boats and steady industry of the Manx, Scotch, and
Cornish fishermen have not been without their use as
examples of how to work the fisheries with profit.

Kinsale has in recent years come into notice as the great
station for the mackerel fishery. This fishery begins early
in March and goes on till about the end of June, thus
immediately preceding the herring season. In 1876 there
were 217 English and Manx boats, 13 Scotch, and 133 Irish
engaged in this fishery, besides more than 60 large French
lugger, the last-mentioned boats salting their fish as soon
as caught, and returning home when they have made their
cargo. The mackerel fishery is a very important one for
Kinsale, as it gives employment, not only to the fishermen,
but to numerous other persons of various descriptions. The
mackerel are almost all packed in ice and sent to England.
During the season of 1876 there were 7 steamers and 11
cutters in this carrying trade—the former at a monthly
expense of £300 to £400 for each vessel, besides paying
duties, coals, and piloteage; and £400 tons of ice were
imported solely for the package of the fish. The mackerel
are packed in boxes containing a "hundred," or six score
of fish in each, and the official returns show a total capture
of 139,083 boxes full in the season of 1876. The prices
ranged from 12s. to £5 per box in the course of the regular
season; but some boats made a large catch afterwards in
July, when there was little demand for the fish, and prices
then went as low as 3s. per 100.

The following is a summary of the quantity of herrings,
mackerel, and cod exported from Ireland to the under-
mentioned places in England during 1876:

<table>
<thead>
<tr>
<th>Fish</th>
<th>Quantity</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herrings</td>
<td>113,995</td>
<td>76,650</td>
</tr>
<tr>
<td>Mackerel</td>
<td>139,083</td>
<td>227,890</td>
</tr>
<tr>
<td>Cod</td>
<td>126,193</td>
<td>165,207</td>
</tr>
</tbody>
</table>

Total value £504,463

It will be seen from the above figures that the Irish
fisheries are by no means wanting in importance, and it is
much to be regretted that the fishermen of the country do
not take a larger share in working them. The produce of
the deep-sea trawl fishery is also very valuable, but we can
give no return of the considerable quantity of trawl-fish
sent to England.

It has been a matter of surprise to many that no system-
atic attempt has been made to catch the large schools of
pilchards which annually visit the south coast of Ireland.
The prejudices of the Irish fishermen against pilchards has
been so great as to almost disincentive the inspectors in their
repeated endeavours to bring this fishery into notice.
Whilst the great Cornish sea fisheries have been languishing
because the shoals of pilchards have not come into the
bays within reach of the nets, they have been in plenty
on parts of the Irish coast. One of the inspectors (Mr
Drakey) has been uncting in his exertions to procure evry
kind of information about the catching and curing of
pilchards in the Cornish fashion, in the hope of its leading
to the establishment of curing stations in Ireland, but
little progress has yet been made. The inspectors, how-
ever, continue to be hopeful in the matter, and in their
report for 1876 they say:—"No efforts have yet been
made to cure for the Continental markets, but some have
been cured for home consumption on various parts of the
cost. By degrees this fish is being regarded with more
favour by the country people, and if they continue to fre-
quent our coast as they have now done for some years,
there is little doubt but that a considerable trade will
result, as they come more into favour."

We have now referred to all the important Irish sea
fisheries. It may be added that line-fishing is more or less
general around the coast, and it is perhaps more systemati-
cally attempted on the north and west sides than else-
where.

Manx Fisheries.—The fisheries carried on from the Isle
of Man do not call for special notice, as they are practically
those of the Irish sea, and in which the industrious Manx-
men always take a prominent part.
FISHERIES

MINOR BRITISH FISHERIES.—Crab and Lobster Fisheries.

—The demand for these crustaceans has increased so much within the last few years that the supply from the coasts of Britain has been insufficient, and from 400,000 to 600,000 lobsters have for some little time been annually imported from Norway. They travel without much loss in vessels fitted with wells; and for journeys lasting no longer than two or three days they will live very well if packed with wet seaweed in boxes. The places from which the principal home supply are sent to the large markets being now mostly within easy reach of railways, there is little occasion to use welled vessels for collecting them.\(^1\)

The English markets are mainly supplied from Cornwall and the south coast of England, from the Orkneys and Shetlands in Scotland, and from the west coast of Ireland. Besides these about 200,000 come from France, the fishery for them being in the neighbourhood of Cherbourg, and a few from Sweden. The means adopted for catching lobsters and crabs in the British Islands are either circular basket-work “pots” with a mouse-trap entrance at the top, or cages covered with netting and with one or two entrances as in the pots. These cages are commonly called “creels.”

Carts are taken in most abundance in the west and south of England, and more or less generally on the east coast, and in Scotland and Ireland, those from parts of Devon and Cornwall being from 40 to 50 feet in length. There is a general disposition on the part of the fishermen to submit to some law limiting the size of both crabs and lobsters to be offered for sale, so as to put a stop to the falling off in these fisheries, which is apparent on some parts of the coast. A close time is objected to, as too short a time in the year is generally suitable, and “berried” lobsters are so valuable for the market that if they had to be returned to the sea the fishermen would lose a great part of their present profits. A limit to the size allowed to be sold seems therefore to be the best means of protecting these fisheries; and such a law is now enforced on the coast of Norfolk.

Shrimp and Prawn Fisheries.—The most important of these fisheries are carried on in the estuary of the Thames, in the Humber, and in the Lancashire coast, but they are more or less general wherever suitable ground is met with. Leigh is the headquarters of the Thames shrimpers. They fish with a net mounted very much like a beam-trawl, but having a long, straight piece of wood at the lower part of the mouth to work over the ground instead of the ordinary ground-ropes. This is in fact like the common form of hand-shrimping net, but so fitted as to be loved instead of pushed. Ordinary trawls are used for prawns or “red shrimps,” and in some other places for true shrimps. The supply of shrimps from Leigh sometimes amounts to 2000 gallons in a day.

Shellfish.—Oysters, Mussels, Whelks, Periwinkles.—The oyster fisheries of the British Islands have been in a failing condition for some years past, owing to a deficiency of spat. The case of which has been the subject of much controversy, not only between rival theorists, but also among practical fishermen. Over-fishing has been regarded by many as the main cause of the decrease, and it may possibly have helped to make matters worse than they would otherwise have been; but it is difficult to explain in this manner the fact that, in England, Scotland, and Ireland, there has been a general failure of spat for some years past, on all kinds of ground and under every condition, in public and private beds, and whether they have been carefully protected, as in the case of old established private companies, or left to the working of the general public, except during a definite close time, more or less enforced. In Ireland, where there are regulations for close time, and restrictions as to the size of oysters allowed to be sold, and where in some cases all fishing has been stopped for two or three years, the decrease of oysters has been as decided as in England or Scotland; and Mr Blake, until recently one of the inspectors of Irish fisheries, and chairman of the oyster commission in 1858, stated in his evidence given before the select committee of the House of Commons in 1858 that the decline in the oyster fisheries was due to the bad spatting seasons, and to the great increase of dredging; “but if the spatting went on as it formerly did, the amount of dredging would not be of much importance.”

The bulk of English supplies is obtained from the oyster beds of private companies, of which the Whitstable company is the most ancient, having worked from time immemorial on their present ground on the south shore of the entrance to the Thames. In 1793 they purchased from the lord of the manor the exclusive right of fishing there. The company is a corporation of fishermen governed by elected members of their own body. The men are paid for the daily work done by them, and each member of the company also receives his share of the profits on the sale of the oysters. A great part of their employment, besides dredging and catching their own ground, is devoted to maintaining the sea. The men are paid for the daily work done by them, and each member of the company also receives his share of the profits on the sale of the oysters. A great part of their employment, besides dredging and catching their own ground, is devoted to maintaining the sea. The men are paid for the daily work done by them, and each member of the company also receives his share of the profits on the sale of the oysters. A great part of their employment, besides dredging and catching their own ground, is devoted to maintaining the sea. In the Thames estuary and the small rivers which flow into it. The oysters thus laid down or bred in these situations become remarkable for the thinness of their shells, and the good flavour and comparatively large size of their contents, and are what are known as “natives.” There are numerous companies or individual proprietors engaged in cultivating oysters on various parts of the coasts, but at the present time they are, we believe, all more or less suffering from deficiency of spat. Channel oysters are generally large and coarse, and do not fetch more than one third of the price given for the more delicate “natives.” Attempts at the artificial cultivation of oysters have not met with much success.

Mussels and whelks, while in some request for food among the lower classes, are in especial demand for the purposes of fish-bait, and the value of mussels in this respect has recently led to a more careful protection of the older banks, and some attempts at the cultivation of new ones. Whelks are particularly valuable in the North Sea cod fishery, and a number of vessels Grimsby are regularly engaged in fishing for them. A mode of catching them is by means of shaw or hoop-nets baited with refuse fish, and sunk to the bottom on suitable banks, in which the winkers collect in large numbers, and are caught without any difficulty. A considerable supply is also obtained from the oyster dredgers; and at the mouth of the Thames they are caught largely by using “trot” or builers—long-lines of small dimensions; but instead of having baited hooks, they have common small wire-hooks threaded on the strings, about twenty on each; these are seized by the winkers and so firmly held whilst being taken that the line may easily be hauled in without disturbing the numbers found on every moor. Periwinkles are all procured between tide marks, and are of course collected by hand. The London market is mainly supplied from the western islands of Scotland, the Orkneys, the Shetlands, and parts of the Irish coast.

\(^1\) Report of Commission on Crab and Lobster Fisheries, p. ii. (1877).
British North American Fisheries—The principal fisheries coming under this head are for cod, herring, and mackerel, including the long-famous cod fishery of Newfoundland. The fisheries of the Dominion of Canada are chiefly carried on with open boats, and consequently are to a great extent, though subject to some variation, what may be called shore fisheries. The proportion, as given by Professor Hind, of the shore fisheries to the deep-sea fisheries, in which decked vessels are employed, is 4 to 1, i.e., that "by far the largest proportion of the fishing industry of the Dominion is pursued in coastal waters, and much of it extends beyond the point of three marine cables from the coast." The following table shows the number of boats and vessels, with the aggregate number of men employed in each, in 1876:

<table>
<thead>
<tr>
<th></th>
<th>Boats</th>
<th>Men</th>
<th>Vessels</th>
<th>Mem.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nova Scotia</td>
<td>9,585</td>
<td>18,603</td>
<td>633</td>
<td>6,049</td>
</tr>
<tr>
<td>New England</td>
<td>6,550</td>
<td>7,422</td>
<td>406</td>
<td>1,794</td>
</tr>
<tr>
<td>Quebec</td>
<td>5,815</td>
<td>10,777</td>
<td>256</td>
<td>1,219</td>
</tr>
<tr>
<td>Prince Edward Island</td>
<td>901</td>
<td>3,831</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20,241</strong></td>
<td><strong>40,928</strong></td>
<td><strong>1,997</strong></td>
<td><strong>9,097</strong></td>
</tr>
</tbody>
</table>

In the Newfoundland fisheries boats and vessels are also used, but the deep-sea fishery is scarcely distinct from that pursued in coastal waters, or within the three-mile limit from the shore. The total number of boats employed at Newfoundland in 1874 was 18,611, and the number of persons engaged in catching and curing fish 45,854, while the number of vessels was 1197, with an aggregate of 61,561 tons, and manned by 8394 fishermen sailors. These vessels, however, include the large number used for sealing. The proportion of "fishing rooms" or portions of the shore set apart for the curing and storing of fish was 8902 in the same year. The numbers of fishing craft, men, and fishing rooms in 1874 showed a considerable increase over those for 1869. Professor Hind, in speaking of the large proportion of indolent fishing, says:—"The more ease and comfort of the fishermen, conjointly with the abundant fish resources of the coastal waters, have combined to limit the industry of the British American fishermen in a great measure to the immediate vicinity of the shore line, and within easy reach of harbours. This is particularly the case with Newfoundland." This inshore fishery, however, depends for its success on the supply of bait fishes, especially the capelin and herring; and, as in every kind of fishery, there are years when migratory fish, those which more or less change their quarters at particular seasons, vary in abundance in certain localities, and sometimes for some time remain in one part of a coast and go to another, so the important fisheries dependent on these movements are subject to fluctuations. The cod, in fact, there follow the bait-fishes precisely as, on the English coast, the cod and mackerel become most numerous near the land when the schools of herrings come close in. On the coasts of British North America the fishing interest is almost entirely concerned with species whose natural habitat is in cold waters; and an immense area of fishing water is there influenced by the Labrador current, it is not surprising that cod, halibut, herring, mackerel, and others should be found in abundance on these coasts. The mackerel has also an extensive range south along the coast of the United States; but the Labrador current is little felt south of Cape Cod, its influence being there almost destroyed by the Gulf Stream. The really cold-water species are therefore mainly found in the Dominion seas; and the fact that American fishermen so systematically work them is the ground on which the Dominion claim for compensation from the United States Government was based. The sum recently awarded to the colony by the arbitrators is much less, however, than the amount of the claim.

The methods of fishing in use in the Dominion and Newfoundland waters are of the same kind as in the British Islands, with the exception of beam-trawling, which seems to be practically unknown on the American coasts. Herrings are taken by drift-nets, anchored nets, and seine; mackerel by seine and hook and line; capelin by seine; and cod and its allies by long lines or buoys—there, strange to say, known as "trawls."

Professor Hind states (at p. 58 of pt. 1 of his report) that the aggregate number of barrels of herrings caught in the Dominion and Newfoundland waters in 1874 may be put down at—

<table>
<thead>
<tr>
<th>Waters</th>
<th>Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dominion</td>
<td>583,307</td>
</tr>
<tr>
<td>Newfoundland</td>
<td>271,282</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>854,589</strong></td>
</tr>
</tbody>
</table>

This number does not include the quantities used for manure or bait; and he adds:—"A million barrels of herring each year, and gradually increasing, will fairly represent the quantity of this fish taken from British American seas." In the same year 164,879 barrels of mackerel were taken in Dominion waters, of which 80 per cent. were caught on the coast of Nova Scotia. The mackerel fishery at Newfoundland appears to have been very small for some years; and the fishermen do not now seem to be well provided with the means of catching them; but there is reason to believe that this fishery might be largely increased in the Dominion waters if more attention were given to it. There is a very great demand for mackerel in the American market. The Newfoundland and Dominion cod fisheries are, as we have mentioned, almost entirely inshore fisheries, and the abundance or scarcity of capelin or other fishes there used as bait materially affects the success of the fishery, for if the bait fishes do not come inshore, there is no attraction for the cod. In the deep-sea fishery on the banks, the case is different; but they are almost neglected by the Dominion and Newfoundland fishermen, for reasons previously stated. The produce of the inshore cod fisheries, although fluctuating, shows no signs of being exhausted. The following table, it is believed, represents with tolerable accuracy the catch of cod and allied fishes on the Dominion coasts in the years stated:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quintals</th>
<th>Year</th>
<th>Quintals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869</td>
<td>790,928</td>
<td>1873</td>
<td>1,405,804</td>
</tr>
<tr>
<td>1870</td>
<td>805,533</td>
<td>1874</td>
<td>1,275,499</td>
</tr>
<tr>
<td>1871</td>
<td>904,101</td>
<td>1875</td>
<td>1,195,579</td>
</tr>
<tr>
<td>1872</td>
<td>1,072,977</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The export of dried cod in quintals from Newfoundland in the years 1869-1876 was:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quintals</th>
<th>Year</th>
<th>Quintals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1869</td>
<td>1,204,086</td>
<td>1873</td>
<td>1,395,205</td>
</tr>
<tr>
<td>1870</td>
<td>1,232,257</td>
<td>1874</td>
<td>1,609,724</td>
</tr>
<tr>
<td>1871</td>
<td>1,158,726</td>
<td>1875</td>
<td>1,138,255</td>
</tr>
<tr>
<td>1872</td>
<td>1,221,166</td>
<td>1876</td>
<td>1,204,086</td>
</tr>
</tbody>
</table>

The British American fishery for lobsters is of some importance, and cod rose and liver are among the valuable articles of export.
The French fisheries at Newfoundland are carried on both on the banks and near the island, the craft employed being of various sizes, ranging from vessels averaging about 170 tons down to open boats. The following table gives the number of craft of all kinds and the total number of men in each year from 1867 to 1874:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1867</td>
<td>390</td>
<td>775</td>
<td>1870</td>
<td>390</td>
<td>775</td>
</tr>
<tr>
<td>1868</td>
<td>177</td>
<td>663</td>
<td>1871</td>
<td>380</td>
<td>760</td>
</tr>
<tr>
<td>1869</td>
<td>166</td>
<td>645</td>
<td>1872</td>
<td>378</td>
<td>755</td>
</tr>
<tr>
<td>1870</td>
<td>333</td>
<td>697</td>
<td>1873</td>
<td>375</td>
<td>750</td>
</tr>
</tbody>
</table>

Of the numbers of fishing craft here given about 70 per cent. are boats. The product of the French Newfoundland fishery in 1872 was said to be 10 million francs.

UNITED STATES FISHERIES.—These may be divided into warm-water and cold-water fisheries, the latter being for the most part carried on in British American waters. The cod fishery, formerly prosecuted off the coast of New England, in the cold water north of Cape Cod, is said to have seriously decreased, and it is believed by Professor Baird, the commissioner of fish and fisheries, that the fishery is largely due to the diminution of alewives and other bait-fishes, caused by the numerous dams and obstructions in the rivers in which these fishes are accustomed to spawn. The young fish formerly produced in such myriads are now said to be comparatively few, and the cod and allied fishes consequently have less food to attract them to the old haunts. As there is no reason to suppose that the cod, as a species, is diminishing in numbers, the conclusion obviously is that they are seeking other feeding grounds. The warm-water fisheries include the pursuit of a majority of fishes, but the "scup," a kind of bream, and the "blue-fish," both migratory species, are those whose capture is thought of most value. Although almost all the shore fisheries are said to be deplorable, Professor Baird, in his elaborate reports to the United States Government, does not seem to be quite clear as to an effectual remedy. The pounds and weirs are said to be very destructive to spawning fish, but they supply a large quantity of fish to the markets. The course of the American coast appears to be the blue-fish, destroying ten times as many fish as they really need for food, and leaving in their track the surface of the sea covered with the blood and fragments of the mangled creatures. Professor Baird estimates that in 1871 there were 100 million of these fish on part of the American coast, and that each one destroyed twenty fish per day; and as the blue-fish season lasts from 120 to 150 days, some idea may be formed of the extent of the mischief caused by them. Fortunately the blue-fish is in great request as an article of food, and about a million and a quarter were captured in 1871, or, as estimated, one in a hundred of those on the coast. The blue-fish Professor Baird assigns the very first position among the injurious influences that have affected the supply of fish on the coast. The agency of man he places next—the pounds and weirs along-shore catching spawning fishes, and the dams and other obstructions in the rivers preventing certain species from ascending to their proper spawning grounds. He proposed to limit the working of the pounds and weir to a certain number of days in each week, and to do away as much as possible with the river obstructions. The blue-fish is beyond control.

The estimated value of the United States sea fisheries in 1876 was:—

<table>
<thead>
<tr>
<th>Class</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warm-water</td>
<td>$3,274,138</td>
</tr>
<tr>
<td>Cold-water</td>
<td>$2,754,373</td>
</tr>
</tbody>
</table>

The comparative value of the cold-water fisheries of the United States and of British North America for the years 1870–6 is shown in the following table:—

<table>
<thead>
<tr>
<th>Year</th>
<th>United States</th>
<th>British North America</th>
</tr>
</thead>
<tbody>
<tr>
<td>1870</td>
<td>$5,315,497</td>
<td>$14,250,268</td>
</tr>
<tr>
<td>1871</td>
<td>11,402,410</td>
<td>16,096,081</td>
</tr>
<tr>
<td>1872</td>
<td>9,506,647</td>
<td>16,524,844</td>
</tr>
<tr>
<td>1873</td>
<td>8,545,155</td>
<td>16,723,563</td>
</tr>
<tr>
<td>1874</td>
<td>9,625,589</td>
<td>15,193,214</td>
</tr>
<tr>
<td>1875</td>
<td>10,747,579</td>
<td>16,193,214</td>
</tr>
<tr>
<td>1876</td>
<td>9,754,883</td>
<td>16,707,928</td>
</tr>
</tbody>
</table>

The oyster fisheries of the United States are on a very large scale, and the coast line generally appears to abound with suitable localities for the production of these favourite mollusks. The oysters are all of a more or less elongated form, and of large size, sometimes growing to a length of 12 or 15 inches. They are obviously more suitable for cooking than for consumption in a natural state; and it is therefore not surprising that they are unable to compete with the favourite "native" oysters of the English market. The trade in oysters in the principal cities of the United States in 1859 was estimated as follows:—

Virginia (State).......
Baltimore...........
Philadelphia........
New York...........
Fair Haven...........
Other cities.........

<table>
<thead>
<tr>
<th>State</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virginia</td>
<td>1,050,000</td>
</tr>
<tr>
<td>Baltimore</td>
<td>8,500,000</td>
</tr>
<tr>
<td>Philadelphia</td>
<td>2,500,000</td>
</tr>
<tr>
<td>New York</td>
<td>6,500,000</td>
</tr>
<tr>
<td>Fair Haven</td>
<td>2,000,000</td>
</tr>
<tr>
<td>Other cities</td>
<td>4,000,000</td>
</tr>
</tbody>
</table>

Total: 20,000,000

NOBREIAN AND SWEDISH FISHERIES.—The important fishery of Norway is that for cod, and the special seat of it is at the Lofoden Islands. In 1876 the fishery was very successful, more than 22 millions of fish having been taken, a larger catch than in any previous year since 1860, excepting 1875. Of this number about 16 millions of fish were salted, and most of the remainder dried. The average price on the spot was 61, 6s. 8d. per 100. The Finmark cod fishery in the same year fell off very much, as will be seen by the following returns for the years 1872–6:—

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1872</td>
<td>11,500,000 cod.</td>
</tr>
<tr>
<td>1873</td>
<td>10,000,000</td>
</tr>
<tr>
<td>1874</td>
<td>12,500,000</td>
</tr>
<tr>
<td>1875</td>
<td>10,750,000</td>
</tr>
<tr>
<td>1876</td>
<td>9,500,000</td>
</tr>
</tbody>
</table>

The catch of Norway mackerel in 1876 was 1,800,000 fish, and the estimated produce of the herring fishery in that year was 400,000 barrels; but the spring or winter herring disappeared about 1874, and the market has since been supplied with the large northern herring. A remarkable instance of the capricious movements of the herring

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1 Report on Newfoundland and Labrador Fisheries, 1875, by Captain Erskine, R.N.
2 Professor Baird says at page 19 of Part I. of his Report,—"It is by no means to be inferred from our remarks as to the scarcity of fish that fewer are actually caught now than formerly at any time, the contrary, perhaps, being the case, since by means of the improved methods of capture, in the way of pounds and nets, an immense supply is taken out at certain seasons of the year, so as frequently to glut the markets. The scarcity is better shown by the great difficulty experienced by fishmen in securing a proper supply throughout the year, on grounds where they were formerly able to catch all they needed for their own use and for sale."
has just been reported by Mr F. W. Duff, the British consul at Gothenburg, to the Foreign Office. He states that "great shoals of herrings of the large kind which disappeared from this coast in 1809 have now made their appearance again north of Gothenburg, on the coast in this country. The first appearance of the herring took place at Christmas (1877), when whales were seen following the shoals of herrings towards the coast." This is by no means the first time that herrings have returned to a particular locality after an interval of very many years.

**FRENCH AND DUTCH FISHERIES.**—The French fisheries on the coast of the Channel are of much the same kind as those on the English side—trawling, drifiting, and line-fishing. Trawling is carried on to a considerable extent from Boulogne, Tréport, Calais, and some other places where there is convenient access to railways; and recently two companies have been established for trawling with steamers along the sandy coast between Arracan and the mouth of the Gironde. On the coast of Brittany the long-standing fishery for sardines, or, as they really are, young pilchards, is regularly worked. It is remarkable that this fishery is almost entirely dependent for its success on a good supply of cod, especially in the part of the tramp with which Norway and other places is carried on solely for this purpose, the separated ova of the cod being freely scattered among the sardine nets in order to attract the fish. French and Dutch vessels work regularly in the North Sea for herrings and cod, and the French fish in large numbers along the east coast of England in company with English boats during the herring season. They also take part in the Kinnaol mackerel fishery.

The French fisheries at Newfoundland have been already noticed; considerable attention is also given by the French to the cod fishery at Iceland. About 200 French vessels visited Iceland in 1877, and during the five years 1872-6 the average annual produce of about 120 vessels from Dunkirk alone was 5 million kilos. of fish, and of oil about 500,000 kilos.

The French oyster fisheries have for many years received considerable attention, and at Arracan especially great success appears to have attended the cultivation of the beds. Eighty-five per cent. of the oysters obtained from these fisheries are said to be the product of four or five breeding grounds, Auray and Arracan being the most prolific. The total produce of all the French oyster fisheries in 1875 reached the enormous number of 57,227,000 oysters.

**ECUADOR FISHERY.**—On the French and Italian coasts of the Mediterranean the espine or sea-eggs, animals belonging to the echinoderm or star-fish tribe, are regularly collected for the market, and are in great request among the poorer classes of the population. They are eaten uncooked, the egg-shaped spiny shell being divided into two parts by a single cut with a knife, and the soft and slippery contents then readily extracted. The echinii form part of the various marine productions well known at Naples as frutti di mare.

**Tripang Fishery.**—The tripang or têche de mer belongs to the order Holothuridea or sea-cucumbers. Representatives of the group are found in British seas, but by no means so abundantly or of such general large size as in tropical waters. Several species go under the commercial name of "tripang"; they are collected among almost all the islands of the Indian Archipelago down to New Guinea and Australia, and also on the north coast of Ceylon. In shape the tripang resembles a cucumber, but with a "head" of short branched tentacles at one end, and surrounding the mouth. The colour is generally black, more or less variegated with red or orange, and although sluggish in its movements, the animal has great power of contracting and altering its form. Coral reefs are favourite haunts of the tripang, and it is found in both deep and shallow water. The only preparation it receives after being gutted consists in drying in the sun and smoking over a wood fire.

**MUSSELS,** 

French Net.—Mussel netting, or rather mussel catching, is a very old art in France. The mussel is caught by means of a net of a particular construction called the "French net." When the course of a river is obstructed by the growth of weeds, the mussel catchers throw across the channel a French net, and by means of a paddle work it down to the bottom of the river, and when the weed is over the mouth of the net they fasten it to a pole fixed in the bottom of the river. The mussels then attach themselves to the mesh of the net, and in this way the bed of the river is cleared of weeds, and the mussel catchers obtain a large quantity of mussels. This art is extensively practised in the channel of the Seine, and the mussels obtained are chiefly used as fish bait. They are also exported to Great Britain, and are chiefly used for fish bait in the fisheries of the Thames and Severn.

**Law relating to Fisheries.**

Fish in English law fall under the general principles of the law as to animals from nature. All mankind, says Blackstone, had by the grant of the Creator an original right to pursue them; and this natural right still continues unless so far it is restrained by the civil law. Accordingly everybody has a right to take fish in the sea, in public rivers, or in private rivers belonging to himself. In private (i.e., non-navigable) rivers the right of fishery belongs prima facie to the owners of the land on either side, in public or navigable rivers to the public at large. In short, however, an exclusive right of fishery may exist, by which the presumptive right is excluded; and this, in the case of public rivers, can only take place by grant of the crown. Since Magna Charta the crown can no longer make such grants—at least such seems to be the better interpretation of the words in the statute.

These various rights are more or less roughly distinguished in English law as follows. A common fishery is the right of fishing in the sea and public rivers open to all the subjects of the realm, and the several entries of the crown are the exclusive right of an individual, derived through or on account of ownership of the soil. A free fishery is an exclusive right of fishing in the public water, derived from royal grant. A limited entry of the crown in every case is the right of fishing "in another man's water," like common pasture, &c. These rights include fish of all descriptions, with this exception that the crown has an old prerogative right to the whale and sturgeon, which, "when thrown ashore or caught near the coast, are the property of the sovereign on account (as it is said in the all of) their superior excellence. A curious distinction is made between the whale and the sturgeon—De auro stirpe argentum quae rex illium habet integrum; de belone vero suffixit et reas habet caput et regina cordum."

As to the mode in which fish may be caught there does not seem to be any restriction at common law. It is a question, however, whether a "by which means a fixed structure on the bed of the river, the object of which is, either by means of an apparatus which then catches them or by impeding their progress, to prevent all or nearly all the fish from passing upwards," is not illegal at common law. In the case of a public river a structure of this sort would be objectionable on the ground of its impeding the navigation, and in a case relating to the River Severn the judges held that the crown could not derogate from the public right of navigation by any grant to erect works in a public river. The legal writer from whom we have quoted above, while stating that no case had arisen directly on the point in England, Scotland, or Ireland, is of opinion that "both wares and fixed nets, and all other exercises or prevent fish passing or to or fro are illegal at common law and form a good ground of action," even although they may not obstruct navigation.

"Though one riparian owner may, by fishing by net or seine, or by other means, prevent fish from passing up to or down, if the method used up the fish as effectually as by keeping fixed nets, this kind of user could not properly be a cause of action, just as one owner who has a large number of cattle could not be liable to an action at the suit of another who has no cattle, and so makes no use of the water. But it is otherwise where a total obstruction occurs. Hence, even independently of any statute, any fixed apparatus in a river or stream which prevents the fish going up to the other riparian owners is a good cause of action at common law, as it deprives him of one of the natural riparian rights."

A considerable number of statutes have been passed on the subject of fisheries, the most important of which are those relating to salmon.

A short Act was passed in 1870 enabling boards of conservators to fix a close term for trout, commencing not earlier than 2d September, nor later than 2d November, and extending over 123 days. A bill for the protection of freshwater fish has passed through parliament during the present session (1878). Sections 8 and 9 of the Salmon Fishery Act 1871 (which relate to fishing with light spears and other prohibited instruments, and to the use of a bait), as amended by the subsequent Salmon Fishery Acts, apply to trout and char in all waters within the limits of the Act, which are the same as the limits of the Salmon Act for other freshwater fish, not migrating to or from the open sea. A close season is established from 1st March to 31st May, both

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1 Commercial Reports, No. 2, 1878 (Herring Fishery).
2 Consular Reports, part v., 1877.
3 See a Report by Major Hayes to the Lord Lieutenant of Ireland, 1878, which contains an immense amount of valuable information.

Inclusive. Fishing for or dealing in freshwater fish during this
close season is subjected to a penalty not exceeding 40s. for the
first or £5 for the second offence, recoverable on summary con-
viction before two justices. The Fisheries (Density) Act is
extended to private waters.

The Act 49 and 50 Vict. c. 62 is an Act to amend the law
relating to the fisheries of oysters, crabs, and lobsters, and other
sea fisheries. The sale of oysters is prohibited, in the case of
"deep sea oysters," between 15th June and 4th August; in
other cases between 14th May and 14th August. Oysters taken
in foreign waters, or preserved in tins, or intended for the purpose
of oyster cultivation are not within this section. The Board
of Trade has power to temporarily prohibit or restrict dredging for
oysters on certain banks. Oysters measuring less than 4½ inches
across the back, or carrying spawn attached to the tail, &c., or
having recently cast the shell may not be sold, except for bait.
Lobsters measuring less than 8 inches "from the tip of the back to
the end of the tail, when spread as far as possible flat," may not
be sold. Oysters are also specially dealt with by the "Sea Fisheries
Act, 1868," which is an Act to carry into effect a convention between
England and France concerning the fisheries in the seas adjoining
the British Islands and France, and to amend the laws relating to
British sea fisheries.

International Law.—As between different nations, fishing in the
high seas is common to all, while fishing in the territorial waters of
any particular state (i.e., within three miles of the coast) is limited
to the subjects of that state. Between France and England the
rights of fishing in the seas adjacent to both countries are regulated
by the convention and Act of Parliament cited above. Between
England and the United States questions of great importance have
arisen as to their respective rights of fishing in North American
waters. Mutual concessions were made by treaties in 1818, 1804, and
1871. The last was the Treaty of Washington, by which "the in-
habitants of the United States are to have in addition to their rights
under the treaty of 1818, in common with British subjects, for ten
years from the date of the treaty and until the end of two years after
notice has been given by either party, the right to take fish of every
kind except shell-fish on the sea coasts and shores, and in the bays,
harbour, and creeks of the provinces of Quebec, Nova Scotia, and
New Brunswick, and the colony of Prince Edward's Island, and of
the several islands thereto adjacent, without being restricted to any
distance from the shore, with permission to land upon the said coasts
and shores and islands, and also upon the Magdalen Islands for the
purpose of drying their nets and curing their fish." Salmon and
shad fisheries and all other fisheries in the rivers and mouths of rivers
are reserved for British subjects. Exactly similar rights are granted
to British subjects on the eastern sea coasts and shores of the United
States north of the 39th parallel of north latitude. But inasmuch as
the English Government insisted that the privileges granted to the
United States were of greater value than those conceded to England,
it was agreed that commissioners should be appointed to determine
the amount of any compensation which ought to be paid to the
English Government in consideration of such excess. The
commissioners have recently made an award finding the sum of
£2,000,000 to be due from the United States to England. Certain
places designated in the abrogated treaty of 1854 are to be excepted
from the operation of the treaty as "places reserved from the com-
mon right of fishing."