

# TRAWLING FOR SCIENTIFIC PURPOSES.

BY ALEXANDER MEEK, M.SC.

IT has been the fate of this country to take a leading part in imposing restrictions affecting the fisheries around our coast. From the time that licences were granted to enterprising Dutch fishermen, as far back as 1609 and 1636, arrangements have been made at various periods with our foreign neighbours with respect to in-shore fishing, culminating in the North Sea Convention of 1882. This convention, entered into with France, Belgium, Holland, Germany, and Denmark, gives to each of these "North Sea Powers" the exclusive right to the fishing in its own in-shore waters within what is defined as the "three mile limit." Norway and Sweden, however, claim a four mile limit from a line drawn outside the islands and also the right to the important cod fishery of the Lofoden Banks.

The international convention did not put a stop to the complaints of the line fishermen as to the scarcity of fish. The complaints were now directed against the home trawlers. They were accused of destroying the spawn, the young, and the food of the fishes in the in-shore waters. As a result of this, and for want of evidence to prove the contrary, Scotland began to close local areas to trawlers for experimental purposes, and this led the way to the general shutting out of the trawlers from the three mile limit practically all round this country.

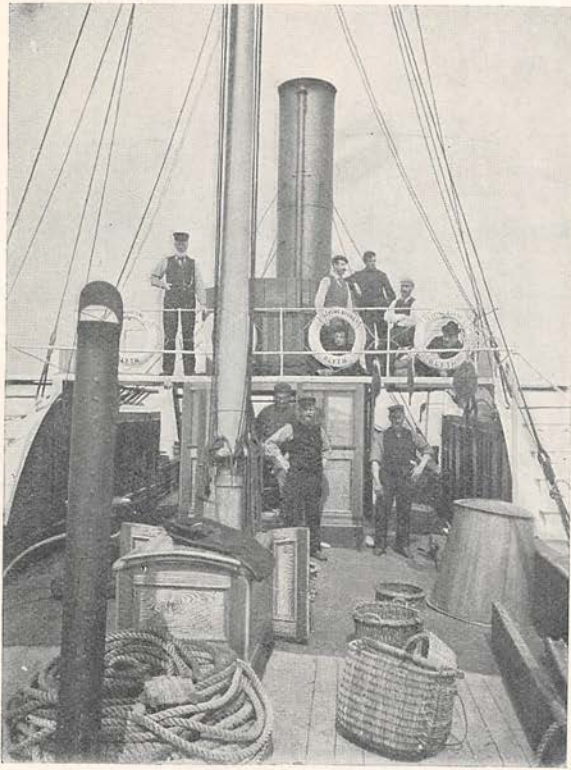
The attention of naturalists at home and abroad was more and more being directed to the alleged diminution in the supplies of fishes. Surprisingly little was known not so many years ago, and speculation often took the form of groundless assertion. Opinions were many and facts were few. But so much has been done in recent years that we can now state very clearly the life-histories of our more important fishes.

Experimental work has heaped up facts and figures showing the effects of closing the in-shore waters to trawlers, and leading to a better understanding of migrations and spawning grounds.

The usefulness of this work, though it was tardily recognised, led to the establishment of marine laboratories at different parts of our coast. This country, moreover, can now boast of two hatcheries — one started at Dunbar in 1894, but which is now being removed to the Bay of Nigg, near Aberdeen,

and the other recently opened at Piel Island, off the coast of Lancashire. The establishment of hatcheries is plainly a confession that the seas are being overfished and indicates one way in which many naturalists and experts believe they may be, to some extent, replenished.

In the laboratories the problems of hatching, development and growth, the food of fishes, together with questions relating to their habits and the living forms associated



ON BOARD THE "LIVINGSTONE."



with them, are being freshly illumined by discoveries made every year, whilst at the same time trawling experiments have been conducted to try to demonstrate whether a diminution was actually taking place or not, and to take a share in the biological and physical investigations.

Comparative trials have been made in Scottish waters for the last twelve years in closed and open seas, and show that the closing of the in-shore waters to trawlers is certainly not conferring the benefit anticipated. Without entering into detail it may simply be mentioned that Lancashire has more recently thrown itself into the work of experiment, and a few trials have also been made in connection with the Marine Laboratory at Plymouth.

The Northumberland Sea Fisheries Committee have conducted a series of trawling excursions every year since 1892. The territorial waters on the



READY!



STEADY!

coast of Northumberland were closed to trawlers in 1891, so that the figures obtained for each year illustrate what changes have occurred as a result of preserving these waters. They show recently a slight improvement, but the improvement is not nearly what we should expect if all that

was said about the three mile limit had been true.

But the fact is, the in-shore areas are not what they were supposed to be. Far from providing a shelter to spawning fish, there are very few valuable fish, indeed, which spawn even partially within the limits. The trawler, moreover, cannot harm the ova of the common food fishes, for we now know that, with the exception of the herring and the catfish, if that can be called a common food fish, all these extrude eggs which float. In-shore areas are, therefore, of little or no benefit as a protection to spawn or to spawning fish. Contributing as they do to the



NOW!



fish supply of the open area outside them, they share in the general diminution which overfishing may give or has already given rise to. But it must be remembered that they do protect the young and many adults as well. It is not quite right to say, then, that the three mile limit is an absurdity. It has done good service in that it is an area entirely closed to a particular kind of fishing.

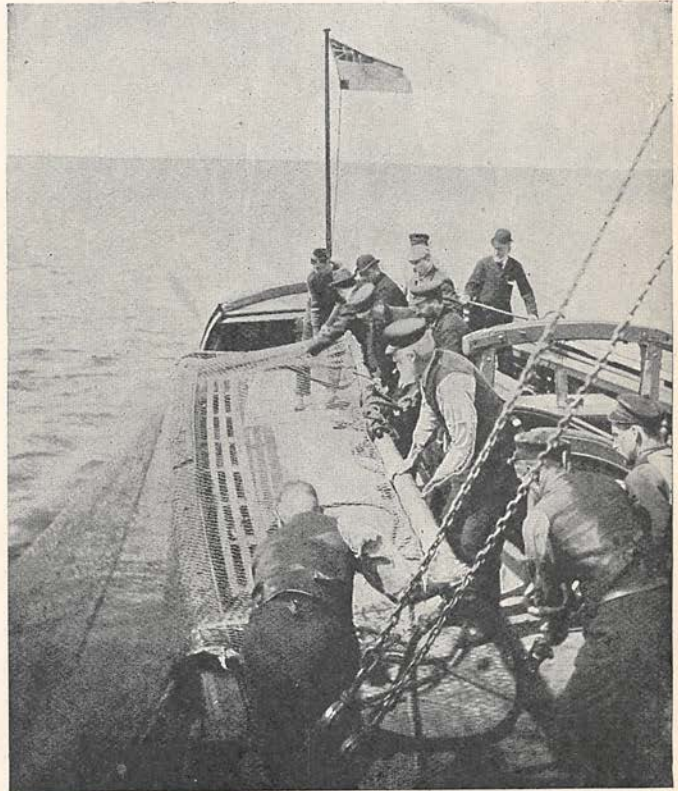
Let my reader now consider himself or herself (for ladies sometimes accompany us when the weather is suitable) invited to be one of our party on the day of one of the Northumberland trawling trips. We find when we get to the harbour at Blyth that the *Livingstone* is ready for starting, and as our companions have all arrived we accompany them on board. We are soon clear of the harbour, and head out to sea to round the "Sow and Pigs" buoy. Let me whisper that name, for we must not let Bob the engineer hear us mention it, else he'll be anticipating disaster the whole day. There is a superstitious notion among fisher people along this coast, that if they see or hear of a pig, it is a sign that the day's fishing will be a failure, or that some misfortune will happen. It has had the effect, I believe, on several occasions of keeping the fishermen at home.

The neat little trawl lying on the deck has a beam of 22 feet. There are two curved iron ends which run along the sea bottom like the runners of a sledge. They are connected at the top by the wooden beam. The large net is conical in shape. The upper part of the broad end is fastened to the beam and the lower half is weighted, usually with a heavy, thick rope, and hangs free, so as to drag along the bottom. You can clearly see, then, that when the trawl is being drawn along by the steamer the front end is like a great open mouth ready to receive the unwary fish. The net is provided with pockets also, which are designed to receive such of the more vigorous as may attempt to escape, and the "cod" end can

be untied, so as to liberate the fish when the trawl is brought on board again.

We reach the bay, which is to be the scene of to-day's experiment, and the trawl is soon at its work on the bottom. Some of us during the time it is down get out fishing lines to fish for gurnards; or, if the day be warm, we may, as may be seen on page 537, indulge in an impromptu douche.

But sooner or later, according to the size of the bay, the notice is given to haul in the trawl. A steam capstan brings it to the



ON DECK AGAIN.

surface, and then the gentlemen find that if they are getting a day at sea, they are expected to help in hauling the trawl on board. Many hands make light work, and there is a race to see which end will be up first. The net containing the fish is then drawn on board and a scene of excitement ensues until the fish are sorted out and the trawl returned once more to the sea. Besides fish which can be kept, a large portion of the contents consists of young fish which must be returned to the water without delay. It is gratifying to find when they are swept overboard that



they swim away at once, evidently none the worse for their journey in the trawl and their visit to the deck of the steamer.

spawning time draws to a close usually about the end of spring; and during spring, especially after a strong easterly wind or storm, we can get quite a quantity of the ova of the cod, haddock, whiting, and other food fishes in in-shore waters.



EXAMINING THE SPOIL.

Among fish that are valuable from a domestic point of view are "other fish," which are chiefly interesting to the naturalist—such are the anglers, the spiny dogfishes, the stinging fishes or weevers, and specimens of many a rare marine animal.

While all this is going on little nets are being towed along on the surface, and another is attached to the beam of the trawl. These are made of a strong muslin-like material—"wireine" in this instance. The mouth of each is fastened to an iron hoop, and the other pointed end is tied round the neck of a bottle into which the minute organisms are swept.

The contents of these tow-nets are a never-failing source of interest to everyone on board, whether scientific or not. Minute crustacean life in abundance, beautiful pulsating medusoids, those transparent globular forms known scientifically as *Pleurobrachia* and their allies *Lesueuria*, with comb-like lines of cilia flashing in iridescent splendour, are among the specimens we see crowded together in our small bottle. But more important and none the less interesting are those small spheres scarcely to be distinguished in the water. They are the floating ova of some of the fishes. We do not get many of the valuable fishes' eggs so near the shore as this. Their

of the bottom and also for catching life on rougher ground. That board ruled in inch squares like a draught-board is used for

ago, and Herdman proved more recently on board an Atlantic liner, the surface life when cooked makes really good and palatable food. With all this work going on the deck of the steamer presents a rather curious spectacle. Here we have bottles containing the living specimens in sea water, which are to be taken to the Marine Laboratory at Cullercoats, and reagents for killing and preserving such as seem valuable enough for investigation. A small dredge is used for obtaining a sample



A COUNCIL OF STATE.

of the bottom and also for catching life on rougher ground. That board ruled in inch squares like a draught-board is used for



measuring the fish, whose food and condition as regards maturity are determined at the same time. Such are some of the things and doings around us as the steamer passes slowly up and down the bay. And when we lift our eyes from the scene on the steamer, we might still extend our description, for on the water itself we have such diving birds as the guillemot, razor-bill, and the yellow-billed puffin; cormorants, solan geese, and flocks of ducks often fly past us, not to mention the gulls and terns which appeal to our ears as well as our eyes. Sometime during the day we have passed through or come near a school of porpoises or dolphins.

As the naturalist department is getting together its statistics and material, some one naturally asks, "What are you going to do with all this?" The answer would be easier if the inquirer could look into the laboratory at Cullercoats on the following day. The floating or "pelagic"

eggs have to be sorted out from the other products

of the surface and midwater nets. Fortunately, though microscopic, the eggs of the various species differ in size and details of structure and pigmentation relating to the growing embryo and its yolk, which has been furnished to give it the necessary start in life until it is enabled to feed for itself. We can therefore determine the kinds and their relative numbers. The records here preserved indicate what forms spawn in or near the district, and to what extent, and the occasional eggs which circumstances of current and wind bring into our waters.



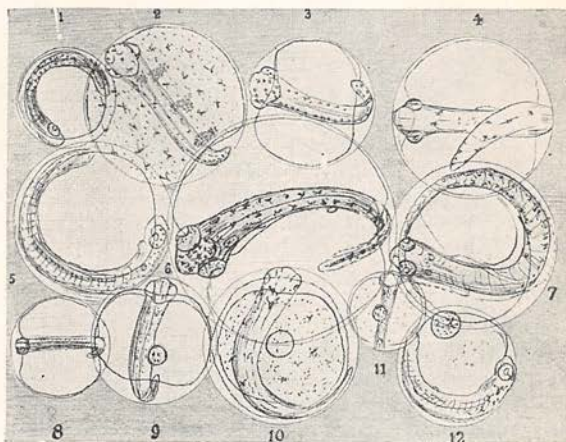
INDULGING IN AN IMPROMPTU DOUCHE.



MASS OF THE DEMERSAL EGGS OF THE CAT-FISH. THE BALL MEASURES SEVEN INCHES IN DIAMETER.

The eggs which remain on the bottom are called "demersal," and may be fixed, as in the case of the herring, or movable, as in the form of the "cat" or "wolf" fish pictured here. This remarkable ball of eggs presents no point of attachment, and it must be a curious sight to the "denizens of the deep" to see this large yellow ball driven or rocked by currents into their midst.

The statistics and specimens are collected, then, to indicate how our local waters are faring from year to year, and to afford the material for solving a few of the still many unsolved problems relating to the sea and its inhabitants.



A GROUP OF PELAGIC EGGS.

- |               |            |             |                            |
|---------------|------------|-------------|----------------------------|
| 1. Dab.       | 2. Sole.   | 3. Whiting. | 4. Haddock.                |
| 5. Lemon Dab. | 6. Plaice. | 7. Cod.     |                            |
| 8. Flounder.  | 9. Turbot. | 10. Brill.  | 11. Five-bearded Rockling. |
|               |            | 12. Ling.   |                            |