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**The harvest of the sea, including sketch**



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NEWHAVEN FISHWIVES.



THE  
HARVEST OF THE SEA

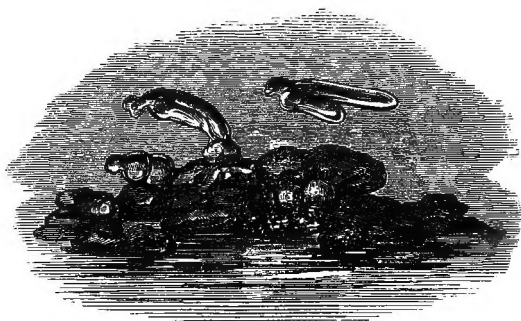
INCLUDING  
*SKETCHES OF FISHERIES & FISHER FOLK*

BY JAMES G. BERTRAM

POLONIUS.—Do you know me, my lord?

HAMLET.—Excellent well; you are a fishmonger.

*Shakespeare.*



*THIRD EDITION, WITH FIFTY ILLUSTRATIONS*

LONDON  
JOHN MURRAY, ALBEMARLE STREET  
1873

*Printed by R. & R. CLARK, Edinburgh.*

## P R E F A C E.

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THE "HARVEST OF THE SEA" has been a great success—not because it has sold so well that a third edition is now called for, or that the critics and reviewers have praised it highly, but because it has led to a continuous discussion of fishery economy ever since the volume was issued from Albemarle Street, and has therefore, in the best sense, fulfilled its "mission." All fishery subjects are now discussed with calmness as well as increased knowledge; and the men who, along with myself, ventured eight years ago to direct attention to what was wrong, will never again be tabooed or written down as visionaries or enthusiasts. Common sense has triumphed, and much in our fishery economy that was wrong has been made right.

The present edition of the work has been thoroughly revised. Much of the matter contained in the previous issues has been excised as being out of date or otherwise unnecessary, and a considerable amount of new, and, I hope, interesting information, gathered at home and abroad since its first publication, is included in the following pages. Every chapter of the book has been carefully revised, and those chapters thought to be too long have been divided, especially in cases where the natural and economic history of particular fishes admitted of that being done. Recent official statistics of the Scotch and Irish fisheries are included in this edition, and a new chapter on Aquariums and Fishery Exhibitions has been interpolated, as well as new stories of fisher life.

I have told over again in the following pages the story of the herring-fishery—its blunders and mistakes; and have shown how our salmon-fisheries have gradually improved by

means of the wise legislation lately entered upon, and pre-figured in the first edition of this book. The year just closing has been an extraordinary one, both as regards the capture of salmon and herring; but, despite of the present abundance of these fish, we must not run away with the idea that such plenty will occur year by year as a matter of course. Some persons may be satisfied with the herring harvest of the present year, and it is undoubtedly large, but I would ask regarding it this question—"Is the take of these fish commensurate to the machinery employed in their capture?" The large increase of salmon in the present year [1873] we can understand; it is, as I have said, the fruit of wise legislation, and it is gratifying to think that it is likely to continue. The same cannot, however, be predicted of the herring, but we are entitled to ask what there is to prevent our taking as many herrings every year as we have caught during the season which has just expired. In a matter of such vital importance to a country as the gathering of its herring harvest, which not only contributes largely to the food resources of the nation, but affords as well a large outlet for capital, and the employment of the population, we cannot afford to make a mistake. If there are more herrings for us to capture than we have hitherto been in the habit of taking, let us by all means capture them, but if, on the other hand, we are over-fishing, let it be known. We dare not by mal-economy lay waste an industry so productive as the herring-fishery of Scotland.

It is fortunate that we can obtain reliable statistics of the herring-fishery. To give us these statistics, and to watch over the curing of the fish, is the business of the Scottish Fishery Board, which a few of our radical Members of Parliament would abolish, if they could. It is to be hoped they will never be able to do so: that Board ought not to be abolished; on the contrary, its life ought to be prolonged and its jurisdiction extended; it is one of the most valuable Boards that the modern mania for centralisation has left to Scotland. It is greatly to be regretted that the Fishery Board cannot take cognisance and collect statistics of all the fisheries of Scotland. We cannot obtain sufficient

information with regard to the annual progress of our had-dock and cod fisheries, and in the face of the repeated assertions which are annually published as to over-fishing, it is only by collecting accurate statistics of the annual catch that we can determine the truth of what is said. It is quite certain that we have a problem set before us, by the correct solution of which we shall find out whether our fisheries are progressing, standing still, or declining. It is not by means of one year's great fishing that we can settle whether or no we have broken upon our capital stock, or are living on its produce.

We ought then, as suggested above, to have consecutive well-planned statistics, systematically gathered every season noting the size of vessels and the extent of their fishing gear, and these might be taken at all the chief ports. In the course of a few years, were this done, we would possess a complete index to the state of our fisheries, and should then be able to know, with exactitude, whether our fish supplies were capable of indefinite extension or not. As regards all fish about which we can obtain statistics, it can at once be seen that man is able to affect the supplies. The salmon-fisheries in particular, gave us a wonderful note of alarm, but the salmon being a proprietary fish of great value, owners of fisheries were quick to scent the danger, and prompt to obtain the necessary remedies; and now, so well is the economy of our salmon rivers understood, that the lower proprietors have actually begun to consider the rights of, and to conciliate, the upper proprietors! What is a salmon-river without those tributary streams which afford a safe home to the fish at that period of its life when it is most in need of it; and whether the venue be laid in Scotland or England, it is absolutely necessary that the salmon should have breeding-ground.

We have still much to learn with regard to fishery economy, although it is not easy to devise better modes of fishing than those which now prevail. If we cast our nets into the water, we must accept the fish they capture, whether they be good for food or quite unfit for use. If we use trawl nets we must endure the consequences, and when we

cast our lines into the deep sea we cannot dictate to the cod or haddocks as to their inclination to bite ; in such circumstances we can take only those fish that offer. But we say all the living fish which are improperly taken, from being too small or in a spawning condition, ought to be again restored to their watery home, and left to be captured at some future date. And what is of still greater importance, in Britain we ought to have a code of logically conceived fishery laws, with proper officers to administer them. In England, at present one department of government superintends the oyster-fisheries, another rules over the herrings, and a third takes charge of the salmon ! In Scotland we have one Board of Fisheries, and in Ireland there is another ! but one Board of Fisheries ought to be sufficient ; and the sooner we have a Fisheries Reform Bill, the better it will be for those interested in the fishing industries of Great Britain and Ireland.

305 ST. VINCENT STREET, GLASGOW,

*October 31, 1873.*

## LIST OF AUTHORITIES.

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HAVING been frequently asked by correspondents for a list of the chief authorities on fish, I beg to subjoin the titles of a few of the works I have had occasion to consult while preparing this volume :—

- A Review of the Domestic Fisheries of Great Britain and Ireland, by Robert Fraser, Esq. Edinburgh, 1818.
- A Short Narrative of the Proceedings of the Society appointed to manage the British White Herring Fishery, etc., by Thos. Cole. London, 1750.
- A Treatise on Food and Diet, by Jonathan Pereira, M.D., etc., 1843. London : Longman and Co.
- A Treatise on the Management of Fresh-Water Fish, by Gottlieb Boccus, 1841. London : Van Voorst.
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- An Account of Three New Specimens of British Fishes, by Richard Parnell, 1837. Royal Society, Edinburgh.
- An Essay towards the Natural History of the Herring, by James Solas Dodd, Surgeon. London, 1752.
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- Experimental Observations on the Development and Growth of Salmon Fry, etc., by John Shaw, 1840. Edinburgh : A. and C. Black.
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## CHAPTER I.

### FISH LIFE AND GROWTH.

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FISH form the fourth class of vertebrate animals, and, as a general rule, live in water; although in Ceylon and India species are found that live in the earth, or, at any rate, that exist in mud, not to speak of others said to occupy the trees of those countries! The classification of fishes given by Cuvier is usually adopted. He has divided these animals into those with true bones, and those having a cartilaginous structure; the former, again, being divided into acanthopterous and malcopterous fish. Other naturalists have adopted more elaborate classifications; but Cuvier's being the simplest has a strong claim to be considered the best, and is the one generally used.

A fish breathes by means of its gills, and progresses chiefly by means of its tail. This animal is admirably adapted for progressing through the water, as may be seen from its form, and fish are exceedingly beautiful, both as regards shape and colour. There are comparatively few persons, however, who have an opportunity of seeing them at the moment of their greatest brilliancy, which is just when they are brought out of the water. I allude more particularly to some of our sea fish—as the herring, mackerel, etc. The power of a fish to take on the

colour of its hiding-place may be mentioned ; various kinds, when in the water, as may be observed at the Brighton and Crystal Palace Aquariums, are not to be distinguished from the vegetable matter in which they take shelter. It is almost impossible to paint a fish so as accurately to transmit to canvas its exquisite shape and glowing colours, because the moment it is taken from its own element its form alters and its delicate hues fade : and in different localities fish have, like the chameleon, different hues, so that the artist must have a quick eye and a responding hand to catch the fleeting tints of the animal. Nothing, for instance, can reveal more beautiful masses of colour than the hauling in of a drift of herring-nets. As breadth after breadth emerges from the water the magnificent ensemble of the fish flashes ever-changing upon the eye—a wondrous gleaming mixture of blue and gold, silver and purple, blended into one great burning glow, and lighted to brilliant life by the soft rays of the newly-risen sun. But, alas for the painter ! unless he can instantaneously fix the burnished mass on his canvas, the light of its colour will fade, and its harmonious beauty become dim, long before the boat can reach the harbour. The brightly-coloured fish of the tropics are gorgeous, as the plumage of tropical birds ; but as regards flavour and food power, they cannot for a moment be compared with that beautiful fish—the common herring, or pilchard, of our British waters.

If the breathing apparatus of a fish were to become dry the animal would at once suffocate. When in the water a fish has very little weight to support, as its specific gravity is about the same as that of the element in which it lives, and the bodies of these animals are so flexible as to aid them in their movements, while the various fins assist either in balancing the body or in aiding progress. The motion of a fish is excessively rapid ; it can dash through the water with lightning-like velocity. Many of our sea fish are curiously shaped, such as the hammer-headed shark, the globe-fish, the monk-fish, the angel-fish, etc. ; then we have the curious forms of the rays, the flounders, and of some other “ fancy fish ;” but all kinds are admirably adapted to their mode of life and the place where they live—as, for instance, in a cave where light has never penetrated fish have been found without eyes ! Fresh-water fish do not vary much in shape, most of them being very elegant. Fish are cold-blooded, and nearly insensible to pain, their blood being only



two degrees warmer than the element in which they live. It is worthy of note that fish have small brains compared to the size of their bodies—considerably smaller in proportion than in the case of birds or mammalia, but the nerves communicating with the brain are as large in fish, proportionately, as in birds or mammalia. The senses of sight and hearing are thought to be well developed in fish, likewise those of smell and taste, particularly smell, which chiefly guides them in their search for food. Fish, I think, have a very keen scent; thus it is that strong-smelling baits are successful in fishing. The French people, for instance, when fishing for sprats and sardines, bait the ground with prepared cod-roe, which adds largely to the expense of that branch of fishing in the Bay of Biscay. As an evidence of fish having a strong sense of smell, salmon-roe used to be a deadly trout-bait. Some naturalists assert that fish do not hear well, which is contrary to my own experience; for after repeated trials of their sense of hearing, I found them as quick in that faculty as in seeing; and have we not all read of pet fish summoned to dinner by means of a bell, and of trouts and cod-fish that have been whistled to their food like dogs? Water is an excellent conductor of sound: it conveys noise of any kind to a great distance, and nearly as quick as air. Benjamin Franklin often experimented on water as a conductor, and arrived at the conclusion that its powers in this way are wonderful. Most kinds of fish are voracious feeders, preying upon each other without ceremony; and the greatest difficulties of anglers are experienced after fish have had a good feed, when the practised artist, with seductive bait, cannot induce them even to nibble. Many fish have a digestion so rapid as to be comparable only to the action of fire, and on good feeding-grounds the growth of fish corresponds to their power of eating. In the sea there exists an admirable field for observing the cannibal propensities of fish, where shoals of one species have apparently no other object in life than to chase other kinds with a view to eat them.

To compensate for the waste of life incidental to their place of birth and their ratio of growth, nature has endowed this class of animals with enormous reproductive power. Fish yield their eggs by thousands or millions, according to the danger incurred in the progress of their growth. There is nothing in the animal world that can in this respect be compared to them, except perhaps a queen bee, with fifty thousand young

each season ; or the white ant, which produces eggs at the rate of fifty per minute, and goes on laying for a period of unknown duration ; not to speak of that terrible domestic *bugbear* which no one likes to name, but which is popularly supposed to become a great-grandfather in twenty-four hours ! The little aphides of the garden may also be noted for their vast fecundity, as may likewise the common house-fly. During a year one green aphid may produce one hundred thousand millions of young ; and the house-fly lays twenty millions of eggs in a season ! But although there may be thirty thousand eggs in a herring, the reader must bear in mind that if these be not vivified by the milt of the male fish, they rot in the sea, and never become of food value, except perhaps to some minor monster of the deep. Millions of the eggs that are emitted by the cod or the herring never come to life—many of them from lack of fructifying power, others being devoured by enemies. Then, again, of those eggs that are ripened, it is ascertained from careful inquiry, that fully ninety per cent of the young fish perish before they are six months old. Were only half the eggs to come to life, and but one moiety of the young fish to live, the sea would so abound with animal life that it would be impossible for a boat to move in its waters. But we can never hope to realise such a sight ; and when it is considered that a single shoal of herrings consists of many millions of individual fish, and takes up a space in the sea far more than that occupied by the city of London, and yet gives no impediment to navigation, my readers will see the magnitude of our fish supplies ; but, by the destruction of fish life from natural causes, the breeding stock is kept down to an amount that may not be far from the point of extermination.

The figures of fish fecundity are quite reliable, and are not dependent on guessing, because different persons have taken the trouble, the writer among others, to count the eggs in the roes of some of our fish, that they might ascertain exactly their amount of breeding power. It is well known that the female salmon yields eggs at the rate of about one thousand for each pound weight, and some fresh-water fish are even more prolific ; sea fish, again, far excelling these in reproductive power. The sturgeon, for instance, is wonderfully fecund, as much as two hundred pounds weight of roe having been taken from one fish, yielding a total of 7,000,000 of eggs. I possess the results of several investigations into fish fecundity, which were

conducted with attention to details, and without any desire to exaggerate: these give the following results:—Cod-fish, 3,400,000; flounder, 1,250,000; sole, 1,000,000; mackerel, 500,000; herring, 35,000, and smelt, 36,000.

Any person who wishes to manipulate these figures may try by way of experiment a few calculations with herring. The produce of a single herring is, say, thirty-six thousand eggs, but we may—the deduction being a most reasonable one—allow that half of these never come to life, which reduces the quantity to eighteen thousand. Allowing that the young fish are able to repeat the story of their birth in three years, we may safely calculate that the breeding stock by various accidents will be reduced to nine thousand individuals; and granting half of these to be females, or let us say, for the sake of rounding the figures, that four thousand of them yield roe, we shall find by multiplying that quantity by thirty-six thousand (the number of eggs in a female herring) that we obtain one hundred and forty-four millions as the produce in three years of a single pair of herrings; and although half of these might be taken for food as soon as they were large enough, there would still be left an immense breeding stock even after all casualties had been given effect to; so that the devastations committed on the shoals while capturing for food uses must be enormous, if, as is asserted, they affect the reproductiveness of these useful animals. Of course this is but guesswork. Practical people do not think that, taking all times and seasons into account, five per cent of the roe of our herrings come to life.

It is known even to *tyros* in the study of natural history, as well as anglers and others interested, that the impregnation of fish-eggs is a purely external act; but at one time this was not believed, and a portion of the experiments at the Stormontfield salmon-breeding ponds was dedicated to a solution of this question, with what result may be guessed. The old theory, that it is contrary both to fact and reason that fish can differ from land animals in the matter of the fructification of their eggs, was signally defeated, and the question conclusively settled at the ponds in a very simple way—namely, by placing in the breeding-boxes a quantity of salmon eggs which not having been brought into contact with milt, rotted away. Curious ideas used to prevail on this branch of natural history. Herodotus observes of the fish of the Nile, that at the spawning season they move in vast multitudes towards the sea; the males lead the way,

and emit the engendering principle in their passage; this the females absorb as they follow, and in consequence conceive, and when their ova are deposited they are then matured into fry! Linnæus backed up this idea, and asserted that there could be no impregnation of the eggs of any animal out of the body. It is this wonderfully exceptional principle in fish life that gave rise to pisciculture—*i.e.* the artificial impregnation of the eggs of fish forcibly exuded and brought into contact with the milt, independent altogether of the will or instinct of the animal.

The principle which brings male and female together at the spawning period is unknown. It is supposed by some naturalists that fish do not gather in shoals till they perform the grandest action of their nature, and that till such period each animal lives a separate life. If we set down the sense of smell as the power which attracts the fish sexes, we shall be nearly correct: cold-blooded animals cannot have any more powerful instinct. A very clever Spanish writer on pisciculture hints that the fish have no amatory feeling for each other at that period, thus forming a curious exception to most other animals, and that it is the smell of the roe in the female which attracts the male.

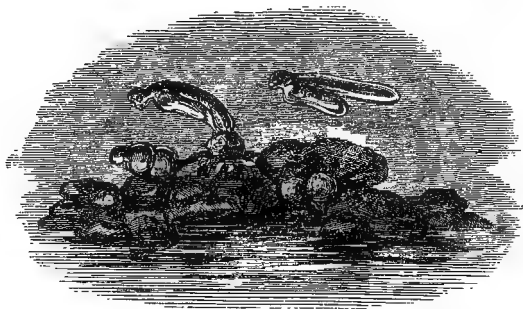
This idea—*viz.* as to the shoaling of fish at the period of spawning only—has been thrown out in regard to the herring by parties who do not admit even a partial migration from deep to shallow water, which, however, is an idea stoutly held by some writers on the herring. It is rather interesting, however, in connection with this phase of fish life, to note that particular shoals of herrings deposit their spawn at particular places, that the eggs come simultaneously to life, and that it is certain that the young fish remain together for a considerable period—a few months at least—after being hatched. This is well known from large bodies of young herrings being caught during the sprat season: these could not, of course, have assembled to spawn; too young, and without milt or roe. This, if these fish separate, gives rise to the question—At what period do the herrings begin their individual wanderings? Sprats, of course, may have come together, at the period when they are so largely captured, for the purpose of perpetuating their kind; but, if so, they must live long together before they acquire milt or roe. And how is it that we so often find young herrings in sprat shoals? Then, again, how comes it that fishermen do not frequently fall in with the separate herrings during the white-fishing seasons? How is it that fisher-

men find particular kinds of fish always on particular ground? How is it that eels migrate in immense bodies? My opinion is, that particular kinds of fish do hold always together, or, at all events, gather at particular seasons into greater or lesser bodies. Life among the inhabitants of the sea is, doubtless, quite as diversified as life on land, where we observe that many kinds of animals colonise—ants, bees, etc. Are, therefore, the old stories about each kind of fish having a king so absolutely incredible after all? That there are schools of fish is certain; how the great bodies may be divided or governed, none can tell.

It is noteworthy that fish-eggs afford us an admirable opportunity of studying a peculiarly interesting stage of animal life—namely, the embryo stage—which, naturally enough, is obscure in all animals. Having observed the eggs of salmon in all stages of progress, from the period of their first contact with the milt till the bursting of the egg and the coming forth of the tiny fish, I venture briefly to describe what I have seen, because salmon eggs are of a convenient size for continued examination. The roe of this fine fish is, I daresay, pretty familiar to most of my readers. The microscope reveals the eggs of salmon as being more oval than round, although they appear quite round to the naked eye. A yolk seems to float in the dim mass, and the skin or shell appears full of minute holes, while there is an appearance of a kind of funnel opening from the outside and apparently closed at the inner end. The milt is found to swarm with a species of very small creatures with big heads and long tails, apparently of very low organisation. On the contact of this fluid with the egg, into which it enters by the canal, an immediate change takes place—the ovum becomes illuminated by some curious power, and the egg appears a great deal brighter and clearer than before. It is surely wonderful that, by the mere touching of the egg with this wonder-working sperm, so great a change should take place—a change indicating that the grand process of reproduction characteristic of all living nature has begun, and will go on with increasing strength to maturity.

Salmon-spawn is so accessible, comparatively speaking, as to render it easy to trace the development from the egg of the complete animal. As may be supposed, however, the transmutation of a salmon egg into a fish is a tedious process, taking above a hundred days. The eggs of the female, under the

natural system of spawning, are laid in the secluded and shallow tributary of some choice stream, in a trough of gravel ploughed up by the fish with great labour, and are there left to be wooed into life by the eternal murmuring of the water. From November till March, through the storms and floods of winter, the ova lie hid among the gravel, slowly but surely quickening into life; and few persons would guess, from a mere casual glance at the tributary of a great salmon stream, that it held among its bubbling waters such countless treasures of future fish. Practised persons will find a burrow of salmon eggs with great precision; and a little bit of water may contain perhaps a million eggs waiting to be summoned into life. During the first three weeks from the milting of the egg, scarcely any change is discernible in its condition, except that about the end of that period it contains a brilliant spot, which gradually increases in

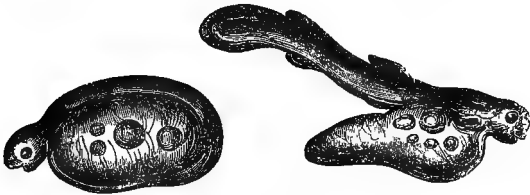


EGGS OF THE SALMON KIND JUST HATCHING.

brilliancy till certain threads of blood faintly prefigure the young fish. After another day or two the bright spot assumes a ring-like form, having a clear space in the centre, and the blood-threads then become more and more apparent. These blood-like tracings are ultimately seen to take an animal shape; but it would be difficult at first to say what the animal may turn out to be—whether a tadpole or a salmon. After this stage of development is reached, two bright black specks are seen—these are the eyes of the fish. We can now, from day to day, note the animal gradually assuming a more perfect shape; we can see it change palpably almost from hour to hour. After the egg has been laved by the water for a hundred days, we can observe

that the young fish is then thoroughly alive, and, to use a common expression, kicking. We can see it moving, and can study its anatomy, which, although as yet very rudimentary, contains all the elements of the perfect fish. Heat expedites the birth of the animal. The eggs of a minnow have been sensibly advanced towards maturity by being held on the palm of the hand. Salmon eggs deposited early in the season, when the temperature is high, come sooner to life than those spawned in mid-winter: indeed a difference of as much as fifty days has been noticed between those deposited in September and those spawned in December, the one requiring ninety, the other one hundred and forty days to ripen into life. Salmon have been brought to life in sixty days at Huningue; but the quickest hatching ever accomplished at the Stormontfield breeding-ponds was when the fish came to life in one hundred and twenty days. The preceding drawing shows the eggs at about their natural size, as also the growth of the fish in its early stages.

At the salmon-ponds of Stormontfield the eggs laid down the first season were hatched in one hundred and twenty-eight days. The usual time for the hatching of salmon eggs in our northern rivers is one hundred and thirty days, or between four



SALMON A DAY OR TWO OLD.

and five months, according to the openness or severity of the season. When at last the infant animal bursts from its fragile prison, it is a clumsy, unbalanced, tiny thing, having attached to it the remains of the parental egg, which hamper its movements; but, after all, the remains of its little prison are exceedingly useful, as for about thirty days the young salmon cannot obtain other nourishment than what is afforded by this umbilical bag.

We have never yet been able to obtain a sight of the ripening eggs of any of our sea fish at a time when they would prove

useful to us. No one, so far as I know, has seen the young herring burst from its shell under such advantageous circumstances as we can view the salmon ova; but I have seen bottled-up spawn of that fish just after it had ripened into life, the infant animal being remarkably like a fragment of cotton thread that had fallen into the water: it moved about with great agility, but required the aid of a microscope to make out that it was a thing endowed with life. Who could suppose, while examining those wavy floating threads, that in a few months afterwards they would be grown into beautiful fish, with a mechanism of bones to bind their flesh together, scales to protect their body, and fins to guide them in the water? But young herring cannot be long bottled up for observation, or be kept in an artificial atmosphere; for in that condition they die almost before there is time to see them live; and when in the sea there are no means of tracing them, because they are speedily lost in an immensity of water. Perhaps now that we have large aquariums at Brighton and the Crystal Palace, we shall be able to trace the progress of the fish with more exactitude.

There are points of contrast between the salmon and the herring which are worthy of notice. They form the St. Giles' and St. James' of the fish world, the one being a portion of the rich man's food, the other filling the poor man's dish. The salmon is hedged round by protecting Acts of Parliament, but the herring gets leave to grow just as it swims, parliamentary statutes not being thought necessary for its protection. The salmon is born in a fine nursery, and wakened into life by the music of beautiful streams: nurses and night-watchers, hover about its cradle and guide its infant ways; the herring, however, like the brat of some wandering pauper, is dropped in the great ocean workhouse, and cradled amid the hoarse roar of ravening waters, whether it lives or dies being a matter of no moment, and no person's business. Herring mortality in its infantile stages is appalling, and even in its old age, at a time when the rich man's fish is protected from the greed of its enemies, the herring is doomed to suffer the most. And then, to finish up with the same appropriateness as they have lived, the venison of the waters is daintily laid out on a slab of marble, while the vulgar but beautiful herring is handled by a dirty costermonger, who drags it about in a filthy cart drawn by a wretched donkey. At the hour of reproduction the salmon is guarded with



jealous care from the hand of man, but at the same season the herring is offered up a wholesale sacrifice to the destroyer. It is only at its period of spawning that the herring is fished. How comes it to pass that what is a high crime and misdemeanour in the one instance is a government-rewarded merit in the other? To kill a gravid salmon is as nearly as possible felony; but to kill a herring as it rests on the spawning-bed is an act at once meritorious and profitable!

Having given my readers a general idea of the fecundity of fish, and the method of fructifying the eggs, and of the development of these into fish—for, of course, the process will be nearly the same with all kinds of fish eggs, the only difference perhaps being that the eggs of some varieties will take a longer time to hatch than those of others—I will now consider the question of fish growth.

All fish are not oviparous. There is a well-known blenny which is viviparous, the young of which at the time of their birth are so perfect as to be able to swim about with great ease; and this fish is also very productive. Our skate fishes are all viviparous. "The young are enclosed in a horny capsule of an oblong square shape, with a filament at each corner. It is nourished by means of an umbilical bag till the due period of exclusion arrives, when it enters upon an independent existence." I could name a few other fish which are viviparous. In the fish-room of the British Museum may be seen one of these. It is known as *Ditrema argentea*, and is plentifully found in South America. But information on this portion of the natural history of fish is still very obscure. Many facts of fish biography have yet to be ascertained, which, if we knew, would probably conduce to stricter economy of fish life and better regulation of the fisheries. Beyond a knowledge of generalities, the kingdom of the sea is a sealed book. No person can tell, for example, how long a time elapses from the birth of any particular fish till it is brought to table. Sea fish grow up unheeded—quite, in a sense, out of the bounds of observation. Naturalists can only guess at what rate a cod-fish grows. The life of a herring, in its most important phase, is still a mystery; and at what age mackerel or other fish becomes reproductive, who can say? The salmon is the one fish that has hitherto been compelled to render up to those inquiring the secret of its birth and the ratio of its growth. We have imprisoned this valuable fish in artificial ponds, and by robbing it of its eggs

have noted when the young ones were born and how they grew, why then not devise a means of observing sea fish at the expense of the nation? What naturalists chiefly and greatly need in respect of sea fish is, precise information as to their rate of growth. We have a personal knowledge of the fact of sea fish selecting our shores as a spawning-ground, but we do not precisely know in some instances the exact time of spawning, how long the spawn takes to quicken into life, or at what rate the fish increase in growth. The eel may be taken as an example of our ignorance of fish life. Do professed naturalists know anything about it beyond its migratory habits?—habits which, from sheer ignorance, have at one period or another been assumed as pertaining to all kinds of fish. The tendency to the romantic, specially exhibited in the amount of travelling power bestowed by the elder naturalists on this class of animals, would seem to be very difficult to put down. An old story about the eel was gravely revived a few years ago, having the larger portion of a little book devoted to its elucidation—a story seriously informing us that the silver eel is the product of a black beetle! But no one need wonder at a new story about the eel, far less at the revival of this old one; for the eel is a fish that has at all times experienced the greatest difficulty in obtaining recognition as being anything at all in the animal world, or as having respectable parentage of even the humblest kind. In fact, the study of the natural history of the eel has been hampered by old-world romances and quaint fancies about its birth, or, in its case, may I not say invention? “The eel is born of the mud,” said one old author. “It grows out of hairs,” said another. “It is the creation of the dews of evening,” exclaimed a third. “Nonsense,” emphatically uttered a fourth controversialist, “it is produced by means of electricity.” “You are all wrong,” asserted a fifth, “the eel is generated from turf;” and a sixth theorist, determined to outdo all others, and come nearer the mark than any of his predecessors, assured the public that young eels are grown from particles scraped off old ones! The beetle theorist tells us that the silver eel is a neuter, having neither milt nor roe, and is therefore quite incapable of perpetuating its kind; that, in short, it is a romance of nature, being *one* of the productions of some wondrous lepidopterous animals seen by Mr. Cairncross (the author of the work alluded to) about the place where he lived in Forfarshire, its other production being of its

own kind, a black beetle! The story of the rapid growth and transformation of the salmon is—as will by and by be seen—wonderful enough in its way, but it is certainly far surpassed by the extraordinary silver eel, which is at one and the same time a fish and an insect.

There can be no doubt that the eel is a curious animal even without the extra attributes bestowed upon it by this very original naturalist, for that fish is in many respects the opposite of the salmon: it is spawned in the sea, and almost immediately after coming to life proceeds to live in brackish or entirely fresh water. It is another of the curious features of fish life that about the period when eels are on their way to the sea, where they find a suitable spawning-ground, salmon are on their way from the sea to the river-heads to fulfil the grand instinct of their nature—namely, reproduction. The periodical migrations of the eel, on which has been founded the great fishing industry of Comacchio, on the Adriatic, can be observed in all parts of the globe: they take place, according to climate, at different periods from February to May; the fish frequenting such canals or rivers as have communication with the sea. The myriads of young eels which ascend are almost beyond belief; they are in numbers sufficient for the population of all the waters of the globe—that is, if there were reservoirs in which they might be preserved for food as required. The eel, indeed, is quite as prolific as the generality of sea fish. Eels have been noted to pass up a river from the sea at the extraordinary rate of eighteen hundred per minute! This *montee* used to be called eel-fair.

It would be interesting, and profitable as well, to learn as much of any one of our sea-fish as we know of the salmon, and as considerable progress is now being made in observing the natural history of fish, we expect in time to know much more than we do at present; everything in the fish world is not taken for granted as formerly, although we are still inclined rather to revive old traditions than to study or search out new facts. Naturalists are so ignorant of how the work of growth is carried on in the fish world—in fact, it is so difficult to investigate points of natural history in the depths of the sea—that we cannot wonder at less being known about marine animals than about any other class of living things. The experiments carried on at the Brighton Aquarium may ultimately help us to more precise information. In that institution there

is scope and verge enough for real practical work to be carried on. It is the want of precise information about the growth of fish that tells so heavily against our fisheries, for all is fish that comes to the fisherman's net, no matter what size the animals may be, or whether they have been allowed to perpetuate their kind. No person, either naturalist or fisherman, knows how long a period elapses from the date of its birth till a turbot or cod-fish becomes reproductive. It is now well known, in consequence of repeated experiments, that salmon grow with immense rapidity, a consequence in some degree of quick digestive power. The cod-fish, again, reasoning from the analogy of its greatly slower power of digesting its food and from other corroborative circumstances, must be correspondingly slow in growth; but people must not, in consequence of this slower power of digestion, believe all they hear about the miscellaneous articles often said to be found in stomachs of cod-fish, as a large number of the curiosities found in the intestinal regions of his codship are placed there by fishermen, as a joke, or to increase the weight, and so enhance the price of the animal.

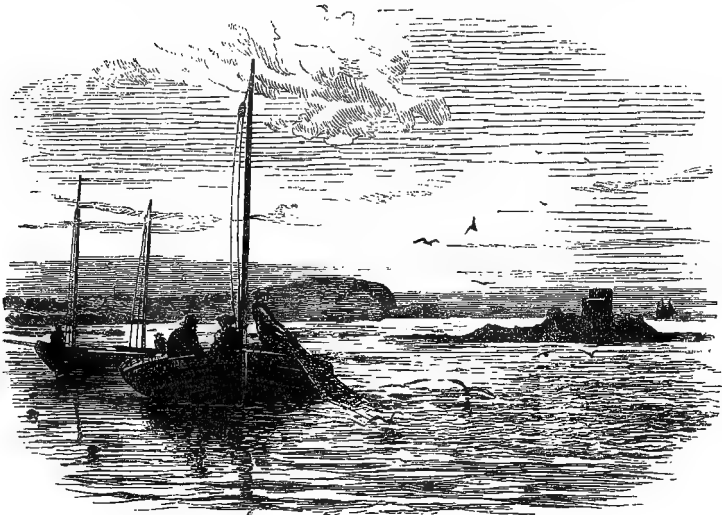
As regards the natural history of one of our best-known food fishes, I have taken the pains to compile a brief *precis* of its life from the best account of it that is known. I allude to the mackerel; and from a perusal of the following facts it will be seen that our knowledge of the growth of this fish is very defective. 1. Mackerel, geographically speaking, are distributed over a wide expanse of water, embracing the whole of the European coasts, as well as the coasts of North America, and this fish may be caught as far southward as the Canary Islands. 2. The mackerel is a wandering unsteady fish, supposed to be migratory, but individuals are always found in the British seas. 3. This fish appears off the British coasts in quantity early in the year; that is, in January and February. 4. The male kind are supposed to be more numerous than the female. 5. The early appearance of this fish is not dependent on the weather. 6. The mackerel, like the herring, was at one time supposed to be a native of foreign seas. 7. This fish is laden with spawn in May, and it has been known to deposit its eggs upon our shores in the following month. Now, we have no account here of how long it is ere the spawn of the mackerel quickens into life, or at what age that fish becomes reproductive, although in these two points is unquestionably obtained the key-note to the natural history of all fishes, whether they be salmon or sprats.

In fact we have no precise information whatever as to power of growth. We have at best only a few guesses and general deductions, and we would like to know as regards all fish—*1st*, When they spawn; *2d*, How long it is ere the spawn quickens into life; and *3d*, At what period fish are able to repeat the story of their birth. These points once known—and they are most essential to the proper understanding of the economy of our fisheries—the chief remaining questions connected with fishing industry would be of comparatively easy solution, and admit of our regulating the power of capture to the natural conditions of supply.

As another example of long continued ignorance of fish life, I may instance that diminutive member of the herring family—the whitebait. This fish, which is so much better known gastronomically than it is scientifically, was thought at one time to be found only in the Thames, but it is much more generally diffused than is supposed. It is found for certain, and in great plenty, in three rivers—viz. the Thames, the Forth, and the Hamble. I have also seen it taken out of the Humber, not far from Hull, and have heard of its being caught near the mouth of the Deveron, on the Moray Firth; and likewise of its being found in plentiful quantities off the Isle of Wight. Mr. Stewart, the natural history draughtsman, tells me also that he has seen it taken in bushels on many parts of the Clyde, and that at certain seasons, while engaged in taking coal-fish, he has found them so stuffed with whitebait that by holding the large fish by the tail the little silvery whitebait have fallen out in handfuls. The whitebait has become celebrated from the mode in which it is cooked, and the excuse it affords to Londoners for an afternoon's excursion, as also from its forming a famous dish at the annual fish-dinner of her Majesty's ministers; but truth compels me to state that there is nothing in whitebait beyond its susceptibility of taking on flavour from the skilled cook.

The whitebait, however, if I cannot honestly praise it as a table fish, is particularly interesting as an object of natural history, there having been from time to time, as in the case of most other fish, some very learned disputes as to where it comes from, how it grows, and whether or not it be a distinct member of the herring family or the young of some other fish. The whitebait—which, although found in rivers, is strictly speaking a sea fish—is a tiny animal, varying in length, when taken for cooking purposes, from two to four inches, and has never been

seen of greater length than five inches. In appearance it is pale and silvery, with a greenish back, and should be cooked immediately after being caught; indeed if, like Lord Lovat's salmon, whitebait could leap from the water into the frying-pan, it would be a decided advantage to those dining upon it, for if



WHITEBAIT GROUND NEAR QUEENSFERRY.

kept even for a few hours it becomes greatly deteriorated, and, in consequence, requires careful cooking to bring the flavour up to the proper pitch of gastronomic excellence. Perhaps, as all fish are chameleon-like in reflecting not only the colour of their abode, but what they feed on as well, the supposed fine flavour of whitebait, so far as not conferred upon that fish by the cook, may arise from matters held in solution in the Thames water, and so the result from the corrupt source of supply may be a quicker than ordinary decay. The waters of the Forth at the whitebait ground, a little way above Inchgarvie, of which I have given a slight sketch, where the sprat-fishing is usually carried on, are clean and clear, and the fish taken there are in consequence slightly different in colour, and

greatly so in taste, from those obtained in the Thames ; in fact, all kinds of fish, including salmon, live and thrive in the Firth of Forth. It is long since the refined salmon forsook the Thames, but then salmon are very delicate in their eating, and at once take on the surrounding flavour, whatever that may be.

Returning, however, to our whitebait, we have over and over again been assured by various authorities that that fish is the young of the shad ; and a whole regiment of the young fish was shown by Mr. Larkin, a Cheapside fishmonger, in order to prove the case. All sizes were marshalled in order, from the tiniest specimen to the comparatively monster parent of the progeny—the great shad itself. The verdict must, however, in the meantime be the Scotch one of “not proven.” It is not very well known who first promulgated the theory of whitebait being the young of the shad ; but Donovan, the author of a *History of British Fishes*, is at least responsible for spreading the error. What must, however, surprise all who take the trouble to study the controversy is this fact, that if whitebait be young shad, their parents are very seldom seen. There is no shad-fishery in the Thames, or near the Thames, at present ; yet millions of these so-called young shad are annually devoured by visitors to Greenwich, Blackwall, and Richmond, not to speak of the number eaten in the great metropolis. If the progeny, then, are plentiful, how come the parents to be scarce ? is the idea immediately presenting itself to the mind when requested to believe whitebait to be young shad. Fishes of all kinds, and especially the herring kind, are very prolific ; but even if the female shad yields its ova in thousands, the dangers the young ones encounter considerably diminish the number that come to life. Thousands of pairs of shads would therefore be required to produce the quantities of so-called whitebait which are annually brought to table during the summer season. Shad were at one time very abundant in the Thames ; and this fact would no doubt be a good argument in the mouths of those who were of opinion that whitebait grew in time into that fish. If, however, we reject the shad as the parent of the whitebait, and conclude that fish to be a distinct species, we shall undoubtedly want to know a great deal more about it than that bare fact. First of all, we must know where the parent fish can be found ; secondly, if they be good for food ; and thirdly, at what season and in what markets they are sold : it seems so strange that we should be addicted to eating the

fry of a fish we never see! Besides, may we not reasonably enough conclude that if the fry be so very fine, the full-grown fish will be even more palatable? It is curious that while there are thousands of whitebait in the Firth of Forth, and equally curious that they are caught chiefly on the sprat-ground there, no Edinburgh fishmonger, nor any of the Scottish fishermen, ever saw specimens of these fish with milt or roe in them. Nor did any of these persons ever see a whitebait bigger than the usual size, that is, ranging in length from one to about three inches. After they attain that size they become either sprats or herrings.

If what some naturalists have published in regard to its habits be true, the shad must be a very interesting fish. It has been hinted that it ascends from the sea to deposit its spawn in the rivers, being something like the salmon in that respect. In this phase of its life it is the opposite of the eel, which lives in fresh but spawns in salt water. What salmon do, shad can doubtless also accomplish, although it will go a long way to disprove what has been said by naturalists, if the shad should be proved not to be the parent of the whitebait, or rather, if it can be proved that whitebait are the young of some other fish. In the days when the herring was thought to be an animal of migratory habits, rushing continually from our own firths and bays to the icy polar seas, some of the giants of the tribe were poetically described as swimming in the van of the mighty *heer*, acting as the guides and leaders of the smaller fish. These giants were Thwaite shads; but as it is now well known that the herring is local in its habits, and not migratory in the sense of taking long journeys, the shad must therefore be deposed from that leadership; nor can it be even allowed the merit of being a tolerable table-fish, it is a coarse, insipid fish, and altogether destitute of the delightful flavour of the common herring.

What is whitebait if it be not the young of the shad? Is it, then, a distinct species? It would be easy enough to befool the public with an absurd answer as to what whitebait is, because no writer, not the ubiquitous Buckland himself, can successfully contradict another on almost any point of fish-growth. When we see the transformation of the tadpole into a frog, and the zœa into a crab, we need not be surprised at its having been once prophesied that the whitebait turned a bleak, or the assertion that it undoubtedly grows into a herring (*clupea hargenus*); and if pressed for our reasons, we have a better



answer to give than the young Scotch ploughman, who, being asked how he knew that God had made him, replied, after some little deliberation, that, "it was the common talk of the country." In many places where whitebait are captured, fishermen believe them to be young herring—"herrinsile" they are called on the river Clyde; and this idea has been ventilated by the author in the popular periodicals of the day—it is an idea too that has long been common among our fishmongers. That whitebait are young herring, or sprats in an infantile stage, can be easily proved—on paper at least; and if our Government had a fish laboratory, such as the French have at Concarneau, the fact might very speedily be ocularly demonstrated. It is left, we suppose, for either the Brighton or Crystal Palace Aquarium to determine what fish the whitebait ultimately becomes, herring or sprat. There has been a great amount of controversy as to the natural history of the herring during late years, and so many curious facts have been educed, that no one need be surprised to learn that whitebait are truly the young of that fish. This may seem extraordinary; but without being dogmatic, it may be permitted us to say that the points of resemblance between herring and whitebait are wonderfully numerous and convincing, as well in the outward appearance as the anatomical structure of the two fishes. At all events the young of the shad and the true whitebait (at *some* places, such is the demand, that all sorts of fry are "manufactured" into the latter fish, there being so many who do not know one from the other) are very different in many essential points as in the formula of the fin-rays and the number of the vertebræ. Of course a young animal will change greatly in appearance during growth. The whitebait, for instance, in common with the sprat, has a serrated belly; but if it be the young of the herring, it must grow out of that serration. It is elsewhere argued that, in the case of the sprat, the bones protruding from the abdomen are ultimately covered by the growth of the animal, and so gradually disappear.

Assuming "whitebait" to be young herring, we are entitled to ask at what date the fish of that name, sold in London in June and July, were spawned. The herrings at Wick, for example, are taken full of spawn up till the end of the great fishery in August; at what time, then, if whitebait be young herring, would those we can now eat at Blackwall be spawned? This, of course, involves a surmise as to the rate of growth of the herring itself, upon which question there has from first to

last been much speculation, many very dissimilar ideas having been propounded as to the period at which the "poor man's fish" arrives at the reproductive stage. As we know that there are different races of herrings coming to maturity at different times, there ought to be no difficulty on this point, as the waters must constantly contain fish of all ages, and it appears certain that the whitebait of May and June cannot be older than the year; it seems pretty certain, also, that the sprat-sized herrings which begin to come to market early in November are a little over a year old; they were probably released from their tiny shells early in the August or late in the July of the previous year. It is admitted by at least one competent naturalist, that fry of the sprat may be seen in multitudes in July and August, when they are of the length of two inches. We know, also, that young herrings and young sprats are captured indiscriminately in the Firth of Forth in the same shoals, of the same size, and presumably of the same age. In a shoal of young herrings the sizes of the fish are exceedingly varied, ranging from three to six inches in length, and of corresponding girth; some serrated, some not; some weighing a quarter of an ounce, some nearly an ounce. Were these fish all born at once? How about the serrations? Again, a jar of whitebait from the Thames, received by the writer for examination, contained specimens of all sizes; some little more than an inch long, while some were two or three inches. How old would these be? and were some of them serrated and others not? The bellies being all decayed, that point could not be determined in any of the specimens received. February and March are the great months for the spring races of herring to spawn; so that the specimens of whitebait just alluded to (there were other fishes besides the young of the herring and the sprat) would be about three months old; and by November they would in all probability be grown to the average size of sprats. Young herrings of the Moray Firth, spawned in August, can sometimes be seen inshore about November, looking exactly like whitebait.

The *blanquette* of Normandy and Brittany did not look when examined—if it *was* it that was placed before us—to be any other fish than our sprat in an early stage of its life. It is curious that whitebait exhibit many of the characteristics of the sprat, and particularly the strongly serrated abdomen. That peculiar mark is held by some naturalists as good proof that sprats never become herrings of any kind; if so, the same

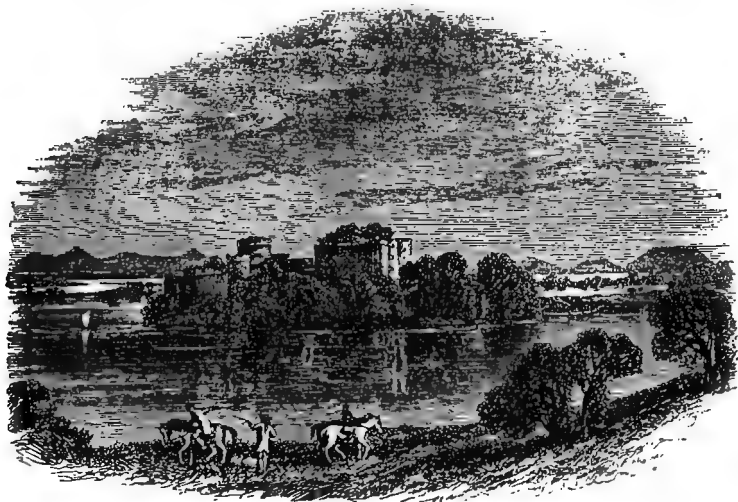
argument must likewise hold good against the whitebait being the young of the herring; yet it is remarkable that the number of vertebræ of both fishes, *i.e.* the common herring and a portion of the whitebait, are the same, namely, fifty-six, as are also the formulæ of the various fin-rays. But little weight need be laid on this latter point; few writers give the same figures about the fin-rays; and as there are different kinds of herrings, and different races of each kind, it is probable that there will be differences in the number of fin-rays. What is harder to understand is the fact that the vertebræ differ also; these run from forty-seven in the sprat to fifty-six in the common herring, different numbers having been found in the same race of herring. But whilst it may be admitted, for the sake of argument, that the smaller number might increase—*i.e.* that sprats with forty-eight vertebræ *might* grow into herring with fifty-six vertebræ—it is quite clear that whitebait with fifty-six vertebræ will never grow into sprats with forty-eight vertebræ! The more the case of the whitebait is studied, the more difficult it becomes to arrive at a satisfactory conclusion. The earliest writer on whitebait that we know is Pennant; but when he wrote the whitebait was not a fashionable fish. It was eaten then only by “common people”—“the lower order of epicures”—and the authorities, thinking that whitebait were the young or fry of some large fish, “proclaimed” that it should not be taken. Pennant at one time held the whitebait to be the young of the bleak, and Dr. Shaw followed suit in his *General Zoology*; while Donovan held “that same” to be the young of the shad. Donovan, blundering himself, “pitches into” Pennant for his errors, maintaining that the industrious zoologist had never seen the *real* whitebait. This latter idea is worth following up. Might not our *savans*, now that the mysterious dish has taken its place on the rich man’s table, summon a congress to sit upon it? Were a general fishery congress to be held, it would be well that specimens of the whitebait of different rivers should be exhibited and reported upon; for the fish known as whitebait at Blackwall may not be the fish known as whitebait at Queensferry. In the case of the parr controversy, it was found that there were parrs of many different members of the salmon family, which, as a matter of course, greatly enhanced the difficulty of solution, as well as setting the experimenters by the ears. The whitebait mystery is one of those mysteries which many a dabbler in natural history will hold himself able to

solve ; and yet those attempting to solve the problem may be all working on different fishes. Any man who may know even a little about fish, will have seen that the so-called dish of whitebait, served at a fashionable tavern, is a varied mass of minnows, young bleak, infantile sprats, and the fry of other well-known fish. So much for this tavern celebrity !

Besides whitebait there are other mysterious fish—especially in Scotland—which are well worthy of being alluded to. An idea prevails in Scotland that the vendace of Lochmaben and the powan of Lochlomond are really herrings forced into fresh water, and slightly altered by the circumstances of a new dwelling-place, change of food, and other causes. One learned person lately ascribed the presence of sea fish in fresh water to a great wave which had at one time passed over the country. But no doubt the real cause is that these peculiar fish were brought to those lakes ages ago by monks or other persons who were adepts in piscicultural art.

A brief summary of the chief points in the habits of these mysterious fish may interest the reader. The “vendiss,” as it is locally called, occurs nowhere but in the waters at Lochmaben, in Dumfriesshire ; and it is thought by the general run of the country people to be, like the powan of Lochlomond, a fresh-water herring. The history of this fish is quite unknown, but it is thought to have been introduced into the Castle Loch of Lochmaben in the early monkish times, when it was essential, for the proper observance of church fasts, to have an ample supply of fish for fast-day fare. It is curious as regards the vendace that they float about in shoals, that they make the same kind of poppling noise as the herring, and that they cannot be easily taken by any kind of bait. At certain seasons of the year the people assemble for the purpose of holding a vendace feast, and at one time large quantities of the fish were caught by means of a sweep net ; but of late years the vendace has been scarce ; only six were taken this year (1873). The fish is said to have been found in other waters besides those of Lochmaben, but I have never been able to see a specimen anywhere else. There are a great number of traditions afloat about the vendace, and a story of its having been introduced to the lake by Mary Queen of Scots. The country people take a pride in showing their fish to strangers. The principal information I can give about the vendace, without becoming technical, is, that it is a beautiful and very symmetri-

cal fish, about seven or eight inches long, not at all unlike a herring, only not so brilliant in colour; and that the females of the vendace seem to be about a third more numerous than the males—a characteristic which is also observed in the salmon family. The vendace spawn about the beginning of



LOCHMABEN.

The home of the Vendace.

winter, and for this purpose gather, like the herring, into shoals. They are very productive, and the young do not take long to grow to maturity.

The specialties of the Lochleven trout may be chiefly ascribed to a peculiar feeding-ground. Feeding I believe to be everything, whether the subjects operated on be cattle, capons, or carps. The land-locked bays of Scotland afford richer flavoured fish than the wider expanses of water, where the finny tribe, it may be, are much more numerous, but have not the same quantity or variety of food, and, as a consequence, the fish obtained in such places are comparatively poor both in size and flavour. Nothing can be more certain than that a given expanse of water will feed only a certain number of fish; if there be more than the feeding-ground will support they will

be small in size, and if the fish again be very large it may be taken for granted that the water could easily support a few more. It is well known, for instance, that the superiority of the herrings caught in the inland sea-lochs of Scotland is owing to the fish finding there a better feeding-ground than in the large and exposed open bays. Look, for instance, at Lochfyne: the land runs down to the water's edge, and the surface water or drainage carries with it rich food to fatten the loch, and put flesh on the herring; and what fish is finer, I would ask, than a Lochfyne herring? Again, in the bay of Wick, which is the scene of the largest herring fishery in the world, the fish have no land food, being shut out from such a luxury by a vast sea wall of everlasting rock; and the consequence is, that the Wick herrings are not so rich in flavour as those taken in the sea-lochs of the west of Scotland. In the same way I account for the fine flavour and beautiful colour of the trout of Lochleven. This fish has been acclimatised with more or less success in other waters, but when transplanted it deteriorates in flavour, and gradually loses its beautiful colour—another proof that much depends on the feeding-ground; indeed, the fact of the trout having deteriorated in quality as a consequence of the abridgment of their feeding-range, is on this point quite conclusive. I feel certain, however, that there must be more than one kind of these Lochleven trouts; there is, at any rate, one curious fact in their life worth noting, and that is, that they are often in prime condition for table use when other trouts are spawning.

The powan, another of the mysterious fish of Scotland, is also considered to be a fresh-water herring, and thought to be confined exclusively to Lochlomond, where they are taken in great quantities. It is supposed by persons versed in the subject that it is possible to acclimatise sea fish in fresh water, and that the vendace and powan, changed by the circumstances in which they have been placed, are, or were, undoubtedly herrings. The fish in Lochlomond also gather into shoals, and on looking at a few of them one is irresistibly forced to the conclusion, that in size and shape they are remarkably like common herring. The powan of Lochlomond and the pollan of Loch Neagh are not the same fish, but both belong to the Coregoni: the powan is long and slender, while the pollan is an altogether stouter fish, although well shaped and beautifully proportioned.

I could analyse the natural history of many other fish, but the result in all cases is nearly the same, and ends in a repeated expression that what we require as regards all fish is the date of their period of reproduction ; all other information, without this great fact, is comparatively unimportant. It is difficult, however, to obtain any reliable information on the natural history of fish either by way of inquiry or by means of experiments. Naturalists cannot live in the water, and those who live on it, and have opportunities for observation, have not the necessary ability to record, or at any rate to generalise what they see. No two fishermen, for instance, will agree on any one point regarding the animals of the deep. I have examined many intelligent fishermen during the last ten years, and few of them have any real knowledge regarding the habits of the fish which it is their business to capture. As an instance of fishermen's knowledge, one of that body recently repeated to me the old story of the migration of the herring, holding that the herring comes from Iceland to Great Britain in order to spawn, and that the sprat goes to the same icy region that it may fulfil the same instinct !

"Where are the haddocks?" I once asked a fisherman. "They are about all eaten up, sir," was his very innocent reply ; and this in a sense is true. The shore races of that fish have long disappeared, and our fishermen have now to seek this most palatable inhabitant of the sea in deeper water. Vast numbers of the haddock used to be taken in the Firth of Forth, but during late years they have become very scarce, and the boats now require to go a night's voyage to seek for them. If we knew the minutiae of the life of this fish we should be better able to regulate the season for its capture, and the percentage that we might with safety take from the water without deteriorating the breeding power of the animal. There are some touches of romance even about the haddock, but I need not further allude to these in this division of my book, as I shall have to refer to this fish under the head of the "White Fish Fisheries." The haddock, like all fish, is wonderfully prolific, and is looked upon by fishermen as being also a migratory fish, as are also turbot and many other sea animals.

The family to which the haddock belongs embraces many of our best food fish, as whiting, cod, ling, etc. ; but of the growth and habits of the members of this family we are as ignorant as we are of the natural history of the whitebait or sprat. I have

the authority of a rather learned Buckie fisherman for stating that cod-fish do not grow at a greater rate than from eight to twelve ounces per annum. This fisherman had seen a cod that had got enclosed by some accident in a large rock pool, and so had obtained for a few weeks the advantage of studying its powers of digestion, which he found to be particularly slow, although there was abundant food. The haddock, which is a far more active fish, my informant considered grew more rapidly. On asking this man about the food of fishes, he said he was of opinion that they preyed extensively upon each other, but that, so far as his opportunities of observation went, they did not as a matter of course live upon each other's spawn; in other words, he did not think that the enormous quantities of roe and milt given to fish were provided, as has been asserted by one or two writers on the subject, for any other purpose than keeping up the species. The spawn of sea-animals is extensively wasted by other means; and fish have no doubt a thousand ways of obtaining food that are unknown to man; indeed the very element in which they live is a great mass of living matter, and doubtless affords by means of minute animals a wonderful supply of food. Fish, too, are less dainty in their eating than is generally supposed, and some kinds eat the most revolting garbage with great avidity.

It is a very common error that all fish are migratory. Some fishermen, and naturalists as well, picture the haddock and the herring as being afflicted with perpetual motion—perpetual wanderers from sea to sea and shore to shore. The migratory instinct in fish, in my opinion, being very limited. They do move about a little, without doubt, but not farther than from their feeding-ground to their spawning-ground—from deep to shallow water. Some plan of taking fish other than the present must speedily be devised; for now we only capture them—and I take the herring as an example—over their spawning-ground, when they are in the worst possible condition, their whole flesh-forming or fattening power having been bestowed on the formation of the milt and roe. I repudiate altogether this iteration of the periodical wandering instincts of the funny tribes. There are great fish colonies in the sea, in the same way as there are great seats of population on land, and these colonies are stationary, having, comparatively speaking, only a limited range of water in which to live and die. Adventurous individuals of the fish world occasionally roam far away from home, and speedily find themselves in a



warmer or colder climate, as the case may be ; but, speaking generally, as the salmon returns to its own waters, so do sea fish keep to their own colony. All they seem to need is a rallying point—thus at any place where there is a wrecked ship in the water, a sand-bank, or a chain of rocks, certain kinds of fish will there be found assembled. Our larger shoals of fish, which form money-yielding industries, are of wonderful extent, and must have been gathering and increasing for ages, having a population multiplied almost beyond belief. Century after century must have passed away as these colonies grew in size, and were subjected to all kinds of influences, evil or good : at times decimated by enemies, or perhaps attacked by mysterious diseases, that killed the fish in tens of thousands. Schools or shoals of fish, when they become of an extent that will admit of constant fishing, must have been forming during long periods of time ; for we know that, despite the wonderful fecundity of all kinds of sea-fish, the expenditure of both seed and life is something tremendous. We may rest assured that, if a female cod-fish yields its roe by millions, a balancing power exists in the water that prevents the bulk of the eggs from coming to life, or at any rate from reaching maturity. If it were not so, how came it, when there was no fish commerce, and when man only killed the denizens of the sea for the supply of his individual wants, that our waters were not, so to speak, impassable from a superfluity of fish ? Buffon has said that if a pair of herrings were left to breed and multiply undisturbed for a period of twenty years, the result would be a bulk of fish equal to that of the globe on which we live !

## CHAPTER II.

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### FISH COMMERCE.

Early Fish Commerce—Sale of Fresh-water Fish—Cured Fish—Influence of Rapid Transit on the Fisheries—Fish-ponds—The Logan Pond—Ancient Fishing Industries—The Dutch Herring Fishing—Zuyder Zee Herring Fishery—The Fishers of Friesland—The Herring in Holland—The Dutch Cure—Dutch Salmon—Salmon Fishing in Holland—Law of the Fishing.

IN the absence of precise information, it may be guessed that even during the far back ages fish was esteemed as an article of food, and formed an important contribution to the diet of such peoples as had access to the sea, or who could obtain the finny inhabitants of the deep by purchase or barter. In the Old and New Testaments, and in various ancient profane histories, fish and fishing are frequently mentioned; and in what may be called modern times a few scattered dates, indicating the progress of the sea fisheries, may, by the exercise of great industry and much research, be collected; but these are not in any sense consecutive, or indeed very reliable, so that we are, as it were, compelled to imagine the progress of fish commerce, and to picture in our mind's eye its transition from a period when the mere satisfaction of individual wants was only cared for, to a time when fish began to be bartered for land goods—such as farm, dairy, and garden produce—and to trace, as we best can, that commerce through these obscure epochs to the present time, when fisheries form a prominent outlet for capital, are a large source of national revenue, and attract, because of these qualities, a degree of attention never before bestowed upon them. Fish commerce being an industry naturally arising out of the immediate wants of mankind, has unfortunately been invested with an amount of exaggeration having no parallel in other branches of industry. Blunders perpetrated long ago in natural histories and Encyclopædias, when the life and habits of all kinds of fish,

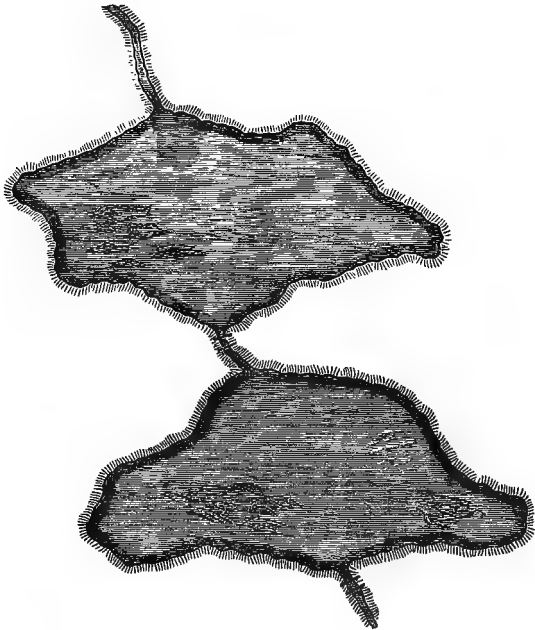
from the want of investigation, were but little understood, have been, with those additions which under such circumstances always accumulate, handed down to the present day, so that even now we are carrying on some of our fisheries on altogether false assumptions, never dreaming that there will be a fishing to-morrow, which must be as important, or even more important, than the fishing of to-day, beyond which the fisher class never look.

It is curious to note that there was in most countries a commerce in fresh-water fish long before the food treasures of the sea were broken upon. This is particularly noticeable in our own country, and is vouched for by many authorities both at home and abroad. We can all imagine, also, that in the pre-historic or very early ages, when the land was untilled and virgin, and the earth was undrained, there were sources for the supply of fresh-water fish that do not now exist in consequence of the enhanced value of land. At the period to which I have been alluding there was a much greater water surface than there is now—rivers were broader and deeper, as also were our lakes and marshes. In those early days, although not so early as the remote uncultivated age of which I have spoken, there were great inland stews populous with fish, especially in connection with monasteries and other religious houses, many examples of which, in their remains, may be seen in England and on the Continent. In fact, fish commerce, in despite of many curious industries connected with the productiveness of the fisheries, was not really developed till a few years ago, when the railway system of carriage began. Even up to the time of George Stephenson commerce in fish was, generally speaking, a purely local business, except in so far as fishwives could extend the trade by carrying the contents of their husbands' boats inland, in order, as in more primitive times, to barter the fish for other produce. The fishermen of Comacchio, for instance, still cure their eels, because they have not the means of sending them so rapidly into the interior of Italy as would admit of their being eaten fresh. Scotch salmon in the beginning of the present century was nearly all kippered or cured in some way as soon as caught, because the demand for fresh fish was purely local, and therefore limited. With the discovery that salmon packed in ice could be kept a long time fresh, trade in that fish began to extend and the price to rise. This discovery, which exercised a very important influence on the value of our salmon-fisheries,

was made by a country gentleman of Scotland, Mr. Dempster of Dunnichen, in 1780. Steamboat and railway transit, when they became general, at once converted salmon into a valuable commodity; and such became the demand, from facility of transport, that this particular fish, from its great individual value, has more than once been in danger of being exterminated through the greed of the fishery tenants.

The network of railways which now encircles the land has conferred upon our inland towns, so far as fish is concerned, all the advantages of the coast. For instance, the fishermen of Prestonpans send more of their fish to Manchester than to Edinburgh, which is only nine miles distant: indeed our most landward cities are comparatively well supplied with fresh fish and crustacea, while at the seaside these delicacies are not plentiful. The Newhaven fishwife is a common and picturesque visitant of many of the larger Scottish inland towns, being able by means of the railways to take profitable journeys; indeed, one consequence of the extension of railways has undoubtedly been to add enormously to the demand for sea produce, and to excite the ingenuity of our seafaring population to still greater cunning and industry in the capture of all kinds of fish. In former years, when a large haul of fish was taken, there was no means of despatching them to a distance, neither was there a resident population to consume what was caught. Railways not being in existence, the conveyance of the period was too slow for perishable commodities, and visitors to the seaside were also rarer than at present. The want of a population to eat the fish no doubt aided the comfortable delusion of our supplies being inexhaustible. But it is now an undoubted fact, that with railways branching to every pier and quay, our densely-populated inland towns are better supplied with fish than the villages where they are caught—a result of that keen competition so noticeable where fish and other sea delicacies are concerned. High prices form an inducement to the fishermen to take from the water all they can get, whether the fish be ripe for food or not. A practical fisherman, whom I have often consulted on these topics, says that forty years ago the slow system of carriage was a sure preventive of over-fishing, as fish, to be valuable for table purposes, require to be fresh. “It’s the railways that has done all the mischief, sir; depend on that; and as for the fishing, sir, it’s going on at such a rate that there will some day be a complete famine. I’ve seen in my time more fish caught with

a score of hooks on a line than can now be got with eight thousand !”



At one time it was usual for noblemen and other country gentlemen to have fish-ponds ; in fact, a fish-pond was as necessary an adjunct of a large country house as its vegetable or fruit garden. These ponds, as the foregoing sketch will show, were of the most simple kind, and were often enough constructed by merely stopping a little stream at some suitable place, and so forming a couple of artificial lakes, in which were placed some large stones, or two or three bits of artificial rock-work, so constructed as to afford shelter to the fish. In those days fish-ponds were a necessity to noblemen and gentlemen in the habit of entertaining guests or giving great dinner-parties ; hence also the multiplicity of recipes in our older cookery-books for the dressing of all kinds of fresh-water fishes ; besides, in ancient times, before the Reformation, when Roman Catholicism

required a rigorous observance of church fasts, a fish-pond near every cathedral city, and in the precincts of every monastery, was a *sine qua non*. The varieties of fish bred in these ponds were necessarily very limited, being usually carp, some of which, however, grew very large. As has been already stated, there are traces of some of our curious and valuable fishes having been introduced into this country during those old monastic times. As already shown, most fish-ponds of these remote times were quite primitive in their construction—very similar, in fact, to the beautiful trout-pond at Wolfsbrunnen, near Heidelberg. There were no doubt ponds of large extent and of elaborate construction, but these were comparatively rare; and even on the sea-coast we used to have ponds or storing-places for sea fish. One of these is still in existence: I allude to Logan Pond in Galloway, for keeping fish so as to have them attainable for table uses without reference to the state of the weather, it is the property of General M'Douall of Port Logan House. This particular pond is not an artificially-constructed one, but has been improved out of the natural surrounding of the place. It is a basin, formed in the solid rock, ten yards in depth, and having a circumference of one hundred and sixty feet, a wall of loose stones admits the waters of the sea through a chasm of rock, and prevents the egress of the fish. The fish which it contains are taken in the neighbouring bay when the weather is fine, and transferred to the pond, which communicates with the sea by a narrow passage. It is generally well stocked with cod, haddock, and flat fish, which in the course of time become very tame; and I regret to say, from want of proper shelter, most of the animals become blind. The fish have of course to be fed, and they partake greedily, from the hand of the woman who feeds them, of the mass of boiled mussels, limpets, whelks, etc., with which they are regaled, and their flavour is really unexceptionable.

Coming back, however, to the subject of fresh-water fish-ponds, it may be stated that these have been long given up, except as adjuncts to the amenities of gentlemen's pleasure-grounds. Ornamental canals and fish-ponds are not at all uncommon in the parks of our country gentlemen, although they are not required for fish-breeding purposes, because the fast London or provincial trains carry baskets of fish a distance of one hundred miles in a very few hours, so that a turbot or a dish of whiting may be in excellent condition for a late dinner.

All the ancient fishing industries, whether still existing or extinct, except in their remains, bear traces of the times in which they originated. Pisciculture was had recourse to at a very ancient period, but chiefly in connection with fresh-water fishes—the ova of such being the most readily obtainable; or with the mollusca, as these could bear a long transport, having



PACKING HERRINGS.

a reservoir of water in their shell. Sea fishers of the olden time dealt with the fish for the purpose of their being cured with salt or otherwise, simply, as has already been stated, because of the want of rapid carriage and a comparatively scanty local population.

The particular fishing industry which has bulked largest in literature, and was pursued in a systematic way, is, or rather was, that of the Dutch, for Holland does not at present make her mark so largely on the waters as she was wont to do, being at present surpassed in fishing enterprise by Scotland and other

countries. The particular fish coveted by the Dutch people was the herring. A set of engravings which I procured in Amsterdam convey a graphic idea of the great importance that was attached by the Dutch themselves to their herring-fishery. This series of sixteen peculiarly Dutch plates begins at the beginning of the fishery, as is indeed proper it should, by showing us a party busy at a sea-side cottage knitting the *gerring* nets; one or two busses are seen in the distance busy at work. We are then shown, on the banks of one of the numerous Dutch canals, a congregation of quaint-looking coopers engaged in preparing the barrels, while next in order comes a representation of the preparing and victualling of the buss, which is surrounded by small boats, and crowded with an active population engaged in getting the vessel ready for sea—barrels of provisions, breadths of netting, and various necessaries, are being got on board. Then follow plates, of which the foregoing is a specimen, showing us the equipment of various other kinds of boats, which again are succeeded by a view of the busses among the shoals of herring, the big mast struck, most of the sails furled, and the men busy hauling the nets, which of course, as is fitting in a picture, are laden with fish. Various other boats are also shown at work, as the great hoy, a one-masted vessel, that is apparently furnished with a seine-net, and the great double shore or sea-board, which is an open boat. Then we have the herring-buss coming gallantly into the harbour, with its sails all set and its flags all flying—its hull deep in the water, which seems to frolic lovingly round its prow, as if glad at its safe return. Next, of course, there is a scene on the shore, where the pompous-looking curer and his servants are seen congratulating each other amid the bustle of surrounding commerce and labour; dealers, too, are figured in these engravings, with their wheelbarrows drawn by dogs of unmistakable Dutch build, and there are also to be seen in the picture many other elements of that industry peculiar to all fishing towns, whether ancient or modern.

The next scene of this fishing panorama is the herring banquet or feast, where the king, or mayhap the rich owner of a fleet of busses sits grandly at table, with his wife and daughter, attended by a butler and a black footman, partaking of the first fruits of the fishery. After this follows a view of the fishmarket, with portraits of the fishwives, altogether thoroughly indicative of their peculiar way of doing business, which is always the same, whether the scene be laid in ancient Holland or



modern Billingsgate. Next comes a picture of the various buyers of the commodity on their way home, of course by the side of a canal, with their purchases of deep-sea, shore, state, and red herrings. The next scene of the series is a smoking-house, partially obscured by wreaths of smoke, where the herrings are being red-ed; and the series is appropriately wound up with a tableau representing the important process of repairing the damaged nets—the whole conveying a really graphic, although not very artistic, delineation of what was once a highly characteristic Dutch industry. A few plates illustrative of the whale-fisheries of Holland are appended to the series I have been describing—for whale-fishing was at one time one of the industries of the hard-working Dutch.

The old saying of Amsterdam being built on herring bones was frequently used to symbolise the fishing power of Holland. It is thought that the attention of the Dutch people was first drawn to the value of the sea fisheries by the settlement of some Scottish fishermen in their country. I cannot vouch for the truth of this statement as to the Scottish emigration, but I believe it was a Fleming who first discovered the virtues of pickled herrings, and it is also known that the capture of the herring was a chief industry on the sea-board of all the Low Countries: it is likewise instructive to learn that at a time when our British fisheries were very much undeveloped the Dutch people found our seas to be a gold mine, so productive were they in fish, and so famous did the Dutch cure of herrings become. We are not willing, however, to credit all the stories of miraculous draughts, and store of wealth garnered up, by the plodding Hollanders. We must bear in mind that when the Dutch began to fish, the seas, as a field of industry were nearly virgin, and that that people at one time kept this great source of wealth all to themselves. At that particular period there was no limit to the supply, fishermen having only to dip their nets in the water to have them filled. No wonder, therefore, that the fisheries of Holland became a prominent industry, and in time the one absorbing hobby of the nation. Busses in large fleets were fitted out and manned, till in time the Dutch came to be reputed the greatest fishers in the world. But great as was the fishing industry of those days in Holland, and industrious as the Dutch undoubtedly were, there has been a considerable amount of exaggeration as to the results, more especially in regard to the enormous quantities of fish said to have

been captured and cured. But whatever this total might be was not of great consequence, for the mere quantity of fish caught is perhaps, although a considerable one, the smallest of the many benefits conferred on a nation by an energetic pursuit of its fisheries. The fishermen must have boats, and these must be fitted with sails, rigging, etc. ; and, moreover, the boats must be manned by an efficient crew ; then the curing and sale of the fish give employment to a large number of people as well ; whilst the articles of cure—as salt, barrels, etc.—must of necessity be largely provided, and are all of them the result of some kind of trained industry : and these varied circumstances of demand combine to feed the particular industrial pursuit I am describing. Besides, the fisheries provide a grand nursery for seamen, which is, perhaps, in a country like ours, having a powerful navy, the greatest benefit of all.

I have taken the pains to collate as many of the figures of the ancient Dutch fishery as I could collect during an industrious search ; and I find that, in the zenith of its prosperity, after the proclamation of the independence of the States of Holland, three thousand boats were employed in her own bays, while sixteen hundred herring busses fished industriously in British waters, and eight hundred larger vessels prosecuted the cod and whale fisheries at remote distances. In the year 1603 we are informed that the Dutch sold herrings to the amount of £4,759,000, besides what they themselves consumed. We are also told that in 1618 they had twelve thousand vessels engaged in this branch of the fishery, and that these ships employed about two hundred thousand men. It must have been a splendid sight, on every 24th of June, to witness the departure of the great fleet from the Texel ; and as most of the Dutch people were more or less interested in the prosperity of the fishery, either as labourers or employers of labour, there would be no lack of spectators on these occasions. The Wick herring drave of a thousand boats is an industrial sight of no common kind ; but it must give way before the picturesque fleet of Holland, as it sailed from the Texel about three hundred years ago.

It is interesting to see the Holland of to-day, and to compare its fishing fleets with those of other nations. Flat fish are the *spécialité* of the Dutch sea fisheries, eels ranking next, vast numbers being taken in the canals of South Holland, while large quantities are obtained from the numerous lakes of Friesland. An active fishery of a miscellaneous description is likewise car-

ried on in the Zuyder Zee. The fishermen who frequent that water capture in particular a small herring, locally known as pan-fish, and they likewise obtain great supplies of anchovies, or rather sprats, as well ; but in South Holland the fish chiefly taken are soles and flounders.

At Scheveningen there are about one hundred and forty boats engaged in this kind of fishery, and also in the red-herring fishery—that is, in capturing herrings which are ultimately smoked. It is interesting to observe the fishing fleet come in to Scheveningen: there being no harbour at that place, the vessels have to sail right upon the sandy beach. The luggers are admirably constructed for that purpose, being flat bottomed as well as blunt bowed, and having, instead of a keel, a large wooden wing at each side, for the purpose of keeping the ship steady. So built, these boats can run quite safely against the shore, although it surprises one not acquainted with the circumstances to see them float right on to the beach with all their sails set. As soon as the vessels take the ground, the crew commence to wade ashore with the produce of the fishery—generally flounders, plaice, and soles, packed in wicker baskets of tolerable size. The women, as is the case in most fishing-places, are at hand to receive and carry away the produce ; and when any very small fish are taken, they fall to these female carriers as a perquisite. The vessels are each fitted with a couple of light trawl nets, which are hauled to the mast-head to be dried, on the ship arriving at the beach. The Dutch fish on the numerous banks of the German Ocean, only, however, for flat fishes: they have done very little of late in the way of local line-fishing, partly, no doubt, from the want of mussels for bait, and partly from the custom which has so long prevailed of following after one kind of fish. The Dutch have, however, a winter cod-fishery, to which their busses proceed after knocking off from what is called in Holland the great fishery. There are no shell-fish about this part of the Netherlands, but large quantities are obtained in other places. At the western side of the Texel, I was told there were both oyster and mussel fisheries, and at Bruinisse, in Zealand, there are fifty or sixty boats employed in obtaining these molluscs. I could not learn that any lobsters or crabs were taken at the places I visited ; but, as there are no rocks among which they can find a fit dwelling-place, crustaceans cannot be expected. Mr. Maas of Scheveningen intends to introduce a shore line-fishery. I asked him where he

would get bait. "Oh," he replied, "I can get thousands of splendid lampreys." Only think of such fine fish being cut up for bait! Would it not pay better to send them to London?

The herring-fishery on the Zuyder Zee has no connection whatever with the great fishery; it is a miscellaneous fishery for winter herrings and sprats, which are cured in different ways, also for the universal flounder and the abounding eel; whilst the great fishery is for the herring only. Many of the fishermen stay out at sea in their beautifully clean half-decked boats during the week, and only come home to their families on Saturday night, their cargo being taken from time to time, as it accumulates, to the curer. The quaint races of fishermen who dwell on the curious islands of Marken, Urk, and Shokland, leave their homes at midnight on Sunday, and, if they find fish, do not return till the following Saturday. There are about twelve hundred boats of all kinds fishing on the Zuyder Zee, and numerous smokeries have been erected for smoking the herrings. The people are now becoming very proficient in this branch of the fishery business, which was inaugurated by the fishermen of Dieppe during the twelfth century. The Dutch do not esteem the fresh herring as we do in Britain—indeed the Zuyder Zee herrings are in a measure despised—still the fresh herring fishery is of considerable value, and yields about £40,000 a year to Scheveningen, Catwyk, and Noordwyk, not to speak of what it brings in to Monnikendam, Enkhuizen, Wollenhove, and numerous other little fishing towns or hamlets. I found it exceedingly difficult to procure reliable statistics of the produce of the fisheries carried on in the Zuyder Zee, but was told that the eels which are annually caught may be valued at 85,000 florins, and that the sprat fishery will produce four times that amount of money. As to the fresh herring fishery, the figures, although they were double the amount stated above, would, after all, be modest, compared to those of the Scottish herring fishery. The Frieslanders are mighty fishers; two-thirds of their fishing craft are on the Zuyder Zee, and their part of the country, as may be seen from any map, is full of lakes, some of them of large size. The Frisons derive wealth from the waters as well as from their peat grounds, and many of their lakes and fish-ponds have been formed out of holes created by carrying away the peat. The Frison people also carry on fishing industries on the islands of Ter Schelling and Ameland, which lie opposite their coast, and which were once united as a part of the land. Then,

again, there is a fishery at Hourn ; and Hourn is celebrated : it gave to Holland the famous navigator who doubled the Cape which he called after his birthplace. There are about two hundred fishermen there, men quite as industrious as their opposite neighbours, the Frisons. There is no doubt that the Dutch are reviving their fisheries ; but it is amusing to hear everywhere of the former greatness of this branch of industry, and to contrast it with what now prevails. It is instructive to note that some of the towns in Holland, which were at one time famous and wealthy fishing ports, are fast fading away into ruins. There is Enkhuizen, which, long ago, sent a fleet of one hundred and fifty mighty vessels to the "great fishery," escorted by a squadron of war-ships, now sending only seven vessels ; but the greatness of the place has passed away, and that town at present is but a wreck or shadow of its former self. Most of the fish taken by the Dutch are sent out of Holland—the eels to Billingsgate, the flounders to Belgium, the turbot to London or Paris, and so forth. The fish-markets of the chief towns of Holland are but poorly supplied with what was once the staple article of the country—another illustration of that old proverb which tells us about the scarcity of coals at Newcastle-on-Tyne.

One would suppose the herring in Holland to be an altogether different animal from the fish which bears that name in Great Britain. The Dutch reverence the stork, but they almost worship the herring ; it is without question their national fish, and they most lovingly eat it—raw out of the pickle ! and some of the people are so fond of it that they devour it, bones, fins, and all. Amsterdam is reputed to have been founded on herring bones ; and whatever greatness Holland has achieved in commerce has undoubtedly grown from the apprenticeship served by its sons on the waters, in the days when the greatness of the nation arose from its fisheries. Although the herring fishery of the Netherlands has fallen off greatly from what it was, it is again reviving ; and the shipowners of Holland talk confidently of renewing the ancient glory of their "herring drave," which at one time was the most gigantic fleet upon the seas. In the meantime, although the trade in herrings be comparatively small, the individual love of the fish is as great as ever. In all towns and cities of that remarkable country there are shops for the sale of this fish, and in these shops there are always to be found numerous persons partaking of that most choice delicacy—a

pickled herring. One requires to be among the Dutch when the arrival of the new fish takes place, to understand the universal love of the people for the herring. It is wonderful to note the enthusiasm which is developed the moment it becomes known that the new fish have come to hand. A fast vessel brings in the first fruits of the cure from the ocean fleet, and lo! the people burst into a demonstration. At one time they used to deck the steeple of Vlaardingen Church—Vlaardingen is now the chief herring port—and ring a joyful peal of bells. The curers and shipowners decked their houses with flowers; and persons who sold the fish decorated their signboards, in order to let the public know that the newly-cured delicacy had arrived. Then rival curers sent off a sample of their herrings to the king; and many a rapid race has been run to the Hague, in order to have the honour of being first in the field, and so obtain the reward of five hundred guilders which were given on the occasion. There is not now, I believe, so much outward demonstration; but the first fruits of the fishery are as valuable as ever, a single herring often costing a couple of guilders! Herrings are usually served raw in Holland, with a sauce of vinegar, cucumber, etc.; they are also dressed with salad, and are likewise eaten *au naturel*. No stranger should leave Holland without making trial of the national dish; it is as delicious in its way as the Scotch kipper herring, or as the exquisite broiled fresh herring of Lochfyne, and almost beats the famous “splitbellies” of the Moray Firth fishing towns.

It is curious that while the State has ceased to interfere in any way with the herring fishery, the size of the mesh, the mode of fishing, and all other details, being left to the honour of the boat owners, it still regulates with jealous care the cure of the fish. The curing laws are carried out as rigorously as ever: the captains are sworn to do their duty in seeing that the herrings are properly cured. Scottish herrings—and it is in Scotland we now find the really “great” fishery for the poor man’s fish—are cured on shore. Dutch herrings, again, are cured on board the vessel that captures them; and there is no question but that their cured herrings are superior to ours, although I think they would be still better if Government would let them alone, and let each curer stand or fall by the perfection of his individual cure. It is certain that a great deal of pains is taken with the manipulation of the herring on board the Netherland busses; and at one time the Dutch mode

of cure was kept a profound secret, it being a strict rule that no stranger should be admitted on board the fishery vessels.

The superiority of the Dutch cure is said to be owing to the use of a superior kind of salt, which the boat-owners take great pains to procure, and to purify still further after they obtain it, and also to the very careful selection and assorting of the fish into different classes, as "full" herrings, "Matjes," etc. Only a portion of the intestines is taken out of the herring by the Dutch; they content themselves with removing the gills and stomach, leaving the crown-gut in the fish. The herrings, as fast as they are prepared, are thrown into a strong brine, in which they are kept for eighteen hours before being packed in the barrels. It is an imperative rule of the great fishery that all herrings taken on one day must be cured during that day; herrings that cannot be cured on the day they are caught must be thrown overboard, or as an alternative they may be so packed as to be sold for inferior fish. There is a penalty of 300 guilders exigible from the master of the buss in case he should fail to perform his duty according to rules which are laid down for his guidance. As I have said, great pains are taken to procure fine salt. All the fish caught before St. James's Day are cured with Spanish or Portuguese salt; those fish are known as herrings of the *large* salt; the herrings cured after that date are known as herrings of the *fine* salt, only the finest Dutch-made small salt being used. Then it is a rule of the great fishery that barrels made of new and good oak only must be used. A small steamer in attendance on the fleet starts off to Vlaardingen as soon as it can collect a hundred barrels of fish, the "hunters" or "yagers" in attendance on the fishery vessels, follow as rapidly as they can, the first one after the steamer with 120 barrels, the second one with fifty more, etc., and the first fish bring the great prices already alluded to. In consequence of the crew having both to fish and to cure, the mass of the herrings taken cannot be dealt with so as to receive the Government brand; they lie in salt, therefore, in the vessel, and after arriving at home, are taken out and smoked, but of course only realise an inferior price.

Having been told that Dutch salmon was excellent, large in size, and delicious in flavour, and knowing that a considerable quantity of that fish is annually sent to London,—indeed Rhine salmon are now sold in Edinburgh in December,—I felt anxious during a visit to the Netherlands to obtain reliable information about the Dutch salmon fisheries. The Rhine having

many mouths in Holland, I expected to see salmon everywhere in that country, and to find it cheap, but in that I was disappointed. There can be no doubt that the mighty father of waters contains in his liquid bosom a great army of fish. The fish breeding and feeding grounds of a river which has a course of nine hundred miles, and which is supplemented, on its way to the sea, by hundreds of minor streams, must be numerous and productive, but for all that I was told that Rhine salmon were not so plentiful in Holland as they had once been. No wonder. A salmon river and its tributaries, to be thoroughly economised, requires, like the Duke of Richmond's Spey, to be under the management of one person, or at any rate to be subject to some one set of laws. But as the Rhine flows through several kingdoms, such an arrangement is obviously impossible. A fish may be bred in some far away tributary, and after passing through the territory of the King of Prussia, may be captured in Holland! Although salmon are now comparatively scarce in Holland, I was told the old story of its having been once so plentiful that apprentices used to bargain against eating it oftener than twice a week! Now, I daresay they never see it except on rare holiday occasions, it being quite as dear in Holland as in London, averaging about 1s. 8d. per pound, and from all I can learn never likely to be cheaper under present circumstances,—1s. 4d. per pound weight being about the price at which salmon is sold to the dealers. The fish is, of course, dearer when bought retail.

Salmon fisheries in Holland appear to be well managed, so far as capturing the fish is concerned, some of them being fished very systematically. I paid a visit to one on the Maas, a few miles above Rotterdam, and easily accessible by means of the steamer to Dordrecht. It is worked by a company of gentlemen in Rotterdam, who rent it from Mr. Van Briennan, and it is situated on a terrace on the right bank of the river—that is, it is worked from the terrace which is fitted up for the purpose. Except during the fence months, which the Company are careful to observe, the fishing is worked night and day, the nets being tugged out from the upper end of the terrace by means of a small steamboat, which, sweeping down the river for about a mile, lands the fish at a stage constructed for the purpose, when they are at once carried in a hand net to a large floating iron tank, pierced with the necessary holes for permitting a full supply of water, there to be kept alive till they are required for market.



Buyers from Rotterdam and elsewhere come to a plateau on the opposite side of the river, and hold a market every morning. The fish are then killed by the fishers, and carried across to the selling place, where they are sold at so much per fish, the persons buying being quite able to discern the weight and quality of each salmon by looking at it. I was not present at any of the sales, but I was told that they were "Dutch auctions," there being always a few persons to compete.

This salmon fishery, so far as I could judge from a visit of a few hours, is remarkably well conducted; the capture of the fish goes on by night as well as by day, so that about thirty hauls of the nets are obtained every twenty-four hours—there being a cessation from labour at the flow of the tide. A considerable number of salmon are taken at this fishery, as many as seventy having been frequently caught in a day (and night)—a common take being fifty or sixty. During the time of my visit, twelve hauls of the nets were made by hand—the steamer being under repair—with a result of eighteen fish: on that day the total capture was sixty-six fish, which produced a sum of £67:15s.—being a little over one pound sterling per fish; and as the average weight of the Maas salmon is fifteen pounds, the sum I have named gives 1s. 4d. per pound weight as the price. Upwards of thirty men and half-a-dozen boys, in addition to an overseer, are employed at this fishery on the Maas, and their wages average about 18s. a week each. These men live in a bothy, and only go home on the Saturdays. None of the persons employed are allowed to drink spirituous liquors, but a plan to provide food for them at a general table was not successful; they now mess individually or in groups at their bothy as best suits them. The superintendent has a pleasant house to live in, and about double the wage of the men under him. The Company weave and dye their own nets in the winter time. Each set of nets is 2000 feet in length, and 33 feet deep, and at the Van Briennan fishery three sets of nets are kept constantly at work night and day, as I have already stated. When the steamboat engaged in this fishery is disabled, as happened to be the case during my visit, horses are called into requisition, in order to wind in the nets by means of a very powerful wheel windlass. The fishing is by law suspended from November till February, and also during every flow of the tide. An act of parliament regulates the size of the mesh, and prohibits the use of all fixed nets. The Dutch people won't allow the Maas to be

called a branch of the Rhine, or their fish to be called Rhine salmon, which the superintendent of the Van Briennan fishery said were inferior fish, but in this he is evidently wrong. The total quantity of salmon taken from the waters of Holland and from the lower Rhine is, of course, very large, great quantities of them being sent to Paris, Brussels, London, Edinburgh, and other populous places. The Scottish people, and they are good judges, do not like the Dutch salmon so well as their own fine curded fish; those taken in the estuaries of Holland are too oily and rich, whilst those taken a few hundred miles up the Rhine are rather lean and flavourless to suit the epicures of Scotland.

## CHAPTER III.

### ITALIAN, SCOTTISH, AND FRENCH FISHERIES.

Comacchio—The Art of Breeding Eels—A well-designed Eel Farm—Profits of Eel breeding in the 16th century—Progress of Fishing in Scotland—A Scottish Buss—Newfoundland Fisheries—The Greenland Whale Fishing—Specialty of different Fishing Towns—The General Sea Fisheries of France—French Fish Commerce—French Sea Fisheries—The Basin of Arcachon—French Sardine Fishery—Sardine Curing—Want of Statistics of the British Fisheries.

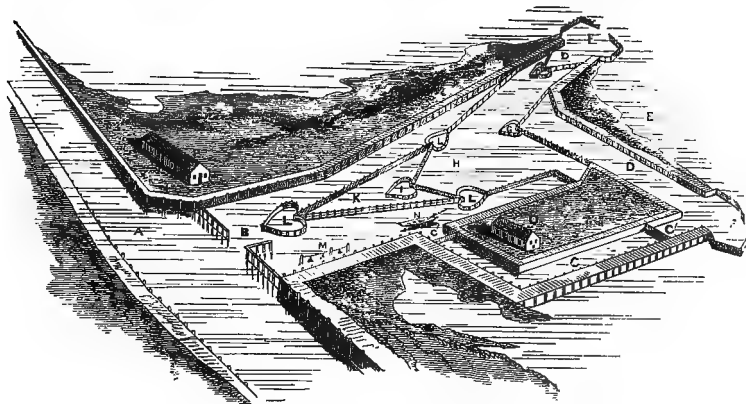
LONG before the organisation of the Dutch fisheries there existed a quaint colony of Italian fisher people on the borders of a more poetic water than the Zuyder Zee. I allude to the eel-breeders of Comacchio on the Adriatic. This particular fishing industry is of very considerable antiquity, as we have well-authenticated statistics of its produce, extending over three centuries. The lagoons of Comacchio afford a curious example of what may be done by design and labour. This place was at one time a great unproductive swamp, about one hundred and forty miles in circumference, accessible to the waves of the sea, where eels, leeches, and other inhabitants of such watery regions, sported about unmolested by the hand of man; and its inhabitants—the descendants of those who first populated its various islands—isolated from the surrounding civilisation, and devoid of ambition, have long been contented with their obscure lot, and have even remained to this day without establishing any direct communication with surrounding countries.

The precise date at which the great lagoon of Comacchio was formed into a fish-pond is not known, but so early as the year 1229 the inhabitants of the place—a community of fishers as quaint, superstitious, and peculiar as those of Buckie on the Moray Firth, or any other ancient Scottish fishing port—proclaimed Prince Azzo d'Este Lord of Comacchio; and from the time of this appointment the place grew in prosperity, and its fisheries began to assume an organisation and design which had not before been their characteristic. The waters of the lagoon

were dyked out from those of the Adriatic, and a series of canals and pools were formed suitable for the requirements of the peculiar fishery carried on at the place, all of which operations were greatly facilitated by the Reno and Volano mouths of the Po forming the side boundaries of the great swamp; and, as a chief feature of the place, the marvellous fish labyrinth celebrated by Tasso still exists. Without being technical, we may state that the principal entrances to the various divisions of the great pond—and it is divided into numerous stations—are from the two rivers. A number of these entrances have been constructed in the natural embankments which dyke out the waters of the lagoon. Bridges have also been built over all these trenches by the munificence of various Popes, and very strong flood-gates, worked by a crank and screw, are attached to each, so as to regulate the migration of the fish and the entrance and exit of the waters. A very minute account of all the varied hydraulic apparatus of Comacchio would only weary the reader; but I may state generally, and I speak on the authority of M. Coste, that these flood-gates place at the service of the fish-cultivators about twenty currents, which allow the salt waters of the lagoon to mingle with the fresh waters of the river. Then, again, the waters of the Adriatic are admitted to the lagoon by means of the Grand Pallota Canal, which extends from the Port of Magnavacca right through the great body of the waters, with branches stretching to the chief fishing stations which dot the surface of this inland sea, so that there are about a hundred mouths always ready to vomit into the lagoon the salt water of the Adriatic. The entire industry of this unique place is founded on a knowledge of the natural history of the particular fish which is so largely cultivated there—viz. the eel. Being migratory, it is admirably adapted for cultivation, and being also very prolific and of tolerably rapid growth, it can be speedily turned into a source of profit. About the end of the sixteenth century we know that the annual income derived from eel-breeding in the lagoons was close upon £12,000—a very large sum of money at that period.

The inhabitants of Comacchio seem to have a very correct idea of the natural history of this rather mysterious fish. They know exactly the time when the animal breeds, which, as well as the question how it breeds, has in Britain been long a source of controversy. And these shrewd people know very well when the fry may be expected to leave the sea and perform

their *montee*. They can measure the numbers, or rather estimate the quantity, of young fish as they ascend to the lagoon, and consequently are in a position to know what the produce will eventually be, as also the amount of food necessary to be provided, for the fish-farmers of Comacchio do not expect their



A DIVISION OF COMACCHIO.

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| A. Canal Palotta.                        | H. Second compartment.                        |
| B. Entrance from the canal.              | I. Chamber of second compartment.             |
| C. Canal for the passage of boats.       | K. Third compartment.                         |
| C'. Sluices for closing canal.           | LLL. Chambers of third compartment.           |
| D. First compartment of the labyrinth.   | M. Wickerwork baskets for keeping fish alive. |
| E. Outer basin.                          | N. Boat with instruments of fishing.          |
| F. Antechamber of the first compartment. | O. Dwelling-house.                            |
| G. Chamber of the first compartment.     | P. Storehouse.                                |

animals to fatten upon nothing. However, they go about this in a very economic way, for the same water that grows the fish also grows the food on which they are fed. This is chiefly the *aquadelle*, a tiny little fish which is contained in the lakes in great numbers, and which, in its turn, finds food in the insect and vegetable world of the lagoons. Other fish are bred as well as the eel—viz. mullet, plaice, etc. On the 2d day of February the year of Comacchio may be said to begin, for at that time the *montee* commences, when may be seen ascending up the Reno and Volano mouths of the Po from the Adriatic a great series of wisps, apparently composed of threads, but in reality young

eels ; and as soon as one lot enters, the rest, with a sheeplike instinct, follow their leaders, and hundreds of thousands pass annually from the sea to the waters of the lagoon, which can be so regulated as in places to be either salt or fresh as required. Various operations connected with the working of the fisheries keep the people in employment from the time the entrance-slucies are closed, at the end of April, till the commencement of the great harvest of eel-culture, which lasts from the beginning of August till December. The engraving represents one of the fishing-places of the lagoon.

No country has, taking into account size and population, been more industrious on the seas than Scotland—the most productive fishery of the country having been that for herring. There is no consecutive historical account of the progress of the herring-fishery. The first really authentic notice we have of a trade in herrings is nine hundred years old, when it is recorded that the Scots exported herrings to the Netherlands, and there are indications that even then a considerable fishery for herrings existed in Scotland ; and prior to that date Boethius alludes to Inverlochy as an important seat of commerce, and persons of intelligence consider that town to have been a resort of the French and Spaniards for the purchase of herring and other fishes. The pickling and drying of herrings for commerce were first carried on by the Flemings. This mode of curing fish is said to have been discovered by William Benkelen of Biervlet, near Sluys, who died in 1397, and whose memory was held in such veneration for that service that the Emperor Charles V. and the Queen of Hungary made a pilgrimage to his tomb. Incidental notices of the herring-fishery are contained in the records of the monastery of Evesham, so far back as the year 709, and the tax levied on the capture of herrings is noticed in the annals of the monastery of Barking as herring-silver. The great fishery for herrings at Yarmouth dates from the earliest Anglo-Saxon times, and at so early a period as the reign of Henry I. it paid a tax of 10,000 fish to the king. We are told that the most ancient records of the French herring-fishery are not earlier than the year 1020, and we know that in 1088 the Duke of Normandy allowed a fair to be held at Fecamp during the time of this fishery, the right of holding it being granted to the Abbey of the Holy Trinity. The Yarmouth fishery, even in these early times, was a great success—as success was then understood. Edward III. did all he could to encourage the

fishery at that place. In 1357 he got his parliament to lay down a body of laws for the better regulation of the fisheries, and the following year sixty lasts of herring were shipped at Portsmouth for the use of his army and fleet in France. In 1635 a patent was granted to Mr. Davis for gauging red-herrings, for which Yarmouth was famed thus early, at a certain price per last; his duty was, in fact, to denote the quality of the fish by affixing a certain seal; this, so far as we know, is the first indication of the brand system. His Majesty Charles II., being interested in the fisheries, visited Yarmouth in company with the Duke of York and others of the nobility, when he was handsomely entertained, and presented with four golden herrings and a chain of considerable value.

Several of the kings of Scotland were zealous in aiding the fisheries, but the death of James V., and the subsequent religious and civil commotions, put a stop for a time to the progress of this particular branch of trade, as well as to every other industrial project of his time. In 1602 his successor on the throne, James VI., resumed the plans which had been chalked out by his grandfather. Practical experiments were made in the art of fishing, fishing towns were built in the different parts of the Highlands, and persons well versed in the practice were brought to teach the ignorant natives; but as the Highlanders were jealous of these "interlopers," very slow progress was made; and again the course of improvement was interrupted by the king's accession to the throne of England and the union of the two Crowns. During the remainder of James's reign little progress was made in the art of fishing, and we have to pass over the reign of Charles I., and wait through the troublous times of the Protectorate till we have Charles II. seated on the throne, before much further encouragement is decreed to the fisheries. Charles II. aided the advancement of this industrial pursuit by appointing a Royal Council of Fishery, in order to the establishment of proper laws and regulations for the encouragement of those engaged in this branch of our commerce.

After this period the British trade in fish and knowledge of the arts of capture expanded rapidly. It is said, as I have already stated, that during our early pursuit of the fishery the Dutch learned much from us, and that, in fact, while we were away founding the Greenland whale-fishery, the people of Holland came upon our seas and robbed us of our fish, and so obtained a supremacy in the art that lasted for many years. At

any rate, whatever the Dutch accomplished, we were particularly industrious in fishing. Our seas were covered with busses of considerable tonnage—the average being vessels of fifty tons, with a complement of fourteen men and a master. The mode of fishing then was to sail with the ship into the deep sea, and then, leaving the vessel as a rendezvous, take to the small boats, and fish with them, returning to the large vessel to carry on the cure. The same mode of fishing, with slight modifications, is still pursued at Yarmouth and some other places in England.

Much has been written about the great cod-fishery of Newfoundland: it has been the subject of innumerable treatises, Acts of Parliament, and other negotiations, and various travellers have illustrated the natural products and industrial capabilities of the North American seas. The cod-fishery of Newfoundland undoubtedly affords one of the greatest fishing industries the world has ever seen, and has been more or less worked for three hundred and sixty years. Occasionally there is a whisper of the cod grounds of Newfoundland being exhausted, and it would be no wonder if they were, considering the enormous capture of that fish that has constantly been going on during the period indicated, not only by means of various shore fisheries, but by the active American and French crews that are always on the grounds capturing and curing. Since the time when the Red Indian lay over the rocks and transfixed the codfish with his spear, till now, when thousands of ships are spreading their sails in the bays and surrounding seas, taking the fish with ingenious instruments of capture, myriads upon myriads of valuable cod have been taken from the waters, although to the ordinary eye the supply seems as abundant as it was a century ago. When my readers learn that the great bank from whence is obtained the chief supply of codfish is nearly six hundred miles long and over two hundred miles in breadth, it will afford a slight index to the vast total of our sea wealth, and to the enormous numbers of the finny population of this part of our seas, the population of which, before it was discovered, must have been growing and gathering for centuries; but when it is further stated—and this by way of index to the extent of this great food-wealth—that Catholic countries alone give something like half a million sterling every year for the produce of these North American seas, the enormous money value of a well-regulated fishery must become apparent even to the most superficial observer of facts and figures. It is much to be regretted that we are not in



possession of reliable annual statistics of the fisheries of Newfoundland, but there are so many conflicting interests connected with these fisheries as to render it difficult to obtain accurate statistics.

It is pleasant to think that the seas of Britain are at the present time crowded with many thousand boats, all gleaning wealth from the bosom of the waters. As one particular branch of sea industry becomes exhausted for the season, another one begins. In spring we have our white fisheries; in summer we have our mackerel; in autumn we have the great herring-fishery; then in winter we deal in pilchards and sprats and oysters; and all the year round we trawl for flat fish or set pots for lobsters, or do some other work of the fishing—in fact, we are continually, day by day, despoiling the waters of their food treasures. When we exhaust the inshore fisheries we proceed straightway to the deep waters. Hale and strong fishermen sail hundreds of miles to the white-fishing grounds, whilst old men potter about the shore, setting nets with which to catch crabs, or ploughing the sand for prawns. At different places we can note the specialties of the British fisheries. In Caithness-shire we can follow the greatest herring-fleet in the world; at Cornwall, again, we can view the pilchard-fishery; at Barking we can see the cod-fleet; at Hull there is a wealth of trawlers; at Whitstable we can make acquaintance with the oyster-dredgers; and at the quaint fishing-ports on the Moray Firth, we can witness the manufacture of “Finnan haddies,” as at Yarmouth we can take part in the making of bloaters; and all round our coasts we can see women and children industriously gathering shell-fish for bait, or performing other functions connected with the industry of the sea—repairing nets, baiting the lines, or hawking the fish, for fisherwomen are true helpmates to their husbands. At certain seasons everything that can float in the water is called into requisition—little cobbles, gigantic yawls, trig schooners, are all required to aid in the gathering of the sea harvest. Thousands of people are employed in this great industry; betokening that a vast population have chosen to seek bread on the bosom of the great deep.

Crossing the Channel, we may note that the general sea fisheries of France are also being prosecuted with great vigour, and at those places which have railways to bear away the produce with considerable profit. All kinds of fish are caught on the French coasts with much assiduity, and the coast-line of that

country being enormous—in length, reaching from Dunkirk to Bayonne, including sinuosities, it will be considerably over 2000 kilometres—there is a great abundance of fish, the only regret in connection with the food fisheries being that at those places where the yield could be best obtained the fishing is but lazily prosecuted, in consequence of the want of inland conveyance. From many of the fishing villages there is no path to the populous inland cities, and the fish is sold, as it used to be sold in Scotland before the days of railways and other quick conveyances, by the wives of the fishermen, who hawk the produce of the sea through the country. In such towns as Boulogne, where there is a large resident population, and a constant accession of English visitors as well, the demand for fish is constant and considerable, and well supplied. In the department of the Pas de Calais there are over 600 fishing-boats. In Boulogne harbour, which is the chief port of the district, the English visitors will see a large number of boats, chiefly trawls, and all who visit Boulogne have seen the fishwives, if not dressed *en fête*, then in their work-a-day habits, doing hard labour for their husbands or the tourists. Sea fish is scarce and dear over most of inland France; the prices in the market at Paris rule very high for premier qualities, but in that gay capital there is apparently no scarcity. Fish must be had, and fish can always be obtained, whenever there is money to pay the price demanded. In fact, a glance at the fish department of the *grand marché* would lead one to suppose that, next to growing fruit and vegetables, catching fish was the great industry of the country.

The modes of sea-fishing are so much alike in every country that it is unnecessary to do more than just mention that the French method of trawling is very similar to our own. But there are details of fishing industry connected with that pursuit on the French coasts that we are not familiar with in Britain. The neighbouring peasantry, for instance, come to the seaside and fish with nets which are called *bas parc*; and these are spread out before the tide is full, in order to retain all the fish which are brought within their meshes. The children of these land-fishers also work, although with smaller nets, at these fore-shore fisheries, while the wives poke about the sand for shrimps and the smaller crustacea. These people thus not only ensure a supply of food for themselves during winter, but also contrive during summer to take as much fish as brings them in a little store of money.

By far the best place to study the economy of the French fisheries is at the basin of Arcachon, 34 miles from Bordeaux. There may be seen the small boat as well as the trawl fishery; and, above all, in the placid waters of the basin may be seen the model oyster-beds of France—beds that rarely languish for lack of spat, which has seldom been known to fail; beds which produce a nice, fat, tasteful oyster, placed in an inland sea that is prolific of many of the best food fishes, and contains the finest grey mullet in the world. To those who are anxious thoroughly to study the French mode of fishing, Arcachon has this advantage, that it has a day as well as a night fishery, and is also one of the most unique bathing-places in the whole of France. From the balconies of one's hotel, or from the windows of the houses, the whole industry of the basin may be observed daily and nightly; but the best plan for seeing a fishery is to take a part in it, to sail out in the boats, and handle the trawl or other nets. The chief fishing quarter is at the extreme east end of Arcachon, consisting of a cluster of wooden houses, easily known as those of the fishermen, from the various apparatus and articles of dress which are depending about, and from the "ancient and fish-like smell" which prevails in their neighbourhood. No less than thirteen hundred sailors find employment in and about the basin; and there are close on five hundred boats of all kinds, a number of them being steam trawlers. The value of the fishery of which Arcachon is the head-quarters is estimated at over 1,500,000*l.*, exclusive of the revenue derived from the oyster-beds. In the basin there are lots of fish of all kinds, both round and flat, capital soles in tolerable abundance, and very excellent mullet, both red and grey; there are also occasional takes of sardines, which fish is locally known as the *royan*. The steamboats referred to go out into the Bay of Biscay to trawl, and carry also an immense net, which the men call a trammel; it is cumbrous and heavy, and can only be drawn in by using the steam-engine of the ship. Great "takes" of mullet are occasionally got at Arcachon by watching and hemming in shoals which get lost in the numerous creeks that indent the shores of the basin. There is a ready market for all the fish that can be taken in Bordeaux, Poitiers, Tours, and neighbourhood, and it is because of this market that there has grown up at Arcachon such a considerable fishing industry. The most picturesque part of the fishing industry carried on at Arcachon is the night fishery. Whenever it becomes dark

enough the fishermen go out with the leister, and fish, as they used to do long ago in the Tweed, from an illuminated boat. Three men are required for each boat for the night fishing, two to row and one to hurl the spear. As many as a dozen boats may be seen nightly at this work, each with a brilliant flame of light flashing from its prow ; the fish speared are mullet, and they are mostly used for local consumption, the accession of visitors in summer rendering a large supply of fish necessary. There are illuminated fisheries in some other parts of France, but that of Arcachon is the most prominent. The yield of fish, however, is not large—indeed it could not be, when it is taken into account that each individual fish has to be speared. Some more economical mode of night fishing, if night fishing be necessary, ought to be invented. A few scores of mullet are a poor reward for three or four hours' labour of three men.

The perpetual industry carried on by the coast people on the French foreshores is quite a sight, although it is fish commerce of a humble and primitive kind. Even the little children contrive to make money by building fish-ponds, or erecting trenches, in which to gather salt, or in some other little industry incidental to sea-shore life. One occasionally encounters some abject creature groping about the rocks to obtain the wherewithal to sustain existence. To these people all is fish that comes to hand ; no creature, however slimy, that creeps about is allowed to escape, so long as it can be disguised by cookery into any kind of food for human beings. Some of the people have old rickety boats patched up with still older pieces of wood or leather, sails mended here and there, till it is difficult to distinguish the original portion from those that have been added to it ; nets torn and darned till they are scarce able to hold a fish ; and yet that boat and that crippled machinery are the stock in trade of perhaps two or three generations of a family, and the concern may have been founded half a century ago by the grandfather, who now sees around him a legion of hungry gamins that it would take a fleet of boats to keep in food and raiment. The moment the tide flows back, the foreshore is at once overrun with an army of hungry people, who are eager to clutch whatever fishy *debris* the receding water may have left ; the little pools are eagerly, nay hungrily, explored, and their contents grabbed with that anxiety which pertains only to poverty.

On some parts of the French coasts, and it is proper to

mention this, the fishery is not of importance, although fish are plentiful enough. At Cancale, for instance, the fishermen have imposed on themselves the restriction of only fishing twice a week. In Brittany, at some of the fishing places, the people seem very poor and miserable, and their boats look to be almost valueless, reminding one of the state of matters at Fittie in the outskirts of Aberdeen. At the isle of Croix, however, there is to be found a tolerably well-off maritime and fishing community; at this place, where the men take to the sea at an early age, there are about one hundred and thirty fishing boats of from twenty to thirty tons each, of which the people—*i.e.* the practical fishermen—are themselves the owners. At the Sands of Olonne there is a most extensive sardine-fishery—the capture of sprats, young herrings, and young pilchards, for curing as sardines, yielding a considerable share of wealth, as a large number of boats follow this branch of business all the year round. Experiments in artificial breeding are constantly being made both with white fish and crustaceans, and sanguine hopes are entertained that in a short time a plentiful supply of all kinds of shell and white fish will reward the speculators, and as regards those parts of the French coast which are at present destitute of the power of conveyance, the apparition of a few locomotives will no doubt work wonders in instigating a hearty fishing enterprise.

In fact the industry of the French as regards the fisheries has become of late years quite wonderful, and there is evidently more in their eager pursuit of sea wealth than all at once meets the eye. No finer naval men need be wished for any country than those that are to be found in the French fishing luggers, and there can be no doubt but that they are being trained with a view to the more perfect manning of the French navy. At any rate the French people (? government) have discovered the art of growing sailors, and doubtless they will make the most of it, being able apparently to grow them at a greatly cheaper rate than we can do.

The commercial system established in France for bringing the produce of the sea into the market is of a highly elaborate and intricate character. The direct consequence of this system is, that the price of fish goes on increasing from its first removal from the shore until it reaches the market. This fact cannot be better illustrated than by tracing the fish from the moment they are landed on the quay by the fishermen, through various

intermediate transactions, until they reach the hands of the fishmonger of Paris. The first agent into whose hands they come is the *ecoreur*. The *ecoreur* is usually a qualified man appointed by the owners of the vessels, the municipality, or by an association termed the *Société d'Ecorage*. He performs the functions of a wholesale agent between the fishermen and the public. He is ready to take the fish out of the fisherman's hands as soon as they are landed. He buys the fish from the fisherman, and pays him at once, deducting a percentage for his own services. This percentage is sometimes 5, 4, or even as low as  $3\frac{1}{2}$  per cent. He undertakes the whole risk of selling the fish, and suffers any loss that may be incurred by bad debts or bad sale, for which he can make no claim whatever upon the owner of the boat. The system of *ecorage* is universally adopted, as the fisherman prefers ready money with a deduction of 5 per cent rather than trouble himself with any repayment or run the risk of bad debts. Passing from the *ecoreur* we come to the *mareyeur*—that is, the merchant who buys the fish from the wholesale agent. He provides baskets to hold the fish, packs them, and despatches them by railway. He pays the carriage, the town-dues or duties, and the fees to the market-crier. Should the fish not keep, and arrive in Paris in bad condition, and be complained of by the police, he sustains the loss. As regards the transport arrangements, the fish are usually forwarded by the fast trains, and the rates are invariable, whatever may be the quality of the fish. Thus, turbot and salmon are carried at the same rate as monk fish, oysters, and crabs. On the northern lines the rate is 37 cents per ton per kilometre; upon the Dieppe and Nantes lines, 25 or 26 cents; which gives 85 or 96 francs as the carriage of a ton of fish despatched from the principal ports of the north—such as St. Valery-sur-Somme, Boulogne, Calais, and Dunkerque—and 130 francs per ton on fish despatched from Nantes.

The fish, on their arrival in Paris, are subjected to a duty. For the collection of this duty the fish are divided into two classes—viz. fine fresh fish and ordinary fresh fish. The fine fish—which class includes salmon, trout, turbot, sturgeon, tunny, brill, shad, mullet, roach, sole, lobster, shrimp, and oyster—pay a duty of 10 per cent of the market value. The duty upon the common fresh fish is 5 per cent. This duty is paid after the sale, and is then of course duly entered in the official register.

All fish sent to Paris are sold through the agency of auctioneers (*facteurs à la criée*) appointed by the town, who receive a commission of 2 or 3 per cent. The auctioneer either sells to the fishmonger or to the consumer.

It will be seen from the above statement that between the landing of the fish by the fisherman and the purchase of it by the salesman at Paris there is added to the price paid to the fisherman 5 per cent for the *ecorage*; 90, 100, or 130 francs per ton for carriage; 10 or 5 per cent, with a double tithe of war, for town-dues; and 3 per cent taken by the auctioneer—or, altogether, 18 or 13 per cent, besides the war-tithe and the cost of transport. This is an estimate of the indispensable expenses only, and does not include a number of items—such as the profit which the *mareyeur* ought to make, the cost of the baskets, carriage from the market to the railway, and from the custom-house to the market in Paris; besides presuming that the merchant who buys in the market is the consumer, which is seldom the case.

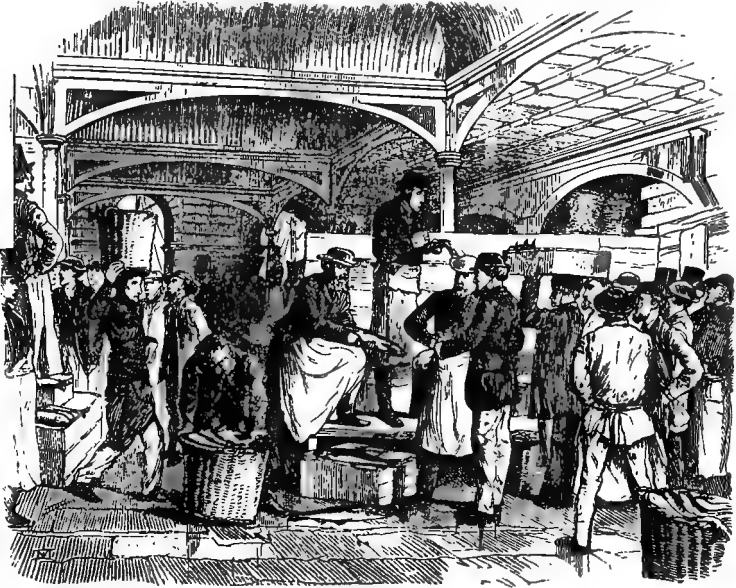
The capture and cure of the sardine is a great business in France, and especially at Concarneau, where as many as 13,000 men aid in the fishery. It is not easy to obtain accurate statistics of the business done in sardines. In the first place there is a large quantity sold fresh—that is, packed in dry salt, in little baskets made of rushes, and sent wherever there is a mode of outlet. Then there is an enormous number sold in those familiar tins. It is said that besides the quantity exported, which is large, there are as many as 4,000,000 boxes cured in oil and prepared for the home market; then, besides these, a large number are sold in barrels, and also pressed in barrels. It is an interesting sight to witness the arrival of the boats, and to see the rush to the curing establishments of the men, women, and children interested in the sales. How their *sabots* do clatter as they prance over the stones! The curers just buy from day to day what sardines they require, and no more; generally speaking, they do not, as in the Scottish herring fishery, make contracts with boats, and only one or two firms have boats of their own. When the curers are in want of a supply of fish they put up a flag at their curing establishment, and the fishermen hurry to supply them, the price varying from day to day according as the fishery has been abundant or the reverse. As soon as the boats arrive the fish are put in train for the cure, by being gutted, beheaded, sorted into sizes, and washed in sea

water, chiefly by women, who can earn from 12 francs to 20 francs a week at these curing establishments. The cure is begun by drying the fish on nets or willows, generally in the open air, but sometimes, from stress of weather it must be done under cover. After being dried they are ready for the process of the pan, which is kept over a furnace, and is filled with boiling oil. Into the cauldron the fish are plunged, two rows deep, arranged on wire gratings. In this pan of oil (the very finest olive oil) they remain for a brief period, till, in the judgment of the cook, they are done sufficiently. Then they are placed to drip, the drippings of oil being, of course, carefully collected; after which they are packed by women and girls into the nice little clean boxes in which they are sold. Again they are allowed to drip by the boxes being sloped; then each box, by means of a tap, is filled carefully up to its lip with pure olive oil, when it is ready for the next operation, which is the soldering on of the lids, or, as it may be called, the hermetical sealing up of the box, a most particular part of the process, at which the men can earn very large wages, with this drawback, that they have to buy all the fish that are spoilt. After the soldering has been accomplished the boxes have to be boiled in a steam chest. Those that do not bulge out after the boiling are condemned as "dead;" for when the process is thoroughly gone through the perfection of the cure is known by the bulging out of the boxes, which are of various sizes, according to the purpose for which they are designed. There are boxes of 6 lbs. weight and 21 lbs. weight, as also half and quarter boxes, with from 24 to 12 fish in them, according to size. Little kegs are also filled with sardines cured as anchovies. The finishing process of the sardine cure is to stamp the boxes and affix the thin brass labels which are always found upon them. There are little incidental industries connected with the cure which may be noticed. The *débris* is sold for agricultural purposes, as is the case at home here, where the curers get a few pounds annually for their offal; then a large quantity of oil is exuded from the sprat during the process of the cure, and on the total fishery this oil is of considerable value. The "dead" fish, as we have said, are sold to the men, but the success of the cure is usually so great that the "dead" form but a very small percentage of the total number of boxes submitted to the test.

But allowing the French people to cultivate to the very utmost—as they especially do as regards the oyster—it is



impossible they can ever exceed, either in productive power or money value, the fisheries of our own coasts. If, without the trouble of taking a long journey, we desire to witness the results of the British fisheries, we have only to repair to Billingsgate to find this particular industry brought to a focus. At that



BILLINGSGATE.

piscatorial bourse we can see in the early morning the produce of our most distant seas brought to our greatest seat of population, sure of finding a ready and a profitable market. The aldermanic turbot, the tempting sole, the gigantic codfish, the valuable salmon, the cheap sprat, and the universal herring, are all to be found during their different seasons in great plenty at Billingsgate; and in the lower depths of the market buildings countless quantities of shell-fish of all kinds, stored in immense tubs, may be seen; while away in the adjacent lanes there are to be found gigantic boilers erected for the purpose of crab and lobster boiling. Some of the shops in the neighbourhood have

always on hand large stocks of all kinds of dried fish, which are carried away in great waggons to the railway stations for country distribution. About four o'clock on a summer morning this grand piscatorial mart may be seen in its full excitement—the auctioneers bawling, the porters rushing madly about, the hawkers also rushing madly about seeking persons to join them in buying a lot, so as to divide their speculations ; and all over is sprinkled the dripping sea-water, and all around we feel that peculiar perfume which is the concomitant of such a place. No statistics of a reliable kind are published as to the value of the British fisheries. An annual account of the Scottish herring-fishery is taken by commissioners and officers appointed for that purpose ; which, along with a yearly report of the Irish fisheries, are the only reliable annual documents on the subject that we possess, and the latest official report of the commissioners will be found analysed in another part of this volume. For any statistics of our white-fish fisheries we are compelled to resort to second-hand sources of information ; and, as is likely enough in the circumstances, we do not, after all, get our curiosity properly gratified on these important topics—the progress and produce of the British fisheries.

## CHAPTER IV.

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### FISH CULTURE.

Antiquity of Pisciculture—Italian Fish-Culture—Sergius Orata—Re-discovery of the Art—Shaw *versus* Gehin and Remy—Jacobi—Shaw of Drumlanrig—The Ettrick Shepherd—Scientific and Commercial Pisciculture—A Trip to Huningue—Bale and its Fishmarket—Huningue described—The Water Supply—*Modus Operandi* at Huningue—Packing Fish-Eggs—An important Question—Artificial Spawning—Danube Salmon—Plan of a Suite of Ponds—M. de Galbert's Establishment—Practical Nature of Pisciculture—Turtle-Culture—Best Kinds of Fish to rear—Pisciculture in Germany—Stormontfield Salmon-Breeding Ponds—Design for a Suite of Salmon-Ponds—Statistics of Stormontfield—Acclimatisation of Fish—The Australian Experiment.

THE art of fish-culture is almost as old as civilisation itself. We read of its having been practised in the empire of China for many centuries, and we also know that it was much thought of in the palmy days of ancient Italy, when expensively-fed fish of all kinds were a necessity of the wonderful banquets given by wealthy Romans and Neapolitans. There is still in China a large trade in fish-eggs, and boats may be seen containing men who gather the spawn in various rivers, and then carry it into the interior of the country for sale, where the young fish are reared in great flocks or shoals in the rice-fields. One Chinese mode of collecting fish-spawn is to map out a river into compartments by means of mats and hurdles, leaving only a passage for the boats. The mats and hurdles intercept the spawn, which is skimmed off the water, preserved for sale in large jars, and is bought by persons who have ponds or other pieces of water which they may wish to stock with gold or other fish. Another plan is to hatch fish-eggs in paddy fields, and in these places the spawn speedily comes to life, and the flocks of little fishes are herded from one field to another as the food becomes exhausted. The trade in ova is so well managed, even

in the present day, that fish are plentiful and cheap—so cheap as to form a large portion of the food of the people ; and nothing so much surprises the Chinese who come here as the high price paid for the fish of this country. A Chinese fisherman was much astonished, some years ago, at the price he was charged for a fish-breakfast at Toulon. This person had arrived in France with four or five thousand young fish of the best kinds produced in his country, for the purpose of their being placed in the great marine aquarium in the Bois de Boulogne. Being annoyed at the comparative scarcity of fish in France, the young Chinaman wrote a brief memoir, showing that, with the command of a small pond, any quantity of fish might be raised at a trifling expense. All that is necessary, he stated in the memoir alluded to, is to watch the period of spawning, and throw yolks of eggs into the water from time to time, by which means an incredible quantity of young fry are saved from destruction. For, according to the information conveyed by this very intelligent youth, thousands of infantile fish annually die from starvation—they are unable to seek their own food at so tender an age. Many of the stories we hear about the Chinese mode of breeding fish are evidently exaggerated ; but one particularly ingenious method of artificial hatching which has been resorted to by the people of China is worth noting as a piscicultural novelty. These ingenious Celestials carry on a business in selling and hatching fish-spawn, collecting the impregnated eggs from various rivers and lakes, in order to sell to the proprietors of canals and private ponds. When the proper season for hatching arrives, they empty a hen's egg, by means of a small aperture, sucking out the natural contents, and then, after substituting fish-spawn, close up the opening. The egg thus manipulated is placed for a few days under a hen ! By and by the shell is broken, and the contents are placed in a vessel of water, warmed by the heat of the sun only ; the eggs speedily burst, and in a short time the young fish are able to be transported to a lake or river of ordinary temperature, where they are of course left to grow to maturity without being further noticed than to have a little food thrown to them.

The luxurious Romans achieved great wonders in the art of fish-breeding, and were able to perform curious experiments with the piscine inhabitants of their aquariums ; they were also well versed in the arts of acclimatisation. A classic friend, who is well versed in ancient fish lore, tells me that the great Roman

epicures could run their fish from ice-cold water into boiling cauldrons without handling them ! They spared neither labour nor money in order to gratify their palates. The Italians sent to the shores of Britain for their oysters, and then flavoured them in large quantities on artificial beds. The value of a Roman gentleman's fish in the palmy days of Italian banqueting was represented by an enormous sum of money. The stock kept up by Lucullus was never valued at a less sum than £35,000 ! These classic lovers of good things had pet breeds of fish in the same sense as gentlemen in the present day have pet breeds of sheep or horned cattle. Lucullus, for instance, to have such a valuable stock, must have been in possession of unique varieties derived from curious crosses, etc. Red mullet or fat carp, which sold for large prices, were not at all unusual. Sixty pounds were given for a single mullet, more than three times that sum being paid for a dish of that fish ; and enormous sums of money were lavished in the buying, rearing, and taming of the mullet ; so much so, that some of those who devoted their time and money to this purpose were satirised as mullet millionaires. One noble Roman went to a fabulous expense in boring a tunnel through a mountain, in order to obtain a plentiful supply of salt-water for his fish-ponds. Sergius Orata invented artificial oyster-beds. He caused to be constructed at Baiæ, on the Lucrine Sea, great reservoirs, where he grew the dainty mollusc in thousands ; and in order that he and his friends might have this renowned shell-fish in its very highest perfection, he built a palace on the coast, in order to be near his oyster-ponds ; and thither he resorted when he wanted to have a fish-dinner free from the care and turmoil of business. Many of the more luxurious Italians, imitating Sergius Orata, expended fabulous sums of money on their fish-ponds, and were so enabled, by means of their extravagance, to achieve all kinds of *outré* results in the fattening and flavouring of their fish. A curious story, illustrative of these times and of the value set on fish of a particular flavour, is related, in regard to the bass (*labrax Lupus*) which were caught in the river Tiber. The Roman epicures were very fond of this fish, especially of those caught in a particular portion of the river, which they could distinguish by means of their taste and fine colour. An exquisite, while dining, was horrified at being served with bass of the wrong flavour, and loudly complained of the badness of the fish ; the fact being that the real bass (the high-coloured kind) were flavoured by the dis-

gusting food which they obtained at the mouth of a common sewer.

The modern phase of pisciculture is entirely a commercial one, which as yet does not lie in imparting fanciful flavours to fish, but has developed itself both at home and abroad in the replenishing of exhausted streams with salmon, trout, or other kinds of fish. The present idea of pisciculture, as a branch of commerce, is due to the shrewdness of a simple French peasant, who gained his livelihood as a *pêcheur* in the tributaries of the Moselle, and the other streams of his native district, *La Bresse* in the *Vosges*. He was a thinking man, although a poor one, and it had long puzzled him to understand how animals yielding such an abundant supply of eggs should, by any amount of fishing, ever become scarce. He knew very well that all female fish were provided with tens of thousands of eggs, and he could not well see how, in the face of this fact, the rivers of *La Bresse* should be so scantily peopled with the finny tribes. Nor was the scarcity of fish confined to his own district: the rivers of France generally had become impoverished; and as in all Catholic countries fish is a prime necessary of life, the want of course was greatly felt. Joseph Remy was the man who first found out what was wrong with the French streams, and especially with the fish supplies of his native rivers—and, better than that, he discovered a remedy. He ascertained that the scarcity of fish was chiefly caused by the immense number of eggs that never came to life, the enormous quantity of young fish that were destroyed by enemies of one kind or another, and the fishing-up of all that was left, in many instances, before they had an opportunity to reproduce themselves; at any rate, without any care being taken to leave a sufficient breeding stock in the rivers, so that the result he discovered had become inevitable.

The guiding fact of pisciculture has been more than once accidentally re-discovered—that is, allowing that the ancient Romans knew it exactly as now practised; but nothing came of such discoveries, and till a discovery be turned to some practical use, it is, in a sense, no discovery at all. After being lost for many hundred years, the art of artificially spawning fish was re-discovered in Germany by one Jacobi, and practised on some trout more than a century ago. This gentleman not only practised pisciculture himself, but wrote essays on the subject as well. His elaborate treatise on the art of fish-culture was written in the German language, but also translated into Latin,

and inserted by Duhamel du Monceau in his *General Treatise on Fishes*. Jacobi, who practised the art for thirty years, was not satisfied with a mere discovery, but at once turned what he had discovered to practical account, and, in the time of Jacobi, great attention was devoted to pisciculture by various gentlemen of scientific eminence. Count Goldstein, a savaan of the period, likewise wrote on the subject. The Journal of Hanover also had papers on this art, and an account of Jacobi's proceedings was enrolled in the Memoirs of the Royal Academy of Berlin. This discovery of Jacobi was the simple result of keen observation of the natural action of the breeding salmon. Observing that the process of impregnation was entirely an external act, he saw at once that this could be easily imitated by careful manipulation; so that, by conducting artificial hatching on a large scale, a constant and unfailing supply of fish might readily be obtained. The results arrived at by Jacobi were of vast importance, and obtained not only the recognition of his government, but also the more solid reward of a pension.

Some persons dispute the claims of France to the honour of this discovery, asserting that the peasant Remy had borrowed his idea from the experiments of the late Mr. Shaw of Drumlanrig, who had by the artificial system undertaken to prove that parrs were the young of the salmon. Mr. Shaw's experiments were very complete and laborious; they extended over a number of years, were reported to the Royal Society of Scotland, and were brought to a successful conclusion long before the re-discovery of the art of pisciculture by Remy. In my opinion the honours may be thus divided, whether Remy knew of Shaw's experiments or not: I would give to Scotland the honour of having re-discovered pisciculture as an adjunct of science, and to France the useful part of having turned the art to commercial account. In regard to what has been already stated here as to the accidental discovery of artificial fish-breeding, I may mention that James Hogg, the Ettrick Shepherd, was one of the discoverers. Hogg had an observant eye for rural scenes and incidents, and anxiously studied and experimented on fish-life. He took an active share in the parr controversy. Having seen with his own eyes the branded parr assuming the scales of the smolt, he never doubted after that the fact that the parr was the young of the salmon. In Norway, too, an accidental discovery of this fish-breeding power was made; and certainly if salmon-fishing in that country goes on at its present rate culti-

vation will be largely required. The artificial plan of breeding oysters has been more than once accidentally discovered. There is at least one well-authenticated instance of this, which occurred about a century ago, when a saltmaker of Marennnes, who added to his income by fattening oysters, lost a batch of six thousand in consequence of an intense frost, the shells not being sufficiently covered with water; but while engaged in mourning over his loss and kicking about the dead molluscs, he found them, greatly to his surprise, covered with young oysters already pretty well developed, and these, fortunately, although tender, all in good health, so that ultimately he reseeded his salt-bed without either trouble or expense—having of course to wait a year or two for the growth of the natives before he could recommence his commerce.

To return to Remy, however, his experiments were so instantaneously crowned with success as even to be a surprise to himself; and in order to encourage him and Gehin, a coadjutor he had chosen, the Emulation Society of the Vosges voted them a considerable sum of money and a handsome bronze medal. But it was not till 1849 that the proceedings of the two attracted that degree of notice which their importance demanded both in a scientific and economic sense. Dr. Haxo of Epinal then communicated to the Academy of Sciences at Paris an elaborate paper on the subject, which at once fixed attention on the labours of the two fishermen—in fact, it excited a sensation both in the Academy and among the people. The government of the time at once gave attention to the matter, and finding, upon inquiry, everything that was said about the utility of the plan to be true, resolved to have it extended to all the rivers in France, especially to those of the poorer districts of the country. The artificial system of fish-breeding was by this mode of action rapidly extended over the chief rivers of France, and added much to the comfort of the people, and in some cases little fortunes were realised by intelligent farmers who appreciated the system, and had a pond or stream on which they could conduct their experiments in safety. The piscicultural system culminated in France, chiefly under the direction of Professor Coste, in the erection of a great establishment at Huningue, near Bale, for the collection and distribution of fish-eggs. In order to see this place with my own eyes, and so be enabled to describe exactly how the piscicultural business of France is administered, I paid a visit to the great laboratory.

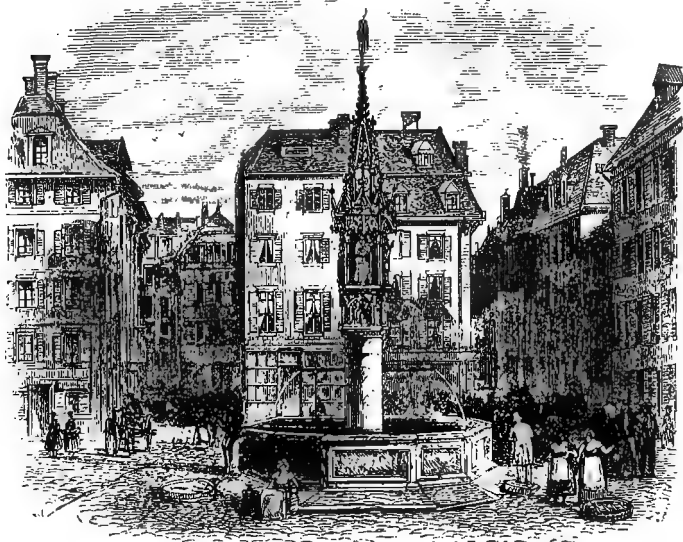


Bent on a piscatorial tour, I noted with care the spots of water that pretty often fringed the line of rails, and wondered if they were populated by any of the finny tribe ; if so, by what kind of fish, and whether they had been replenished by the aid of pisciculture ? There was evidently fishing in the districts passed through, because at some of the stations there was the vision of an occasional angler, and a frequent "flop" in many of the pools which we passed convinced me that fair sport might be had ; and the entry of an occasional Waltonian into some of the stations with a few pounds weight of trout quite excited everybody, and made some of us long to whip the waters of the district of Champagne, through which we were passing. And a close inspection of the national *etablissement de pisciculture* at Huningue has convinced me that if any river in France be still fishless, it is not through any fault of the government.

As even the longest journey will come to an end, the train arrived in due time at Mulhouse, or Mulhausen, as it is called in the German, and it being late and dark, and all of us (I was one of a little party) somewhat fatigued, we allowed ourselves to be carried to the nearest hotel, a large, uncomfortable, dirty-looking place, where apparently they seldom see British gold, and make an immense charge for *bougies*. Being within scent of Switzerland, having the feeling that we were in the shadow of its mountains, and almost within hearing of the noise made by its many waters, we hurried on by the first morning train to Bale. The distance is short, and the conveyance quick. Almost before we had time to view the passing landscape, which is exceedingly beautiful, being rich in vineyards and orchards, and rapidly turning Swiss in its scenery, we were stopped at St. Louis by the custom-house authorities, who, it is but proper to say, are exceedingly polite to all honest travellers. I would advise any one in search of the *etablissement de pisciculture* at Huningue to leave the train at this station. Not knowing its proximity at the time of my visit, I went right on to Bale.

Poets might go into raptures about Bale—Bale the beautiful—with the flowing Rhine cutting it into two halves, its waters green as the icefields which had given them birth, its houses quaint, its streets so clean, its fountains so antique ; but we had no time to go into raptures—our business was to get to Huningue, and curiously enough we had wandered into the fishmarket before we knew where we were. Like various other fishmarkets which we have visited, it contained no fish that we could see, but it is

so picturesque that I determined to place a view of it in this work. Hailing a *voiture*, our party had no end of difficulty to get the coachman to understand where we wanted to be driven. I said, "To Huningue;" he then suggested that it must be "Euiniguen," and a Scotch young lady friend, who was all in a

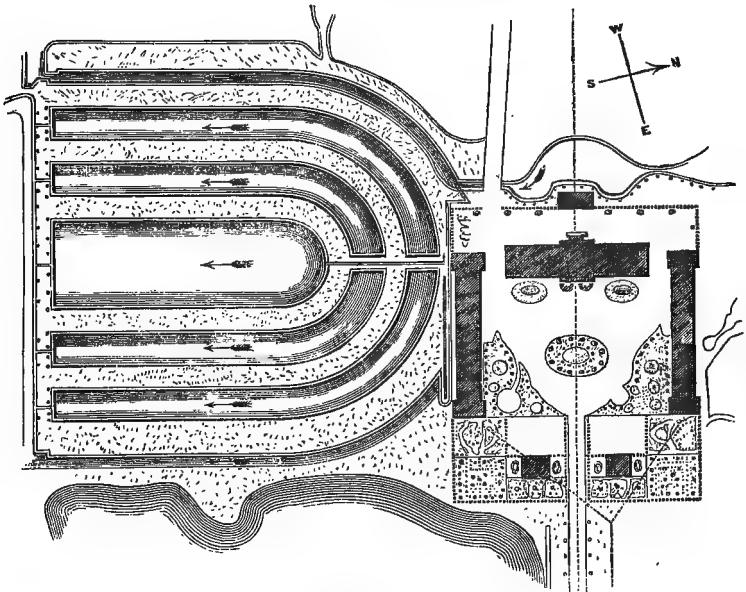


THE FISHMARKET AT BALE.

glow about the "beautiful Rhine," as, of course, a young lady ought to be, suggested that the pronunciation might be "Huningue," which proved a shrewd guess, as immediately on hearing it we were addressed in tolerable but very broken English by a quiet-looking coachman, who said, "Come with me; I have study the English grammair; I know where you want to go, and will take you." Although I could not help wondering that a celebrated place, as we all thought Huningue ought to be, was not better known, I felt pretty sure our coachman knew it; and having persuaded my Scotch friend and his young lady to take a drive, we at once started for the *etablissement de pisciculture*, where we were all of us most hospitably received by the super-

intendent, who at once conducted us over the whole place with great civility and attention.

The series of buildings which have been erected at Huningue are admirably adapted to the purpose for which they have been designed. The group forms a square, the entrance portion of which—two lodges—is devoted to the *corps de garde*, and the centre has been laid out as a kind of

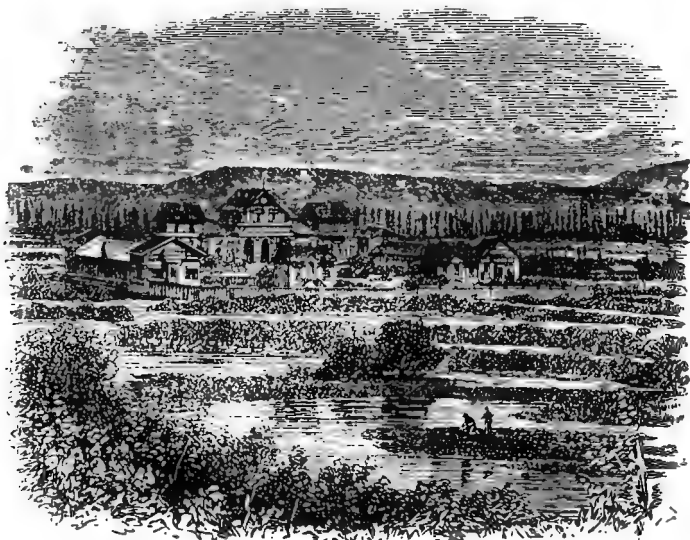


GROUND-PLAN OF THE PISCICULTURAL ESTABLISHMENT AT HUNINGUE.

Showing the disposition of the buildings and the situation of the experimental watercourses.

shrubbery, and is relieved with two little ponds containing fish. The whole establishment, ponds and buildings, occupies a space of eighty acres. The suite of buildings comprise at the side two great hatching galleries, 60 metres in length and 9 metres broad, containing a plentiful supply of tanks and egg-boxes; and in the back part of the square are the offices, library, laboratory, and residences of the officers. Having

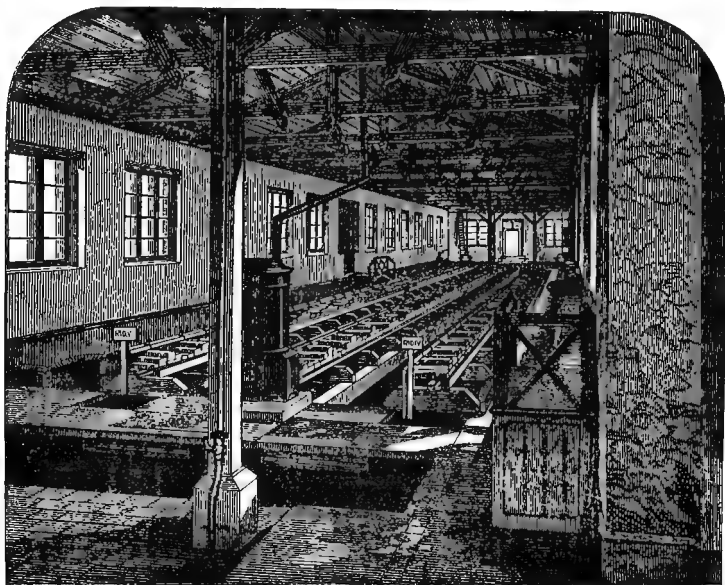
minutely inspected the whole apparatus, I particularly admired the aptitude by which the means to a certain end had been carried out. The egg-boxes are raised in pyramids, the water flowing from the one on the top into those immediately below. The eggs are placed in rows on glass frames which fit into the boxes, as will be seen by examining the drawings. The grand



VIEW OF HUNINGUE.

agent in the hatching of fish-eggs being water, I was naturally enough rather particular in making inquiry into the water supplies of Huningue, and these I found were very ample: they are derived from three sources—the springs on the private grounds of the establishment, the Rhine, and the Augraben stream. The water of the higher springs is directed towards the buildings through an underground conduit, whilst those rising at a lower level are used only in small basins and trenches for the experiments in rearing fish outside. Being uncovered, however, they are easily frozen, and are besides frequently muddy and troubled. As a general rule, fish are not bred at Huningue, the chief business accomplished there being the collec-

tion and distribution of their eggs; but there is a large supply of tanks or troughs for the purpose of experimenting with such fish as may be kept in the place. The waters of the Rhine, being at a higher level than the springs, can be at once



HALL OF INCUBATION.

employed in the *appareils* and basins. The waters of the Augraben stream, which cross the grounds, are of very little use. Nearly dry in summer, rapid and muddy after rain, they have only hitherto served to supply some small exterior basins. Of course, different qualities of water are quite necessary for the success of the experiments in acclimatisation carried on so zealously at this establishment. Some fish delight in a clear running stream, while others prefer to pass their life in sluggish and fat waters. The engineering of the different water-supplies, all of them at different levels; has been effectually accomplished by M. Coumes, the engineer of this department of the Rhine, who, in conjunction with Professor Coste, planned

the buildings at Huningue ; indeed the machinery of all kinds is as nearly as possible perfect.

The course of business at Huningue is as follows :—The eggs are brought chiefly from Switzerland and Germany, and embrace those of the various kinds of trout, the Danube and



BASINS FOR THE YOUNG FISH.

Rhine salmon, and the tender ombre chevalier. People are appointed to capture gravid fish of these various kinds, and having done so to communicate with the authorities at Huningue, who at once send an expert to deprive the fishes of their spawn and bring it to the breeding or store boxes, where it is carefully tended and daily watched till it is ready to be despatched to some district in want of it. The mode of artificial spawning is as follows, and I will suppose the subject operated upon to be a salmon :—Well, first catch your fish ; and here I may state that male salmon are a great deal scarcer than female ones, but fortunately one of the former will milt two or even three of the latter, so that the scarcity is not so much felt

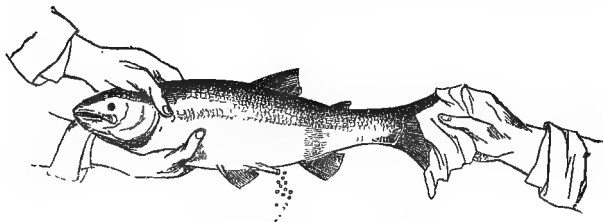
as it might otherwise be. The fish, then, having been caught, it should be seen, before operating, that the spawn is perfectly matured, and that being the case, the salmon should be held in a large tub, well buried in the water it contains, while the hand



GUTTERS FOR HATCHING PURPOSES.

is gently passed along its abdomen, when, if the ova be ripe, the eggs will flow out like so many peas. The eggs must be carefully roused or washed, and the water should then be poured off. The male salmon may be then handled in a similar way, the contact of the milt immediately changing the eggs into a brilliant pink colour. After being again washed, the eggs may be ladled out into the breeding-boxes, and safely left to come to maturity in due season. Very great care is necessary in handling the ova. The eggs distributed from Huningue are all carefully examined on their arrival, when the bad ones are thrown out, and those that are good are counted and entered upon the records of the establishment, which are carefully

kept. The usual way of ascertaining the quantity is by means of a little stamped measure, which varies according to the particular fish-eggs to be counted. The ova are watched with great care so long as they remain in the boxes at Huningue, and any dust is removed by means of a fine camel-hair brush, and from day to day all the eggs that become addled are removed. The applications to the authorities at Huningue for eggs, both from individuals and associations, are always a great deal more



ARTIFICIAL MODE OF SPAWNING.

numerous than can be supplied ; and before second applications from the same people can be entertained, it is necessary for them to give a detailed account of how their former efforts succeeded. The eggs, when sent away, are nicely packed in boxes among wet moss, and they suffer very little injury if there be no delay in the transit.

“ How about the streams from which the eggs are brought ? ” I asked. “ Does this robbery of the spawn not injure them ? ”

“ Oh, no ; we find that it makes no difference whatever. The fish are so enormously fecund that the eggs can be got in any quantity, and no difference be felt in the parent waters ; what we obtain here are a mere percentage of the grand totals deposited by the fish. ”

Of course, as the operations are pursued over a large district of two countries, no immediate difference will be felt ; but how if these Huningue *explorateurs* go on for years taking away tens of thousands of eggs ? Will not that ultimately prove a case of robbing Peter to pay Paul ? I know full well that all kinds of fish are enormously prolific, and the reader would see from the figures given in a former section that it is so ; but suppose a river, with the breeding power of the Tay, was annually robbed of a few million eggs, the result must some day be a slight dif-

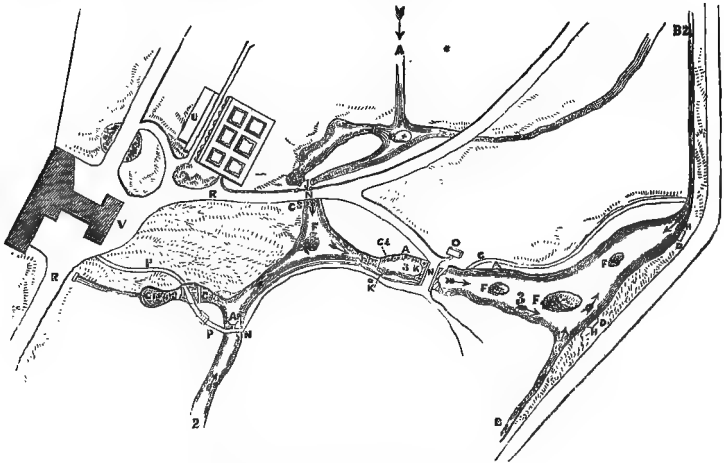


ference in the productive power of the water. I would like to know with exactitude if, while the waters of France are being replenished, the rivers in Switzerland and Germany are not beginning to be in their turn impoverished? It surely stands to reason that if the impoverishment of streams resulting from natural causes be aided by the carrying away of the eggs by zealous *explorateurs*, they must become in a short time almost totally barren of fish. The best plan, in my opinion, is for each river to have its own breeding-ponds on the plan of those of Stormontfield on the river Tay.

It would scarcely pay to breed the commoner fishes of the lakes and rivers, as pike, carp, and perch; the commonest fish bred at Huningue is the *fera*, whilst the most expensive is the beautiful ombre chevalier, the eggs of which cost about a penny each before they are in the water as fish. The general calculation, however, appertaining to the operations carried on at Huningue gives twelve living fish for a penny. The *fera* is very prolific, yielding its eggs in thousands; it is called the herring of the lakes; and the young, when first born, are so small as scarcely to be perceptible. The superintendent at Huningue told me that several of them had escaped by means of the canal into the Rhine, where they had never before been found. I inquired particularly as to the Danube salmon, but found that it was very difficult to hatch, especially at first, great numbers of the eggs, as many sometimes as 60 or 70 per cent, being destroyed; but now the manipulators are getting better acquainted with the *modus operandi*, and it is expected that by and by the assistants at Huningue will be as successful with this fish as they are with all others. Even allowing for a very considerable loss in the artificially-manipulated ova—and it is thought that two-thirds at least of the eggs of this fish are in some way lost—it is certain that the artificial system of protection is immensely more productive in fish than the natural one, for it has been said, in reference especially to the salmon of the river Tay, that hardly one in a thousand of the eggs ever reaches maturity as a proper table-fish, such is the enormous destruction of eggs and young fry; and the percentage of destruction in Catholic countries is greatly larger, because during those fast-days enjoined by the church fish *must* be obtained.

The piscicultural establishment of M. de Galbert, one of the most important of the kind which exists in France, is worthy of notice. It is situated at Buisse in the canton of Voiron in

Isere, a department on the south-east frontier of France. The works, of which the accompanying engraving is a plan, comprise four ponds for the reception of the fish in various stages of growth. The first (1 in the plan) is about 100 metres long by 3 m. 50 in breadth, with a mean depth of 1 metre. It is almost divided into two parts, a sheet of water and a stream,



PISCICULTURAL ESTABLISHMENT AT BUISSE.

by a peninsula, and the division is completed by a grating which prevents the mixing of the fish contained in each part, and also arrests the ascent or descent of the fry. The sheet of water is supplied from sources of an elevated temperature which diverge into the stream, and thence into pond No. 2 at N. This basin (2) is 150 metres long, with a mean breadth of 8 metres, and a depth varying from 1 to 2 metres. Besides the waters from the first pond, this basin is supplied from the springs, and from the millstream which rises from a rock situated at a distance of 200 metres. This pond contains fish of the second year. A sluice or water-gate (J), placed in the deepest part of the pond, affords the means of turning the water and the fish contained therein into the pond No. 3. Courses of rough stones and weeds line the banks of the pond, and form places of shelter for the fish, besides encouraging the growth of such shell-fish as shrimps,

lobsters, etc. The third pond (3) has a surface of about 5000 yards, with a depth equal to that of the second pond. An underground canal (G) runs along the eastern side, and at distances of 2 metres trenches lined with stones loosely thrown together join the canal to the basin, and allow the fish to circulate through these subterranean passages, where every stone becomes a means of shelter and concealment. The adult trout can conceal themselves in the submerged holes and crevices of the islands (F), of which there are three in the pond. The narrowest part of the basin is crossed by a viaduct of 8 metres (N), to the arch of which is fitted an iron grating with rods in grooves to receive either a sluice or a snare. The sluice, formed of fine wire, keeps out the fish that would destroy the spawn at the time of fecundation. The spawn is covered with a layer of fine round gravel, to the thickness of 0 m. 30, which the trout can easily raise as fast as it bursts the egg. The snare or netting encloses the fish destined for artificial breeding without hurting them, and also secures the fish that are to be consumed, and those which it is necessary to destroy because of their voracity, as the pike. A floodgate placed at the lower end of the pond permits the pond to be emptied when necessary, and an iron grating prevents the escape of the fish. All the ponds are protected by a double line of galvanised iron wire placed on posts armed with hooks, and yet low enough to allow a boat to pass. The water of the ponds finally passes into the Isere, where a permanent snare allows strange fish to penetrate into the ponds. At spawning time a great many trout deposit their spawn there. The small pond (4) fed by the mill-stream is a sort of reservoir for large fish destined for sale or domestic use. Throughout the year the fish caught in the nets of the third pond are placed in this basin, so when the spawning season arrives it is a vast nursery for the purpose of reproduction. In the house (O) built near the bridge (N) of the third pond lodge the guard and the hatching-apparatus. The *appareils* are similar to those employed at the Collège de France, and are supplied from a spring. One particular appareil, placed in a source of which the temperature never varies, is slightly different from the other models: it is simply zinc boxes pierced with very fine holes. This apparatus, which has been in use for three years, has given great satisfaction. It may be added that the establishment at Buisse can supply 40,000 or 50,000 young trout in the year at five centimes each, a result which is mainly

due to the care and solicitude with which M. de Galbert has conducted his operations.

What strikes us most in connection with the history of French fish-culture is the essentially practical nature of all the experiments which have been entered upon. There has been no toying in France with this revived art of fish-breeding. The moment it was ascertained that Remy's discoveries in artificial spawning were capable of being carried out on the largest possible scale, that scale was at once resolved upon, and the government of the country became responsible for its success, which was immediate and substantial. The discoverer of the art was handsomely rewarded; and the great building at Huningue, used as a place for the reception and distribution of fish-eggs, testifies to the anxiety of France to make pisciculture one of the most practical industries of the present day. Unceasing efforts are still being made by the government to extend the art, so that every acre of water in that country may be as industriously turned to profit as the acres of land are. Why should not an acre of water become as productive as an acre of land? We have an immensity of water space that is comparatively useless. The French people are now beginning thoroughly to appreciate the value of their lakes and rivers, and to cultivate them with the greatest possible assiduity—there is not an acre of water in the country that is not turned to use by the people. Think of the fish-ponds of Doombes being of the extent of thirty thousand acres! No wonder that in France pisciculture has become a government question, and been taken under the protecting wing of the state.

The different kinds of water in France are carefully considered, and only fish suitable for them placed therein. In marshy places eels alone are deposited, whilst in bright and rapid waters trout and other suitable fish are now to be found in great plenty. Attention is at present being turned to sea-fish, and the latest "idea" that has been promulgated in connection with the cultivation of sea-animals is turtle-culture. The artificial multiplication of turtle, on the plan of securing the eggs and protecting the young till they are able to be left to their own guidance, is advocated by M. Salles, who is connected with the French navy, and who seems to have a considerable knowledge of the nature and habits of the turtle. To some extent turtle-culture is already carried on in the island of Ascension—so far at least as the protection of the eggs and watching

over the young is concerned. M. Salles proposes, however, to do more than is yet done at Ascension ; he thinks that, to arrive quickly at a useful result, it would be best to obtain a certain number of these animals from places where they are still abundant, and transport them to such parks or receptacles as might be established on the coasts of France and Corsica, where, at one time, turtles were plentiful. Animals about to lay would be the best to secure for the proposed experiments ; and these might be captured when seeking the sandy shores for the purpose of depositing their eggs. Male turtles might at the same time be taken about the islets which they frequent. A vessel of sufficient dimensions should be in readiness to bring away the precious freight ; and the captured animals, on arriving at their destination, should be deposited in a park chosen under the following considerations :—The formation of the sides to be an inclosure by means of an artificial barrier of moderate height, formed of stones, and perpendicular within, so as to prevent the escape of the animals, but so constructed as to admit the sea, and, at the same time, allow of a large sandy background for the deposition of the eggs, which are about the size of those laid by geese. As the turtles are herbivorous, the bottom of the park should be covered with sea-weeds and marine plants of all kinds, similar to those the animal is accustomed to at home. A fine southern exposure ought to be chosen for the site of the park, in order to obtain as much of the sunshine as possible, heat being the one grand element in the hatching of the eggs. Turtles are very fond of sunshine, and float lazily about in the tropical water, seldom coming to the shore except to lay. This they do in the night-time : crawling cautiously ashore, and scraping a large hole in a part of the sand which is never reached by the tide, they deposit their eggs, and carefully cover them with the sand, leaving the sun to effect the work of quickening them into life.

It may be as well to state here that the French people eat all kinds of fish, whether they be from the sea, the river, the lake, or the canal. In Scotland and Ireland the salmon only is bred artificially as yet, and chiefly because it is a valuable and money-yielding animal, and no other fresh-water fish is regarded in these countries as being of value except for sport. In France large quantities of eels are bred and eaten ; but in Scotland, and in some parts of England, the people have such a horror of that fish that they will not touch it. This of course is due to

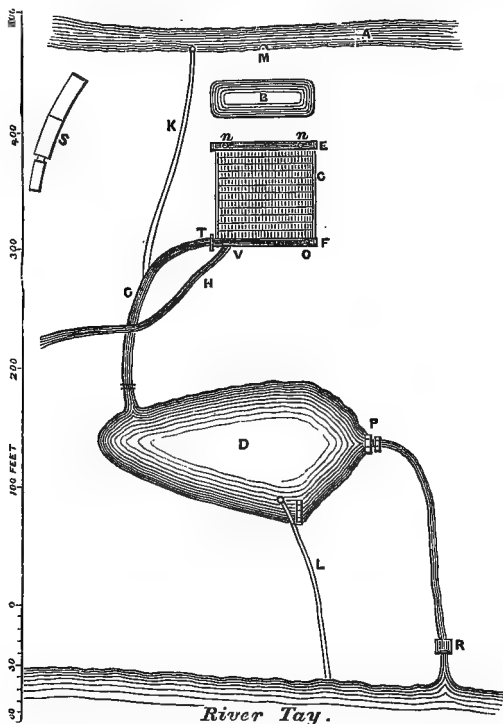
prejudice, the eel being good for food in a very high degree. In all Roman Catholic countries there are so many fast-days that fish-food becomes to the people an essential article of diet ; in France this is so, and the consequence is that a good many private amateurs in pisciculture are to be found in that country ; but the mission of the French government in connection with fish-culture is apparently to meddle only with the rearing and acclimatising of the more valuable fishes. It would be a waste of energy for the authorities at Huningue to commence the culture of the carp or perch. In our Protestant country there is no demand for the commoner river or lake fishes except for the purposes of sport ; and with one or two exceptions, such as the Lochleyen trout, the charr, etc., there is no commerce carried on in these fishes. One has but to visit the fishmarket at Paris to observe that all kinds of fresh-water fish and river crustacea are there ranked as saleable, and largely purchased. The mode of keeping these animals fresh is worthy of being followed here. They are kept alive till wanted in large basins and troughs, where they may at all times be seen swimming about in a very lively state.

As soon as the piscicultural system became known, it was rapidly extended over the whole continent of Europe, and the rivers of Germany were among the first to participate in the advantages of artificial cultivation. In particular may be noticed the efforts made to increase the supplies of the Danube salmon, a beautiful and excellent food-fish, with a body similar to the trout, but still more shapely and graceful, and which, if allowed time, is said to grow to an enormous size. The young salmon of the Danube are always of a darker colour than those a little older, but they become lighter in colour as they progress in years. The mouth of this fish is furnished with very strong teeth ; its back is of a reddish grey, its sides and belly perfectly white ; the fins are bluish white ; the back and the upper part of both sides are slightly and irregularly speckled with black and roundish red spots. This fish is also very prolific. Professor Wimmer of Landshut, the authorities at Huningue mentioned, had frequently obtained as many as 40,000 eggs from a female specimen which weighed only eighteen pounds. Our own *Salmo salar* is not so fecund, it being well understood that a thousand eggs per pound weight is about the average spawning power of the British salmon. The ova of the Danube salmon are hatched in half the time that our salmon eggs re-

quire for incubation—viz. in fifty-six days—while the young fry attain the weight of one pound in the first year; and by the third year, if well supplied with the requisite quantity of food, they will have attained a weight of four pounds. The divisions of growth of the great fish of the Danube, as compared with *Salmo salar*, are pretty nearly as follows:—Our fish, curiously enough, may at the end of two years be eight pounds in weight, or it may not be half that number of ounces. One batch of a salmon hatching go to the sea at the end of the first year after birth, and rapidly return as grilse, handsome four-pound fish, whilst the other moiety remain in the fresh water till the expiry of the second year from the time of birth, so that *they* require about thirty months to become four-pound fish, by which time the first moiety are salmon of eight or ten pounds! These are ascertained facts. This is rapid growth when compared with the Danube fish, which, after the first year, grows only at about the rate of eighteen ounces per annum. But, even at that rate, fish-cultivation must pay well. Suppose, for the sake of an illustration, that by the protected or piscicultural system a full third (*i.e.* 13,500) of the 40,000 eggs arrive in twelve months at the stage of pound fish, and are sold at the rate of three-pence per pound weight, a revenue of £162 would thus result in one year's time from a single pair of breeding salmon! Two pairs would, of course, double the amount, and so on.

A series of well-conducted operations in fish-culture has been carried on for about twenty years on the river Tay, about five miles from Perth; and as these have attracted a great amount of attention, they merit description. The breeding ponds at Stormontfield are beautifully situated on a sloping haugh on the banks of Tay, and are sheltered at the back by a plantation of trees. The ground has been laid out to the best advantage, the ponds, water-runs, etc., having been planned and constructed by Mr. Peter Burn, C.E. The supply of water is obtained from a rapid mill-stream, which runs in a line with the river Tay, as is shown by our plan. The necessary quantity of water is first run from this stream into a reservoir, from which it is filtered through pipes into a little watercourse at the head of the range of boxes from whence it is laid on. These boxes are fixed on a gentle declivity, half-way between the mill-race and the Tay, and by means of the slope the water falls beautifully from one to another of the "procreant cradles" in a gradual but constant stream, and collects at the bottom of the range of boxes in a

kind of dam, and thence runs into a small lake or depôt where the young fish are kept. For some years after the experiments



ORIGINAL BREEDING-POND AT STORMONTFIELD.

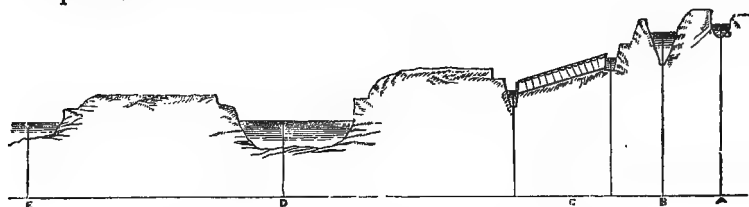
- |                                  |   |
|----------------------------------|---|
| A. Mill-race.                    | L. Pipe to empty pond.                    |
| B. Filtering-pond.               | M. Pipe from mill-race to filtering-pond. |
| C. Hatching-boxes.               | n n. Discharge-pipes from do.             |
| D. Rearing-pond.                 | O. Do. do. to lower canal.                |
| E. Upper canal.                  | P. Sluices from pond.                     |
| F. Lower canal.                  | R. Marking-box.                           |
| G. Connecting stream of C and D. | S. Keeper's house.                        |
| H. By-run to river.              | T V. Sluices from lower canal.            |
| K. Pipe from mill-race to pond.  |   |

were begun only one pond was to be found at Stormontfield, but another pond for the smolts has since been added in order



to complete the suite. A sluice made of fine wire-grating admits of the superfluous water being run off into the Tay, so that an equable supply is invariably kept up. It also serves for an outlet to the fish when it is deemed expedient to send them out to try their fortune in the greater deep near at hand, and for which their pond experience has been a mode of preparation. The planning of the boxes, ponds, sluices, etc., has been accomplished with great ingenuity; and one can only regret that the whole apparatus is not three times the size, so that the Tay proprietors might breed annually two or three million of salmon, which would add largely to the productiveness of that river, and of course aid in increasing the rental.

For the purpose of showing "the level of the pond at Stormontfield I beg to introduce what the French people call "a profile."



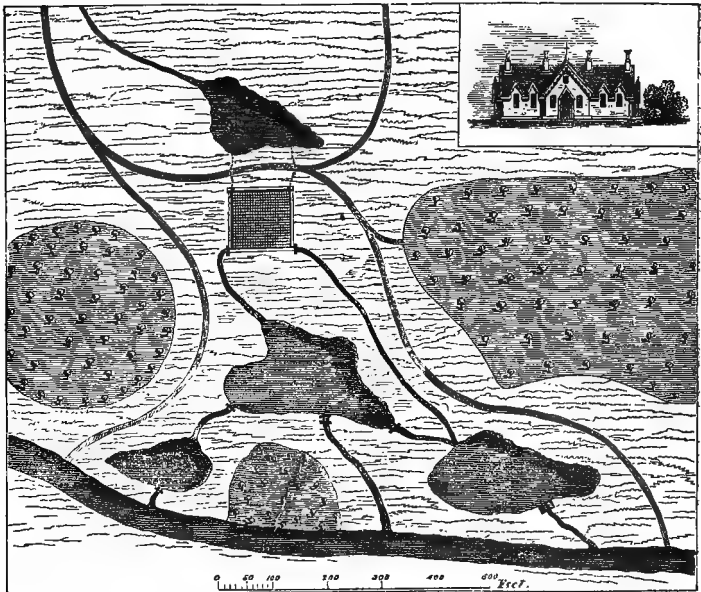
PROFILE OF STORMONTFIELD SALMON-BREEDING PONDS.

- |   |  |
|---|--|
| <p>A. Source of water-supply.</p> <p>B. Pond from which to filter water on boxes.</p> | <p>C. Egg-boxes.</p> <p>D. Pond for young fish.</p> <p>E. River Tay.</p> |
|---|--|

The salmon-breeding operations at Stormontfield originated at a meeting of the proprietors of the river Tay held in July 1852. On the suggestion of Mr. Ashworth, a practical pisciculturist was engaged to inaugurate the breeding operations, and to teach a local fisherman the art of artificial spawning. The preparation of the spawn for the nursing boxes was commenced on the 23d of November 1853, and in the course of a month 300,000 ova were deposited in the 300 boxes, which had been carefully filled with prepared gravel, and made all ready for their reception. Mr. Ramsbottom, who conducted the manipulation, says the river Tay is one of the finest breeding streams in the world, and thinks that it would be presumptuous to limit the numbers of salmon that might be bred

in it were the river cultivated to the full extent of its capabilities.

The date when the first of the eggs deposited was observed to be hatched was on the 31st of March, a period of more than



DESIGN FOR A SERIES OF SALMON-BREEDING PONDS.

Source of supply at top.  
Breeding-boxes next.  
Parr-pond after.  
Smolt-pond to the right.

Adult salmon-pond to the left.  
River at foot of plan.  
Ornamental walks.  
Clumps of trees, etc., according to taste.

four months after the stocking of the boxes; and during April and May most of the eggs had burst into life, and the fry were observed waddling about the breeding-boxes, and were in June promoted to a place in the reception-pond, being then tiny fish a little more than an inch long. The first year's experiments were remarkably successful in showing the practicability of hatching, rearing, and maintaining in health, a very large number of young fish, at a comparatively trifling cost.

The artificial breeding of salmon is still carried on at these ponds, and with very great success, when their limited extent is taken into account: half-a-million of eggs are hatched every year. They have sensibly increased the stock of fish in the Tay, and also, as I will by and by relate, under the separate head of "The Salmon," contributed greatly to the solution of the various mysteries connected with the growth of that fish. The fish, it is remarkable, suffer no deterioration of any kind by being bred in the ponds, and can compare in every respect with those bred in the river.

The plan of the ponds at Stormontfield, as originally constructed, will be a better guide to persons desiring information than any written description. The engraving on the opposite page with the double pond, shows a design of my own, founded on the Stormontfield suite; it contains a separate pond for the detention, for a time, of such large fish as may be taken with their spawn not fully matured. Cottages for the superintendent of the ponds and his assistants are also shown in the plan.

The ponds at Stormontfield were originally designed with a view to breed 300,000 fish per annum, but after a trial of two years it was found, from a specialty in the natural history of the salmon elsewhere alluded to, that only half that number of fish could be bred in each year. Hence the necessity for the smolt-pond which was added a few years ago, and which will now admit of a hatching at Stormontfield of at least 500,000 eggs every year. Another reason for the construction of the additional pond was the fact of the old one being too small in proportion to the breeding-boxes. Its dimensions were 223 feet by 112 feet at its longest and broadest parts. The second pond is nearly an acre in extent, and well adapted for the reception of the young fish.

The egg-boxes at Stormontfield, unlike those at Huningue, are in the open air, and in consequence the eggs are exposed to the natural temperature, and take, on an average of the seasons, about 120 days to ripen into fish. For instance, the eggs laid down in November 1872 did not come to life till 29th March 1873. The young fish, as soon as they are able to eat—which is not for a good few days, the umbilical bag supplying all the food required for a time by the newly-hatched animal—are fed with particles of boiled liver. On the occasion of my last visit Mr. Peter Marshall, the very intelligent keeper, threw a few crumbs into each of the ponds, which caused an

immediate rising of the fry in great numbers. It would, of course, have been a simple plan to turn each year's fish out of the ponds into the river as they were hatched, but it was thought advisable rather to detain them till they were seized with the migratory instinct and assumed the scales of smolthood, which occurs, as already stated in other parts of this work, at the age of one and two years respectively. Indeed, the experiments conducted at the Stormontfield ponds have conclusively settled the long-fought battle of the parr, and proved indisputably that the parr is the young of the salmon, that it becomes transformed to a smolt, grows into a grilse, and ultimately attains the honour of full-grown salmonhood.

The anomaly in the growth of the parr was also attempted to be solved at Stormontfield, but without success. In November and December 1857 provision was made for hatching in separate compartments the artificially impregnated ova of—1, parr and salmon; 2, grilse and salmon; 3, grilse pure; 4, salmon pure. It was found, when the young of these different matches came to be examined early in April 1859, that the sizes of each kind varied a little, the superintendent of fisheries informing us that—“1st, the produce of the salmon with salmon are 4 in. in length; 2d, grilse with salmon,  $3\frac{1}{2}$  in.; 3d, grilse with grilse,  $3\frac{1}{2}$  in.; 4th, parr with grilse, 3 in.; 5th, smolt from large pond, 5 in.” These results of a varied manipulation never got a fair chance of being of use as a proof in the disputation; for, owing to the limited extent of the ponds at the time, the experiments were matured in such small boxes or pools as evidently tended to stunt the growth of the fish. Up to the present time the riddle which has so long puzzled our naturalists in connection with the growth of the salmon has not been solved. A visitor whom I met at the ponds was of opinion that a sufficient quantity of milt was not used in the fructification of the eggs, as the male fish were scarcer than the female ones, and that those eggs which first came into contact with the milt produced the stronger fish.

The late Mr. Robert Buist used to say that what most struck strangers who visited the ponds was the great disparity in the size of fish of the same age, the difference of which was only that of a few weeks, as all were hatched by the month of May. That there are strong and weak fry from the moment that they burst the covering admit of no doubt, and that the early fish may very speedily be singled out from among the

late ones is also quite certain. In the course of a few weeks the smolts that are to leave at the end of the first year can be noted. The keeper's opinion is that at feeding-time the weak are kept back by the strong, and therefore are not likely to thrive so fast as those that obtain a larger portion of food ; he lays great stress on feeding, and his opinion on that subject is entitled to consideration.

The guiding of the smolts from the ponds to the river used to be easily managed through the provision made at Stormontfield for that purpose, and which consisted of a runlet lined with wood, protected at the pond by a perforated zinc sluice, and terminating near the river in a kind of reception-chamber, about four feet square, likewise provided with a zinc sluice (also perforated), to keep the fish from getting away till the arranged time, thus affording proper facilities for the marking and examination of departing broods. [See plan.] The sluice being lifted, the current of water carried the fish down a gentle slope to the Tay, into which they proceeded in considerable quantities, day by day, till all had departed ; the parrs, strange to say, evincing no desire to remove, although, of course, being in the same breeding-ponds, they had a good opportunity of reaching the river. Now all the outlets are kept constantly open, so that the fish can go away to the sea when the instinct seizes them.

It was a great drawback in former years at Stormontfield, during the hatching seasons, that many fish were caught with their eggs not sufficiently matured, and could not be used in consequence. To remedy this, a plan has been adopted of keeping all the salmon that are caught, if they be so nearly ripe for spawning as to warrant their detention. These are confined in the mill-race till they become thoroughly ready for the manipulator, and are kept within bounds by strong iron gratings, placed about 100 yards from each other. These gravid fish are taken out as they are required, or rather as they ripen, by means of a small sweep-net, and it is noteworthy that the animals, after being once or twice fished for, become very cunning, and hide themselves in such bottom holes as they can discover, in order that the net may pass over them. I have no doubt that the Stormontfield mill-race forms an excellent temporary feeding-place for these fish, as its banks are well overhung with vegetation, and its waters are clear as crystal, and of good flavour. It is a decided convenience to be able thus to store the egg-and-milt producing fish till they are

wanted, and will render the annual filling of the breeding-boxes a certainty, which, even under the old two-year system, was not so, in consequence of floods on the river Tay, and from many other causes besides.

Upwards of three millions of pond-bred fish have now been thrown into the river Tay, and the result has been a satisfactory rise in the salmon-mental of that magnificent stream.

I have compiled the following summary of what has been achieved in salmon-breeding in the Stormontfield ponds :—

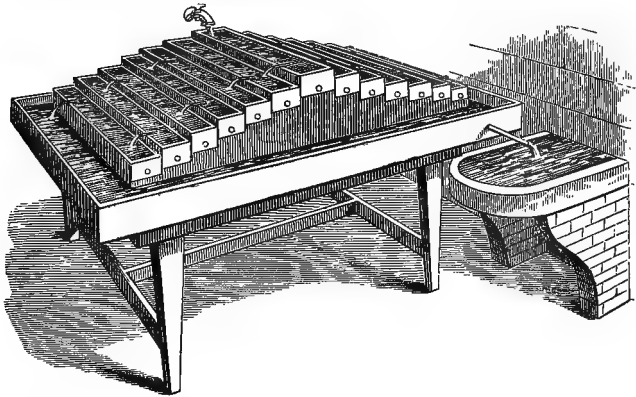
On the 23d November 1853 the stocking of the boxes commenced, and before a month had expired 300,000 ova were deposited, being at the rate of 1000 to each box, of which at that time there were 300. These ova were hatched in April 1854, and the fry were kept in the ponds till May 1855, when the sluice was opened, and one moiety of the fish departed for the river and the sea. About 1300 of these were marked by cutting off the dead or second dorsal fin. The smolts marked were about one in every hundred, so that about 130,000 must have departed, leaving more than that number in the pond. The second spawning, in 1854, was a failure, only a few thousand fish being produced. This result arose from the imperfect manipulation of the fish by those intrusted with the spawning. The third spawning took place between the 22d November and the 16th December 1855, and during that time 183,000 ova were deposited in the boxes. These ova came to life in April 1856. The second migration of the fry spawned in 1853 took place between the 20th April and 24th May 1856. Of the smolts that then left the ponds, 300 were marked with rings, and 800 with cuts in the tail. Many grilse having the mark on the tail were re-taken, but none of those marked with the ring. The smolts from the hatching of 1856 left the pond in April 1857. About 270 were marked with silver rings inserted into the fleshy part of the tail; about 1700 with a small hole in the gill-cover; and about 600 with the dead fin cut off in addition to the mark in the gill-cover. Several grilse with the mark on the gill and tail were caught and reported, but no fish marked with the ring. The fourth spawning took place between the 12th November and the 2d December 1857, when 150,000 ova were deposited in the boxes. These came to life in March 1858. Of the smolts produced from the previous hatching, which left the pond in 1858, 25 were marked with a silver ring behind the dead fin, and 50 with gilt copper wire. Very few of this exodus were

reported as being caught. The smolts produced from the hatching of 1858 left the pond in April 1859, and 506 of them were marked. The fifth spawning, from 15th November to 13th December 1859, produced 250,000 ova, which were hatched in April 1860. Of the smolts that left in 1860, 670 were marked; and a good many of them were reported as having been caught on their return from the sea. The smolts of the hatching of 1860 left the pond in May 1861, but none of them were marked. The number of eggs deposited in the breeding-boxes in the spawning season of 1862 (November and December) was about 250,000; but in 1863 not more than 80,000 ova could be obtained in consequence of the unfavourable state of the river for capturing gravid salmon. During the last nine years the hatching has been continued as usual, about half-a-million eggs being now manipulated every season; but, considering the size of the river Tay, which has a water basin of 2250 square miles, four times that number of fish might be advantageously thrown into the water. Peter Marshall has proved a most able pisciculturist. The loss of eggs under his management forms an almost infinitesimal proportion of the total quantities hatched at Stormontfield. The pisciculture of salmon and other fresh-water fishes is not now a novelty in the United Kingdom; many experiments in salmon and trout breeding having been instituted, with more or less success, both in Ireland and England. These have been so frequently detailed by the newspapers of the day, as to render it unnecessary to chronicle them here: they are all more or less an imitation of what is done every season at the Stormontfield breeding boxes.

In order that gentlemen who have a bit of running water on their property may try the experiment of artificial breeding, I give a drawing of an apparatus invented by M. Coste suitable for hatching out a few thousand eggs—it could be set up in a garden or be placed in any convenient outhouse. I may state that I am able to hatch salmon-eggs in the saucer of a flower-pot; it is placed on a shelf over a fixed wash-hand basin, and a small flow of water regulated by a stopcock falls into it. The vessel is filled with small stones and bits of broken china, and answers admirably. Out of a batch of about two hundred eggs brought from Stormontfield, only fifteen were found to have turned opaque in the first five weeks. Eggs hatched in this homely way are very serviceable, as one can examine them day by day, and note how they progress, and in due time observe the

development of the fish for a few days. The young animals can only be kept in the saucer about ten or twelve days, and should then be placed in a larger vessel or be thrown into a river.

I should like to see one of the great rivers of England turned into a gigantic salmon "manufactory." Ponds might be readily



PISCICULTURAL APPARATUS.

constructed on one or two places of the Severn, or on some of the other suitable salmon streams of England or Wales, capable of turning out two millions of fish per annum, and at a comparatively trifling cost. The formation of the ponds would be the chief expense; a couple of men could watch and feed the fry with the greatest ease. The size adopted might be five times that of the ponds on the river Tay, and the original cost of these was less than £500. I would humbly submit that the ponds should be constructed after the manner of the plan I have elsewhere given. Except by the protecting of the spawn and the young fish from their numerous enemies, there is no way of meeting the present great demand for salmon, which, when in season, is in the aggregate of greater value than the best butcher's meat, dear as beef and mutton now are. The salmon is an excellent fish to work with in a piscicultural sense, because it is large enough to bear a good deal of handling, and it is very accessible to the operations of mankind, because of the instinct which leads it to spawn in the fresh water instead of the sea. It is only such a fish as this monarch of the brook that would individually pay



for artificial breeding, for, having a high money value as an animal, it is clear that salmon-culture would in time become as good a way of making money as cattle-feeding or sheep-rearing.

There are waste places in England—the Essex marshes, for instance, or the fens of Norfolk—where it would be profitable to cultivate eels or other fish after the manner of the inhabitants of Comacchio. The English people are fond of eels, and would be able to consume any quantity that might be offered for sale, and the place being in such close proximity to the Thames, other fish might be cultivated as well. All the best portions of the hydraulic apparatus of Comacchio might be imitated, and to suit the locality, such other portions as might be required could be invented. The art of pisciculture is but in its infancy, and we may all live in the hope of seeing great water farms—to be profitable, they must be gigantic—for the cultivation of fish, in the same sense as we have extensive grazing or feeding farms for the breeding and rearing of cattle.

In Ireland, the late Mr. Thomas Ashworth, of the Galway fisheries, found it as profitable and as easy to breed salmon as it is to rear sheep. His fisheries became a decided success; and, if we except the cost of some extensive engineering operations in forming fish-passes to admit of a communication with the sea, the cost of his experiments was trifling and the returns exceptionally large.

Grave doubts at one time prevailed among persons interested in acclimatisation and pisciculture as to whether or not it would be possible to introduce the British salmon into the waters of Australia; and an interesting controversy was about twelve years ago carried on in various journals as to the best way of taking out the fish to that country. Those very wise people who never do anything, but are largely endowed with the gift of prophecy, at once proclaimed that it could not be done; that it was impossible to take the salmon out to Australia, etc. etc. But happily for the cause of progress in natural science, and the success of that particular experiment, there were men who had resolved to carry it out, and who would not be put down. Mr. Francis Francis, Mr. Frank Buckland, and Mr. J. A. Youl, took a leading part in the achievement; but before they fell upon their successful plan of taking out the ova in ice, hot discussions had ensued as to how the salmon could be introduced into the rivers of the Australian continent. Many plans were suggested:

some for carrying out the young fish in tanks, and others for taking out the fructified ova, so that the process of hatching might be carried on during the voyage. One ingenious person promulgated a plan of taking the parr in a fresh-water tank a month or two before it changed into a smolt, saying that after the change it would be easy to keep the smolts supplied with *fresh* salt water direct from the sea as the ship proceeded on her voyage.

The mode ultimately adopted was to pack up the ova in a bed of ice, experiments having first been made with a view to test the plan. For that purpose a large number of ova were deposited in an ice-house in order to ascertain how long the ripening of the egg could be deferred—a condition of the experiment of course being that the egg should remain quite healthy. The Wenham Lake Ice Company were so obliging as to allow boxes containing salmon and trout ova, packed in moss, to be placed in their ice-vaults, and to afford every facility for the occasional examination of the eggs. Satisfactory results being obtained—in other words, it having been proved that the eggs of the salmon could with perfect safety be kept in ice for a period exceeding the average time of a voyage to Australia—it was therefore resolved that a quantity of eggs, properly packed in ice, should be sent out. The result of this experiment is now well known, most of the daily papers having chronicled the successful exportation of the ova, and announced that the fish had come to life and were thriving in their foreign home.

The naturalisation of fish, to which a brief reference has already been made, is a subject that is not very well understood; but so far as practical experience goes, I have seen nothing to prevent our breeding in England some of the most productive foreign kinds. We must not, however, build ourselves much on the acclimatisation of foreign fish, especially tropical fish, as—although fish can bear great extremes of temperature—it would be no easy matter to habituate them to our climate.

## CHAPTER V.

### ANGLERS' FISHES.

Fresh-Water Fish not of much value—The Angler and his Equipment—Pleasures of the Country in May—Anglers' Fishes—Trout, Pike, Perch, and Carp—Gipsy Anglers—Angling Localities—Gold Fish—The River Scenery of England—The Thames—Thames Anglers—Sea Angling—Various Kinds of Sea-Fish—Proper Kinds of Bait—The Tackle necessary—The Island of Arran—Corry—Goatfell, etc.

ALTHOUGH it may be deemed necessary in a work like the present to devote some space to the subject, I do not set much store by the common anglers' fishes, so far, at least, as their food value is concerned; for although we were to cultivate them to their highest pitch, and by means of artificial spawning multiply them exceedingly, they would never (the salmon, of course, excepted) form an article of any great commercial value in this beef-eating country. In France, where the Church enjoins many fasts and strict sumptuary laws, the people require, in the inland districts especially, to have recourse to the meanest produce of the rivers in order to carry out the injunctions of their priests. The smallest streams are therefore assiduously cultivated in many continental countries; but the fresh-water fishes of the British Islands have only at present a very slight commercial value, as they are not captured, either individually or in the aggregate, for the purposes of commerce; but to persons fond of angling they afford sport and healthful recreation, whether they are pursued in the large English or Scottish lakes, or caught in the small rivulets that feed our great salmon streams.

Although Britain is possessed of a seaboard of 4000 miles, and a large number of fine rivers and lakes, the total number of British fishes is comparatively small (about 250 only), and the varieties which live in the fresh water are therefore very limited; those that afford sport may be numbered with ease on our ten

fingers. Fishers who live in the vicinity of large cities are obliged in consequence to content themselves with the realisation of that old proverb which tells them that small fish are better than no fish at all; hence there is a race of anglers who are contented to sit all day in a punt on the Thames, happy when evening arrives to find their patience rewarded with a fisher's dozen of stupid gudgeons. But in the north, on the lakes of Cumberland or on the Highland lochs of Scotland, such tame sport would be laughed at. Are there not charr in the Derwent and splendid trout in Loch Awe? and these require to be pursued with a zeal, and involve an amount of labour, not understood by anglers who punt for gudgeon or who haunt the East India Docks for perch, or the angler who only knows the usual run of Thames fish—barbel, roach, dace, and gudgeon. To kill a sixteen-pound salmon on a Welsh or Highland stream is to be named a knight among anglers; indeed, there are men who never lift a rod except to kill a salmon; such, however, like the Duke of Roxburghe, are giants among their fellows. For sport there is no fish like the "monarch of the brook," and great anglers will not waste time on any fish less noble. An angler, with a moderate-sized fish of the salmon kind at the end of his line, is not in the enjoyment of a sinecure, although he would not for any kind of reward allow his work to be done by deputy. I have seen a gentleman play a fish for four hours rather than yield his rod to the attendant gillie, who could have landed the fish in half-an-hour's time. It is a thrilling moment to find that, for the first time, one has hooked a salmon, and the event produces a nervousness that certainly does not tend to the speedy landing of the fish. The first idea, naturally enough, is to haul our scaly friend out of the water by sheer force; but this plan has speedily to be abandoned, for the fish, making an astonished dash, rushes away up stream in fine style, taking out no end of "rope;" then when once it obtains a bite of its bridle away it goes sulking into some rocky hiding-place. In a brief time it comes out again with renewed vigour, determined as it would seem to try your mettle; and so it dashes about till you become so fatigued as not to care whether you land it or not. It is impossible to say how long an angler may have to "play" a salmon or a large grilse; but if it sinks itself to the bottom of a deep pool, it may be a business of hours to get it safe into the landing net, if the fish be not altogether lost, as in its exertions to escape it may so chafe the line as to cause it to snap, and thus

regain its liberty ; and during the progress of the battle the angler has certainly to wade, ay and be pulled once or twice through the stream, so that he comes in for a thorough drenching, and may, as many have to do, go home after a hard day's work without being rewarded by the capture of a single fish.

There is abundance of good salmon-angling to be had at the proper season in the north of Scotland, where there are always a great variety of fishings to let at prices suitable for all pockets ; and there is nothing better either for health or recreation than a day on a salmon stream. There are one or two places on Tweed frequented by anglers who take a fishing as a sort of joint-stock company, and who, when they are not angling, talk politics, make poetry, bandy about their polite chaff, and generally "go in," as they say, for any amount of amusement. These societies are of course very select, and not easily accessible to strangers, being of the nature of a club. The plan which every angler ought to adopt on going to a strange water is to place himself under the guidance of some shrewd native of the place, who will show him all the best pools and aid him with his advice as to what flies he ought to use, and give him many useful hints on other points as well. Anglers, however, must divide their attention, for it is quite as interesting (not to speak of convenience) for some men to spend a day on the Thames killing barbel or roach as it is to others to kill a ten-pound salmon on the Tweed or the Spey. It is good sport also to troll for pike in the Lodden or to capture grayling in beautiful Dovedale. And so pleasant has of late years become the sport, that it is now quite a common sight to see a gentle-born lady handling a salmon-rod with much vigour on some of our picturesque Highland or border streams. In fact, angling is a recreation that can be made to suit all classes, from the child with his stick and crooked pin to the gentleman with his well-mounted rod and elaborate tackle, who hies away in his yacht to the fiords of Norway in search of salmon that weigh from twenty to forty pounds, and require half a day to capture. For those, however, who desire to stay at home there is abundant angling all the year round. From New-Year's Day to Christmas there needs be no stoppage of the sport ; even the weather should never stop an enthusiastic angler ; but on very bad days, when it is not possible to go out of doors, there is the study of the fish, and their natural and economic history, which ought to be interesting to all who use the angle, and to the majority of mankind besides.

Without pretending to rival the hundred and one guides to angling that now flood the market, I shall take a glance at a few of the more popular of the angler's fishes ; not, however, in any scientific or other order of precedence, but beginning with the trout, seeing that the salmon is discussed in a separate division of this work.

Of all our fresh-water fishes, the one that is most plentiful, and the one that is most worthy of notice by anglers, is the trout. It can be fished for with the simplest possible kind of rod in the most tiny stream, or be captured by elaborate apparatus on the great lochs of Scotland. There are so many varieties of it as to suit all tastes ; there are well-flavoured burn trout, not so large as a small herring, and there are lake giants that, when placed in the scales, will pull down a twenty-pound weight. The usual run of river trout, however, is about six or eight ounces in weight ; a pound trout is an excellent reward for the patient angler. Where a trouting stream flows through a rich and fertile district of country, with abundant drainage, the trout are usually well-conditioned and large, and of good flavour ; but when the country through which the stream flows is poor and rocky, with no drains carrying in food to enrich the stream, the fish are, as a matter of course, lanky and flavourless ; they may be numerous, but they will be of small size. It is curious, too, to note the difference of the fish of the same stream : some of the trout taken in Tweed, and in other rivers as well, are sharp in their colour, have fine fat plump thick shoulders, great depth of belly, and beautiful pink flesh of excellent flavour. The flavour of trout is of course dependent on the quality and abundance of its food ; those are best which exist on ground-feeding, living upon worms and such fresh-water crustaceans as are within reach. Fly-taking fish—those that indulge in the feed of ephemera that takes place a few times every day—are comparatively poor in flesh and weak in flavour. As to where fishers should resort, must be left to themselves. I was once beguiled out to the Dipple, but it is a hungry sort of river, where the trout were on the average only about three ounces, and scarce enough ; although I must say that for a few minutes, when “the feed” was on the water, there was an enormous display of fish, but they preferred to remain in their native stream, a tributary of the Clyde I think. The mountain streams and lochs of Scotland, or the placid and picturesque lakes of Cumberland and Westmoreland, are the paradise of anglers.

For trout-fishing I would name Scotland as being before all other countries. "What," it has been asked, "is a Scottish stream without its trout?" Doubtless, if a river has no trout it is without one of its greatest charms, and it is pleasant to record that, except in the neighbourhood of very large seats of population, trout are still plentiful in Scotland. It is true the railway, and other modes of conveyance, have carried of late years a perfect army of anglers into its most picturesque nooks and corners, and therefore fish are not so plentiful as they were fifty years since, in the old coaching days, when it was possible to fill a washing-tub in the space of half-an-hour with lovely half-pound trout from a few pools on a burn near Moffat. But there are still plenty of trout; indeed there are noted Scotch fishers who can fill baskets from streams near large cities that have been too much fished.

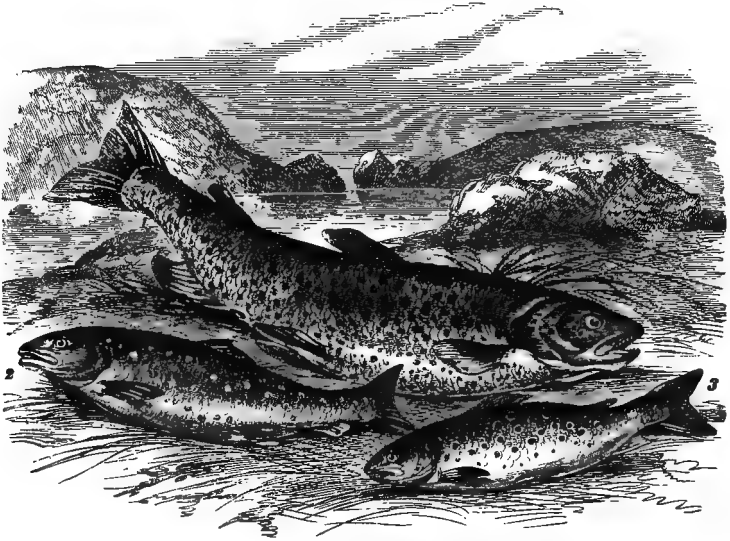
The place to try an angler is a fine Border stream or a grand Highland loch; but I shall not presume to lay down minute directions as to *how* to angle, for an angler, like a poet, must be born, he can scarcely be bred, and no amount of book lore can confer upon a man the magic power of luring the wary trout from its crystalline home. The best anglers, and fish-poachers, are gipsies. A gipsy will raise fish when no other human being can move them. If encamped near a stream, a gipsy band are sure to have fish as a portion of their daily food; and how beautifully they can broil a trout or boil a grilse those only who have dined with them can say. Your gipsy is a rare good fisher, and with half a rod can rob a river of a few dozens of trout in a very brief space of time, and he can do so while men with elaborate "fishing machines," fitted up with costly tackle, continue to flog the water without obtaining more than a questionable nibble, just as if the fish knew that they were greenhorns, and took pleasure in chaffing them. Mr. Cheek, who wrote a capital book for the guidance of those I may call Thames anglers, says that the best way to learn is to see other anglers at work—which is better than all the written instructions that can be given, one hour's practical information going farther than a folio volume of written advice. It is all in vain for men to fancy that a suit of new Tweeds, a fair acquaintance with Stoddart or Stewart, and a large amount of angling "slang," will make them fishers. There is more than that required. Besides the natural taste, there is wanted a large measure of patience and skill; and the proper place to acquire these best virtues of

the angler is among the brawling hill streams of Scotland, or on the expansive bosom of some Cumberland lake, while trying for a few delicious charr. A congregation of fish brought together by means of a scatter of food and an angler's taking advantage of the piscine convention over its diet of worms, is no more angling than a battue is sport. An American that I have heard of has a fish-manufactory in Connecticut, where he can shovel the animals out by the hundred; but then he does not go in for sport; his idea—a thoroughly American one—is money! But despite this exceedingly commercial idea, there are a few anglers in America, and as water and game fishes abound, there is plenty of sport. In North America are to be found both the true salmon and the brook trout; and as a great number of the American fishes visit the fresh and salt water alternately, they, by reason of their strength and size, afford excellent employment either to the river or sea angler. One of the best American fishes is called the Mackinaw salmon.

To come back, in the meantime, to Scotland and the trout, and where to find them, I may mention that that particular fish is the stock in trade of the streams and lochs of Scotland,—Scotland, the “land of the mountain and the flood,”—and there is an ever-abiding abundance of water, for the lochs and streams of that country are numberless. One county alone (Sutherland, to wit) contains a thousand lochs, and one parish in that county has in it two hundred sheets of water, all abounding with fine trout, affording sport to the angler—rewarding all who persevere with full baskets. As I have already hinted, the fisher must study his locality and glean advice from well-informed residents. The gipsies of a district can usually give capital advice as to the kind of bait that will please best. Many a time have anglers been seen flogging away at a stream or lake that was troutless, or at their wit's end as to which of their flies would please the dainty palate of my lord the resident trout. But I shall not further dogmatise on such matters; most people given to angling are quite as wise, on that subject at least, as the writer of these remarks; and there are as fine trout in England, I daresay, as there are in Scotland; indeed there are a thousand streams in Great Britain and Ireland where we can find fish—there are splendid trout even in the Thames. Then there are the Dove and the Severn, as well as rivers that are much farther away, so that on his second day from London an active angler may be whipping the Spey for salmon, or trolling on



Loch Awe for the large trout that inhabit that sheet of water. The change of scene is of itself a delight, no matter what river the visitor may choose. At the same time the physical exertion undergone by the angler flushes his cheek with the hue of health,



ANGLERS' FISHES.

1. Great lake trout (*Salmo ferox*).      2. *Salmo fario*.      3. Trout.

and imparts to his frame a strength and elasticity known only to such as are familiar with country scenes and pure air. May and the Mayfly are held to inaugurate the angler's year; for although a few of the keenest sportsmen keep on angling all the year round, most of them lay down their rod about the end of October, and do not think of again resuming it till they can smell the sweet fragrance of the advancing summer. Although few of our busy men of law or commerce are able to forestall the regular holiday period of August and September, yet a few do manage a run to the country at the charming time of May, when the days are not too hot for enjoyment nor too short for country industry. In August and September the landscape is preparing for the sleep of winter, whilst in May it is being

robed by nature for the fêtes of summer, and, despite the sneers of some poets and naturalists, is new and charming in the highest degree. Town living people should visit the country in May, and see and feel its industry, pastoral and simple as it is, and at the same time view the charms of its scenery in all its vivid freshness and fragrance.

Some anglers delight in pike-catching, others try for perch ; but give me the trout, of which there is a large variety, and all worth catching. In Loch Awe, for instance, there is the great lake trout, which, combined with the beauty of the scenery, has sufficed to draw to that neighbourhood some of our best anglers. The trout of Loch Awe, as is well known, are very ferocious, hence their scientific name of *Salmo ferox*. It attains to great dimensions ; individuals weighing twenty pounds have been often captured ; but its flavour is indifferent and the flesh is coarse, and not prepossessing in colour. This kind of trout is found in nearly all the large and deep lochs of Scotland. It was discovered scientifically about the end of last century by a Glasgow merchant, who was fond of sending samples of it to his friends in proof of his prowess as an angler. The usual way of taking the great lake trout is to engage a boat to fish from, which must be rowed gently through the water. The best bait is a small trout, with at least half-a-dozen strong hooks projecting from it, and the tackle requires to be prodigiously strong, as the fish is a most powerful one, although not quite so active as some others of the trout kind, but it roves about in the deeper waters, enacting the part of bully and cannibal to all lesser creatures, and driving before it even the hungry pike. Persons residing near the great lochs capture these large trout by setting night lines for them. As has been already mentioned, they are exceedingly voracious, and have been known to be dragged for long distances, and even after losing hold of the bait to seize it again with much eagerness, and so have been finally captured. These great lake trout are also to be found in other countries.

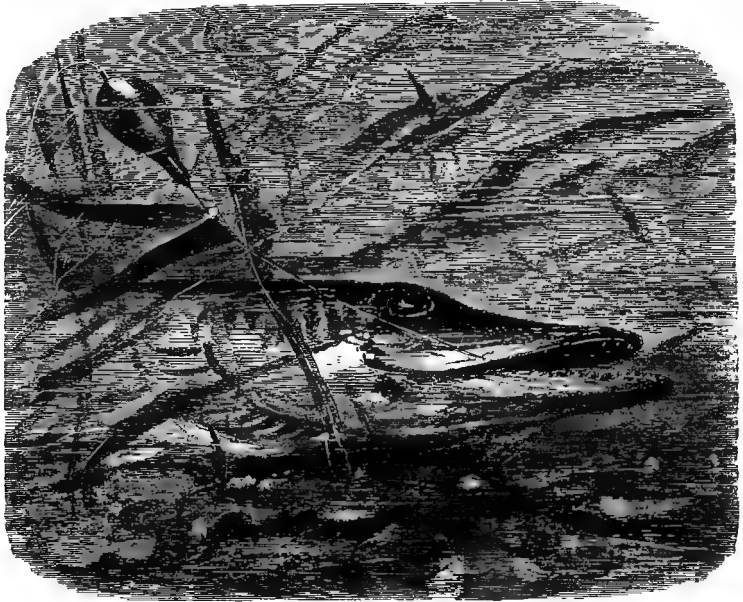
In Lochleven, at Kinross, twenty-two miles from Edinburgh, there will be found localised that beautiful trout which is peculiar to this one loch, and which I have already referred to as one of the mysterious fishes of Scotland. This fish—although its quality is said to have been degenerated by the drainage of the lake in 1830, at which period it was reduced by draining to a third of its former dimensions—is of con-

siderable commercial value ; it cannot be bought in Edinburgh or London except at a fancy price ; and if it was properly cultivated might yield a large revenue. I have not been able to obtain recent statistics of "the take" of Lochleven trout, but in former years, during the seven months of the fishing season, it used to range from fifteen thousand to twenty thousand pounds weight, and at the time referred to all trout under three-quarters of a pound in weight were thrown back into the water by order of the lessee. Eighty-five dozen of these fine trout have been known to be taken at a single haul, while from twenty to thirty dozen used to be a very common take. As to perch, they used to be caught in thousands. Little has or can be said about Lochleven trout, except that they are a specialty. Some learned people (but I take leave to differ from them) consider the Lochleven fish to be identical with *Salmo fario*, but never in any of my piscatorial wanderings have I found its equal in colour, flavour, or shape. It has been compared with the *Fario Lemanus* of the Lake of Geneva, and having handled both fishes, I must allow that there is very little difference between them ; but still there are differences. Netting is not now allowed on the loch, but there is a large fleet of boats, which can be hired at Kinross for an hour or two's fishing on Lochleven.

I need not go over all the varieties of fresh-water trout *seriatim*, for their name is legion, and every book on angling contains lists of those peculiar to districts. If anglers' fishes ever become valuable as food, it will be by the cultivation of our great lochs. With such a vast expanse of water as is contained in some of these lakes, and having ample river accommodation at hand for spawning purposes, there could be no doubt that artificial breeding, if properly gone about, would be successful. The Lochleven trout is already of great money value commercially, and could be systematically cultivated so as to become a considerable source of revenue to the proprietor of the lake and amusement to the angler ; an experimental attempt at cultivation took place some years ago, but no regular plan of breeding these fish has yet been organised.

There are some pretty big pike in Lochleven. As every angler knows, the pike affords capital sport, and may be taken in many different ways. Pike spawn in March and April, when the fish leaves its hiding-place in the deep water and retires for procreative purposes into shallow creeks or ditches. The pike

yields a very large quantity of roe on the average, and the young fish are not long in being hatched. Endowed with great feeding power, pike grow rapidly from the first, attaining a length of twenty-two inches. Before that period a young pike is called a jack, and its increase of weight is at the rate of about four



JACK IN HIS ELEMENT.

pounds a year when well supplied with food. The appetite of this fish is very great, and, from its being so fierce, it has been called the pirate of the rivers. It is not easily satisfied with food, and numerous extraordinary stories of the pike's powers of eating and digesting have been from time to time related. I remember, when at school at Haddington (seventeen miles from Edinburgh), of seeing a pike that inhabited a hole in the "Lang Cram" (a part of the river Tyne), which was nearly triangular\* in shape, supposed to be the exact pattern of its hiding-place, and which devoured every kind of fish or animal that came in its way. It was hooked several times, but always

managed to escape, and must have weighed at least twenty-five pounds. Upon one occasion it was hooked by a little boy, who fished for it with a mouse, when it rewarded him for his cleverness by dragging him into the water; and had help not been at hand the boy would assuredly have been drowned, as the water at that particular spot was deep. As to the voracity of this fish many particulars have been given. Mr. Jesse, in one of his works, says that a pike of the weight of five pounds has been known to eat a hundred gudgeon in three weeks; and I have myself seen them killed in the neighbourhood of a shoal of parr, and, notwithstanding their rapidity of digestion, I have seen four or five fish taken out of the stomach of each. Mr. Stoddart, one of our chief angling authorities, has calculated the pike to be amongst the most deadly enemies of the infant salmon. He tells us that the pike of the Teviot, a tributary of the Tweed, are very fond of eating young smolts, and says that, in a stretch of water ten miles long, where there is good feeding, there will be at least a thousand pike, and that these during a period of sixty days will consume about a quarter of a million of young salmon!

One would almost suppose that some of the stories about the voracity of pike had been invented; if only half of them be true, this fish has certainly well earned its title of shark of the fresh water. There is, for instance, the well-known tale of the poor mule, which a pike was seen to take by the nose and pull into the water; but it is more likely I think that the mule pulled out the pike. Pennant, however, relates a story of a pike that is known to be true. On the Duke of Sutherland's Canal at Trentham, a pike seized the head of a swan that was feeding under water, and gorged as much of it as killed both. A servant, perceiving the swan with its head below the surface for a longer time than usual, went to see what was wrong, and found both swan and pike dead. A large pike, if it has the chance, will think nothing of biting its captor; there are several authentic instances of this having been done. The pike is a long-lived fish, grows to a large size, and attains a prodigious weight. There is a narrative extant about one that was said to be two centuries and a half old, which weighed three hundred and fifty pounds, and was seventeen feet long. There is abundant evidence of the size of pike: individuals have been captured in Scotland, so we are told in the Scots Magazine, that weighed seventy-nine pounds. In the London

newspapers of 1765 an account is given of the draining of a pool, twenty-seven feet deep, at the Lilishall Limeworks, near Newport, which had not been fished for many years, and from which a gigantic pike was taken that weighed one hundred and seventy pounds, being heavier than a man of twelve stone! I have seen scores of pike which weighed upwards of half a stone, and a good many double that weight, but the weight is thought now to be on the descending ratio, the giants of the tribe having been apparently all captured. Formerly there used to be great hauls of this fish taken out of the water. Whether or not a pike be good for food depends greatly on where it has been fed, what it has eaten, and how it has been cooked. In fact, as I have already endeavoured to show, the animals of the water are in respect of food not unlike those of the land—their flavour is largely dependent on their feeding; and pike that have been luxuriating on Lochleven trout, or feeding daintily for a few months on young salmon, cannot be very bad fare.

§ The carp family (Cyprinidæ) is very numerous, embracing among its members the barbel, the gudgeon, the carp-bream, the white-bream, the red-eye, the roach, the bleak, the dace, and the well-known minnow. There is one of the family which is of a beautiful colour, and with which all are familiar—I mean the golden carp, which may be seen floating in its crystal prison in nearly every home of taste, and which swarms in the ponds at Hampton Court, in the tropical waters of the Crystal Palace at Sydenham, as also in all the great aquariums. The gold and silver fish are natives of China, whence they were introduced into this country by the Portuguese about the end of the seventeenth century, and have become, especially of late years, so common as to be hawked about the streets for sale. In China, as we can read, every person of fashion keeps gold-fish by way of having a little amusement. They are contained either in the small basins that decorate the courts of the Chinese houses, or in porcelain vases made on purpose; and the most beautiful kinds are taken from a small mountain lake in the province of Che-Kyang, where they grow to a comparatively large size, some attaining a length of eighteen inches and a comparative bulk, the general run of them being equal in size to our herrings. These lovely fish afford much delight to the Chinese ladies, who tend and cultivate them with great care. They keep them in very large basins, and a common earthen pan is generally placed

at the bottom of these in a reversed position, and so perforated with holes as to afford shelter to the fish from the heat and glare of the sun. Green stuff of some kind is also thrown upon the water to keep it cool, and it (the water) must be partially changed every two days, and the fish, as a general rule, must never be touched by the hand. Great quantities of gold-fish are often bred in ponds adjacent to factories, where the waste steam being let in the water is kept at a warmish temperature. At the manufacturing town of Dundee they became at one time a complete nuisance in some of the factories, having penetrated into the steam and water pipes, occasionally bringing the works to a complete standstill. In England the golden carp usually spawns between May and July, the particular time being greatly regulated by the warmth of the season. The time of spawning may be known by the change of habit which occurs in this fish. It sinks at once into deep water instead of basking on the top, as usual; previous to which the fish are restive and quick in their movements, throwing themselves out of the water, etc. It may be stated here, to prevent disappointment, that golden carp seldom spawn in a transparent vessel. A Mr. Mitchell of Edinburgh, however, brought out a hatching in his shop aquarium, in the Lothian Road, but the fry escaped by the waste pipe. When the spawn is hatched the fish are very black in colour, some darker than others: these become of a golden hue, while those of a lighter shade become silver-coloured. It is some time before this change occurs, a portion colouring at the end of one year, and others not till two or three seasons have come and gone. These beautiful prisoners seldom live long in their crystal cells, although the prison is beautiful enough, one would fancy:—

“ I ask, what warrant fixed them (like a spell  
Of witchcraft fixed them) in the crystal cell ;  
To wheel with languid motion round and round,  
Beautiful, yet in mournful durance bound ! ”

Gold-fish ought not to be purchased except from some very respectable dealer. I have known repeated cases where the whole of the fish bought have died within an hour or two of being taken home. These golden carp, which are reared for sale, are usually spawned and bred in warmish water, and they ought in consequence to be acclimatised or “tempered” by the dealer before they are parted with. Parties buying ought to be

particular as to this, and ascertain if the fish they have bought have been *tempered*.

Returning to the common carp, I can speak of it as being a most useful pond-fish. It is a vegetarian, and may be classed among the least carnivorous fishes; it feeds chiefly upon vegetables or decaying organic matter, and very few of them prey upon their kind, while some, it is thought, pass the winter in a torpid state. There is a rhyme which tells us that

Turkeys, carp, hops, pickerel, and beer,  
Came into England *all* in one year.

But this couplet must, I think, be wrong, as some of these items were in use long before the carp was known; indeed, it is not at all certain when this fish was first introduced into England, or where it was brought from, but I think it extremely possible that it was originally brought here from Germany. In ancient times there used to be immense ponds filled with carp in Prussia, Saxony, Bohemia, Mecklenburg, and Holstein, and the fish was bred and brought to market with as much regularity as if it had been a fruit or a vegetable. The carp yields its spawn in great quantities, no fewer than 700,000 eggs having been found in a fish of moderate weight (ten pounds); and, being a hardy fish, it is easily cultivated, so that it would be profitable to breed in ponds for the fishmarkets of populous places, and the fish-salesmen assure us that there would be a large demand for good fresh carp. It is necessary, according to the best authorities, to have the ponds in suites of three—viz. a spawning-pond, a nursery, and a receptacle for the large fish—and to regulate the numbers of breeding fish according to the surface of water. It is not my intention to go minutely into the construction of carp-ponds; but I may be allowed to say that it is always best to select such a spot for their site as will give the engineer as little trouble as possible. Twelve acres of water divided into three parts would allow a splendid series of ponds—the first to be three acres in extent, the second an acre more, and the third to be five acres; and here it may be again observed that, with water as with land, a given space can only yield a given amount of produce, therefore the ponds must not be overstocked with brood. Two hundred carp, twenty tench, and twenty jack per acre is an ample stock to begin breeding with. A very profitable annual return would be obtained from these twelve acres of water; and, as many



country gentlemen have even larger sheets than twelve acres, I recommend this plan of stocking them with carp to their attention. There is only the expense of construction to look to, as an under-keeper or gardener could do all that was necessary in looking after the fish. A gentleman having a large estate in Saxony, on which were situated no less than twenty ponds, some of them as large as twenty-seven acres, found that his stock of fish added greatly to his income. Some of the carp weighed fifty pounds each, and upon the occasion of draining one of his ponds, a supply of fish weighing five thousand pounds was taken out; and for good carp it would be no exaggeration to say that sixpence per pound weight could easily be obtained, which, for a quantity like that of this Saxon gentleman, would amount to a sum of £125 sterling. Now, I have the authority of an eminent fish-salesman for stating that ten times the quantity here indicated could be disposed of among the Jews and Catholics of London in a week, and, could a regular supply be obtained, an unlimited quantity might be sold.

I have been writing about Highland streams and northern lochs; but the river scenery of England is, in its way, equally beautiful, and no river is more charming than the Thames. It is a classic stream, and its praises have been sung by the poets and celebrated by the historian. After Mrs. S. C. Hall and Thorne, it were vain to repeat its praises:—

“Glide gently, thus for ever glide,  
O Thames! that anglers all may see  
As lovely visions by thy side,  
As now, fair river, come to me.  
Oh, glide, fair stream, for ever so  
Thy quiet soul on all bestowing,  
Till all our minds for ever flow  
As thy deep waters are now flowing.”

The total length of the river Thames is 215 miles, and the area of the country it waters is 6160 square miles. It has as affluents a great many fine streams, including the river Loddon, as also the Wey and the Mole. I am not entitled to consider it here in its picturesque aspects—my business with it is piscatorial, and I am able to certify that it is rich in fish of a certain kind—

“The bright-eyed perch with fins of Tyrian dye,  
The silver eel in shining volumes rolled,  
The yellow carp in scales bedropp’d with gold,  
Swift trout diversified with crimson stains,  
And pike, the tyrants of the watery plains.”

Considering that all its best fishing points are accessible to an immense population, many of whom are afflicted with a mania for angling, it is quite wonderful that there is a single fish of any description left in it; and yet there are several bands of honest anglers who can fill occasional big baskets. I may be allowed just to run over a few Thames localities, and note what fish may be taken from them. Above Teddington at different places an occasional trout may be pulled out, but, although the finest trout in the world may be got in the Thames, they are, unfortunately, so scarce in the meantime, that it is hardly worth while to lose one's time in the all but vain endeavour to lure them from their home. Pike fishing or trolling will reward the Thames angler better than trouting. There are famous pike to be taken every here and there—in the deep pools and at the weirs: and, as the pike is voracious, a moderately good angler, with proper bait, is likely to have some sport with this fish. But the speciality of the Thames, so far at least as most anglers are concerned, is the quantity of fish of the carp kind which it contains, as also perch. This latter fish may be taken with great certainty about Maidenhead, Cookham, Pangbourne, Walton, Labham, and Wallingford Road; and a kindred fish, the pope, in great plenty, may be sought for in the same localities. Then the bearded barbel is found in greater plenty in the Thames than anywhere else, and, as it is a fish of some size and of much courage, it affords great sport to the angler. The best way to take the barbel is with the "Ledger," and the best places for this kind of fishing are the deeps at Kingston Bridge, Sunbury Lock, Halliford, Chertsey Weir, and in the deeps at Bray, where many a time and oft have good hauls of barbel been taken. The best times for the capture of this fish are late in the afternoon or very early in the morning. Chub are also plentiful in the Thames; and Mr. Arthur Smith, who wrote a guide to Thames anglers, specially recommended the island above Goring for chub, also Marlow and the large island below Henley Bridge. This fish can be taken with the fly, and gives tolerable sport. The roach is a fish that abounds in all parts of the Thames, especially between Windsor and Richmond; and in the proper season—September and October—it will be found in Teddington Weir, Sunbury, Blackwater, Walton Bridge, Shepperton Lock, the Stank Pitch at Chertsey, and near Maidenhead, Marlow, and Henley Bridges. At Teddington I may state that the dace is abundant, and there is plenty of little fish of various kinds

that can be had as bait at most of the places we have named. In fact, in the Thames there is a superabundance of sport of its kind, and plenty of accommodation for anglers, with wise "professionals" to teach them the art; and although the best sport that can be enjoyed on this lovely stream is greatly different from the trout-fishing of Wales or Scotland, it is good in its degree, and tends to health and high spirits, and an anxiety to excel in his craft, as one can easily see who ventures by the side of the water about Kew and Richmond.

"With hurried steps,  
The anxious angler paces on, nor looks aside,  
Lest some brother of the angle, ere he arrive,  
Possess his favourite swim."



THAMES ANGLERS.—FROM AN OLD PICTURE.

I come now to the perch, a well-known because common fish, about which a great deal has been written, and which is easily taken by the angler. There are a great number of species of this fish, from the common perch of our own canals and lochs to the "lates" of the Nile, or the beautiful golden-tailed

mesoprion, which swims in the seas of Japan and India, and flashes out brilliant rays of colour. The perch was assiduously cultivated in ancient Italy, in the days when pisciculture was an adjunct of gastronomy, and was thought to equal the mullet in flavour. In Britain, the fish, left to its natural growth and no care being taken to flavour it artificially, is surpassed for table purposes by the salmon and the trout; but perch being abundant afford plenty of good fishing. The perch usually congregate in small shoals, and delight in streams, or water with a clear bottom and with overhanging foliage to shelter them from the overpowering heat of summer. These fish do not attain any considerable weight, the one recorded as being taken in the Serpentine, in Hyde Park, which weighed nine pounds, being still the largest on record. Perch of three and four pounds are by no means rare, and those of one pound or so are quite common. The perch is a stupid kind of fish, and easily captured. Many of the foreign varieties of perch attain an immense weight. Some of the ancient writers tell us that the "lates" of the Nile attained a weight of three hundred pounds; and then there is the vacti of the Ganges, which is often caught five feet long. The perch, after it is three years old, spawns about May. It may be described as rather a hardy fish, as we know it will live a long time out of water, and can be kept alive among wet moss, so that it may be easily transferred from pond to pond. Its hardy nature accounts for its being found in so many northern lochs and rivers, as in the olden times of slow conveyances it must have taken a long time to send the fish to the great distances we know it must have been carried to. On the Continent, living perch are a feature of nearly all the fishmarkets. The fish, packed in moss and occasionally sprinkled with water, are carried from the country to the cities, and if not sold are taken home and replaced in the ponds. This particular fish, which is very prolific, might be "cultivated" to any extent. Fishponds, although not now common, used to be at one time as much a food-giving portion of a country gentleman's commissariat as his kitchen-garden or his cow-paddock.

As I have said so much about the Scottish lochs, it would be but fair to say a few words about those of England; but in good honest truth it would be superfluous to descant at the present day on the beauties of Windermere, or the general lake scenery of Cumberland and Westmoreland: it has been described by hundreds of tourists, and its praises have been sung by its

own poets—the lake poets. It is with its fish that we have business, and honesty compels us to give the charr a bad character. It is not by any means a game fish, so far as sport is concerned ; nor is it great in size or rich in flavour. But potted charr is a rare breakfast delicacy. This fish, which is said by Agassiz to be identical with the ombre chevalier of Switzerland, is rarely found to weigh more than a pound ; specimens are sometimes taken exceeding that weight, but they are scarce. The charr is found to be pretty general in its distribution, and is found in many of the Scottish lochs. It spawns about the end of the year, some of the varieties depositing their eggs in the shallow parts of the lake, while others proceed a short way up some of the tributary streams. In November great shoals of charr may be seen in the rivers Rothay and Brathay, particularly the latter, with the view of spawning. The charr, we are told by Yarrell, afford but scant amusement to the angler, and are always to be found in the deepest parts of the water in the lochs which they inhabit. “The best way to capture them is to trail a very long line after a boat, using a minnow for a bait, with a large bullet of lead two or three feet above the bait to sink it deep in the water ; by this mode a few charr may be taken in the beginning of summer, at which period they are in the height of perfection both in colour and flavour.”

As I am on the subject of anglers' fishes, the reader will perhaps allow me to suggest that “no end of sport” may be obtained in the sea ; that capital sea-angling may be enjoyed all the year round, and all round the British coasts ; and that there are fighting fishes in the waters of the great deep that will occasionally try both the cunning and the nerve of the best anglers. The greatest charm of sea-angling, however, lies in its simplicity, and the readiness with which it can be engaged in, together with the comparatively homely and inexpensive nature of the instruments required. A party living at the seaside can either fish off the rocks or hire a boat, and purchase, or obtain on loan (for a slight consideration) such simple tackle as is necessary ; though it must not be too simple, for even sea-fish will not stand the insult of supposing they can be caught as a matter of course with anything ; and as the larger kinds of hooks are often scarce at mere fishing villages, it is better to carry a few to the scene of action.

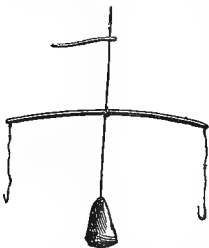
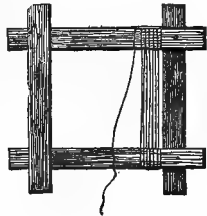
“Well then, what sport does the sea afford ?” will most likely be the first question put by those who are unacquainted

with sea-angling. I answer, Anything and everything in the shape of fish or sea-monster, from a sprat to a whale. This is literally true. It is not an unfrequent occurrence for tourists in Orkney, or other places in Scotland, to assist at a whale battue; and some of my readers may remember a very graphic description of an Orcadian whale-hunt, given in *Blackwood's Magazine*, by the late Professor Aytoun, who was Sheriff and Admiral of Orkney. The kind of sea-fish, however, that are most frequently taken by the angler, both on the coasts of England and Scotland, are the whiting, the common cod, the beautiful poor or power cod, and the mackerel; there is also the abundant coal-fish, or sea-salmon as I call it, from its handsome shape. This fish is taken in amazing quantities, and in all its stages of growth. It is known by various names, such as sillock, piltock, cudden, poddly, etc.; indeed most of our fishes have different names in different localities; but I shall keep to the proper name so as to avoid mistakes. The merest children are able, by means of the roughest machinery, to catch any quantity of young coal-fish; they can be taken in our harbours, and at the sea-end of our piers and landing-places. The whiting is also very plentiful, so far as angling is concerned, as indeed are most of the Gadidæ. It feeds voraciously, and will seize upon anything in the shape of bait; several full-grown pilchards have been more than once taken from the stomach of a four-pound fish. Whiting can be caught at all periods of the year, but it is of course most plentiful in the breeding season, when it approaches the shores for the purpose of depositing its spawn—that is in January and February. The common cod-fish is found on all parts of our coast, and the sea-anglers, if they hit on a good locality—and this can be rendered a certainty—are sure to make a very heavy basket.

The pollack, or, as it is called in Scotland, lythe, also affords capital sport; and the mackerel-herring and conger-eel can be captured in considerable quantities. I can strongly recommend lythe-fishing to gentlemen who are *blasés* of salmon or pike, or who do not find excitement even among the birds of lone St. Kilda. Then, as will afterwards be described, there is the extensive family of the flat fish, embracing brill, plaice, flounders, soles, and turbot. The latter is quite a classic fish, and has long been an object of worship among gastronomists; it has been known to attain an enormous size. Upon one occasion an individual, which measured six feet across, and weighed one hundred and ninety pounds, was caught near Whitby. The

usual mode of capturing flat fish is by means of the trawl-net, but many varieties of them may be caught with a hand-line. A day's sea-angling will be chequered by many little adventures. There are various minor monsters of the deep that vary the monotony of the day by occasionally devouring the bait. A tadpole-fish, better known as the sea-devil or "the angler," may be hooked, or the fisher may have a visit from a hammer-headed shark or a pile-fish, which adds greatly to the excitement; and if "the dogs" should be at all plentiful, it is a chance if a single fish be got out of the sea in its integrity. So voracious and active are this species of the *Squalidæ*, that I have often enough pulled a mere skeleton into the boat, instead of a plump cod of ten or twelve pounds weight.

I shall now say a few words about the machinery of capture. The tackle in use for handline sea-fishing is much the same everywhere, and that which I describe will suit almost any locality. It consists of a frame of four pieces of wood-work about a foot and a half in length, fastened together in the shape of such a machine as ladies use for certain worsted work. Round this is wound a thin cord, generally tanned, of from ten to twenty fathoms in length. To the extreme end of this line is attached a leaden sinker, the weight of which varies according as the current of the tide is slow or rapid.



About two feet above the sinker is a cross piece of whalebone or iron, to the extremities of which the strings on which the hooks are dressed are attached. Sometimes a third hook is affixed to an outrigger, about two feet above the other hooks. The length of the cords to which the lower hooks are attached should be such as to allow them to hang about six inches higher than the

bottom of the sinker. In some parts of the Western Highlands a rod consisting of thin fir is used, but from the length of line required it is rather a clumsy instrument, as after the fish has been struck the rod has to be laid down in the boat, and the line to be hauled in by hand.

As to bait it is quite impossible to lay down any strict

rule. The bait which is the favourite in one bay or bank is scouted by the fish of other localities. At times almost anything will do : numbers of mackerel have been taken with a little bit of red cloth attached to the hook ; on certain occasions the fish are so hungry that they will swallow the naked iron ! On the English coasts, and among the Western Islands of Scotland, the most deadly bait that is used is boiled limpets, which require to be partially chewed by the fisher before placing them on the hooks ; in other places mussels are the favourites, and in others the worms procured among the mud of the shore. The limpet has this one advantage, that it is easily fixed on the hook, and keeps its hold tenaciously. A very excellent bait for the larger kinds of fish is the soft parts of the body of small crabs, which are gathered for that purpose at low tide under the stones ; a good place for procuring them is a mussel-bed. The best time for fishing is immediately before ebb or flow. The hooks being baited, the line is run over the side of the boat until the lead touches the bottom, when it is drawn up a little, so as to keep the baits out of reach of the crabs who gnaw and destroy both bait and tackle. The line is held firmly and lightly outside the boat, the other hand, inside the boat, also having a grip of the line.



The moment a fish is felt to strike, the line is jerked down by the hand inside, thus bringing it sharply across the gunwale and fixing the hook. A little experience will soon enable the angler to determine the weight of the fish, and according as it is light or heavy must he quickly or slowly haul in his line. When the fish reaches the surface, he should, if practicable, seize it with his hand, as it is apt, on feeling itself out of water, to wriggle off. A landing-clip or gaff, such as is used in salmon-fishing, is useful, as, in the event of hooking a conger or a ray, there is much difficulty, and even some danger.

In fishing for lythe—the most exciting of all sea-angling—a very strong cord is used, on which, in order to prevent the fouling of the line, one or two stout swivels are attached. The hooks also cannot be too strong ; those used for cod or ling fishing are very suitable. The baits in general use are the body of a small eel, about half a foot in length, skinned and tied to the shaft ; or a strip of red cloth, or a red or white feather similarly



attached. A piece of lead is fixed on the line at a short distance above the hook.

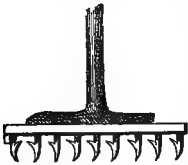
The boat must be rowed or sailed at a moderate rate, and from five or ten fathoms of the line allowed to trail behind. The boat end of the line should be turned once or twice round the arm, and held tightly in the hand ; if the line were fastened to the boat, there is every chance that a large lythe—and they are frequently caught upwards of thirty pounds weight—would snap the tackle. The fish, when hooked, gives considerable play, and rather strongly objects to being lifted into the boat. The clip or gaff is in this case always necessary. In fishing for lythe, mackerel and dogfish are not unfrequently caught. The best place for prosecuting this sport is in the neighbourhood of a rocky shore ; and the best times of the day are the early morning and evening. This fish will also take readily during any period of a dull but not gloomy day.

The most amusing kind of sea-angling is fly-fishing for small lythe and saithe (coal-fish). The tackle is exceedingly simple : a rod consisting of a pliant branch about eight feet in length ; a line of light cord of the same length, and a little hook roughly busked with a small white, red, or black feather. The fly is dragged on the surface as the boat is rowed along, and the moment the fish is struck it is swung into the boat. The fry of the lythe and saithe may also be fished for from rocks and pier-heads, using the same tackle. A very ingenious plan for securing a number of these little fish is carried on in the Firth of Clyde and elsewhere. A boat similar in shape to a salmon-coble, with a crew of two—one to row and one to fish—goes out along the shore in the evening, when the sea is perfectly calm or nearly so. The fisher has charge of half-a-dozen rods or more, similar to the one already mentioned. These rods project across the square stern of the boat, and their near ends are inserted into the interstices of a seat of wattled boughs, on which the fisher sits, not steadily, but bumping gently up and down, communicating a trembling motion to the flies. The course of the coble is always close in shore, and, if the fish are taking well, the same ground may be fished over many times during the course of the evening.

As to set-line-fishing, it can only be practised in places where the tide recedes to a considerable distance. The cord used is of no defined length, and at certain distances along its entire extent are affixed corks to prevent the hooks sinking in

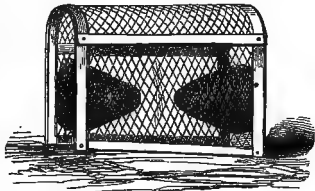
the sand or mud. The shore-end is generally anchored to a stone, and the further end fastened to the top of a stout staff firmly fixed in the beach, and generally attached also to a stone to prevent it drifting ashore in the event of being loosened from its socket. From the staff almost to the shore, hooks are tied along the line at distances of a yard. The hooks are baited at low tide, and on the return of next low tide the line is examined. This is neither a satisfactory nor sure method of fishing, as many of the fish wriggle themselves free, and clear the hook of the bait, and many, after being caught, fall a prey to dogfish, etc., so that the disappointed fisher, on examining his line, too often finds a row of baitless hooks, alternating with the half-devoured bodies of haddocks, flounders, saithe, and other shore fish.

I may just name another mode of obtaining sport, which is by spearing flat fish, such as flounders, dab, plaice, etc. No rule can be laid down on this method of fishing. It has been carried on successfully by means of a common pitchfork, but some gentlemen go the length of having



fine spears made for the purpose, very long and with very sharp prongs; others, again, use a three-pronged farm-yard "graip," which has been known to do as much real work as more elaborate utensils specially contrived for the purpose. The simplest directions I can give to those who try this style of fishing are just to spear all the fish they can see, but the general plan is to stab in the dark with the kind of instrument delineated above. At the mouths of most of the large English rivers there is usually abundance of all the minor kinds of flat fish.

Lobsters and crabs can be taken at certain rocky places of the coast; mussels can be picked from the rocks, and cockles can be dug for in the sand. Shrimps can also be taken, and various other wonders of the sea and its shores may be picked up. After a storm a great number of curious fishes and shells may be gathered, and some of these are very valuable as specimens of natural history. The ap-



paratus for capturing lobsters and crabs is like a cage, and is generally made of wicker work, with an aperture at the top or the side for the animal to enter by ; it can be baited with any sort of garbage that is at hand. Having been so baited, the lobster-pot is sunk into the water, and left for a season, till, tempted by the mess within, the game enters and is caged. Those who would induce crabs to enter their pots must set them with fresh bait ; lobsters, on the other hand, will look at nothing but garbage. Very frequently rock-cod, saithe, and other fish, are found to have entered the pots, intent both on foul and fresh food. Shell-fish for bait can be taken by means of a wooden box or old wicker basket sunk near a rocky place, and filled with garbage of some kind ; the whelks and small crabs are sure to patronise the mess extensively, and can thus be obtained at convenience. It is impossible to tell in the limits of a brief chapter one half of the fishing wonders that can be accomplished during a sojourn at the sea-side. A visit to some quaint old fishing town, on the recurrence of "the year's vacation sabbath," as some of our poets now call the annual month's holiday, might be made greatly productive of real knowledge ; there are ten thousand wonders of the shore which can be studied besides those laid down in books.

As will be noted, I have avoided as much as possible the naming of localities, preferring to state the general practice. In all seaside towns and fishing villages there are usually three or four old fishermen who will be glad to do little favours for the curious in fish lore—to hire out boats, give the use of tackle, and point out good localities in which to fish. For such as have a few weeks at their disposal, I would suggest the western sea-lochs of Scotland as affording superb sport in all the varieties of sea-angling. Fish of all kinds, great and small, are to be found in tolerable quantity, and there is likewise the still greater inducement of fine scenery, cheap lodgings, and moderate living expenses. But the entire change of scene is the grand medicine ; nothing would do an exhausted London or Manchester man more good than a month on Lochfyne, where he could not only angle in the great water for amusement, but also watch the commercial fishers, and enjoy the finely-flavoured herring of that loch as a portion of his daily food. If persons in search of sea-angling wish to combine the enjoyment of picturesque scenery with their pleasant labours on the water, they cannot do better

than select the rural village of Corry, on the Island of Arran, as a centre from which to conduct their operations.

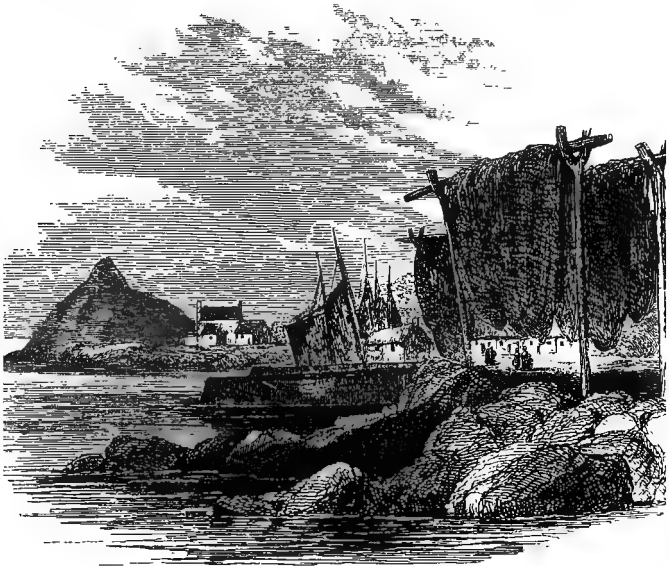
Our angler, having arrived at Glasgow, can go down the Clyde by steamboat direct to Arran. There is another and a quicker way—viz. by railway to Ardrossan and steamboat to Brodick, but most strangers prefer the river; and let me say here, without fear of contradiction, there is no pleasure river equal to the Clyde, especially as regards accessibility. The steamers from Glasgow peer at stated intervals into every nook and cranny of the water, and, on the Saturdays especially, deposit perfect armies of people at various towns and villages below Greenock, who are thus enabled to pass the Sunday in the bright open air by the clear waters of this great stream. Any kind of lodging is put up with for the sake of being “down the water;” and all sorts of people—merchants even of high degree, and “Glasgow bodies” of lower social standing—are contented, chiefly no doubt at the instigation of their better halves, to sojourn in places that when at home they would think quite unsuitable for even the Matties of their households. The banks of the Clyde have become wonderfully populous within the last twenty-five years—villages have expanded into towns, hamlets have grown into villages, and single cottages into hamlets. Now the railway to Greenock is insufficient as a daily travelling aid to persons whose half-hours are of large commercial value; and as a consequence, a new line of rails has been constructed to come upon the water at Wemyss Bay, about twelve miles below Greenock. To your thorough business man time is money, and if he is alternately able to leave his place of business and his place of pleasure half-an-hour later each way, he is all the better pleased with both. To speculators in want of an idea I would say: Rush to the Clyde, and buy up every inch of land that can be had within a mile of the water, build upon it, and from the half million of human beings who tenant Glasgow and the surrounding towns I will engage to find two competing occupants for every house that can be put up. Building has progressed even in Arran, and this too despite the late Duke of Hamilton’s dislike to strangers, so that there is now a population on the island of about 7000. A friend of mine says that such an important entity as a duke has no right to do as he likes with his own, and consequently that Arran ought to be built upon, and blackcocks and other game birds be left to take their chance. Even with such limited

accommodation as can be now obtained, Arran is a delightful summer residence ; were it to be generally built upon, it would realise from ground-rents alone an annual fortune to his Grace the Duke of Hamilton, who owns the greater part of it, and he might have capital shooting into the bargain.

Arran, I may state to all who are ignorant of the fact, is a very paradise for geologists ; and amateur globe-makers—persons who think they are better at constructing worlds than the Great Architect who preceded them all—are particularly fond of that island, being, as they suppose, quite able to find upon it *materiel* sufficient for the erection of the largest possible “theories.” Figures, it is said, can be made to prove either side of a cause ; so can stones. Each geologist can build up his own pet world from the same set of rocks ; and so active geologists proceed to stucco over with their own compositions—“adumbrate” a friend calls the process—the sublime works of the greatest of all designers. None of the sciences have given rise to so much controversy as the science of geology. I make no pretensions to much geologic knowledge, although I do know a little more than the man who wondered if the granite boulders which he saw on a brae-side were on their way up or down the hill, and argued that it was a moot point. What I would like to see would be a good work on geology, divested entirely of the learned and scientific slang which usually makes such books entirely useless to ninety-nine out of every hundred persons who attempt to read them. I would like, moreover, a work that would not bully us with a ready-made theory.

We had been landed from the steamboat on a massive grey boulder, on the sides of which, thick as was the atmosphere, we observed dozens of limpets and crowds of “buckies,” and other sea-ware, giving us token of ample employment when we could obtain leisure for a more minute survey of the rocks and stray stones which sprinkle the sea-beach of Corry. In the meantime, that is just after landing, the great, the momentous question on this and every other Saturday night is—Is *the* inn full ? A hurried scramble over the jagged stones, and a rush past the very picturesque residence of Mr. Douglas’ pigs, brought us to the inn, and at once decided the question. Mrs. Jamison, the landlady, shook her lawn-bedizened head—the inn, alas, *was* full, overflowing in fact, for a gentleman had engaged the coach-house ! It was feared, too, that every house in the village was in a like predicament, and further inquiry soon confirmed this

to us rather awful statement, and so I was left standing at the inn-door, with a biting shrewd companion, to solve this problem—Given the barest possible accommodation throughout all Corry for only forty-eight strangers, how to shake fifty into the village, so that each might have somewhere to lay his head?



CORY HARBOUR.

This is a problem, I suspect, that few can answer. What was to be done? The steamboat had gone! Were we then to tramp on to Brodick, with more than a suspicion of a rainy night in the moist atmosphere, or try a shake-down of clean straw in a lime quarry? It might have come to that, and as both of us had before then camped out for a night by the sheltered side of a haystack, we might have arranged, fortified by the aid of a dram, or perhaps two, to pass a tolerable night in the lime cavern beside a very canny-looking horse-of-all-work that we caught a glimpse of through the gloom of the place while peeping into it.

It fortunately occurred that a modest maiden lady, a very "civil-spoken" woman indeed, by name Grace Macalister, had been disappointed of two Glasgow gentlemen, who had engaged her whole house, and so the two benighted travellers from the east were accepted, at the instigation of the late Mr. Douglas, a well-known man in Corry, in lieu of them. Taking possession of our lodgings at once, we formed ourselves into a committee of supply, which resulted in a prompt expenditure of a sum of six shillings and threepence, the particulars of which, for the benefit of my readers, and to show how primitive we had all at once become, I beg to subjoin—namely, bread, 7d. ; mutton, 2s. 4d. ; butter, 6½d. ; tea, 6d. ; sugar, 3d. ; milk, ½d. ; herring, 2d. This sum, with eighteenpence added for whisky, threepence for potatoes, and one penny for a candle, represented the total commissariat expenses of two persons in Corry for five wholesome but homely meals. Our bed cost us one shilling each per night, and our attendance and washing were charged at the rate of a shilling a day, so long as we used the Hotel Macalister, but even this did not very much swell the grand total of the bill, which, at such rates, was by no means heavy at the end of our holiday ramble over Arran, especially when it is considered that the Arran season does not very greatly exceed one hundred days. Our quarters were certainly primitive enough—namely, half of a thatched cottage, or rather hut we may call it, consisting of one apartment containing two beds, four chairs, a small table, and a little cupboard. The beds were curtained by a series of blue striped cotton fragments of three different patterns of an old Scotch kind, and the walls were papered with five different kinds of paper ; but the low roof was the greatest treat of all—it was covered with old numbers of the *Witness* newspaper, at the time when it was edited by Hugh Miller, and these had, no doubt, been left in the cottage by previous travellers. The floor was covered with fragments of canvas laid down as a carpet. Many tourists would perhaps turn up their noses at this humble cottage, but to my friend and myself it was a delightful change.

I have not space in which to particularise all the beauties of Arran, but I must say a word or two about Glen Sannox. Near the golden beach of Sannox Bay is situated the solitary churchyard of Corry, with its long grass waving rank over the graves, and its borders of fuchsias laden with brilliant blossoms. There was, we observed, on peeping over the wall, a new-made grave,

that of an orphan girl who had been drowned while bathing. Passing the churchyard—there was once a church at the place, but all trace of it, save one stone built into the wall of the churchyard, has long passed away—we came upon a brawling stream, which led us up to the ruins of what had been a Barytes-mill. The stones lay around in great masses, as if they had been suddenly undermined by the passing stream, and had fallen cemented as they stood. In a year or two they will be grown over with weeds, and in a century hence some persons may ingeniously speculate on the ruins, and give a learned disquisition as to the building that once stood there, and its uses. My friend and I wondered what it had been, but an old man told us all about it; and strange to say, in the course of conversation, we found this old resident reciting scraps of Ossian's poems. He told us, too, that the bard had died in the very parish in which we were standing. He believed Ossian to have been a priest and teacher of the people, and this was an idea that was quite new to us. We had heard before, or rather read, that the poet was by some esteemed a great warrior, and by others a necromancer—perhaps to esteem him a teacher is right enough; his poems, at any rate, were at one time as familiar in the mouths of the West Highlanders as household words.

The scenery of Arran would certainly inspire a poet. As we penetrated into Glen Sannox it became most interesting, whether we noted the brawling and bubbling brook, or the rich carpet of heath and wild flowers upon which we trod. The luxuriance of its wild flowers is remarkable, and of its rabbits equally so. As we proceed up the glen, the lofty hills with their granitic scars frown down upon us, and one with a coroneted brow looks kingly among the others, as the mists float upon their shoulders, like a waving mantle, and with their bold and rugged precipices they seem as if they had just been suddenly shot out from the bosom of the earth. Glen Sannox is sublime indeed; its magnitude is remarkable, and it is so hemmed in with hills as to look at once, even without any details, or the aid of history, a fitting hiding-place for the gallant Bruce and his devoted followers. About three miles north from this glen we can view—and, we venture to say, not without astonishment—the falling fragments of the broken mountain; a stream of large stones that lie crowded on the declivity of the hill, till they in one long trail reach the ocean. But to enumerate a tithe even of the scenic and antiquarian beauties of the island would



require—nay, it has obtained, and more than once—a volume. I could dwell upon the blue rock near Corry, and picture the overhanging cliffs of the neighbourhood mantled o'er with ivy. The visitor might enter some of the caves which have been scooped out by the sea, or wander among the rock pools of the indented shore, rich with treasures wherewith to feed the greedy eye of the naturalist, and view the ladies, with kilted coats, doing their daily lessons from Glaucus, collecting pretty shells, bottling anemones, or gathering sea-weeds wherewith to ornament their botanic albums. At last, after a long day's work of wandering and climbing, we long for a quiet seat and a refreshing cup of tea, and by and by, when the night shuts us out from active labour, we hie us to our box bed, in order to stretch our wearied limbs in Miss Macalister's well-lavendered sheets; and, as we are just attempting to coax the balmy goddess to close our eyes with her soft fingers, we hear the landlady in her garret reading her nightly chapter from a Gaelic Bible, with that droning sound incidental to the West Highland voice.

I have more than once after nightfall passed a quiet half-hour at our cottage door inhaling the saline breath of the mighty sea. The look-out at midnight is beautiful: the Cumbrae light looks like a monitor telling us that even at that dread hour we are watched over. On the opposite coast of Ayr a huge iron-work throws a lurid glare upon the bosom of the sea, and almost at my feet the restless waves play a mournful dirge on the boulder-crowded beach. I could see along the water to Holy Island, and almost feel the silence which at that moment would render the cave of old Saint Molio a wondrous place for holding a feast of the imagination, the viands brought forward from a far-back time, and the island being again peopled with the quaint races that had passed a brief span of life upon its shores—who had been warmed by the same sun as had that day shone upon me, and whose nights had been illumined by the moon now shimmering its soft radiance upon the liquid bosom of the glittering waters.

## CHAPTER VI.

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### NATURAL HISTORY OF THE SALMON.

The Salmon our best-known Fish—Controversies and Anomalies—Food of Salmon—The Parr Controversy—Experiments by Shaw, Young, and Hogg—Grilse : its Rate of Growth—Do Salmon make Two Voyages to the Sea in each Year?—The Best Way of Marking Young Salmon.

So many books have been written about this beautiful and valuable animal that I do not require to occupy a very large portion of my work with either its natural or economic history ; for of the two hundred and fifty kinds of fish which inhabit the rivers and seas of Britain, the salmon (*Salmo salar*) is the one about which we know more than any other, and chiefly for these reasons :—It is of greater value as property than any other fish ; its large size better admits of observation than smaller members of the fish tribe ; and, in consequence of its migratory instinct, we have access to it at those seasons of its life when to observe its habits is the certain road to information. And yet, with all these advantages, or rather in consequence of them, there has been a vast amount of controversy, oral and written, as to the birth, breeding, and growth of the salmon. There have been controversies as to the impregnation of its eggs, as to the growth of the fish from the parr to the smolt stage ; also as to the kind of food it eats, how long it remains in the salt water, and whether it makes one or two voyages to the sea per annum. There has likewise been a grilse controversy, as well as a rate-of-growth quarrel. These scientific and literary combats have been fought at intervals, and, to speak generally, have exhibited the temper and the learning of the combatants in about equal proportions. The dates of these controversies are not so easily fixed as might

be desired, seeing that they are either scattered at intervals throughout the Transactions of learned societies, buried in heavy encyclopædias, or altogether lost in the columns of newspapers. It is scarcely an exaggeration to say that during the past quarter of a century there has been a committee of inquiry either in the House of Lords and Commons, a royal commission, a blue book, or an Act of Parliament, every year on behalf of the salmon, besides several publications by private individuals.

Although no person now believes the assertion of the Billingsgate naturalist, that salmon eggs come to maturity in a period of forty-eight hours, or that other authority who told the world that as soon as the fish burst from the ovum—a smolt six inches long coming out of a pea!—it was conducted to the sea by its parents, there is much of the romantic in the history of this monarch of the brook, and about the manner in which the varied disputed points have been solved, if indeed some of these points be yet completely settled.

I shall not again enter into the impregnation theory, having said as much as was necessary about that portion of my subject in a previous division of this work, but proceed at once to give a summary of the parr controversy, and a few statements about the grilse and the full-grown fish as well.

According to the state of knowledge forty years ago—and I need not go farther back at present—the smolt was said to be the first stage of salmon-life, and the abounding pair was thought to be a distinct fish. Now we know better, and are able to regulate our salmon-fisheries accordingly. The spawn deposited by the parent fish in October, November, and December, lies in the river till about April or May,

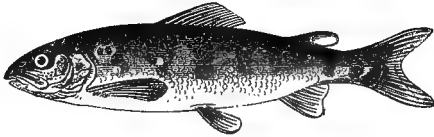


when it quickens into life. I have already described the changes apparent in the salmon-egg from the time of its fructification till the birth of the fish. The infant fry are of course very helpless, and are seldom seen during the first week or two of their existence, when



they carry about with them as a provision for food a portion of the egg from whence they emanated. At that time the fish is about half-an-inch in size, and presents such a very singular appearance that no person seeing it would ever believe that it would grow into a fine grilse or salmon. About fifty days is required for the animal to assume the shape of a perfect fish ;

before that time it might be taken for anything else than a young salmon. Our engravings, which are exactly half the



size of life, show the progress of the salmon during the first two years of its existence, at the end of which time it will, most likely, have changed into a smolt. After eating up its umbilical bag, which it takes a period of from twenty to forty days to accomplish, the young salmon may be seen about its birthplace, timid and weak, hiding among the stones, and always apparently of the same colour as the surroundings of its sheltering place. The transverse bars of the parr very early become apparent, and the fish begins to grow with considerable rapidity, especially if it is to be a twelve-months' smolt, and this is very speedily seen at such a good point of observation as the Stormontfield ponds. The smallest of the specimens given in the preceding page represents a parr at the age of two months; the next in size shows the same fish two months older; and the remaining fish is six months old. The young fish continue to grow for a little longer than two years before the whole number make the change from parr to smolt and seek the salt water. Half of the quantity of any one hatching, however, begin to change at a little over twelve months from the date of their coming to life; and thus there is the extraordinary anomaly, as I shall by and by show, of fish of the same hatching being at one and the same time parr of half-an-ounce in weight and grilse weighing four pounds. The smolts of the first year return from the sea whilst their brothers and sisters are timidly disporting in the breeding shallows of the upper streams, having no desire for change, and totally unable to endure the salt water, which would at once kill them. The sea-feeding must be favourable, and the condition of the fish well suited to the salt water, to ensure such rapid growth—a rapidity which every visit of the fish to the ocean serves but to confirm. Various fish, while in the grilse stage, have been marked to prove this; and at every migration they returned to their

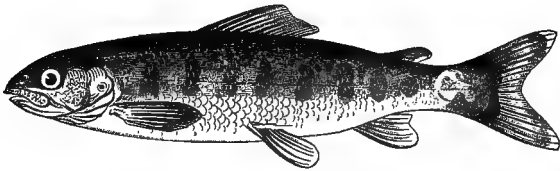
breeding stream with added weight and improved health. What the salmon feeds upon while in the salt water is not well known, as the digestion of that fish is so rapid as to prevent the discovery of food in their stomachs when they are captured and opened. Guesses have been made, and it is likely that these approximate to the truth ; but the old story of the rapid voyage of the salmon to the North Pole and back again turns out, like the theory upon which was built up the herring-migration romance, to be a mere myth.

None of our naturalists have yet attempted to elucidate that mystery of salmon life which converts one-half of the fish into sea-going smolts, while as yet the other moiety remain as parr. It has been investigated so far at the breeding-ponds at Stormontfield, but without resolving the question. There is another point of doubt as to salmon life which I shall also have a word to say about—namely, whether or not that fish makes two visits annually to the sea ; likewise whether it be probable that a smolt remains in the salt water for nearly a year before it becomes a grilse. A salmon only stays, as it is popularly supposed, a very short time in the salt water, and as it is one of the quickest swimming fishes we have, it is able to reach a distant river in a very short space of time, therefore it is most desirable that we should know what it does with itself when it is not migrating from one water to the other ; because, according to the opinion of some naturalists, it would speedily become so deteriorated in the river as to be unequal to the slightest exertion.

The mere facts in the biography of the salmon are not very numerous ; it is the fiction and mystery with which the life of this particular fish have been invested by those ignorant of its history that have made it a greater object of interest than it would otherwise have become. This will be obvious as I briefly trace the amount of controversy and state the arguments which have been expended on the three divisions of its life.

**THE PARR CONTROVERSY.**—None of the controversies concerning the growth of the salmon have been so hotly carried on or have proved so fertile in argument as the parr dispute. At certain seasons of the year, most notably in the months of spring and early summer, our salmon streams and their tributaries become crowded, as if by magic, with a pretty little fish, known in Scotland as the parr, and in England as the brandling, the

peel, the samlet, etc. The parr was at one time so wonderfully plentiful, that farmers and cottars who resided near a salmon river used not unfrequently, after filling the family frying-pan, to feed their pigs with the dainty little fish! Countless thousands were annually killed by juvenile anglers, and even so lately as thirty years ago it never occurred either to country gentlemen or their cottars that these parr were young salmon. Indeed, the young of the salmon, as then recognised, was only known as a smolt or smout. Parr were thought, as I have already said, to be distinct fish of the minor or dwarf kind. Some large-headed anglers, however, had their doubts about the little parr, and naturalists found it difficult to procure specimens



PARR ONE YEAR OLD.

Half the natural size.

of the fish with ova or milt in them. Dr. Knox, the anatomist, asserted that the parr was a hybrid belonging to no particular species of fish, but a mixture of many; and it is curious enough that although this fish was declared over and over again to be a separate species, no one ever found a female parr containing roe. The universal exclamation of naturalists for many a long year was always: It is a quite distinct species, and not the young of any larger fish. The above drawing represents a parr, the engraving being exactly half the size of life.

This "distinct-species" dogma might have been still prevalent, had not the question been taken in hand and solved by practical men. Before mentioning the experiments of Shaw and Young, it will be curious to note the varieties of opinion which were evoked during the parr controversy, which has existed in one shape or another for something like two hundred years. As a proof of the difficulty of arriving at a correct conclusion amidst the conflict of evidence, I may cite the opinion of Yarrell, who held the parr to be a distinct fish. "That the parr," he says, "is not the young of the salmon, or, indeed, of any other of the

large species of Salmonidæ, as still considered by some, is sufficiently obvious, from the circumstance that parr by hundreds may be taken in the rivers all the summer, long after the fry of the year of the larger migratory species have gone down to the sea." Mr. Yarrell also says, "The smolt or young salmon is by the fishermen of some rivers called 'a laspring ;'" and explains, "The laspring of some rivers is the young of the true salmon ; but in others, as I know from having had specimens sent me, the laspring is really *only a parr*." Mr. Yarrell further states the prevalence of an opinion "that parrs were hybrids, and all of them males." Many gentlemen who would not admit that parr were salmon in their first stage have lived to change their opinion.

The first person who "took a thought about the matter"—*i.e.*, as to whether the parr was or was not the young of the salmon—and arrived at a solid conclusion, was James Hogg, the Ettrick Shepherd, who, in his usual impulsive way, proceeded to verify his opinions. He had, while herding sheep, many opportunities of watching the fishing-streams, and, like most of his class, he wielded his fishing-rod with considerable dexterity. While angling in the tributaries of some of the Border salmon-streams he had often caught the parr as it was changing into the smolt, and had, after close observation, come to the conclusion that the little parr was none other than the infant salmon. Mr. Hogg did not keep his discovery a secret, and the more his facts were controverted by the naturalists of the day the louder became his proclamations. He had suspected all his life that parr were salmon in their first stage. He would catch a parr with a few straggling scales upon it ; he would look at this fish and think it queer ; instantly he would catch another a little better covered with silver scales, but all loose, and not adhering to the body. Again he would catch a smolt, manifestly a smolt, all covered with the white silver scales, yet still rather loose upon its skin, which would come off in his hand. Removing these scales he found the parr, with the blue finger-marks below them, and that the fish were young salmon then became as manifest to the Shepherd as that a lamb, if suffered to live, would become a sheep. Wondering at this, he marked a great number of the lesser fish, and offered rewards (characteristically enough of whisky) to the peasantry to bring him such as had evidently undergone the change predicted by him. Whenever this conclusion was settled in his mind, the

Shepherd at once proclaimed his new-gained knowledge. "What will the fishermen of Scotland think," said he, "when I assure them, on the faith of long experience and observation, and on the word of one who can have no interest in instilling an untruth into their minds, that every insignificant parr with which the Cockney fisher fills his basket is a salmon lost?" These crude attempts of the impulsive shepherd of Ettrick—and he was hotly opposed by the late Mr. Buist of Stormontfield—were not without their fruits; indeed they were so successful as quite to convince him that parr were young salmon in their first stage.

As I have had occasion to mention the opinions of James Hogg on the salmon question, I may be allowed to state here that the following amusing bit of dialogue on the habits of the salmon once took place between the Ettrick Shepherd and a friend:—

*Shepherd*—"I maintain that ilka saumon comes aye back again frae the sea till spawn in its ain water."

*Friend*—"Toots, toots, Jamie! hoo can it manage till do that? hoo, in the name o' wonder, can a fish, travelling up a turbid water frae the sea, know when it reaches the entrance to its birthplace, or that it has arrived at the tributary that was its cradle?"

*Shepherd*—"Man, the great wonder to me is no hoo the fish get back, but hoo they find their way till the sea first ava, seein' that they've never been there afore!"

The parr question, however, was determined in a rather more formal mode than that adopted by the author of "Bonny Kilmenny." The late Mr. Shaw, a forester in the employment of the Duke of Buccleuch, took up the case of the parr in 1833, and succeeded in solving the problem. In order that he might watch the progressive growth of the parr, Mr. Shaw began by capturing seven of these little fishes on the 11th of July 1833; these he placed in a pond supplied by a stream of excellent water, where they grew and flourished apace till early in April 1834, between which date and the 17th of the following May they became smolts; and all who saw them on that day when they were caught by Mr. Shaw were thoroughly convinced that they were true salmon smolts. In March 1835 Mr. Shaw repeated his experiments with twelve parrs of a larger size, taken also from the river. On being transferred to the pond, these so speedily acquired the scales of the smolt that Mr. Shaw assumed a period of two years as being the time at which the



change took place from the parr to the smolt. The late Mr. Young of Invershin, a well-known authority on salmon life, was experimenting at the same time as Mr. Shaw, and for the same purpose—namely, to determine if parr were young salmon, and, if so, at what period they became smolts and proceeded to the sea. Mr. Shaw said two years, and Mr. Young, who was then manager of the Duke of Sutherland's fisheries, said the change took place in twelve months; others, again, who took an interest in the controversy, said that three years elapsed before the change was made. The various parties interested held each their own opinion, and it may even be said that the disputation still goes on; for although a numerous array of facts bearing on the migration have been gathered, we are still in ignorance of any regulating principle on which the migratory change is based, or to account for the impulse which impels a brood of fish to proceed to sea divided into two moieties. Mr. Shaw watched his young fry with unceasing care, and described their growth with great minuteness, for a period extending over two years, when his parrs became smolts. Mr. Young, in a letter from Invershin, dated January 1853, says, pointedly enough—"The fry remain in the river one whole year, from the time they are hatched to the time they assume their silvery coat and take their first departure for the sea. All the experiments we have made on the ova and fry of the salmon have exactly corresponded to the same effects, and none of them have taken longer in arriving at the smolt than the first year."

The late Mr. Buist, in one of his letters on the progress of artificial breeding at the Stormontfield ponds, says: "There is at present a mystery as regards the progress of the young salmon. There can be no doubt that all in our ponds are really and truly the offspring of salmon; no other fish, not even the seed of them, could by any possibility get into the ponds. Now we see that about one half have gone off as smolts, returning in their season as grilises; the other half remain as parrs, and the milt in the males is as much developed, in proportion to the size of the fish, as their brethren of the same age seven to ten pounds weight, whilst these same parrs in the ponds do not exceed one ounce in weight. This is an anomaly in nature which I fear cannot be cleared up at present. I hope, however, by proper attention, some light may be thrown upon it from our experiments next spring. The female parrs in the pond have

their ova so undeveloped that the granulations can scarcely be discovered by a lens of some power. It is strange that both Young's and Shaw's theories are likely to prove correct, though seemingly so contradictory, and the much-disputed point settled, that parrs (such as ours at least) are truly the young of the salmon."

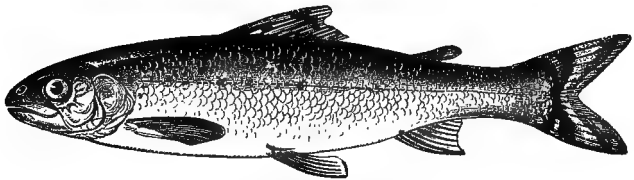
It is quite certain that parr are young salmon, and that a parr becomes a smolt and goes to the sea, although there are still to be found, no doubt, a few wrong-headed people who refuse to be convinced on the point, but pridefully maintain all the old salmon theories and prejudices. With them the parr is still a distinct fish, the smolt is the true young of *Salmo salar* in its first stage, and a grilse is just a grilse and nothing more. However, these old-world people will in time pass away (there is no hope of converting them), and then the modern views of salmon biography, founded as they are on laborious personal investigation, will ultimately prevail.

THE SMOLT AND GRILSE.—But the great parr mystery is still unsolved—that is to say, no one knows on what *principle* the transformation is accomplished; why it is that only half of a brood ripen into smolts at the end of a year, the other moiety taking double that period to arrive at the same stage of progress. Some scientific visitors to the Stormontfield ponds say that this anomaly is natural enough, and that similar ratios of growth may be observed among all animals; but it is curious that just exactly the half of a brood—and the eggs, be it remembered, all from adult salmon, and therefore similar in ripeness and other conditions—should change into smolts at the end of a year, leaving a moiety in the ponds as parr for another twelvemonth.

The most remarkable phase in the life of the salmon is its extraordinary instinct for change. After the parr has become a smolt, it is found that the desire to visit the sea is so intense, especially in pond-bred fish, as to cause them to leap from their place of confinement, in the hope of attaining at once their salt-water goal; and of course the instinct of river-bred fish is equally strong on this point—they all rush to the sea at their proper season. There are various opinions as to the cause of this migratory instinct in the salmon. Some people say it finds in the sea those rich feeding-grounds which enable it to add so rapidly to its weight. It is quite certain that the fish attains its primest condition while it is in the salt water;

those caught in the estuaries by means of stake or bag nets being richer in quality and finer in flavour than the river fish : the moment the salmon enters the fresh water it begins to decrease in weight and fall from its high condition. It is a curious fact, and a wise provision of nature, that the eel, which is also a migratory fish, descends to spawn in the sea as the salmon is ascending to the river-head for the same purpose ; were the fact different, and both fish to spawn in the river, the roe of the salmon would be completely eaten up. In due time then, we find the silver-coated host leaving the rippling cradle of its birth, and adventuring on the more powerful stream, by which it is borne to the sea-fed estuary, or the briny ocean itself. And this picturesque tour is repeated year after year, being apparently the grand essential of salmon life.

It is pleasant, rod in hand, on a breezy spring day, while trying to coax "the monarch of the brook" from his sheltering pool, to watch this annual migration, and to note the passage of the bright-mailed army adown the majestic river, that hurries on by busy corn-mill, and sweeps with a murmuring sound past hoar and ruined towers, washing the pleasant lawns of country magnates or laving the cowslips on the



SMOLT TWO YEARS OLD.

Half the natural size.

village meadow, and as it rolls ceaselessly ocean-ward, giving a more picturesque aspect to the quaint agricultural villages and farm homesteads which it passes in its course. During the whole length of its pilgrimage the army of smolts pays a tribute to its enemies in gradual decimation : it is attacked at every point of vantage ; at one place the smolts are taken prisoners by the hundred in some well-contrived net, at another picked off singly by some juvenile angler. The smolt is greedily devoured by the trout, the pike, and various other enemies, which lie constantly in waiting for it, sure of a rich

feast at this annually-recurring migration. But the giant and fierce battle which this infantile tribe has to fight is at the point where the salt water begins to mingle with the stream, where are assembled hosts of greedy monsters of the deep of all shapes and sizes, from the porpoise and seal down to the young coal-fish, who dart with inconceivable rapidity upon the defenceless shoal, and play havoc with the numbers.

Many naturalists dispute most lustily the assertion that the smolt returns to the parental waters as a grilse the same year that it visits the sea; and some writers have maintained that the young fish makes a grand tour to the North Pole before it makes up its mind to "hark back." It has been pretty well proved, however, that the grilse may have been the young smolt of the same year. A most remarkable fact in the history of grilse is, that we kill them in thousands before they have an opportunity of perpetuating their kind; indeed on some rivers the annual slaughter of grilse is so enormous as palpably to affect the "takes" of the big fish. It has been asserted, likewise, that the grilse is a distinct fish, and not the young of the salmon in its early stage. There has been a controversy as to the rate at which the salmon increases in weight; and there have been numerous disputes about what its instinct had taught it to "eat, drink, and avoid."

It has been authoritatively settled, however, that grilse become salmon; and, notwithstanding a recent opening up of this old sore, I hold the experiments conducted by his Grace the Duke of Athole and the late Mr. Young of Invershin to be quite conclusive. The latter gentleman, in his little work on the salmon, after alluding to various points in the growth of the fish, says—"My next attempt was to ascertain the rate of their growth during their short stay in salt water, and for this purpose we marked spawned grilses, as near as we could get to four pounds weight; these we had no trouble in getting with a net in the pools below the spawning-beds, where they had congregated together to rest, after the fatigues of depositing their seed. All the fish above four pounds weight, as well as any under that size, were returned to the river unmarked, and the others marked by inserting copper wire rings into certain parts of their fins: this was done in a manner so as not to interrupt the fish in their swimming operations, nor be troublesome to them in any way. After their journey to sea and back again, we found that the four-pound grilses had grown

into beautiful salmon, varying from nine to fourteen pounds weight. I repeated this experiment for several years, and on the whole found the results the same, and, as in the former marking, found the majority returning in about eight weeks; and we have never among our markings found a marked grilse go to sea and return a grilse, for they have invariably returned salmon."

The late Duke of Athole took considerable interest in the grilse question, and kept a complete record of all the fish that he had caused to be marked; and in his Journal there is a striking instance of rapidity of growth. A fish marked by his Grace was caught at a place forty miles distant from the sea; it travelled to the salt water, fed, and returned in the short space of thirty-seven days. The following is his entry regarding this particular fish:—"On referring to my Journal, I find that I caught this fish as a kelt this year, on the 31st of March, with the rod, about two miles above Dunkeld Bridge, at which time it weighed exactly ten pounds; so that, in the short space of five weeks and two days, it had gained the almost incredible increase of eleven pounds and a quarter; for, when weighed here on its arrival, it was twenty-one pounds and a quarter." There could be no doubt, Mr. Young thinks, of the accuracy of this statement, for his Grace was most correct in his observations, having tickets made for the purpose, and numbered from one upwards, and the number and date appertaining to each fish was carefully registered for reference.

As the fish grew so rapidly during their visit to the salt water, people began to wonder what they fed on, and where they went. A hypothesis was started of their visiting the North Pole; but it was certain, from the short duration of their visit to the salt water that they could proceed to no great distance from the mouth of the river which admitted them to the sea. Hundreds of fish were dissected in order to ascertain what they fed upon; but only on very rare occasions could any traces of food be found in their stomachs. What, then, do salmon live upon? was asked. It is quite clear that salmon obtain in the sea some kind of food for which they have a peculiar liking, and upon which they rapidly grow fat; and it is very well known that after they return to the fresh water they begin to lose flesh and fall off in condition. The rapid growth of the fish seems to imply that its digestion must be rapid, and may perhaps account for food never being in its stomach when found;

although I am bound to mention that one gentleman who writes on this subject accounts for the emptiness of the stomach by asserting that salmon vomit at the moment of being taken. The codfish again is frequently found with its stomach crowded; in fact, I have seen the stomach of a large cod which formed quite a small museum, having a large variety of articles "on board," as the fisherman said who caught it.

It is supposed by some writers that salmon make two voyages in each year to the sea, and this is quite possible, as we may judge from data already given on this point; but sometimes the salmon, although it can swim with great rapidity, takes many weeks to accomplish its journey, because of the state of the river. If there be not sufficient water to flood the course, the fish must remain in various pools till the state of the water admits of their proceeding on their journey either to or from the sea. The salmon, like all other fish, is faithful to its old haunts; and it is known, in cases where more than one salmon-stream falls into the same firth, that the fish of one stream will not enter another, and where the stream has various tributaries suitable for breeding purposes, the fish breeding in a particular tributary invariably return to it.

But, in reference to the idea of a double visit to the salt water, may we not ask—particularly as we have the dates of marked fish for our guidance—what a salmon that is known to be only five weeks away on its sea visit does with itself the rest of the year? A salmon, for instance, spawning about "the den of Airlie," on the Isla, some way beyond Perth, has not to make a very long journey before it reaches the salt water, and travelling at a rapid rate would soon accomplish it; but supposing the fish took thirty days for its passage there and back, and allowing a period of four weeks for spawning and rest, there are still many months of its annual life unaccounted for. It cannot remain in the river forty-seven weeks, because it would become so low in condition from the want of a proper supply of nourishing food that it would die; and it is this fact that has led to the supposition of a double journey to the sea. The Rev. Dugald Williamson, who wrote a pamphlet on this subject, entertains no doubt about the double journey. "Salmon migrate twice in the course of the year, and the instinct which drives them from the sea in summer impels them to the sea in spring. Let the vernal direction of the propensity be opposed, let a salmon be seized as it descends and confined in a fresh-water pond or lake,

and what is its fate? Before preparing to quit the river it had suffered severely in strength, bulk, and general health, and, imprisoned in an atmosphere which had become unwholesome, it soon begins to languish, and in the course of the season expires: the experiment has been tried, and the result is well known. This being an ascertained and unquestionable fact, is it a violent or unfair inference that a similar result obtains in the case of those salmon that are forced back, from whatever cause, to the sea, that the salt-water element is as fatal to the pregnant fish of autumn as the fresh-water element is to the spent fish in spring? . . . If there is any truth in these conjectures, they suggest the most powerful reasons for *resisting* or *removing* obstructions in the estuary of a river." The riddle of this double migration of the salmon is likely still to puzzle us. It is said that the impelling force of the migratory instinct is, that the fish is preyed upon in the salt water by a species of crustaceous insect, which forces it to seek the fresh waters of its native river; again that while the fresh water destroys these sea-lice a parasite infests it in the river, thus necessitating its return to the sea. My own experience leads me to believe that salmon can exist in the fresh water for a considerable time, and suffer but little deterioration in weight, but they never, so far as I could ascertain, grow while in the fresh streams. It is a well-known fact that parr cannot live in salt water. I have both tried the experiment myself and seen it tried by others; the parr invariably die when placed in contact with the sea-water.

Mr. William Brown, in his painstaking account of *The Natural History of the Salmon*, also bears his testimony on this part of the salmon question:—"Until the parr takes on the smolt scales, it shows no inclination to leave the fresh water. It cannot live in salt water. This fact was put to the test at the ponds, by placing some parrs in salt water—the water being brought fresh from the sea at Carnoustie; and immediately on being immersed in it the fish appeared distressed, the fins standing stiff out, the parr-marks becoming a brilliant ultramarine colour, and the belly and sides of a bright orange. The water was often renewed, but they all died, the last that died living nearly five hours. After being an hour in the salt water, they appeared very weak and unable to rise from the bottom of the vessel which contained them, the body of the fish swelling to a considerable extent. This change of colour in the fish could not be attributed to the colour of the vessel which held them, for

on being taken out they still retained the same brilliant colours."

All controversies relating to the growth of salmon may now be held as settled. It has been proved that the parr is the young of the salmon; the various changes which it undergoes during its growth have been ascertained, and the increase of bulk and weight which accrues in a given period is now well understood. But we still require much information as to the "habits" of fish of the salmon kind.

In a recent conversation with Mr. Marshall of Stormontfield, while comparing notes on some of the disputed points of salmon growth, we both came to the conclusion that the following dates, founded on the experiments conducted at Stormontfield, might be taken as marking the chief stages in the life of a salmon. An egg deposited in the breeding-boxes in December 1869 yielded a fish in April 1870; that fish remained as a parr till a little later than the same period of 1871, when, being seized with its migratory instinct, and having upon it the protecting scales of the smolt, it departed from the pond into the river Tay on its way to the sea, having previously had conferred upon it a certain mark by which it could be known if recaptured on its return. It was recaptured as a grilse within less than three months of its departure (July), and weighed about four pounds. Being marked once more, it was again sent away to endure the dangers of the deep; and lo! was once more taken, this time a salmon of the goodly weight of ten pounds! But there comes in here the question if it was the same fish, for it is said that the smolt in some cases remains a whole winter in the sea, and therefore that the fish I have been alluding to was a smolt that had never come back as a grilse. I have a theory that half of the brood of smolts sent to sea do remain over the winter and come back as salmon, while the others come back almost immediately as grilse. It is possible, however, that any particular fish may lose its river for a season, and be in some other water for a time as a grilse, and then finding its birth-stream come once again to its "procreant cradle." The rapidity of salmon-growth, however, I consider to be undoubtedly proved.

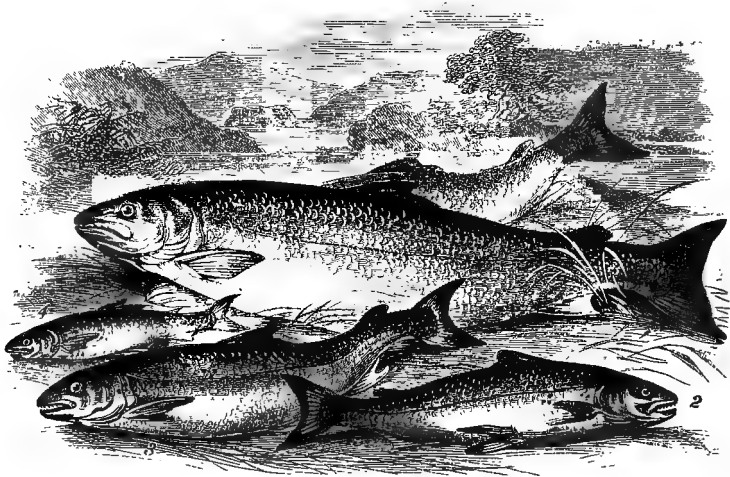
A good deal has been said in various quarters about the best way of marking a young salmon, so that at some future stage of its life it may be easily identified. Cutting off the dead fin is not thought a good plan of marking, because such a mark may be accidentally imitated, and so mislead those interested, or it



may be wilfully imitated by persons wishing to mislead. Of the smolts sent away from the Stormontfield ponds during May 1855, 1300 were marked in a rather common way—viz. by cutting off the second dorsal fin—and twenty-two of these marked fish were taken as grilse during that same summer, the first being caught on the 7th of July, when it weighed three pounds. The late Mr. Buist, who took charge of the experiments, was quite convinced that a much larger number of the marked fish than twenty-two was caught, but many of the fishermen, having an aversion to the system of pond-breeding, took no pains to discover whether or not the grilse they caught had the pond-mark, and so the chance of still further verifying the rate of salmon growth was lost. A reward offered by Mr. Buist of 2s. per pound weight for each grilse that might be brought to his office, led to an imitation of the mark and the perpetration of several petty frauds in order to get the money. The mark was frequently imitated, and one or two fish were brought to Mr. Buist which almost deceived him into the belief of their being some of the real marked fish. As Mr. Buist said—“So cunningly had this deception been gone about, that a casual observer might have been deceived. When the fin was cut off the recent wound was far too palpable; and to hide this the man cut a piece of skin from another fish and fixed it upon the wounded part. I examined this fish, which was lying alongside of an undoubted pond-marked fish, which had the skin and scales grown over the cut, and I am satisfied that it would be impossible to imitate the true mark by any process except by marking the fish while young.”\* Peter Marshall, the intelligent keeper of the ponds, agrees with me in saying that the number of fish taken, each being minus the dead fin, was a sufficient proof that

\* In a very old number of the *Scots Magazine* I find the following:—“I was told by a gentleman who was present at a boat’s fishing on Spey near Gordon Castle in the month of April, that in hauling, the weight of the net brought out a great number of smolts which the fishers were not willing to part with; but that a gentleman, who knew the natural propensity of the salmon to return to their native river, persuaded them to slip them back again into the water, assuring them that in two months they would catch most of them full-grown grilses, which would be of much greater value. He at the same time laid a bet of five guineas with another gentleman present, who was somewhat dubious, that he should not fail in his prediction. The fishers agreed. He accordingly clipt off a part of the tail-fins from a number of them before he dropped them into the river; and within the time limited the fishers actually caught upwards of a hundred grilses thus marked, and soon after many more.”

these fish were really the pond-bred ones returned as grilse. It is impossible that twenty or thirty grilse could have all been accidentally maimed within a few weeks, and each present the same—the very same appearance. Various other plans of marking were tried by the authorities at Stormontfield, some of which were partially successful, and added another link to the chain of evidence, which proves at any rate that many individual fish have grown from the smolt to the grilse state in the course of a very few weeks.



FISHES OF THE SALMON FAMILY.

1. Salmon.

2. Grilse.

3. Sea-trout.

4. Herling.

## CHAPTER VII.

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### THE ECONOMY OF A SALMON RIVER.

The Salmon as an article of Commerce—Fecundity of the Fish—Mr. Stoddart's Calculations—Dangers of Over-fishing—Growth of our Salmon-Fisheries—The Golden Age of the Fisheries—Grilse-Killing—The River Tay : Statistics of its Produce—The English Salmon-Fisheries—Upper and Lower Proprietors.

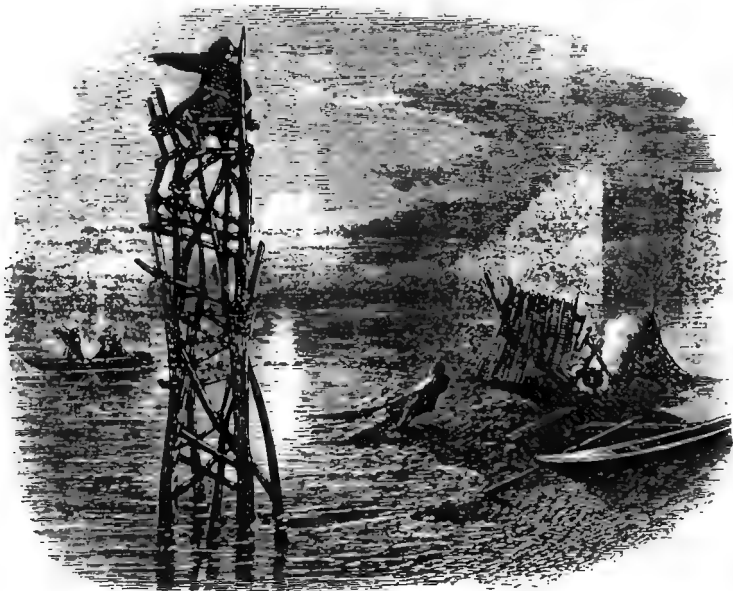
LEAVING the salmon as an object of natural history, I shall now look at it as an article of commerce. The "breeches-pocket" view of the question some years ago became of considerable importance, in consequence of failing supplies ; for the commerce carried on in this particular fish is very large ; and although our salmon-fisheries are not nearly equal in value to the herring and white fisheries, still the individual salmon is our most tangible fish, and brings to its owner a larger sum of money than any other member of the fish family. Indeed, of late years this "monarch of the brook" has become emphatically the rich man's fish ; its price for table purposes, at certain seasons of the year, being only compatible with a large income ; and liberty to ply one's rod on a salmon river is a privilege paid for at a high figure per annum. Such facts at once elevate *Salmo salar* to the highest regions of luxury : certainly, salmon can no longer find a place on the tables of the poor ; for we shall never again hear of its selling at twopence per pound weight, or of farm servants bargaining not to be compelled to eat it oftener than twice a week.

At every stage of its career the salmon is surrounded by enemies. At the very moment of spawning, the female is watched by a horde of devourers, who instinctively flock to the breeding-grounds in order to feast on the ova. The hungry pike, the lethargic perch, the greedy trout, the very salmon itself, are lying in wait, all agape for the palatable roe, and greedily swallow-

ing whatever quantity the current carries down. Then the water-fowl eagerly pounces on the precious deposit the moment it has been forsaken by the fish ; and if it escape being gobbled up by such cormorants, the spawn may be washed away by a flood, or the position of the bed may be altered, and the ova be destroyed perhaps for want of water. As an instance of the loss incidental to salmon-spawning in the natural way, I may just mention that a whitling of about three-quarters of a pound weight has been taken in the Tay with three hundred impregnated salmon ova in its stomach ! If this fish had been allowed to dine and breakfast at this rate during the whole of the spawning season it would have been difficult to estimate the loss our fisheries sustained by his voracity. No sooner do the eggs ripen, and the young fish come to life, than they are exposed, in their defenceless state, to be preyed upon by all the enemies already enumerated ; while as parr they have been taken out of our streams in such quantities as to be available for the purposes of pig-feeding and as manure ! Some economists estimate that only one egg out of every thousand ever becomes a full-grown salmon. Mr. Thomas Tod Stoddart calculated that one hundred and fifty millions of salmon ova are annually deposited in the river Tay ; of which only fifty millions, or one-third, come to life and attain the parr stage, that twenty millions of these parrs in time become smolts, and that their number is ultimately diminished to 100,000 ; of which 70,000 are caught, the other 30,000 being left for breeding purposes. Sir Humphrey Davy calculates that if a salmon produce 17,000 roe, only 800 of these will arrive at maturity. It is well, therefore, that the female fish yields 1000 eggs for each pound of her weight ; for a lesser degree of fecundity, keeping in view the enormous waste of life indicated by these figures, would long since—especially taking into account the destructive modes of fishing that used a few years ago to be in use—have resulted in the utter extinction of this valuable fish.

The increased value of all kinds of fish food during late years has engendered in lessees a degree of avarice that leads to the capture and sale of almost everything that bears the shape of fish. The tenant of a salmon-fishery has but one desire, and that is to earn his rent and get as much profit as he can. To achieve this end he takes all the fish that come to his net, no matter of what size they may be. It is not his interest to let a single one escape, because if he did so his neighbour above or below him on the water would in all probability

capture it. As a general rule, the tenant has no care for future years, and has no personal interest in stocking the upper waters with breeding fish. He is forced by the competition of his rivals to do all he can in the way of slaughter; and were there not a legal pause of so many hours in the course of the week, and a close-time of so many days in the year, it is questionable if a score of fish would make their way past the engines devoted to their capture. A watcher can stand on the bridge



SALMON-WATCHER'S TOWER ON THE RHINE.

of Perth, and at certain seasons signal or count every fish that passes in the water below him, and every fish passing can be caught by those on the look out; and I have seen the same watch kept on the Rhine,\* and on other salmon rivers. The

\* The Rhine is an excellent salmon stream, and yields a large number of fish. The five fishing stations at Rotterdam are very productive, each of them yielding about 40,000 salmon per annum; and it would not be extravagant to estimate the produce of these fisheries as of the value of £25,000 per annum.

accompanying sketch of a salmon-watcher's tower on the great German river may interest those of my readers who have never been on that beautiful water.

This unhealthy competition will always continue till some new system be adopted, such as converting each river into a joint-stock property, when the united interests of the proprietors, both upper and lower, would be considered. The trade in fresh salmon, which culminated in the almost total extermination of the fish in some rivers, dates from the time of Mr. Dempster's discovery of packing in ice. Half-a-century ago, when we had no railways, and when even *fast* coaches were too slow for the transmission of sea-produce, the markets were exceedingly local. Then salmon was so very cheap as to be thought of no value as food, and was only looked upon by the population with an eye of good-humoured toleration—nobody ever expected to hear of it as a luxury at ten shillings a pound weight. No Parisian market existed then for foul fish, and fifty years ago people only poached for amusement. But in the excessive poaching which now goes on during close-time we have a minor cause nearly as productive of evil as the primary and legal one; for of course it is *legal* for the tacksman of the station to kill all the fish he can. Add to these causes the extraordinary quantities of infant fish which are annually killed, coupled with that phase of insanity which leads to the capture of grilse (salmon that have never spawned), and we obtain a rough idea of the progress of destruction as it goes on in our salmon rivers. Fifty or sixty years ago men caught a salmon or shot a pheasant for mere sport, or at most for the supply of an individual want. Now poaching is a trade or business entered into as a means of securing a weekly or annual income; it has its complex machinery—its nets, guns, and other implements. There are men who earn large wages at this illicit work, who take to "the birds" in autumn and "the fish" in winter with the utmost regularity; and there are middlemen and others who encourage them and aid them in disposing of the stolen goods.

In former times, as at present, there were more ways of killing a salmon than by angling for it. Parties used to be made up for the purpose of "burning the water," a practice which prevailed largely on the Tweed, and which afforded good rough sport. The burning took place a little after sunset, when an old boat was commissioned for the purpose, and flaming torches of pinewood were lighted to lure the fish to their destruc-

tion. The leister, a sharp iron fork, was used on these occasions with deadly power ; rude mirth and song were usually the order of the night ; and the practice being illegal was not without a spice of danger, or at least the chance of a ducking. Burning the water, it must, however, be confessed, was more a picturesque way of poaching than a means of adding legitimately to the produce of the fisheries as a branch of commerce. It would have been well for the salmon-fisheries had the arts of poaching never extended beyond the rude practice here alluded to ; but now poaching, as I have endeavoured to show, has become a business, and countless thousands of the fish are still swept off the breeding-beds and sold to dealers. Legislation on the salmon question has of late been greatly extended, some powerful Acts of Parliament having been passed for the better regulation of the various British salmon-fisheries, and it is satisfactory to think that much good has been achieved in consequence.

It is recorded that at one time great hauls of salmon could be taken either in the rivers of Scotland or Ireland, and that in England salmon were also quite plentiful. One miraculous draught is mentioned as having been taken out of the river Thurso, on which occasion the enormous number of two thousand five hundred fish were captured. The discovery that fish packed in ice would carry a long way without decaying, led, as was to be expected, to so large a trade in fresh salmon between Scotland and England, that it at once effected a great rise in the price of the fish. High prices had their usual consequence with the producer. Every device was put in requisition to catch fish for London and the continent ; and if this was the case at the beginning, it will be readily understood how rapidly the fish-trade rose in importance as new modes of transit became common. At one time there were famous salmon in the Thames, and hopes are entertained of fish being successfully cultivated in that river. It is certain that much deleterious matter has been allowed to get into that stream, and also into that famous salmon river the Severn ; and in the rivers of Cornwall I believe the hope of breeding salmon is faint in consequence of the poisonous matters which flow from the mines. Many rivers which were known to contain salmon in abundance in the golden age of the fisheries are now less prolific, from matter by which they are polluted, such as the refuse of gasworks, paper-mills, etc.

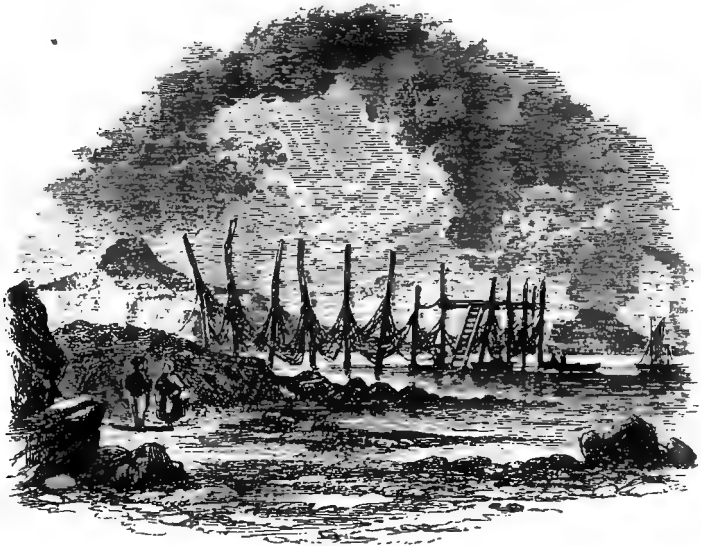
Stake and bag nets in Scotland are known to have been very destructive, as have the putchers, butts, and trumpets of the

English and Welsh rivers. It would be tedious to describe the different fixed engines invented for the capture of salmon ; what I desire to show is that they injured the fisheries. A striking example of the effect of bag-nets occurred with regard to the Tay. The system having been at one time extended to that river, the productiveness of the upper portions of the stream was very speedily affected ; and shortly after their removal, the fisheries became greatly more productive, as will be seen by and by when it becomes necessary to deal with the figures denoting the rental of that river.

At the date of the first publication of this work the size and weight of salmon were diminishing, and, as some fishermen thought, their condition and flavour also ; but now there is a change for the better, and our salmon are growing in size again, so that we shall soon find fish as large as those of the olden time, notably the fish mentioned by Yarrell, which was exhibited by Mr. Groves, and weighed eighty-three pounds ; or that alluded to by Pennant, which was only ten pounds lighter. It is within the memory of anglers that fish of forty-five pounds weight were by no means rare in the Scottish rivers : that salmon of thirty pounds and thirty-five pounds weight were quite common ; and that the general run of fish were in the aggregate many pounds heavier than those of ten or twelve years ago. Mr. Anderson, the lessee of the best salmon-fisheries on the Firth of Forth, a gentleman who is master of his business, is of opinion that the average weight of fish was reduced at the time indicated to about sixteen pounds ; and by the Tweed Tables of the period, the average weight of those killed, though apparently on the increase, in no month exceeded fifteen pounds. I asked, in the first edition of this work, "How is it, then, that we have no giants of the river in these days ? The answer, I think, is simple and convincing. Let us suppose, for example, that the fish grows at the rate of five pounds per annum : it would, therefore, take ten years to achieve a growth of fifty pounds. Now it is needless to say that, in British waters at any rate, we never either see or hear of a fish of that weight. The fact is, we do not give our salmon time to grow to that size. The greater portion of the fish that we kill are two years old, or at the most three—fish running from eight pounds to sixteen pounds in weight. It is clear that, if we go on for a year or two longer at the rate of slaughter we have been indulging of late years, there will



speedily not be even a three-year-old fish to pull out of the water. It is very suggestive of the state of the salmon-fisheries that we have now eaten down to our three-year-olds." Happily recent wise legislation on behalf of the fisheries has checked a great number of the evils which prevailed eight or ten years



STAKE-NETS ON THE RIVER SOLWAY.

ago ; the salmon is again increasing in weight, and the fisheries have once more become comparatively prosperous.

A fertile source of salmon destruction is the killing of grilse ; the grilse being a virgin fish, its slaughter is just analogous to the killing of lambs, without due regulation as to quantity. In this respect, "the conduct of salmon proprietors is as rational as high-farming with the help of tile-drains, liquid manure, and steam-power, would be for the purpose of eating corn in the blade." As many as 100,000 grilses have been taken from one river in a year—a notable example of killing the goose for the golden egg. If we had an Act of Parliament to prevent the capture of grilse, we should never want salmon. The part

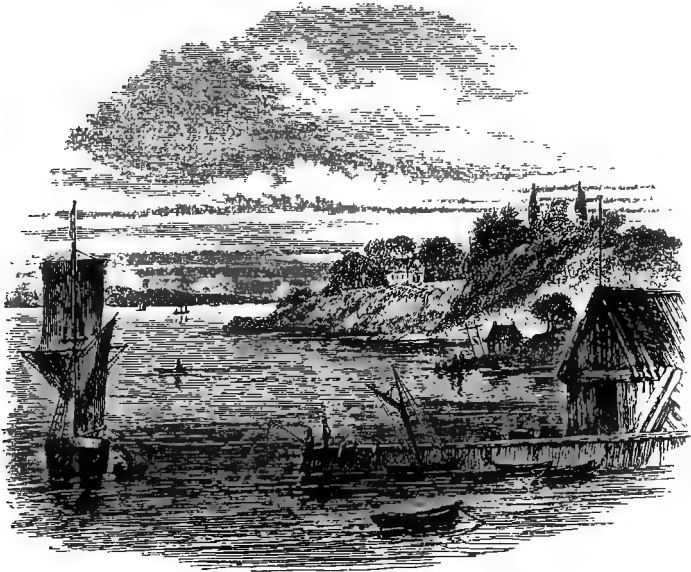
and smolt are protected. Why? Because they are the young of the salmon. Well, are not grilse the young of the salmon also?

Various debates in the House of Commons on the English and Scottish Salmon Fisheries Bills brought out very distinctly the worst phase of the salmon question—viz. the prevalence of stake and bag nets. These machines exercised a baneful influence on the fisheries, and in numerous instances intercepted about one-half of the salmon of particular rivers, before they could reach their own waters. These nets are erected in the tideways, not far from the shore, and as the fish are coasting along towards their own particular spawning-ground, they are intercepted either in the chambers of the bag-net, or in the meshes of the stake-net. It being held that fish taken in the tidal estuaries are in finer condition than those caught in the fresh-water division of the large salmon rivers, they are of course in greater demand, and bring a slightly better price. There is, as we have already noted—but the fact needs iteration—no consideration among tacksmen of river fishings for the preservation of the fish; it seems to be a rule with these gentlemen to kill all they can. It is obvious that, if the upper-water proprietors were to act in the same spirit, and kill all salmon which reached the breeding-grounds, that fine fish, not unaptly called the “venison of the waters,” would very speedily become extinct.

As may be known to most of my readers, the chief British salmon streams, so far at least as productiveness is concerned, are the Tay, the Spey, the Tweed, and the Esk. I have not space in which to describe each of these rivers, but I desire, on behalf of English readers particularly, to say a few words about the Tay and the Spey.

The Tay is equal to a basin of 2250 square miles, and it discharges, after a run of about 150 miles, a greater volume of water than any other Scottish river. “As ascertained by Dr. Anderson, the quantity which is carried forward per second opposite the city of Perth, averages no less than 3640 cubic feet.” The main river and its affluents, and *their* varied tributaries, afford splendid breeding-ground for salmon. As an instance take the Earn. It flows from Loch Earn in the far west of Perthshire, and is, when it leaves the Lake, a considerable river, and over the greater part of its course its current is very rapid. A slight drawback to its capabilities as a fish-breeding river is the fact of its sometimes overflowing its banks;

but its tributaries afford plenty of excellent ground for salmon-breeding. Indeed, in all its tributaries the Tay contains ample accommodation for fish. I have in my mind's eye some excellent salmon-beds near Airlie Castle, on the Isla. The banks of the river are overhung by foliage, and salmon sport industriously in deep pools, resorting to the gravel at the proper season in order to dig beds in which to deposit their eggs, and when in due time these are vivified and grow from the fry to the parr state, I have seen the youthful "natives" catching them in scores.



SALMON-FISHING STATION AT WOODHAVEN ON TAY.

The Tay deserves special honour, for it must rank as the king of Scottish rivers, receiving as it does the tribute of so many streams, and running its course through such a variety of fine scenery. Loch Tay is generally accounted the source of this river, but if it be considered that the loch is chiefly fed by the river Dochart, the source of this latter river is actually the fountain-head of the Tay. The Dochart rises in the extreme

west of Perthshire, and, after striking the base of the "mighty Ben More" and the Dochart hills, falls into Loch Tay at the village of Killin, before reaching which place it assumes the dimensions of a considerable river. There is fine angling to be had in the vicinity of Killin; indeed, the salmon rod-fisheries there are of some value, and trout can be taken in great plenty both in the Dochart and the Lochay. Loch Tay contains abundance of fish, and, as that sheet of water is of considerable size, there is ample room to ply the angle, either for salmon, trout, or charr. A few local inquiries as to angling on the Tay will elicit more valuable information than I can give here. At some places on the lower portion of the water the aid of a boat (a Tay boat) is necessary, as the best pools are otherwise inaccessible to the angler. The cost of a boat and man is about eight shillings, and on most parts of the river two men are required for attendance. Some parts of the Tay are quite free to anglers, especially about Kinfauns; and, if I mistake not, at other places as well. Perth forms a capital centre for the angler: it is a good place in which to obtain information or tackle, and it is easy to get away from the "Fair City" to places and streams of note. And if the angler wants to "harl" the Tay itself, Perth is the very best place to obtain instructions in the art of "harling," which is very attractive. The commercial fishings may be seen in operation at and below Perth: they are carried on by means of the net and coble. A boat sails out with the net, and taking a sweep of the water returns: in its progress enclosing any of the salmon kind that may be in that part of the river. The operation is usually repeated several times each day at every fishing station.

The Tay salmon-fisheries are owned by various noblemen, gentlemen, and corporations; and they yield a gross annual rent of nearly £17,000.

The present season [1873] has been most productive as regards the Tay as well as other rivers, the fish having been plentiful, and a fair average price has been obtained for the catch in the wholesale markets. During the first eight days of February—that is, from the 6th, when the first supplies reached the salesmen, to the 15th—the wholesale price in London averaged 2s. 2d. per lb., but for the next twelve days prices ruled low, lower than is usual in February, ranging from 1s. 4d. to 1s. per lb. During March the highest price reached was 2s. 1d., and the lowest 1s. 6d., but the average obtained during both months

was the same, a fraction over 1s. 9d. per lb. The fish taken in these two months were of a good size, averaging about 20 lb. weight. During April and May the fish did not weigh so heavy, as a run of smaller fish sets in during these months, and, as the season progresses, the quotations, of course, become lower, because in the early part of the year corporation banquets and private dinner parties cause a persistent demand just at the time when, in ordinary places, salmon are least plentiful. This year, however, has been in many respects exceptional, more especially as regards the plentifulness of the supply. In the earlier weeks of the London season fancy prices are obtained by West End fishmongers for their choicest cuts, half a guinea a pound weight having on many occasions been charged. After a little time, when the novelty of a slice of early salmon wears off, and the fish from late rivers, and the famous Scotch grilse, begin to reach the London salesmen, the price falls considerably, if the supply be at all equal to the demand: it would not be safe to name a higher average price than 1s. 3d. per pound weight.

It is necessary to be somewhat particular in ascertaining the sales and averaging the price, because it is the only way in which an estimate of the probable number of salmon taken from any particular river can be arrived at. But, even taking the money value of the fish caught as a criterion, an estimate can only at best be a mere guess, although such an estimate is better than none at all, as no reliable statistics of the total number of fish captured in the Tay can be otherwise obtained. It is not the tacksman's interest to proclaim to his neighbours or his landlord the exact value of his particular bit of water; but, by knowing the rental of a particular fishery and the average price which the fish bring in the wholesale markets, where most of them are sold, a pretty safe conclusion may be arrived at. One other element is necessary to the calculation, and that is the size of the fish. Salmon, it is gratifying to know, may now be taken all over at a heavier weight than they could ten or fifteen years ago. Last year and the year before many very heavy fish were caught in the Tay, some being over 50 lb. weight, and this season also very heavy fish have been obtained. Although a plentiful run of grilse, ranging from 3 lb. to 7 lb. weight, in the course of the summer tends to reduce the average, more especially as about five grilse for each salmon are taken in the course of the year, it may, for the purpose of an estimate,

be accepted as a tolerable approximation to the true average of Tay fish as brought to market if they are set down individually at 12 lb. The question to be decided then is this,—Given the rental paid, the price of the fish and their average weight, how many salmon must be captured in order to cover the sum paid to the landlord, as well as the expenses of fishing and a fair profit to the tacksman? Supposing a particular fishery to be rented at £1000 for the season, it would require the capture of 1334 fish at 15s. each (that is, salmon of 12 lb. at 1s. 3d. per lb.) to pay the rent; and as it is given out that the expenses of a fishery are equal to the rent, other 1334 fish would require to be taken from the water to reimburse the tenant for his outlay. Then the lessee, or, as he is called in Scotland, “the tacksman,” must have his profit, and that cannot be put at less, estimating that he may have some “pickings” out of the expenses, than an additional 400 fish, or say for each £1000 of rental a total of 3000 salmon, grilse, and sea-trout must annually be taken from the water. Therefore, as the rental of the Tay salmon-fisheries may be set down for the present season as being at least £17,000 (last year [1872] the assessed rental was £16,382:6:4), 51,000 fish will require to be captured to yield the rental demanded by the “salmon lairds,” and cover the working expenses and profit of the tacksmen.

During some years the lessees will bag, perhaps, twice the number of fish which has been quoted; this season the chances are that all or most of the lessees on the Tay secured in the early part of the year as many fish as paid their rent and other expenses. But in some seasons it requires hard work to make two ends meet, for the fishery is much of a lottery. On some stations large profits are obtained; on others occasional great losses must be endured. Judging of rents and profits on the plan laid down, and going on authentic information of the number of fish taken, the following statement of the Beaully salmon fisheries may prove of interest:—The average rental of these fishings for the seven years from 1863 to 1869 (both inclusive) was £768:16:9, and the average quantities of fish caught were—1304 salmon, 4261 grilse, and 350 trout. Taking these at the price arrived at—namely, 1s. 3d. per lb., and allowing, as the grilse are numerous, the average weight of the fish to be 8 lb. each, which is at the rate of 10s. for each fish, the number captured would therefore yield at that price the sum of £2957:10s., or a balance over the rent of £2188:13:3. On

the Duke of Sutherland's fisheries, in his own county, and in seven different rivers, the total number of fish captured in 1870 was 19,689 salmon and 29,899 grilse. These figures are quoted to show the value of the salmon as rent-yielding fish.

As has already been stated, the rental of the Tay may be set down this season at £17,000. That sum is made up from over 50 different "lets," and these again are divided into many different fishing-stations or "shots." There are, in all, about 267 of these, including 50 bag and stake net stations on the coast district, which extends from Redhead in Forfarshire to Fifeness in Fifeshire. Above Perth bridge there are 45 net and coble stations; on the Earn, a tributary, there are 15, besides two cruives; and from Perth to Newburgh there are no less than 132 shots; and in the estuary—that is, below the town of Newburgh—there are 23. One man, Mr. Speedie of Perth, is lessee of nearly half of the river, judging by the rent he pays, which amounts to about £8000 per annum. The salmon wealth of the river Tay is certainly found between the city of Perth and the town of Newburgh, but no "laird" can say how long such wealth may endure, as floods on the river frequently alter its bed and change the run of the salmon, so that fisheries which 30 or 40 years ago were of considerable value are to-day of no value at all. Others, again, have risen with magic rapidity to be sources of considerable wealth to their owners. Fishings yielding an annual rental of £250, 12 or 15 years ago, do not now let for as many shillings. Such changes have occurred chiefly in the estuary of the river. The chief "salmon-mine" of the Tay is called the "throat of the river," a stretch of water about three miles in length, which is very fruitful in fish and yields a heavy rental. It is thought that the breeding operations at Stormontfield have slightly augmented the produce, and, of course, the rental of the river, which about the time they began was at its lowest point, the total rents in 1852 amounting to £7973 : 5s., and in 1853 to £8715 : 17 : 6. In the next year they had increased by £500, and by £700 in the following season; and in 1858, when the young fish were beginning to tell on the supply, the rental had attained the grand total of nearly £11,487 : 2 : 5, being an increase of over £3000 per annum.

The economy of a salmon river is as yet but dimly understood. A time must come, however, when the "salmon lairds" will co-operate each with the other, instead of doing as they do

at present—namely, compete each against his fellow. The waste of fishing power involved in the maintenance of the number of stations already quoted as belonging to the river Tay is lamentable. If the river were formed into a joint-stock company, the shares being allotted, say, on the average rentals of the last five years, the salmon could be captured and sent to market at about a fifth of the expense which is now incurred. The observance of a proper close time on all salmon streams is of great importance—indeed, the key-note of their prosperity. Most salmon rivers indicate their condition as truly as a thermometer indicates heat or cold; a change in their economy at once affects the supply of fish, and can at once be detected. A proof of this sensitiveness was afforded by the introduction of bag-nets in the estuary of the Tay. The quantity of salmon taken in the ten years during which the stake-nets existed at Kinfauns fisheries was diminished to 46,663; but after the removal of these nets the quantity increased to 90,101 salmon. The take of grilse diminished and was augmented in similar proportions. The Tay has over and over again afforded a striking example of the effects of mal-economy, and of the good results of wise legislation, conscientiously carried into effect. In the year 1828, at which time the rental of the Tay was above £14,000 a year, an Act of Parliament came into operation which lengthened the fishing season of every salmon river in Scotland, and, as a matter of course, shortened the close season. That Act inflicted great injury on the Tay fisheries. The income derived from the river at that date gradually dwindled down from the sum named to less than half the amount. By a voluntary arrangement, the proprietary, with one or two exceptions, restored in 1852 the *status quo*, and stopped net fishing on the 26th of August instead of the 14th of September. The fisheries soon began to respond by increased supplies. But this golden age did not last. In three years the agreement was broken through, and the reckless, although perfectly legal, system of fishing was again resumed for a year or two. At length a local Act was obtained, which greatly improved the fisheries and augmented the rents, though, in fact, the extra rest which had been afforded to the fish in the three years during which the voluntary system was in force had already done so much good that the bad system which was again resorted to had not prevented the rental from beginning to rise, as has been already shown in connection with the Stormontfield breeding experiments. It is still thought by one or two of the Tay



proprietors that the annual close-time is too long (it extends from August 20 to February 5), and that the net season, in some years, might be advantageously lengthened if a permissive clause were added to the present Act, in order to suit certain contingencies which in some years influence the takes of fish ; but it is perhaps best to leave well alone, especially where the proprietary is numerous, and not likely to be all of one mind on the subject of close time. The Tay is now in a flourishing condition, and so far as can be foreseen at present its salmon-fisheries are likely to go on increasing in value for many years to come, showing that the Acts of Parliament passed during late years have operated beneficially. The Tay is a salmon river *par excellence*, and the breeding power of the stream is now allowed to be better developed, and the fish have chances of obtaining a longer lease of life than was the case long ago ; consequently salmon have become of more value both in a commercial and sporting sense. Indeed it is obviously better that the spawning "redds" of a river should be occupied by fish yielding 30,000 eggs than by others which would only yield half the number. It is not only the number of fish which are annually caught, but the number which escapes the net and reaches the breeding grounds that renders a salmon stream truly valuable. Nothing is more certain than that if no seed be sown no harvest can be gathered, and only one salmon egg out of a thousand, it is said, yields a fish for the dinner table.

As regards the Tay fisheries, the present season [1873] which has just closed as these sheets go through the press, may be said to have ended in a blaze of triumph. It was signalled by the taking of some very large fish—one of 60 and another of 64 lbs. weight. I measured the 60 lb. salmon : in length it was 4 feet 3 inches, and in girth 2 feet 8½ inches ; its circumference at the narrowest part of the tail was 11½ inches, and the breadth of the fan was 13 inches. I did not see the 64 lb. salmon, nor the fish of 58 lb. that had been taken a few days before at one of Mr. Speedie's shots, but I saw at one time about 300 fish that had been all taken from the Tay, among which were a great number of heavy salmon. A few days before my visit, Mr. Speedie's boats brought to his fish-packing house a haul of over 900 fish !

The river Spey is an excellent salmon-producing stream ; in fact, size considered, it is the richest in Scotland, the fishings at Speymouth being worth £12,000 per annum. The Spey

runs about a hundred and twenty miles before it falls into the sea, and some parts of the river are very picturesque.

“ Dipple, Dundurcus, Dandaleith, and Dalvey  
Are the bonniest haughs on the run of the Spey.

The stream is very rapid, having in its course a fall of twelve hundred feet ; it rushes on in one continuous gallop from its mountain well to the sea, giving rise to the local proverb of there being “ no standing water in Spey,” although there are pools thirty feet deep. Still, as a rule, the river is shallow, having generally a depth of about three feet ; and there are places which, when the water is a little low, may be crossed by a man on foot.

I have seen rafts of wood coming down from the hills at the rate of ten miles an hour ; and the Spey is not only the most rapid, but also the widest of our large Scottish rivers. “ The cause of this is easily explained. The river drains thirteen hundred miles of mountains, many of whose bases are more than a thousand feet above the level of the sea. The Dulnain, draining the southern part of the Monagh-Lea Mountains, runs more than forty miles before entering Spey ; and the Avon, with a course as long, brings down the waters of Glenavon, which lies between the most majestic mountains in Britain. Besides these great tributaries, the Spey has the Truim, the Tromie, the Feshie, the Fiddoch, and other affluents, swelling her volume with the rapidly-descending waters of a mountainous country.” The river Spey is an example of a well-managed stream, producing a very handsome revenue. It is well managed, because the Duke of Richmond fishes it himself ; and, of course, it is his interest to have it well protected, and to keep a proper stock of breeding fish. On the Spey, however, there is no confusion of upper and lower proprietors to fight against and take umbrage at each other, the river belonging mostly to one proprietor. Other Scottish rivers also yield, or did at one time yield, large annual sums in the shape of rental ; and on the larger salmon rivers of Scotland the income derived by many of the “ lairds ” from salmon-shots forms a very welcome addition to their land revenues. Mr. Johnstone, the lessee of the Esk fisheries at Montrose, stated at a public meeting held in Edinburgh to protest against the removal of stake-nets that he estimated the Duke of Sutherland’s fisheries at £6000 a year, and quoted his own rents as £4000 per annum, giving him the privilege to

fish on two different rivers, on one of which he had eight miles of water, on the other six. Princely rentals have been drawn from the salmon rivers of Scotland. The Tweed alone at one period gave to its proprietors an annual income of £20,000; but although the price of fish has greatly increased of late years, the rental of that river fell at one time to about a fifth part of that sum, and the take of fish sank from 40,000 to 4000.

Much curiosity has existed as to the results achieved by the Tweed Acts, the first really stringent code enforced on any British river; and although statistics in such matters, unless taken over very extended periods, are not to be too implicitly relied on, and much allowance must be made for the variations caused by weather and unfavourable seasons during so short a period as has elapsed, yet it is well worth while to ascertain what can be learned concerning this experiment. With this view I have consulted the very valuable and interesting series of tables which has been compiled and printed for private circulation by Alexander Robertson, Esq., one of the Tweed Commissioners, and a director of the Berwick Shipping Company. A brief reference to the figures in these tables shows at once whether or not there has been an improvement in the fishing. The total capture of salmon, grilse, and trout, in Tweed for the six years preceding 1857 was 50,209 salmon, 153,515 grilse, and 294,418 trout; making a yearly average of 8368 salmon, 25,586 grilse, and 49,069 trout. In the six years succeeding the Act—viz. 1858 to 1863—the total capture was 60,726 salmon, 124,182 grilse, and 175,538 trout; being an average of 10,121 salmon, 20,697 grilse, and 29,256 trout. These are improving figures, taking into account that the fishing season had been curtailed by a period of four weeks. The total rent of the river in 1857 was about £5000; the rents during the last five years, as stated for assessment of the Tweed tax, have been as follows:—In 1868, £9224; 1869, £9284; 1870, £9598; 1871, £9785; 1872, £9945. The average wholesale prices for the same period have been 1s. 5d. per pound for salmon; 1s. per pound for grilse; and 1s. 2½d. per pound for trout.

The English salmon-fisheries, generally speaking, were allowed to fall into so low a state that it will be impossible to recruit them in a moderate period of time without foreign aid. It is difficult to select an English river that will in all respects compare with the Tay, but the Severn produces the finest salmon of any of the English salmon rivers; and it is a noble stream,

containing many kinds of fish, which afford sport to the angler. If the river flowed in a direct course from its source to the sea, it would be eighty miles in length : as it is, by various windings, it flows for two hundred miles. It has many fine affluents, and in its course passes through some beautiful scenery. It rises in Wales, high up the eastern side of Plinlimmon, at a place in the moors called Maes Hafren, which gave at one time its title to the river, Hafren being its ancient name. After flowing through several counties it falls into the sea at Bristol Channel. Had the fisheries of the Severn been as free from obstacles and as well preserved as those on the river Tay, they would still have been of immense value, as it possesses some very fine breeding-grounds. The Severn could be speedily restored to its primary condition as one of our finest salmon streams ; that is, if the various interests could be consolidated, and artificial breeding be extensively carried on for a few years. The Severn still possesses a tolerable stock of breeding-fish, which might be turned to good account in a way similar to those at Stormontfield on the Tay.

Mr. Tod Stoddart, who is an authority particularly on matters relating to angling, says that a river like the Tay or the Tweed requires 15,000 pairs of breeding-fish to keep it in stock, the average weight of the breeders to be ten pounds each. Proceeding on these data, and taking the period of growth of the fish as previously stated, it may be interesting if we inquire how soon a fine river like the Severn could be made a property. Allowing that there is at present a considerable stock of breeding-fish in that river—say 10,000 pairs—and that for a period of two years these should be allowed a jubilee, the river during that time to be carefully watched ; that plan alone would soon work a favourable change ; but if supplemented by an extensive resort to artificial nurture and protection, in the course of three years the Severn would be, speaking roundly, a mine of fish wealth. A series of ponds capable of breeding 1,000,000 fish might, I think, be constructed for a sum of £2000 ; there ought of course to be two reception ponds, and an adult salmon pond as well, for fish about to spawn. Thus, in a year's time, half a million of well-grown smolts would be thrown into the river from the ponds, a moiety of which would in the course of ten weeks be saleable grilse ! The following year that number would be doubled, and added to the quantity naturally bred would soon stock even a larger river than the Severn. There

can be no doubt of the practicability of such a scheme : what has been achieved in Ireland and at Stormontfield might surely be accomplished in England. An ample return would be obtained for the capital sunk, and in all probability a large profit besides.

A recent report of the Inspectors of the English Salmon Fisheries [1872] contains some interesting particulars of the numbers of fish taken in one or two of the English rivers. Thirty-five salmon rivers were put under question by Mr. Buckland, but replies were received from only eighteen of these. It is difficult to obtain correct statistics from net fishermen, they are so unwilling to reveal the secrets of the prison-house. The Tyne, according to the printed returns, is the best fished water, more than 129,000 fish having been captured by the nets ; the Ribble follows with over 8000 salmon, and the Severn with 6500. In all, 150,936 salmon were entered as taken from the few rivers which have answered. As to the destination of the fish taken from English waters, the returns show that they are chiefly sent to those great seats of population, London, Manchester, Liverpool, Birmingham, and Bristol. Many tons of salmon are likewise sent every year to Paris and some parts of Germany. "It will thus be seen," says Mr. Buckland, "that not only the inhabitants of London, but of all our large and populous cities, have a direct interest in the progress and development of the salmon-fisheries, as they affect the pockets of all classes of society. The flesh of the salmon is in one respect cheaper than butcher's meat, for when a joint of meat is bought, the bone is paid for, whereas in salmon there is little or no bone."

Mr. Buckland makes a contribution to the economy of salmon rivers : he says—"In many rivers, I feel convinced—though it may seem a great heresy—that there are too many breeding fish, for a river may be overstocked just as a sheep-farm may be overstocked." This is an opinion that is held by several practical salmon-fishers, and it indicates a most welcome change of circumstances. Ten years ago nearly all salmon rivers were suffering from the scarcity of breeding fish, and the cry all over the country was, We are exterminating the salmon ! On this point, Mr. Buckland says—"In most cases the stock of fish is so ample that we may now venture to draw a larger dividend from our fish capital than we have heretofore, and, in any case, it is advisable to breed as many tons of salmon for the markets as possible."

The following table is offered as a guide to the salmon productiveness of the different divisions of the three kingdoms: it has been courteously furnished by Messrs. Wm. Forbes Stuart and Co., of 104 Lower Thames Street, London, and shows the quantity of salmon (*i.e.* the number of boxes weighing one hundred and twelve pounds each) sent to London in 1872:—

DELIVERIES OF SALMON AT BILLINGSGATE MARKET DURING 1872.

	No. of Boxes.
Scotch . . . . .	23,028
Irish . . . . .	5,298
English and Welsh . . . . .	2,706
Dutch . . . . .	952
Norwegian . . . . .	352
Swedish . . . . .	964
Total . . . . .	83,300
Total in 1871 . . . . .	85,275
. Decrease . . . . .	1,975

[At the time this work is going through the press it is impossible to obtain the returns for 1873, but that they will be large is certain, and that the fish will be far above the average in weight has already been ascertained; fish above thirty pounds weight having been quite common. As an additional index to the take of 1873, Mr. John Anderson, the lessee of the Firth of Forth fisheries, tells me he took fourteen hundred salmon and grilse in the last eight days of his season, and as he ceased to capture per force of the Act of Parliament, the fish were coming up the water in large quantities. Mr. Anderson predicts that in a year or two fifty and sixty pound salmon will be quite common; and he does not despair of some day showing us a fish that shall weigh a hundred pounds!]

One of the least understood, although one of the most hotly-contested parts of the salmon question, is the relation between upper and lower proprietors. A great salmon river may pass through the estates or mark the property boundaries of a number of gentlemen; and portions of this river are sure to be much more valuable than others. As has been already stated, some of the proprietors on the river Tay derive a large revenue from their fisheries; while others only obtain a little angling, although they very likely furnish the breeding-ground for the thousands of fish which aid in producing the large rentals lower down. This part of the salmon question has been well argued by Mr. Donald Bain, a gentleman who understood the

economy of a salmon river very well. He said, in a letter on the subject—

“Considering that the only chance of having fish in the rivers depends upon the excellence and care of the breeding-grounds at the river-heads, while the river-head proprietors, by disturbing the shingle (which should be protected) at the period of depositing and hatching the roe, could destroy all chance, and yet be legally unchallengeable, these river-head proprietors are hardly recognised as proprietors at all, which therefore should be altered. I propose that a river, from its highest breeding-ground to its mouth, and so far into the sea as private or public interests can extend, should be made a common property and a common care; improved where improvable, at the general expense of the whole proprietors along its banks; fished, not savagely, and as if extermination were a laudable object, but prudently, and with a view to permanent interests; the fish allowed to go unmolested to the breeding-grounds, at least so far as to secure a full brood, and protected against destruction in returning when unfit for food; and the expense and the profit to be divided *pro rata*, according to the mileage along the banks; unless, in the judgment of intelligent and equitable men, a degree of preference should be given in the case of grounds of acknowledged excellence for breeding or feeding. It may be said it would be malicious in the proprietors of breeding-grounds to consider it necessary to repair their gravel-walks with shingle from the river at the very time when depositing or hatching the roe was going on; but could it be prevented?—and would it be more inequitable than anticipating every fish worth catching at the mouth of the river or along their course, and allowing the proprietors of the head-waters no share?”

There must of course be a limit to the productiveness of even the most prolific salmon river; and if this be overpassed and the capital stock be broken upon, it is clear that a decrease will at once begin, and that the production must annually become weaker, till the fish are in course of time completely exterminated. Happily the prospects of our salmon-fishery proprietors never were so bright as they are at present, and as Mr. Jamieson, the intelligent fishmonger of Edinburgh, says, “it is best to let well alone.”

## CHAPTER VIII.

### THE NATURAL HISTORY OF THE HERRING.

Overfishing of the Herring—The Old Theory of Migration—Geographical Distribution of the Herring—Mr. John Cleghorn's Ideas of the Natural History of the Herring—Mr. Mitchell on the National Importance of that Fish—Commission of Inquiry into the Herring-Fishery—Growth of the Herring—The Sprat—Should there be a Close-time?—Caprice of the Herring.

THE common herring is one of our most beautiful and abundant fishes. It is taken throughout the year in vast quantities, thus affording a plentiful supply of cheap and wholesome food to all classes, whilst its capture and cure afford remunerative employment to a large body of industrious people. It is greatly to be regretted, therefore, that recent fluctuations in the quantity caught have given occasion for well-grounded fears of an ultimate exhaustion of some of our largest shoals, or at all events of so great a diminution of their producing power as probably to render one or two of the best fisheries unproductive. This is nothing new, however, in the history of the herring-fishery: various places can be pointed out, which, although now barren of herrings, were formerly frequented by large shoals, that, from overfishing or other causes, have been dispersed.

This supposed overfishing of the herring has resulted chiefly from our ignorance of the natural history of that fish—ignorance which has long prevailed, and which we are only now beginning to overcome. Indeed, much as the subject has been discussed during the last ten years, and great as the light is that has been thrown on the natural and economic history of our fish, considering the elemental difficulty which stands in the way of perfect observation, there are yet persons who insist upon believing all the old theories and romances pertaining to the lives of sea animals. We occasionally hear of the great sea-serpent; the



impression of St. Peter's thumb is still to be seen on the haddock ; "Moby Dick," a Tom Sayers among fighting whales, still ranges through the *squid* fields of the Pacific Ocean ; and I know an old fisherman who once borrowed a comb from a polite mermaid !

Not very long ago, for instance, the old theory of the migration of the herring to and from the Arctic Regions was gravely revived in an unexpected quarter, as if that romance of fish-life was still believed by modern naturalists to be the chief episode in the natural history of *Clupea harengus*. The original migration story—which was invented by Pennant, or rather was constructed by him from the theories of fishermen—old as it is, is worthy of being briefly recapitulated, as affording a good point of view for a consideration of the natural and economic history of the herring as now ascertained : it was to the effect that in the inaccessible seas of the high northern latitudes herrings were found in overwhelming abundance, securing within the icy Arctic Circle a bounteous feeding-ground, and at the same time a quiet and safe retreat from their numerous enemies. At the proper season, inspired by some commanding impulse, vast bodies of this fish gathered themselves together into one great army, and in numbers far exceeding the power of imagination to picture departed for the waters of Europe and America. The particular division of this great *heer*, which was destined annually to repopulate the British seas, and afford a plenteous food-store for the people, was said to arrive at Iceland about March, and to be of such amazing extent as to occupy a surface more than equal to the dimensions of Great Britain and Ireland, but subdivided, by a happy instinct, into battalions five or six miles in length and three or four in breadth, each line or column being led, according to the ideas of fishermen, by herrings (probably the *Alice* and *Twait* *shad*) of more than ordinary size and sagacity. These heaven-directed strangers were next supposed to strike on the Shetland Islands, where they divided of themselves, as we are told ; one division taking along the west side of Britain, whilst the other took the east side, the result being an adequate and well-divided supply of this fine fish in all our larger seas and rivers, as the herrings penetrated into every bay, and filled all our inland lochs from Wick to Yarmouth. Mr. Pennant was not contented with the development of this myth, but evidently felt constrained to give *éclat* to his invention by inditing a few moral remarks just by way of a *tag*. "Were we," he says, "inclined to consider this migration of the herring in a moral light, we might reflect

with veneration and awe on the mighty power which originally impressed on this useful body of His creatures the instinct that directs and points out the course that blesses and enriches these islands, which causes them at certain and invariable times to quit the vast polar depths, and offer themselves to our expectant fleets. This impression was given them that they might remove for the sake of depositing their spawn in warmer seas, that would mature and vivify it more assuredly than those of the frigid zone. It is not from defect of food that they set themselves in motion, for they come to us full and fat, and on their return are almost universally observed to be lean and miserable."

Happily, the naturalists of the present day know a vast deal more of the natural history of the herring than Mr. Pennant ever knew, and on the authority of the most able inquirers it may be taken for granted that the herring is a local and not a migratory fish. It has been repeatedly demonstrated that the herring is a native of our immediate seas, and can be caught all the year round on the coasts of the three kingdoms. The fishing begins at the island of Lewis, in the Hebrides, in the month of May, and goes on as the year advances, till in July it is being prosecuted off the coast of Caithness; while in autumn and winter we find large supplies of herrings at Yarmouth; and there is a winter fishery in the Firth of Forth: moreover, this fish is found in the south long before it ought to be there, if we were to believe in Pennant's theory. It has been deduced, from a consideration of the figures of the annual takes of many years, that the herring exists in distinct races, which arrive at maturity month after month; and it is well known that the herrings taken at Wick in July are quite different from those caught at Dunbar in August or September: indeed, I would go further, and say that even at Wick each month has its changing shoal, and that as one race ripens for capture another disappears, having fulfilled its mission of procreation. It is certain that the herrings of these different seasons vary considerably in size and appearance; and it is very well known that the herrings of different localities are marked by distinctive features. Thus, the well-known Lochfyne herring is essentially different in its flavour from that of the Firth of Forth, and those taken in the Firth of Forth differ again in many particulars from those caught off Yarmouth.

In fact, the herring never ventures far from the spot where it is taken, and its condition, when it is caught, is just an index

of the feeding it has enjoyed in its particular locality. The superiority in flavour of the herring taken in our great land-locked salt-water lochs is undoubted. Whether or not it results from the depth and body of water, from more plentiful marine vegetation, or from the greater variety of land food washed into these inland seas, has not yet been determined; but it is certain that the herrings of our western sea-lochs are infinitely superior to those captured in the more open sea. It is natural that the animals of one feeding locality should differ from those of another: land animals, it is well known, are easily affected by change of food and place; and fish, I have no doubt, are governed by the same laws. But on this part of the herring question I need scarcely waste any argument.

Moreover, it is now known, from the inquiries of the late Mr. Mitchell and other authorities on the geographical distribution of the herring, that that fish has never been noticed as being at all abundant in the Arctic Regions; and the knowledge accumulated from recent investigations has dispelled many of what may be termed the minor illusions once so prevalent about the life of the herring and other fish. People, however, have been very slow to believe that fish were subject to the same natural laws as other animals. In short, seeing that the natural history of all kinds of fish has been largely mixed up with tradition or romance, it is no wonder that many have been slow to discard Pennant's pretty story about the migratory instinct of the herring, and the wonderful power of sustained and rapid travelling by which it reached and returned from our coasts. Even Yarrell wrote in a weak uncertain tone about this fish; indeed his account of it is not entitled to very much consideration, being a mere compilation, or rather a series of extracts, from other writers.

It was not till the year 1854 that anything like an authentic contradiction to Pennant's theory was obtained. Before that time one or two bold people asserted that they had doubts about the migration story, and thought that the herring must be a local animal, from the fact of its being found on the British coasts all the year round; while one daring man said authoritatively, from personal knowledge, that there were no herrings in the Arctic seas. During the year I have mentioned, a paper, which was communicated to the Liverpool Meeting of the British Association by Mr. Cleghorn of Wick, directed an amount of public attention to the herring-fishery, which still continues,

and which, at the time, was thought sure ultimately to result in an authentic inquiry into the natural and economic history of that fish. Such an investigation has since been made by persons qualified to undertake the task, and the result of their inquiries summed up in a most interesting report, which, along with the evidence taken by the Commissioners, I shall have occasion to refer to in another part of the present chapter; the labours of Cleghorn, Mitchell, and others, claiming priority of notice, as the ideas promulgated by these gentlemen, although often hotly opposed and combated, have gone a great way to guide public opinion on the subject, and have evidently helped to influence recent investigators.

In his paper communicated to the British Association at Liverpool, Mr. Cleghorn stated that, living at Wick, the chief seat of the fishery—"the Amsterdam of Scotland" in fact—his attention had been directed to the herring-fishery by the fluctuations in the annual take. Mr. Cleghorn believes the fluctuations in the capture to be caused by "overfishing," as in the case of the salmon, the haddock, and other fish. The points brought forward by Mr. Cleghorn in order to prove his case were the following:—1. That the herring is a native of waters in which it is found, and never migrates. 2. That distinct races of it exist at different places. 3. That twenty-seven years ago the extent of netting employed in the capture of the fish was much less than what is now used, while the quantity of herrings caught was, generally speaking, much greater. 4. There were fishing stations extant some years ago which are now exhausted; a steady increase having taken place in their produce up to a certain point, then violent fluctuations, and *then* final extinction. 5. The races of herrings nearest our large cities have disappeared first; and in districts where the tides are rapid, as among islands and in lochs, where the fishing grounds are circumscribed, the fishings are precarious and brief; while on the other hand extensive seaboard having slack tides, with little accommodation for boats, are surer and of longer continuance as fishing stations. 6. From these premises it follows that the extinction of districts, and the fluctuations in the fisheries generally, are attributable to overfishing. In the portion of this work bearing on the fishery I shall again have occasion to refer to Mr. Cleghorn's investigations on the subject of the netting employed, but it occurred to me to state Mr. Cleghorn's theory at this place, as it has been the key-note to much of the recent discussion on the subject of the

natural history of the herring. Before the reading of Mr. Cleghorn's statistics, the natural history of the herring was not well understood even by naturalists; so difficult is it to make observations in the laboratories of the sea. Only a few persons, till recently, were intimate with the history of this fish, and knew that, instead of being a migratory animal, as had been asserted by Anderson and Pennant, the herring was as local to particular coasts as the salmon to particular rivers.

The late Mr. J. M. Mitchell, in a paper which he read before the British Association at Oxford, settled with much care and very effectually the geographical part of the herring question. His idea also is that the herring is a native of the coast on which it is found, and that immediately after spawning the full-sized herrings make at once for the deep waters of their own neighbourhood, where they feed till the spawning season again induces them to seek the shallow water. Mr. Mitchell gives his reasons, and states that the herrings resorting to the various localities have marked differences in size, shape, or quality; those of each particular coast having a distinct and specific character which cannot be mistaken; and so well determined are those particulars, that practical men, on seeing the herrings, can at once hit upon the locality from whence they come; as, indeed, is the case with salmon, turbot, and many other fishes and crustaceans.

On the southern coast of Greenland the herring is a rare fish; and, according to Crantz, only a small variety is found on the northern shore, nor has it been observed in any number in the proper icy seas—as it would undoubtedly have been had it resorted thither in such innumerable quantities as was imagined by the naturalists of the last century. Another proof that the herring is local to the coasts of Britain lies in the fact of the different varieties brought to our own markets. As expert fishers know the salmon of particular rivers, so do some men know the different localities of our herring from merely glancing at the fish. Experienced fishmongers can tell the different localities of the same kinds of fish as easily as a farmer can tell a Cheviot sheep from a Southdown. Thus they can at once distinguish a Severn salmon from one caught in the Tweed or the Spey, and they can tell at a glance a Lochfyne *matie* from a Firth of Forth one.

Turning now to the report of the Commissioners already referred to, we obtain some interesting information as to the spawning and growth of the herring. Upon these branches of

the subject the public have hitherto been very ill informed. Yarrell's account of this particular fish is a mere compilation from Dr. M'Culloch, W. H. Maxwell, Dr. Parnell, and others, and is thus very disappointing. Again, the account in the *Naturalist's Library* is compressed into five small pages, referring chiefly to authorities on the subject, with quotations from Yarrell! It is only by searching in Blue Books, by perusing much newspaper writing of a controversial kind, and by arduous personal inquiry, as well as by making a minute study of the fish, that I have been able to complete anything like an accurate *précis* of the natural and economic-history of this very plentiful fish.

As to the periods at which herrings spawn, the Commissioners inform us that they met with "singularly contradictory" statements, and after having collected a large amount of valuable evidence, they arrived at the conclusion that herrings spawn at two seasons of the year—viz. in the spring and autumn. They have no evidence of a spawning during the solstitial months—viz. June and December; but in nearly all the other months gravid herrings are found, and the Commissioners assert that a spring spawning certainly occurs in the latter part of January, as also in the three following months, and the autumn spawning in the latter end of July, and likewise in the following months up to November. "Taking all parts of the British coast together, February and March are the great months for the spring spawning, and August and September for the autumn spawning." The spawn, it may be stated in passing, is deposited on the surface of the stones, shingle, and gravel, and on old shells, at the various spawning places, and it adheres tenaciously to whatever it happens to fall upon. This, as will be seen, brings us exactly back to Mr. Cleghorn's ideas of the herring existing in races at different places and in separate bodies, and thereby rendering the fluctuations of the great series of shoals at Wick more and more intelligible, especially when we take into account the fact that winter shoals are now found at that place, giving rise to what may ultimately prove a considerable addition to the great autumn fishery yet carried on there.

As to the question of how long herrings take to grow, from the period of the deposition of the egg, there are various opinions, for no naturalist or practical fisherman has been able definitely to fix the time. There is reason to believe, we are told in the report, that the eggs of herrings are hatched in, at most, from two to three weeks after deposition. This is very rapid work

when we consider that the eggs of the salmon require to be left for a period of ninety or a hundred days, even in favourable seasons, before they quicken into life, and that the eggs of a considerable number of fish are known to take a much longer period than three weeks to ripen. The rate of growth of the herring, and the time at which it begins to reproduce itself, are not yet well understood ; indeed, it seems particularly difficult to fix the period at which it reaches the reproductive stage. As an example of the numerous absurd statements that have been circulated about fish, the reader may study the following paragraph :—“ Old fishermen about Dunbar say the way herring spawn is —first, the female herrings deposit their roe at some convenient part on sand or shingly bottom ; second, the male fish then spread their milt all over the roe to protect it from enemies, and the influence of the tide and waves from moving it about. The fishermen also say that when the young herrings are hatched they can see and swim ; the milt covering bursts open, and they are free to roam about. Some naturalists think the roes and milts of herring are all mixed together promiscuously, and left on the sands to bud and flourish. The fishermen’s idea seems to be the most likely of the two opinions.”

I have had young herrings of all sizes in my possession, from those of an inch long upwards. The following are the measurements of a few of my specimens which were procured about the end of February, and not one of which had any appearance of either roe or milt, while some (the smaller fish) were strongly serrated in the abdominal line, and others, as they advanced in size, lost that distinguishing mark, and were only very slightly serrated. The largest of these fish—and they must all have been caught at one time—was eight inches long, nearly four inches in circumference at the thickest part of the body, and weighed a little over two ounces. The smallest of these herring-fry did not weigh a quarter of an ounce, and was not quite three inches in length. One of them, again, that was six inches long, only weighed three-quarters of an ounce ; whilst another of the same lot, four and a half inches long, weighed a quarter of an ounce exactly. I do not propose at present to enter at great length into the sprat controversy ; but, if the sprat be the young of some one of the different species of herring, as I take leave to think it is, then the question of its growth and natural economy will become highly important. Some people say that the herring must have attained the age of seven

years before it can yield milt or roe, whilst a period of three years has been also named as the ultimate time of this event; but there are persons who think that the herring attains its reproductive power in eighteen months, while others affirm that the fish grows to maturity in little more than half that time. If the average size of a herring may be stated as eleven and a half inches, individual fish of *Clupea harengus* have been found measuring seventeen inches, and full fish have been taken only ten inches in length, when should the example, noted above as being eight inches long, reach its full growth? and how old was it at the time of its capture? And, again, were the fish—all taken out of the same boat, be it observed, and caught in the same shoal—all of one particular year's hatching? Is this the story of the parr over again, or is it the case that the fishermen had found a shoal of mixed herrings—some being of one year's spawning, some of another? I confess to being puzzled, and may again remind the reader that my largest fish had never spawned, and had not the faintest trace of milt or roe within it. Then, again, as to the time when herrings spawn, I have over and over again asserted in various quarters that they spawn in nearly every month of the year—an assertion which has been proved by official inquiry.

As to the place of spawning, development of the ova, and other circumstances attendant on the increase of the herring, I promulgated the following opinions some years ago, and I see no reason to alter them:—The herring shoal keeps well together till the time of spawning, whatever the fish may do after that event. Some naturalists think that the shoal breaks up after it spawns, and that the herring then live an individual life, till again instinctively moved together for the grand purpose of procreating their kind. It is quite clear, I think, that herring move into shallow water because of its increased temperature, and its being more fitted in consequence for the speedy vivifying of their spawn. The same shoal will always gather over the same spawning ground, and the fish will keep their position till they fulfil the chief object of their life. The herrings will rise buoyantly to the surface of the water after they have spawned; before that they swim deep and hug the ground. The herring, in my opinion, must have a rocky place to spawn upon, with a vegetable growth of some kind to receive the roe; shoals may of course accidentally spawn on soft ground. It is not accurately known how long a period elapses till the spawn



ripens into life. I think, however, that herring spawn requires a period of about ten weeks to ripen. It is known that young herrings have appeared on a spawning ground in myriads within fifty days after the departure of a shoal, and fishermen say that no spawn can be found on the ground after the lapse of a few weeks from the visit of the gravid shoal—that the eggs in fact have come to life, and that the fish are swimming about.

It is generally known that the sprat (*Clupea sprattus*) is a most abundant fish. The fact of its great abundance has induced a belief that it is not a distinct species of fish, but is, in reality, the young of the herring. It is true that many distinguishing marks are pointed out as belonging only to the sprat—such as its serrated belly, the relative position of the fins, etc. But there remains, on the other side, the very striking fact of the sprat being rarely found with either milt or roe; indeed, the only case I know of this fish having been found in a condition to perpetuate its species was detailed by the late Mr. Mitchell, who exhibited before one of the learned societies of Edinburgh a pair of sprats having the roe and milt fully developed. Dr. Dod, an ancient anatomist, says: “It is evident that sprats are young herrings. They appear immediately after the herrings are gone, and seem to be the spawn just vivified, if I may use the expression. A more undeniable proof of their being so is in their anatomy; since, on the closest search, no difference but size can be found between them.” After the nonsense which was at one time written about the parr, and considering the anomalies of salmon-growth, it would be unsafe to dogmatise on the sprat question. As to the serrated belly, we might look upon it as we do the tucks of a child’s frock—viz. as a provision for growth. The fin-rays of this fish have also been cited in evidence as not being the same in number as those of the herring, but as I can testify from actual counting, the fin-rays of the latter fish vary considerably, therefore the number of fin-rays is not evidence in the case. The slaughter of sprats which is annually carried on in our seas is, I suspect, as decided a killing of the goose for the sake of the golden eggs as the grilse-slaughter which is annually carried on in our salmon rivers.

The herring is found under four different conditions:—1st, Fry or sill; 2d, *Maties* or fat herring; 3d, Full herring; 4th, Shotten or spent herring. All herrings under five or six inches in length come under the first denomination. The *matie* is the finest condition in which a herring can be used for food pur-

poses ; and if the fishery could be so arranged, that is the time at which it should be caught for consumption. At that period it is very fat, its feeding-power being all developed on its body ; the spawn is small, the growth of the roe or milt not having yet demanded the whole of the nutriment taken by the fish. A full herring is one in which the milt or roe is fully developed. The *maties* develop into spawning herring with great rapidity—in the course of three months, it is said. The herrings at the spawning season come together in vast numbers, and proceed to their spawning places in the shallower and consequently warmer parts of the sea. As Gilbert White says, “The two great motives which regulate the brute creation are love and hunger ; the one incites them to perpetuate their kind, the latter induces them to preserve individuals.” In obedience to these laws the herring congregate on our coast, for there only they find an abundant supply of food to mature with the necessary rapidity their milt and roe, as well as a sea-bottom fitted to receive their spawn ; and they are thus brought within the reach of man at what many persons consider the wrong time of their life.

As to this division of the question, it has been said that it matters not at what period you take a herring, whether it be old or young, without or with spawn ; that fish cannot again be caught, and will never spawn again ; and it is argued, therefore, that the taking of fish in “the family way” no more prevents it from reproducing than if it had been killed in the condition of a *matie*. The same argument was used in the case of the young salmon ; and it was asked : If you kill all your grilse, where are you to find your salmon ?

The herring breeds, then, and is caught in greater or lesser quantities, during every month of the year. There is no general close-time for the herring in Scotland. How is it that the time selected by fishermen for the capture of this fish corresponds with the period when it is a crime to take a salmon ? If a gravid salmon be unwholesome, is a gravid herring good for food ? Do not the same physical laws affect both of these fish ? There cannot be a doubt that at the period of spawning, this fish, as well as all other fish, is in its worst condition so far as its food-yielding qualities are concerned, because at that time of its life its whole nutritive power is exerted on behalf of its seed, and its flesh is consequently lean and unpalatable. Yet it is a great fact that the time which the herring selects to fulfil the grandest instinct of its nature is the very time appointed by

man for its capture! In fact, that is the period when herrings are at a premium; they must be "full fish," or they cannot obtain the official brand; in other words, *shotten* herrings—*i.e.* fish that have spawned—are not of much more than half the value of the others. When it is taken into account that each pair of full fish (male and female) are killed just as they are about to give us the chance of obtaining an increase of the stock to the extent say of thirty thousand, the ultimate effect must be to disturb and cripple the producing powers of the shoal to such a degree that it will break up and find a new breeding-ground, safe for a time perhaps from the spoliation of the greedy fishermen. The Lochfyne Commissioners gave as a reason for their non-recommendation of a close-time the fact, that were there to be a cessation from labour, the enemies of the herring would so increase that the jubilee given would be nugatory. But surely there is a great want of logic in this argument! How is it that a close-time operates so favourably in the case of the salmon—not only a seasonal close-time, but a weekly one as well? Would not the herring, with its almost miraculous breeding-power, increase in the same ratio, or even in a greater ratio than its enemies, especially, if, as the Commissioners tell us, and we believe, it is engaged in multiplying its kind during ten months of the year? Are not the enemies of the herring at work during the fishing season as well as at other periods? I could understand the logic of denying a close-time on the ground that, as the herring never ceases breeding, it is impossible to fix a correct period. But, according to the deliverance of the Commissioners, a close-time is possible. I have ever been of opinion, notwithstanding the practical difficulties that would have to be encountered in carrying it out, that the want of a close-time, especially for the larger kinds of sea-fish, is one of the causes which are so obviously affecting the supplies. It is certain also, from chemical and sanitary investigation, that all fish are unwholesome at the period of spawning; the salmon at that time of its life is looked upon as being little better than carrion. But, without dwelling on this phase of the question, or considering the effect of unwholesome fish on the public health, I must point out most strongly that the want of a well-defined close-time is one of the greatest and severest of our fish-destroying agencies. We give our grouse a breathing space; nay, we sometimes afford to that bird a whole jubilee year; we do not shoot our hares during certain months of the year, nor

do we select their breeding season as the proper time to kill our oxen or our sheep ; but we do not at dinner-time object to an *entrée* composed of cod-roe, and we evidently rather believe in the propriety of killing only our seed-laden herrings ! This lavish destruction of fish-life has arisen in great part from the well-known fecundity of all kinds of sea-fish, which has given rise to the idea that it is impossible to exhaust the shoals. But when it is considered that this wonderful fecundity is met by an unparalleled destruction of the seed and also of the young fish, we need not be astonished at the ever-recurring complaint of scarcity. An old and probably exaggerated complaint has been lately revived that the beam-trawl is one of the most destructive engines employed in the sea, five hundred tons of spawn being destroyed by trawlers in twenty-four hours ! There can be no doubt that there is annually an enormous waste of fish-life through the accidental destruction of very large quantities of spawn,—herring-spawn as well as all other kinds.

As to the food of the herring, the report already alluded to tells us that it “ consists of crustacea, varying in size from microscopic dimensions to those of a shrimp, and of small fish, particularly sand-eels. While in the *matie* condition they feed voraciously, and not unfrequently their stomachs are found immensely distended with crustacea and sand-eels, in a more or less digested condition.” I have personally examined the stomachs of many herrings, and have found in them the remains of all kinds of food procurable in the place frequented by the particular animal examined—including herring-roe, young herrings, sprats, etc. ; but the sand-eel seems to be its favourite food.

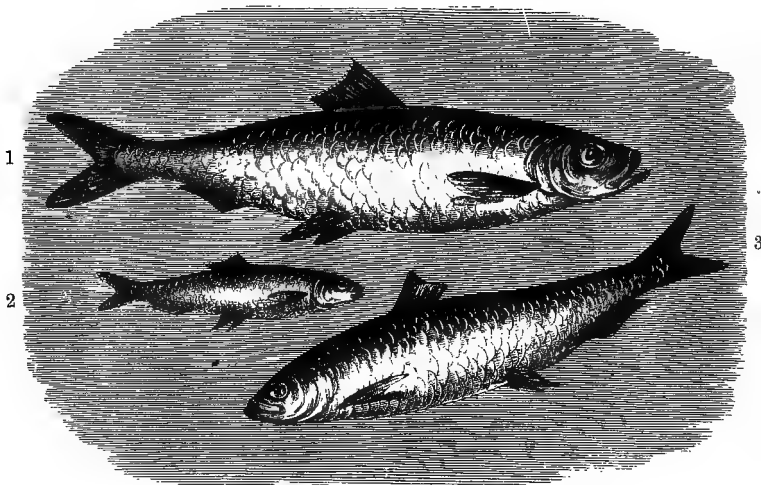
One of the wonders connected with the natural history of the herring is the capricious nature of the fish. It is always changing its *habitat*, and, according to vulgar belief, from the most curious circumstances. I need not add to the necessary length of this chapter by giving a great number of instances of the capricious nature of the herring ; but I must cite a few, in order to make my recapitulation of herring history as complete as possible, and at the same time it is proper to mention that superstition is brought to bear on this point. The fishermen of St. Monance, in Fife, used to remove their church-bell during the fishing season, as they affirmed that its ringing scared away the shoals of herring from the bay ! It has long been a favourite and popular idea that they were driven away by the noise of

gun-firing. The Swedes say that the frequent firings of the British ships in the neighbourhood of Gothenburg frightened the fish away from the place. In a similar manner and with equal truth it was said that they had been driven away from the Baltic by the firing of guns at the battle of Copenhagen! "Ordinary philosophy is never satisfied," says Dr. M'Culloch, "unless it can find a solution for everything; and it is satisfied for this reason with imaginary ones." Thus in Long Island, one of the Hebrides, it was asserted that the fish had been driven away by the kelp-manufacture, some imaginary coincidence having been found between their disappearance and the establishment of that business. But the kelp fires did not drive them away from other shores, which they frequent and abandon indifferently, without regard to that work. A member of the House of Commons, in a debate on a Tithe Bill in 1835, stated that a clergyman, having obtained a living on the coast of Ireland, signified his intention of taking the tithe of fish, which was, however, considered to be so utterly repugnant to their privileges and feelings, that not a single herring had ever since visited that part of the shore!

The most prominent members of the *Clupeidæ* are the common herring (*Clupea harengus*); the sprat, or garvie (*Clupea sprattus*); and the pilchard, or gipsy herring (*Clupea pilchardus*). The other members of this family are the anchovy, and the Alice and Twaite shad; but these, although affording material for speculation to naturalists, are not of great commercial importance.

Before concluding this chapter I wish to say a few words about a point of herring economy, which has been already alluded to in connection with the special commission appointed to inquire into the trawling system—viz. as to the natural enemies of the herring, the most ruthless of which are undoubtedly of the fish kind, and whose destructive power, some people assert, dwarfs into insignificance all that man can do against the fish:—"Consider," say the Commissioners, "the destruction of large herring by cod and ling alone. It is a very common thing to find a codfish with six or seven large herrings, of which not one has remained long enough to be digested, in his stomach. If, in order to be safe, we allow a codfish only two herrings *per diem*, and let him feed on herrings for only seven months in the year, then we have 420 herrings as his allowance during that time; and fifty codfish will equal one fisherman in destructive power. But the quantity of cod and

ling taken in 1861, and registered by the Fishery Board, was over 80,000 cwts. On an average thirty codfish go to one cwt. of dried fish. Hence, at least 2,400,000 will equal 48,000 fishermen. In other words, the cod and ling caught on the Scotch coasts in 1861, if they had been left in the water, would have caught as many herring as a number of fishermen equal to all those in Scotland, and six thousand more, in the same year; and as the cod and ling caught were certainly not one tithe part of those left behind, we may fairly estimate the destruction of



MEMBERS OF THE HERRING FAMILY.

1. Herring.

2. Sprat.

3. Pilchard.

herring by these voracious fish alone as at least ten times as great as that effected by all the fishermen put together." As to only one of the numerous land enemies of the herring, the late Mr. Wilson, in his *Tour round Scotland*, calculated that the gannets or solan geese frequenting one island alone—St. Kilda—picked out of the water for their food 214 millions of herrings every summer! The shoals that can withstand these destructive agencies must indeed be vast, especially when taken in connection with the millions of herrings that are accidentally killed by the nets, and never brought ashore for food purposes. The

work accomplished by these natural enemies of the herring, which has been going on during all time, does not however affect my argument, that by the concentration on one shoal of a thousand boats per annum, with an annually-increasing net-power, we both so weaken and frighten the shoal that it becomes in time unproductive. As the late Mr. Methuen said in one of his addresses: "We have been told that we are to have dominion over the fish of the sea, but dominion does not mean extermination."

## CHAPTER IX.

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### THE HERRING FISHERY.

The Herring Fisheries—The Lochfyne Fishery—The Pilchard—Herring Commerce—Mr. Methuen—The Brand—The Herring Harvest—A Night at the Fishing—The Cure—The Curers—Herring Boats—Increase of Netting—Are we Overfishing?—Proposal for more Statistics.

THE fisheries for the common herring, the pilchard, and the sprat, are carried on, with a brief interval, all the year round ; but the great herring season is during the autumn—from August to October—when the sea is covered with boats in pursuit of that fine fish, and in some of its phases the herring-fishery assumes an aspect that is decidedly picturesque. Every little bay all round the island has its tiny fleet ; the mountain-closed lochs of the Western Highlands have each a fishery ; while at some of the more important fishing stations there are very large fleets assembled—as at Wick, Dunbar, Ardrishaig, Stornoway, Peterhead, and Anstruther. The chief curers have places of business in these towns, where they keep a large store of curing materials, and a competent staff of coopers and others to aid them in their business. Such boats as do not carry on a local fishery proceed from the smaller fishing-villages to one or other of the centres of the herring trade. In fact, wherever an enterprising curer sets up his stand, there the boats will gather round him ; and beside him will collect a crowd of all kinds of miscellaneous people—dealers in salt, sellers of barrel-staves, vendors of “cutch,” Prussian herring-buyers, comely girls from the inland districts to gut, and men from the Highlands anxious to officiate as “hired hands.” Itinerant ministers and revivalists also come on the scene and preach occasional sermons to the hundreds of devout Scotch people who are assembled ; and thus arises many a prosperous little town, or at least towns that might be prosperous were the finny treasures of the sea always plentiful. As the



chief herring season comes on a kind of madness seizes on all engaged, ever so remotely, in the trade; as for those more immediately concerned, they seem to go completely "daft," especially the younger hands. The old men, too, come outside to view the annual preparations, and talk, with revived enthusiasm, to their sons and grandsons about what they did twenty years ago; the young men spread out the shoulder-of-mutton sails of their boats to view and repair defects; and the wives and sweethearts, by patching and darning, contrive to make old nets "look amaisht as weel as new;" boilers bubble with the brown *catechu*, locally called "cutch," which is used as a preservative for the nets and sails; while all along the coasts old boats are being cobbled up, and new ones are being built and launched.

The scene along the Scotch seaboard from Buckhaven to Buckie is one of active preparation, and all concerned are hoping for a "lucky" fishing; "winsome" young lassies are praying for the success of their sweethearts' boats, because if the season turns out well they will be married women at its close. Curers look sanguine, and the owners of free boats seem happy. The little children too—those wonderful little children one always finds in a fishing village, striving so manfully to fill up "daddy's" old clothes—participate in the excitement: they have their winter's "shoon" and "Sunday breeks" in perspective. At the quaint village of Gamrie, at Macduff, or Buckie, the talk of old and young, on coach or rail, from morning to night, is of herrings. There are comparisons and calculations about "crans" and barrels, and "broke" and "splitbellies," and "full fish" and "lanks," and reminiscences of great hauls of former years, and much figurative talk about prices and freights, and the cost of telegraphic messages. Then, if the present fishery be dull, hopes are expressed that the next one may be better. "Ony fish this mornin'?" is the first salutation of one neighbour to another: the very infants talk about "herrin'"; schoolboys steal them from the boats for the purpose of aiding their negotiations with the gooseberry woman; while wandering paupers are rewarded with one or two broken fish by good-natured fishers, when "the take" has been so satisfactory as to warrant such largess. At Wick the native population, augmented by four thousand strangers, wakens into renewed life; it is like Doncaster on the approach of the St. Leger. The summer-time of Wick's existence begins with the fishery: the shops are painted on their outsides and are replenished within; the milliner and

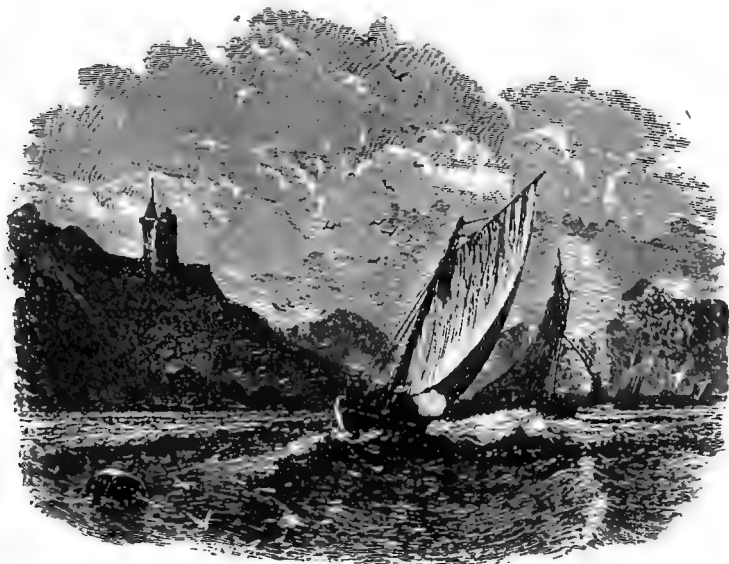
the tailor exhibit their newest fashions ; the hardware merchant flourishes his most attractive frying-pans ; the grocer amplifies his stock ; and so for a brief period all is *couleur de rose*.

They are not all practical fishermen who go down to the sea for herring during the great autumnal fishing season. By far the larger portion of those engaged in the capture of this fish—particularly at the chief stations—are what are called “hired hands,” a mixture of the farmer, the mechanic, and the sailor ; and this fact may account in some degree for a portion of the accidents which are sure to occur in stormy seasons. Many of these men are mere labourers at the herring fishery, and have little skill in handling a boat ; they are many of them farmers in the Lewis, or small crofters in the Isle of Skye. The real orthodox fisherman is a different being, and he is the same everywhere. If you travel from Banff to Bayonne you find that fishermen are unchangeable.

The men’s work is all performed at sea, and, so far as the capture of the herring is concerned, there is no display of either skill or cunning. The legal mode of capturing the herring is to take it by means of what is called a drift-net. The herring-fishery, it must be borne in mind, is regulated by Act of Parliament, by which the exact means and mode of capture are explicitly laid down. A drift-net is an instrument made of fine twine worked into a series of squares, each of which is an inch, so as to allow plenty of room for the escape of young herrings. Nets for herring are measured by the barrel-bulk, and each barrel will hold two nets, each net being fifty yards long and thirty-two feet deep. The larger fishing-boats carry something like a mile of these nets ; some, at any rate, carry a drift which will extend two thousand yards in length. These drifts are composed of many separate nets, fastened together by means of what is called a back-rope, and each separate net of the series is marked off by a buoy or bladder which is attached to it, the whole being sunk in the sea by means of a leaden or other weight, and fastened to the boat by a longer or shorter trail-rope, according to the depth in the water at which it is expected to find the herrings. This formidable apparatus, which forms a great perforated wall, being let into the sea immediately after sunset, floats or drifts with the tide, so as to afford the herring an opportunity of striking against it, and so becoming captured—in fact they are drowned in the nets. The boats engaged in the drift-net fishing are of various sizes, and are strongly and carefully built : the largest,

being upwards of thirty-five feet keel, with a large drift of nets and good sail and mast, will cost something like a sum of £200.

The other mode of fishing for herrings, which has existed for about a quarter of a century, is known as trawling. In the west of Scotland, on Lochfyne in particular, where it is prac-



VIEW OF LOCHFYNE.

tised, it is called "trawling;" but the instrument of capture is in reality a "seine" net; and, so far as the size of the mesh is concerned, is all right.

The pilchard is generally captured by means of the seine-net, and we never hear of its being injured thereby. It is also cured in large quantities, the same as the herring, although the *modus operandi* is somewhat different. The pilchard was at one time, like the herring, thought to be a migratory fish, but it has been found, as in the case of the common herring, to be a native of our own seas. In some years the pilchard has been known to shed its spawn in May, but the usual time is October.

Their food is small crustaceous animals, as their stomachs are frequently crammed with a small kind of shrimp, and the supply of this kind of food is thought to be enormous. When on the coast, the assemblage of pilchards assumes an arrangement like that of a great army, and the vast shoal is known to be made up by the coming together of smaller bodies of that fish, and these frequently separate and rejoin, and are constantly shifting their position. The pilchard is not now so numerous as it was a few years ago, but very large hauls are still occasionally obtained.

Great excitement prevails on the coast of Cornwall during the pilchard season. Persons watch the water from the coast, and signal to those who are in search of the fish the moment they perceive indications of a shoal. These watchers are locally called "huers," and they are provided with signals of white calico or branches of trees, with which to direct the course of the boat, and to inform those in charge when they are upon the fish—the shoal being best seen from the cliffs. The pilchards are captured by the seine-net—that is, the shoal, or spot of a shoal, that has risen, is completely surrounded by a wall of netting, the principal boat and its satellites the volyer and the lurker, with the "stop-nets," having so worked as quite to overlap each other's wall of canvas. The place where the joining of the two nets is formed is carefully watched, to see that none of the fish escape at that place, and if it be too open, the fish are beaten back with the oars of some of the persons attending—about eighteen in all. In due time the seine is worked or hauled into shallow water for the convenience of getting out the fish, and it may perhaps contain pilchards sufficient to fill two thousand hogsheads. Generally speaking, four or five seines will be at work together, giving employment to a great number of the people, who may have been watching for the chance during many days. When the tide falls the men commence to bring ashore the fish, a tuck-net worked inside of the seine being used for safety; and the large shallow dipper boats required for bringing the fish to the beach may be seen sunk to the water's edge with their burden, as successive bucketfuls are taken out of the nets and emptied into these conveyance vessels. To give the reader an idea of quantity, as connected with pilchard-fishing, I may state that it takes nearly three thousand fish to fill a hogshead. I have heard of a shoal being captured that took a fortnight to bring ashore.

Ten thousand hogsheads of pilchards have been known to be taken in one port in a day's time. The convenience of keeping the shoal in the water is obvious, as the fish need not be withdrawn from it till it is convenient to salt them. The fish are salted in curing-houses, great quantities of them being piled up into huge stacks, alternate layers of salt and fish. During the process of curing a large quantity of useful oil exudes from the heaps. The salting process is called "bulking," and the fish are built up into stacks with great regularity, where they are allowed to remain for four weeks, after which they are washed and freed from the oil, then packed into hogsheads, and sent to Spain and Italy, to be extensively consumed during Lent, as well as at other fasting times. The hurry and bustle at any of the little Cornwall ports during the manipulation of a few shoals of pilchards must be seen, the excitement cannot be very well described. The pilchard is, or rather it ought to be, the *Sardinia* of commerce, but its place is usurped by the sprat, or garvie as we call it in Scotland, and thousands of tin boxes of that fish are annually made up and sold as sardines. I have already alluded to the sprat, so far as its natural history is concerned. It is a fish that is very abundant in Scotland, especially in the Firth of Forth, where for many years there has been a good sprat-fishery. We do not now require to go to France for our sardines, as we can cure them at home in the French style.

Sprats, whether they be young herrings or no, are very plentiful in the winter months, and afford a supply of wholesome food of the fish kind to many who are unable to procure more expensive kinds. When the fishing for garvies (sprats) was stopped a few years ago by order of the Board of White Fisheries, there was quite a sensation in Edinburgh; and an agitation was got up that has resulted in a partial resumption of the fishing, which is of considerable value—about £50,000 in the Firth of Forth alone.

Commerce in herring is entirely different from commerce in any other article, particularly in Scotland. In fact the fishery, as at present conducted, is just another way of gambling. The home "curers" and foreign buyers are the persons who at present keep the herring-fishery from stagnating, and the goods (*i.e.* the fish) are generally all bought and sold long before they are captured. The way of dealing in herring is pretty much as follows:—Owners of boats are engaged to fish by curers, the bargains

being usually that the curer will take two hundred crans of herring—and a cran, it may be stated, is forty-five gallons of ungutted fish ; for these two hundred crans a certain sum per cran is paid according to arrangement, the bargain including as well a definite sum of ready money by way of bounty, perhaps also an allowance of spirits, and the use of ground for the drying of the nets. On the other hand, the boat-owner provides a boat, nets, buoys, and all the apparatus of the fishery, and engages a crew to fish ; his crew may, perhaps, be relatives and part-owners sharing the venture with him, but usually the crew consists of hired men who get so much wages at the end of the season, and have no risk or profit. This is the plan followed by free and independent fishermen who are really owners of their own boats and apparatus. It will thus be seen that the curer is bargaining for two hundred crans of fish months before he knows that a single herring will be captured ; for the bargain of next season is always made at the close of the present one, and he has to pay out at once a large sum by way of bounty, and provide barrels, salt, and other necessaries for the cure before he knows even if the catch of the season just expiring will all be sold, or how the markets will pulsate next year. On the other hand, the fisherman has received his pay for his season's fish, and very likely pocketed a sum of from ten to thirty pounds as earnest-money for next year's work. Then, again, a certain number of curers, who are men of capital, will advance money to young fishermen in order that they may purchase a boat and the necessary quantity of netting to enable them to engage in the fishery—thus thirling the boat to their service, very probably fixing an advantageous price per cran for the herrings to be fished and supplied. Curers, again, who are not capitalists, have to borrow from the buyers, because to compete with their fellows they must be able to lend money for the purchase of boats and nets, or to advance sums by way of bounty to the free boats ; and thus a rotten unwholesome system goes the round—fishermen, boat-builders, curers, and merchants, all hanging on each other, and evidencing that there is as much gambling in herring-fishing as in horse-racing. The whole system of commerce connected with this trade is decidedly unhealthy, and ought at once to be checked and reconstructed if there be any logical method of doing it. At a port of three hundred boats a sum of £145 was paid by the curers for “arles,” and spent in the public-houses ! More than £4000 was paid in bounties, and an advance of nearly

£7000 made on the various contracts, and all this money was paid eight months before the fishing began. When the season is a favourable one, and plenty of fish are taken, then all goes well, and the evil day is postponed; but if, as in one or two recent seasons, the take is poor, then there comes a crash. One falls, and, like a row of bricks, the others all follow. At the large fishing stations there are comparatively few of the boats that are thoroughly free; they are tied up in some way between the buyers and curers, or they are in pawn to some merchant who "backs" the nominal owner. The principal, or at least the immediate sufferers by these arrangements are the hired men.

This "bounty," as it is called, is a most reprehensible feature of herring commerce, and although still the prevalent mode of doing business, has been loudly declaimed against by all who have the real good of the fishermen at heart. Often enough men who have obtained boats and nets on credit, and hired persons to assist them during the fishery, are so unfortunate as not to catch enough of herrings to pay their expenses. The curers for whom they engaged to fish having retained most of the bounty money on account of boats and nets, consequently the hired servants have frequently in such cases to go home—sometimes to a great distance—penniless. It would be much better if the old system of a share were re-introduced: in that case the hired men would at least participate to the extent of the fishing, whether it were good or bad. Boat-owners try of course to get as good terms as possible, as well in the shape of price for herrings as in bounty and perquisites. My idea is that there ought to be no "engagements," no bounty, and no perquisites. As each fishing comes round let the boats catch, and the curers buy day by day as the fish arrive at the quay. This plan has already been adopted at some fishing-towns, and is an obvious improvement on the prevailing plan of gambling by means of "engagements" in advance.

In fact, this fishery is best described when it is called a lottery. No person knows what the yield will be till the last moment: it may be abundant, or it may be a total failure. Agriculturists are aware long before the reaping season whether their crops are light or heavy, and they arrange accordingly; but if we are to believe the fishermen, his harvest is entirely a matter of "luck." It is this belief in "luck" which is, in a great degree, the cause of our fisher-folk not keeping pace with the times: they are greatly behind in all matters of progress;

our fishing towns look as if they were, so to speak, stereotyped. It is a woeful time for the fisher-folk when the herrings fail them ; for this great harvest of the sea, which needs no tillage of the husbandman, the fruits of which are reaped without either sowing seed or paying rent, is the chief industry that the bulk of the coast population depend upon for a good sum of money. The fishing is the bank, in which they have opened, and perhaps exhausted, a cash-credit ; for often enough the balance is on the wrong side of the ledger, even after the fishing season has come and gone. In other words, new boats have to be paid for out of the fishing ; new clothes, new houses, additional nets, and even weddings, are all dependent on the herring-fishery. It is notable that after a favourable season the weddings among the fishing populations are very numerous. The anxiety for a good season may be noted all along the British coasts, from Newhaven to Yarmouth, or from Crail to Wick.

The highest prices are paid for the early fish, contracts for these in a cured state being sometimes fixed as high as forty-five shillings per barrel. These are at once despatched to Germany, in the inland towns of which a prime salt herring of the early cure is considered a great luxury, fetching sometimes the handsome price of one shilling ! Great quantities of cured herrings are sent to Stettin or other German ports, and so eager are some of the merchants for an early supply that in the beginning of the season they purchase quantities unbranded, through the agency of the telegraph. On those parts of the coast where the communication with large towns is easy, considerable quantities of herring are purchased fresh, for transmission to Birmingham, Manchester, and other inland cities. Buyers attend for that purpose, and send them off frequently in an open truck, with only a slight covering to protect them from the sun. It is needless to say that a fresh herring is looked upon as a luxury in such places, and a demand exists that would exhaust any supply that could be sent.

Having explained the relation of the curers to the trade, I must now speak of the cure—the greater number of the herrings caught on the coast of Scotland being pickled in salt ; a result originally, no doubt, of the want of speedy modes of transit to large seats of population, where herrings would be largely consumed if they could arrive in a sufficiently fresh state to be palatable. At stations about Wick the quantity of herrings disposed of fresh is comparatively small, so that by far the larger



portion of the daily catch has to be salted. This process during a good season employs a very large number of persons, chiefly as coopers and gutters; and, as the barrels have to be branded, by way of certificate of the quality of their contents, it is necessary that the salting should be carefully done. As soon as the



VIEW OF A CURING YARD.

boats reach the harbour—and as the fishing is appointed to be carried on after sunset they arrive very early in the morning—the various crews commence to carry their fish to the reception-troughs of the curers by whom they have been engaged. A person in the interest of the curer checks the number of crans brought in, and sprinkles the fish from time to time with considerable quantities of salt. As soon as a score or two of baskets have been emptied, the gutters set earnestly to do their portion of the work, which is dirty and disagreeable in the extreme. The gutters usually work in companies of about five—one or two gutting, one or two carrying, and another packing. Basketfuls

of the fish, so soon as they are gutted, are carried to the back of the yard, and plunged into a large tub, there to be roused and mixed up with salt ; then the adroit and active packer seizes a handful and arranges them with the greatest precision in a barrel, a handful of salt being thrown over each layer as it is put in, so that, in the short space of a few minutes, the large barrel is crammed full with many hundred fish, all gutted, roused, and packed, in a period of not more than ten minutes. As the fish settle down in the barrel, more are added from day to day till it is thoroughly full and ready for the brand. On the proper performance of these parts of the business the quality of the cured fish very much depends.

The following detailed description of the "herring-harvest," as gathered in the Moray Firth, may be of interest to the general reader. It is reprinted, by permission, from a paper contributed by the author to the *Cornhill Magazine* :—

The boats usually start for the fishing-ground an hour or two before sunset, and are generally manned by four men and a boy, in addition to the owner or skipper. The nets, which have been carried inland in the morning, in order that they might be thoroughly dried, have been brought to the boat in a cart or waggon. On board there is a keg of water and a bag of bread or hard biscuit ; and in addition to these simple necessaries, our boat contains a bottle of whisky which we have presented by way of paying our footing. The name of our skipper is Francis Sinclair, and a very gallant-looking fellow he is ; and as to his dress—why, his boots alone would ensure the success of a Surrey melodrama ; and neither Truefit nor Ross could satisfactorily imitate his beard and whiskers. Having got safely on board—a rather difficult matter in a crowded harbour, where the boats are elbowing each other for room—we contrive, with some labour, to work our way out of the narrow-necked harbour into the bay, along with the nine hundred and ninety-nine boats that are to accompany us in our night's avocation. The heights of Pulteneytown, which commands the quays, are covered with spectators admiring the pour-out of the herring fleet and wishing with all their hearts "God speed" to the venturers ; old salts who have long retired from active seamanship are counting their "takes" over again ; and the curer is mentally reckoning up the morrow's catch. Janet and Jeanie are smiling a kindly good-bye to "faither," and hoping for the safe return of Donald or Murdoch ; and crowds of people are scattered on the heights,

all taking various degrees of interest in the scene, which is stirringly picturesque to the eye of the tourist, and suggestive to the thoughtful observer.

Bounding gaily over the waves, which are crisping and curling their crests under the influence of the land-breeze, our shoulder-of-mutton sail filled with a good capful of wind, we hug the rocky coast, passing the ruined tower known as "the Old Man of Wick," which serves as a capital landmark for the fleet. Soon the red sun begins to dip into the golden west, burnishing the waves with lustrous crimson and silver, and against the darkening eastern sky the thousand sails of the herring-fleet blaze like sheets of flame. The shore becomes more and more indistinct, and the beetling cliffs assume fantastic and weird shapes, whilst the moaning waters rush into deep cavernous recesses with a wild and monotonous sough, that falls on the ear with a deeper and a deeper melancholy, broken only by the shrill wail of the herring-gull. A dull hot haze settles on the scene, through which the coppery rays of the sun penetrate, powerless to cast a shadow. The scene grows more and more picturesque as the glowing sails of the fleet fade into grey specks dimly seen. Anon the breeze freshens and our boat cleaves the water with redoubled speed: we seem to sail farther and farther into the gloom, until the boundary-line between sea and shore becomes lost to the sight.

We ought to have shot our nets before it became so dark, but our skipper, being anxious to hit upon the right place, so as to save a second shooting, tacked up and down, uncertain where to take up his station. We had studied the movements of certain "wise men" of the fishery—men who are always lucky, and who find out the fish when others fail; but our crew became impatient when they began to smell the water, which had an oily gleam upon it indicative of herring, and sent out from the bows of the boat bright phosphorescent sparkles of light. The men several times thought they were right over the fish, but the skipper knew better. At last, after a lengthened cruise, our commander, who had been silent for half-an-hour, jumped up and called to action. "Up, men, and at 'em," was then the order of the night. The preparations for shooting the nets at once began by our lowering sail. Surrounding us on all sides was to be seen a moving world of boats; many with their sails down, their nets floating in the water, and their crews at rest, indulging in fitful snatches of sleep. Other boats again

were still flitting uneasily about ; their skippers, like our own, anxious to shoot in the best place, but as yet uncertain where to cast : they wait till they see indications of fish in other nets. By and by we are ourselves ready, the sinker goes splash into the water, the " dog " (a large bladder, or inflated skin of some kind, to mark the far end of the train) is heaved overboard, and the nets, breadth after breadth, follow as fast as the men can pay them out (each division being marked by a large painted bladder), till the immense train sinks into the water, forming a perforated wall a mile long and many feet in depth ; the " dog " and the marking bladders floating and dipping in a long zigzag line, reminding one of the imaginary coils of the great sea-serpent.

Wrapped in the folds of a sail and rocked by the heaving waves we tried in vain to snatch a brief nap, though those who are accustomed to such beds can sleep well enough in a herring-boat. The skipper, too, slept with one eye open ; for the boat being his property, and the risk all his, he required to look about him, as the nets are apt to become entangled with those belonging to other fishermen, or to be torn away by surrounding boats. After three hours' quietude, beneath a beautiful sky, the stars—

"Those eternal orbs that beautify the night"—

began to pale their fires, and the grey dawn appearing indicated that it was time to take stock. On reckoning up we found that we had floated gently with the tide till we were a long distance away from the harbour. The skipper had a presentiment that there were fish in his nets ; indeed the bobbing down of a few of the bladders had made it almost a certainty ; at any rate we resolved to examine the drift, and see if there were any fish. It was a moment of suspense, while, by means of the swing-rope, the boat was hauled up to the nets. " Hurrah !" at last exclaimed Murdoch of the Isle of Skye, " there's a lot of fish, skipper, and no mistake." Murdoch's news was true ; our nets were silvery with herrings—so laden, in fact, that it took a long time to haul them in. It was a beautiful sight to see the shimmering fish as they came up like a sheet of silver from the water, each uttering a weak death-chirp as it was flung to the bottom of the boat. Formerly the fish were left in the meshes of the nets till the boat arrived in the harbour ; but now, as the net is hauled on board, they are at once shaken out. As our silvery treasure

showers into the boat we roughly guess our capture at fifty crans—a capital night's work.

The herrings being all on board, our duty is now to "up sail" and get home: the herrings cannot be too soon among the salt. As we make for the harbour, we discern at once how rightly the term lottery has been applied to the herring-fishery. Boats which fished quite near our own were empty; while others again greatly exceeded our catch. "It is entirely chance work," said our skipper; "and although there may sometimes be millions of fish in the bay, the whole fleet may not divide a hundred crans between them." On some occasions, however, the shoal is hit so exactly that the fleet may bring into the harbour a quantity of fish that in the gross would be an ample fortune. So heavy are the "takes" occasionally, that we have known the nets of many boats to be torn away and lost through the sheer weight of the fish which were enmeshed in them.

The favouring breeze soon carried us to the quay, where the boats were already arriving in hundreds, and where we were warmly welcomed by the wife of our skipper, who bestowed on us, as the lucky cause of the miraculous draught, a very pleasant smile. When we arrived the cure was going on with startling rapidity. The night had been a golden one for the fishers—calm and beautiful, the water being merely rippled by the land-breeze. But it is not always so in the Bay of Wick; the herring-fleet has been more than once overtaken by a fierce storm, when valuable lives have been lost, and thousands of pounds' worth of netting and boats destroyed. On such occasions the gladdening sights of the herring-fishery are changed to wailing and sorrow. It is no wonder that the heavens are eagerly scanned as the boats marshal their way out of the harbour, and the speck on the distant horizon keenly watched as it grows into a mass of gloomy clouds. As the song says, "Caller herrin'" represent the lives of men; and many a despairing wife and mother can tell a sad tale of the havoc created by the summer gales on our exposed northern coast.

From the heights of Pulteneytown, overlooking the quays and curers' stations, one has before him, as it were, an extended plain, covered with thousands and tens of thousands of barrels, interspersed at short distances with the busy scene of delivery, of packing, and of salting, and all the bustle and detail attendant on the cure. It is a scene difficult to describe, and has ever struck those witnessing it for the first time with wonder and surprise.

Having visited Wick in the very heat of the season, and for the express purpose of gaining correct information about this important branch of our national industry, I am enabled to offer a slight description of the place and its appurtenances. Travellers by the steamboat usually arrive at the very time the "herring-drawe" is making for the harbour; and a beautiful sight it is to see the magnificent fleet of boats belonging to the district, radiant in the light of the rising sun, all steadily steering to the one point, ready to add a large quota to the wealth of industrial Scotland. As we wend our way from the little jagged rock at which we are landed by the small boat attendant on the steamer, we obtain a glimpse of the one distinguishing feature of the town—the herring commerce. On all sides we are surrounded by herring. On our left hand countless basketfuls are being poured into the immense gutting-troughs, and on the right hand there are countless basketfuls being carried from the three or four hundred boats which are ranged on that particular side of the harbour; and behind the troughs more basketfuls are being carried to the packers. The very infants are seen studying the "gentle art;" and a little mob of breechless boys are busy hooking up the silly "poddies." All around the atmosphere is humid; the sailors are dripping, the herring-gutters and packers are dripping, and every thing and person appears wet and comfortless; and as you pace along you are nearly ankle-deep in brine. Meantime the herrings are being shovelled about in the large shallow troughs with immense wooden spades, and with very little ceremony. Brawny men pour them from baskets on their shoulders into the aforesaid troughs, and other brawny men dash them about with more wooden spades, and then sprinkle salt over each new parcel as it is poured in, till there is a sufficient quantity to warrant the commencement of the important operation of gutting and packing. Men are rushing wildly about with note-books, making mysterious-looking entries. Carts are being filled with dripping nets ready to hurry them off to the fields to dry. The screeching of saws among billet-wood, and the plashing of the neighbouring water-wheel, add to the great babel of sound that deafens you on every side. Flying about, blood-bespattered and hideously picturesque, we observe the gutters; and on all hands we may note thousands of herring-barrels, and piles of billet-wood ready to convert into staves. At first sight every person looks mad—some appear so from their costume, others from their manner—and the confusion seems

inextricable; but there is method in their madness, and even out of the chaos of Wick harbour comes regularity, as I have endeavoured to show.

So soon as a sufficient quantity of fish has been brought from the boats and emptied into the gutting troughs, another of the great scenes commences—viz. the process of evisceration. This is performed by females, hundreds of whom annually find well-paid occupation at the gutting-troughs. It is a bloody business; and the gaily-dressed and dashing females whom we had observed lounging about the curing-yards, waiting for the arrival of the fish, are soon most wonderfully transmogrified. They of course put on a suit of apparel adapted to the business they have in hand—generally of oil-skin, and often much worn. Behold them, then, about ten or eleven o'clock in the forenoon, when the gutting scene is at its height, and after they have been at work for an hour or so: their hands, their necks, their busts, their

“Dreadful faces throug'd, and fiery arms”—

their every bit about them, fore and aft, are spotted and besprinkled o'er with little scarlet clots of gills and guts; or, as Southey says of Don Roderick, after the last and fatal fight—

“Their flanks incarnadined,  
Their poitral smear'd with blood”—

See yonder trough, surrounded by a score of fierce eviscerators, two of them wearing the badge of widowhood! How deftly they ply the knife! It is ever a bob down to seize a herring, and a bob up to throw it into the basket, and the operation is over. It is performed with lightning-like rapidity by a mere turn of the hand, and thirty or forty fish are operated upon before you have time to note sixty ticks of your watch. These ruthless widows seize upon the dead herrings with such a fierceness as almost to denote revenge for their husbands' deaths; for they, alas! fell victims to the herring lottery, and the widows scatter about the gills and guts as if they had no bowels of compassion.

In addition to herrings that are pickled and those sold in a fresh state, great numbers are made into what are called “bloaters,” or transformed into “reds.” At Yarmouth, immense quantities of bloaters and reds are annually prepared for the English markets. The bloaters are very slightly cured and as slightly smoked, being prepared for immediate sale; but the herrings brought into Yarmouth are cured in various ways: the

bloaters are for quick sale and speedy consumption ; then there is a special cure for fish sent to the Mediterranean—" Straitsmen " I think these are called ; then there are the black herrings, which have a really fine flavour. In fact the Yarmouth herrings are so cured as to be suitable to particular markets. It may interest the general reader to know that the name of " bloater " is derived from the herring beginning to swell or bloat during the process of curing. Small logs of oak are burned to produce the smoke, and the fish are all put on " spits " which are run through the gills. The " spitters " of Yarmouth are quite as dexterous as the gutters of Wick, a woman being able to spit a last per day. Like the gutters and packers of Wick, the spitters of Yarmouth work in gangs. The fish, after being hung and smoked, are packed in barrels, each containing seven hundred and fifty fish.

The Yarmouth boats do not return to harbour every morning, like the Scotch boats ; being decked vessels of some size, from fifty to eighty tons, costing about £1000, and having stowage for about fifty lasts of herrings, they are enabled to remain at sea for some days, usually from three to six, and of course they are able to use their small boats in the fishery, a man or two being left in charge of the large vessel, while the majority of the hands are out in the boats fishing. There has always been a busy herring-fishery at the port of Yarmouth. A century ago upwards of two hundred vessels were fitted out for the herring-fishery, and these afforded employment to a large number of people—as many as six thousand being employed in one way or the other in connection with the fishery. The Yarmouth boats or busses are not unlike the boats once used in Scotland, which have been already described. They carry from fifteen to twenty lasts of herrings (a last, counted fisherwise, is more than 13,000 herrings, but nominally it is 10,000 fish), and are manned with some fourteen men or boys.

The following summary of the official statistics issued by the Board for the fishing of 1872 will give the reader an idea of the present state of this important industry. The information laid before Parliament about the capture and branding of herrings during the year 1872 is fuller than usual, and is of more than usual interest, setting forth as it does the increasing value which is attached by curers to the brand, and giving at the same time a series of minute details of the great improvement annually being effected in the construction of



fishing boats and the increase of the number. The Fishery Board can only take cognizance of the herrings which are cured (*i.e.* salted), as no machinery exists for tabulating those quantities which are sold "fresh," but it would not, perhaps, be an exaggeration to consider the quantities of the latter as being equal to the number cured, which was last year 773,859 barrels, as against 825,475 barrels in 1871. Calculating, in a rough way, each barrel to contain 800 fish, that would give a total of 619,087,200 cured herrings, while that number doubled might give a tolerable approximation of the total capture of herrings on the coast of Scotland. As regards the numbers captured off the Isle of Man, at Yarmouth, and other English fisheries, we have no authentic information—no statistics being taken of the English herring or other fisheries. The following figures denote the quantities of herrings which have been cured in Scotland during the last six years—a period which affords a very fair idea of the fluctuations incidental to this fishery:—

Year.	Barrels.	Year.	Barrels.
1867 . .	825,589	1870 . .	833,160
1868 . .	651,433	1871 . .	825,475
1869 . .	675,143	1872 . .	773,859

The Commissioners state that, at the rate of 4d. per barrel a sum of £7045 : 10 : 6 was derived in 1872 from the exercise of the brand, which is the largest amount yet obtained in any one year since payments for branding were exacted. For branding portions of the take of the above six years a sum of £30,669 : 4 : 2 was taken by the Board; which, as the payment of fees is not compulsory, shows that the brand, as an official certificate of cure, is greatly appreciated by a considerable body of the Scottish curers; the number of barrels branded last year being 422,731, or more than half of the quantity which was cured. It is estimated by the Commissioners that the fees taken for branding yielded in 1872 a profit to the Government of £3765. As already stated the quantity of herrings cured in 1872 was 773,859 barrels, and of these, as has been shown, 422,731 barrels were branded, a proportion which is larger than that of any preceding year, and proves, say the Commissioners, "the care with which the herrings were selected for market." The Commissioners also say that, "considering the great extent of the herring fishery, that it is carried on *at night*, the rough weather to which the boats are often exposed, the unavoidable

hurry with which they are unloaded to get the fish into the curing stations as soon as possible after they are caught—the number of mixed hands then put upon them to gut and pack, and the rapidity with which that work has to be done, it speaks well for the existing organisation of the fisheries of Scotland that 54 per cent of the total cure, or more than one half, should have reached the high standard required by the Board." Another feature which is brought out by the Commissioners in connection with the brand is, that the quantity branded this year bears an unusual proportion to the quantity exported, which was 549,631 barrels; showing that only 126,900 barrels were exported which were not branded, a number which, though it may seem considerable, is small when analysed; for it includes ungutted fish, also the export to Ireland, which consists for the most part of fish not originally selected for first-class cure; also the greater part of the fish from the early herring fishery of the Hebrides prepared for immediate sale. In short, the quantity exported is 71 per cent of the quantity cured, and the quantity branded is 77 per cent of the quantity exported, thus showing that more than three-fourths of the export trade consists of branded herrings. The highest years of branding previous to 1872 were the years 1820, 1862, and 1871. The branding in these years was:—In 1820, 363,872 barrels; in 1862, 346,712 barrels; in 1871, 346,663 barrels; in 1872, 422,731 barrels. The branding of 1872 has therefore exceeded the branding of 1820 by 58,859 barrels, equal to 16 per cent of increase, and has exceeded the branding of 1862 by 76,019 barrels, and of 1871 by 76,098 barrels, equal in each of these years to 22 per cent of increase. In this comparison it is to be remarked further, that the year 1820 includes brandings at stations in England, and that the brand was given at that time not only without the charge of a fee, but with a bounty upon it paid by the Government; a bounty which amounted for the year 1820 to upwards of £72,000. It is therefore remarkable to see Scotland alone, without England, and without the stimulus of a bounty, relieving Government by an annual payment which could reach in a year £72,000, and substituting instead a return from branding which has already paid to Government upwards of £63,000, and which yielded as its collection in 1872 the sum of £7045 : 10 : 6.

An improved order of fishing boat has of late come prominently into use in the Scottish herring-fishery. Decked boats

are now coming greatly into use, and in time will entirely supplant the old-fashioned open boats. Upon the east coast particularly, nearly every new boat now built is bigger than the one it displaces, and although the decked vessels cost much more money than the open boats, the return which they yield is commensurate with the cost. At some fishing places the gains of those crews fishing with decked vessels ranged in 1872 from £100 to £550 per boat, while the money taken by other crews about the same place who fished with open boats did not exceed £160, that being the highest amount reached, some crews only realising £60 for their season's adventure. The decked boats cost about £200 each, and it is thought by the builders that there will not be less than 600 of this class of vessels at work in the fishery of this year. Already at Buckie, on the Banffshire coast, there are 400 such vessels engaged in the fishing, and in every important fishery district the boatbuilders are at work adding to the fleet. "No fisherman would now," say the Commissioners, "undertake fishing with boats and nets of the kind which were in use a century ago, and the increase in the number of boats and fishermen during the last ten years yields conclusive evidence of the steadily advancing prosperity of the Scottish fisheries. We gather from the current report that the number of fishing boats belonging to Scotland in 1862 was 12,545, and that, in the ten years which have elapsed since, that number has increased at the rate of 260 boats per annum, and the total number of Scottish boats now engaged in the fisheries is 15,232. In 1862 the number of fishermen in Scotland was 41,008, but the number now is 46,178, being an increase in ten years of 5170 fishermen, or an average of 500 per year. The value of the boats and fishing gear was estimated in the year 1862 at £747,794, and in 1872 at £997,293, being an increase in ten years of £249,499, equal to an annual average of about £25,000. "In boats, and in the condition of the fishermen, the fisheries of Scotland may therefore be regarded as thriving."

As to the takes of herring at the different fishing districts, the report of the fishery of 1872 records the usual fluctuations—an increase in one district, a decline in another. At Fraserburgh and Peterhead the fishing of 1872 was remarkably successful, as also at Aberdeen, where the fishery is only of recent development. At these places larger quantities of herring were cured last year than ever were cured before. Upon the west coast the fishing was again deficient, the Lewes fishery

being far less productive than in former seasons. At Campbeltown the fishery was very prolific, the fishing of 1872 being the most successful of any year of which there is a record in the district. The winter herring fishery of the Firth of Forth was very deficient in productiveness, but the sprat fishery proved only too abundantly productive, as the quantity of sprats taken began to exceed the demand. At one time sprats were selling as low as a ls. per barrel.

The herring fishery of 1873 has been more than usually productive, but no official statistics regarding it will be procurable till next year. At some of the stations the curers were unable to operate in consequence of an exhaustion of the materials of cure. Boats so seldom reach an average of more than sixty crans that, in seasons when that quantity is exceeded, the curer, counting on the average, is sure to be found unprepared—hence large quantities of the fish are wasted, and a cry is circulated of a prolific fishery, and men triumphantly point to the fact, and ask What about “the fished-up” theory now? But the answer is not far to seek: the number of boats and extent of netting ought to capture double—nay treble—the quantity of herring they have taken this year, or any previous year in which the take has been larger. Because the curers have run out of the materials of cure the cry has arisen that we have had a great fishery!

The quantity of netting now employed in the herring-fishery is enormous, and is increasing from year to year. It has been strongly represented by Mr. Cleghorn, and others who hold his views, that the herring-fishery is on the decline; that if the fish were as plentiful as in former years, the increased amount of netting would capture an increased number of herrings. It is certain that, with a growing population and an increasing facility of transport, we are able to use a far larger quantity of sea produce now than we could do fifty years ago, when we were in the pre-Stephenson age. If, with our present facilities for the transport of fish to inland towns, Great Britain had been a Catholic instead of a Protestant country, having the example of the French fisheries before us, I have no hesitation in saying that by this time our fisheries would have been completely exhausted—that is, supposing no remedial steps had been taken to guard against such a contingency. Were we compelled to observe Lent with Catholic rigidity, and had there been numerous fasts or fish-days, as there used to be in England

before the Reformation, the demand, judging from our present ratio, would have been greater than the sea could have borne. Interested parties may sneer at these opinions; but, notwithstanding, I maintain that the pitcher is going too often to the well, and that some day soon it will come back empty.

I have always been slow to believe in the inexhaustibility of the shoals, and can easily imagine the overfishing, which some people pooh-pooh so glibly, to be quite possible, especially when supplemented by the cod and other cannibals so constantly at work, and so well described by the Lochfyne Commission; not that I believe it possible to pick up or kill every fish of a shoal; but, as I have already hinted, so many are taken, and the economy of the shoal so disturbed, that in all probability it may change its ground or amalgamate with some other herring colony. I shall be met here by the old argument, that "the fecundity of fish is so enormous as to prevent their extinction," etc. etc. But the certainty of a fish yielding twenty thousand eggs is no surety for these being hatched, or if hatched, of their escaping the dangers of infancy, and reaching the market as table food. I watch the great shoals at Wick with much interest, and could wish to have been longer acquainted with them. How long time have the Wick shoals taken to grow to their present size?—what size were the shoals when the fish had leave to grow without molestation?—how large were the shoals when first discovered?—and how long have they been fished? are questions which I should like to have answered. As it is, I fear the great Wick fishery must come some day to an end. When the Wick fishery first began the fisherman could carry in a creel on his back the nets he required; now he requires a cart and a good strong horse!

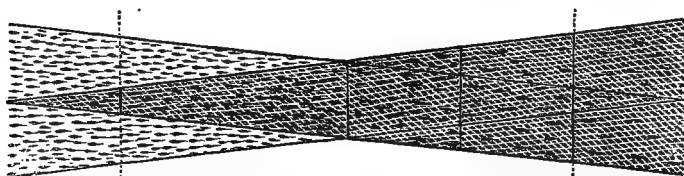
Although Scotland is the main seat of the herring-fishery, I should like to see statistics, similar to those collected in Scotland, taken at a few English ports for a period of years, in order that we might obtain additional data from which to arrive at a right conclusion as to the increase or decrease of the fishery for herring. It is possible to collect statistics of the cereal and root crops of the country; it was done for all Scotland during three seasons, and it was well and quickly accomplished. What can be done for the land may also, I think, be done for the sea. I believe the present Board for Scotland to be most useful in aiding the regulation of the fishery, and in collecting statistics of the catch; their functions, however, might be considerably extended, and

elevated to a higher order of usefulness, especially as regards the various questions in connection with the natural history of the fish. The operations of the Board might likewise be extended for a few seasons to a dozen of the largest English fishing-ports, in order that we might obtain confirmation of what is so often rumoured, the falling off of our supplies of sea-food. There are various obvious abuses also in connection with the economy of our fisheries that ought to be remedied, and which an active Board could remedy and keep right; and a body of naturalists and economists might easily be kept up at a slight toll of say a guinea per boat.

The state of the case as between the supply of fish and the extent of netting has been focussed into the annexed diagram, which shows at a glance how the question stands.

1818-1845. The drift of nets per boat contained 4500 square yards.

1857-1863. The drift of nets per boat contained 16,800 square yards.



1818-1824. The average per boat 125½ crans.

During the 10 years 1841-50 the average catch per boat was 112 crans.

1857-1863. The average per boat 82 crans.

## CHAPTER X.



### OUR WHITE-FISH FISHERIES.

Difficulty of obtaining Statistics of our White-Fish Fisheries—Ignorance of the Natural History of the White Fish—"Finnan Haddies"—The Gadidæ Family : the Cod, Whiting, etc.—The Turbot and other Flat Fish—When Fish are in Season—How the White-Fish Fisheries are carried on—The Cod and Haddock Fishery—Line-Fishing—The Scottish Fishing Boats—Loss of Boats on the Scottish Coasts—Storms in Scotland—Trawl-Net Fishing—Description of a Trawler—Evidence on the Trawl Question.

How do we obtain our haddocks? Where do we get our turbot? How comes it that all kinds of sea-fish are now so dear? I propose briefly to answer these often-asked questions, and to indulge at the same time in a little gossip about our larger sea-fishes, so far as their economic history and value are concerned.

The two families which supply the cod, haddock, turbot, sole, and other well-known table-fishes, such as the whiting and flounder, are known to naturalists as *Gadidæ* and *Pleuronectidæ*—the latter being the family of the flat fishes. Cod and turbot are of considerable individual value, large prices being, at certain seasons of the year, obtained for them; indeed, it is not long since the columns of the *Times* recorded that a guinea had been given for a single cod-fish; and as to haddocks and whittings, once so cheap, they are now, in every sense of the word, dear, because, in addition to costing much money, they are not so fine in quality as they used to be. At one time, in various parts of both England and Scotland, a prime haddock, of say three pounds weight, might have been purchased for about twopence; and a cod-fish of great size could, in the days referred to, be purchased for ninepence. Indeed, so near the present time as a quarter of a century ago, all kinds of white fish were purchasable at less than a penny per pound weight; and as for sprats and herrings, a large dish of the former could be had for a half-

penny, whilst, "three a penny" was a common price for the finest fresh herrings. At various times within the memory of the present generation, both sprats and herrings have been so plentiful as to be sold for manure. Such days, however; are gone, never to return. The railways, which have altered so many conditions of life and trade, have changed entirely the whole system of fish commerce. Thousands of tons of our best food fishes are now borne daily from the sea to the great inland seats of population, where there is a sure and speedy demand for as much as can be sent. The London commissariat alone, supplemented by a few other large cities, demands, but fortunately does not obtain, all the fish of the sea! Haddocks, cod-fish, whittings, and turbot, can be sold in any quantity when the price is moderate; but no person can exactly estimate the supply, as there is no record kept at Billingsgate of the total business done there; nor is all the fish business of London now transacted at Billingsgate, as many of the West-end fishmongers obtain their supplies direct from the coast. We should be glad if reliable statistics of the annual "take" of sea-fish were collected by Government. Correct figures would be a guide as to the supplies; we should then really know if our fish food was increasing or diminishing. Such statistics are taken in Scotland as regards the herring, and what is done for that fish might be done for other fishes. It is said that there are at present a thousand trawlers employed for the London market; and if each of these vessels takes about one hundred tons of fish per annum, we should find that nearly one hundred thousand tons of large fish are taken every year, in addition to the abundant supplies of herring, mackerel, sprats, etc., which are being constantly forwarded day by day to the great metropolis.

The natural history of our white fish is but imperfectly known. As an instance of the very limited knowledge we possess of the natural history of even our most favourite fishes, I may state that at a meeting of the British Association a few years ago, a member who read an interesting paper *On the Sea Fisheries of Ireland*, introduced specimens of a substance which the Irish fishermen considered to be spawn of the turbot; stating that wherever this substance was found trawling was forbidden; the supposed spawn being in reality a kind of sponge, with no other relation to fish except as being indicative of beds of mollusca, the abundance of which marks that fish are plentiful. It follows that the stoppage of trawling on the grounds

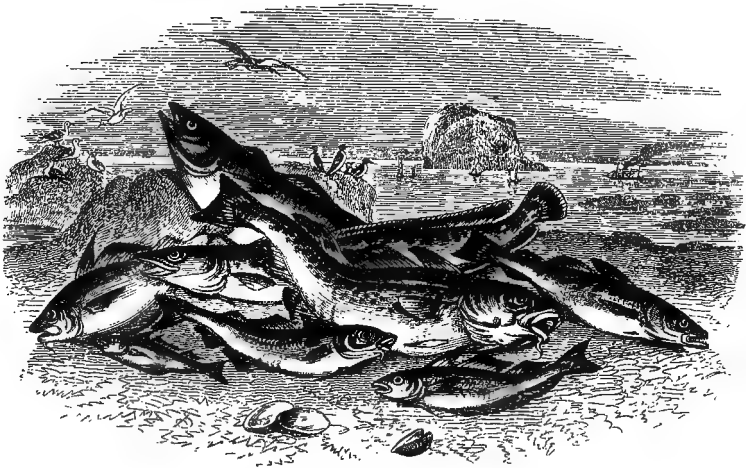


where this kind of squid is found is the result of sheer ignorance, and causes the loss, in all likelihood, of great quantities of the best white fish. It is not easy to say when the Gadidæ are in proper season. Some of the members of that family are used for table purposes all the year round; and as different salmon rivers have their different close-times, so undoubtedly will the white fish of different seas or firths have different spawning seasons. In reference, for instance, to so important a fish as the turbot, we are very vaguely told by Yarrell that it spawns in the spring-time, but no indication is given of the particular month in which that important operation takes place, or how long the young fish take to grow. Even a naturalist so well informed as the late Mr. Wilson was of opinion that the turbot was a travelling fish, which migrated from place to place.

The combined ignorance of naturalists and fishermen has much to do with the scarcity of white fish now beginning to be experienced; and unless some plan be hit upon to prevent overfishing, we may some fine morning experience the same astonishment as a country gentleman's cook, who had given directions to the gamekeeper to supply the kitchen regularly with a certain quantity of grouse. For a number of years she found no lack, but in the end the purveyor threw down the prescribed number, and told her she need look for no more from him, for on that day the last grouse had been shot. "There they are," said the gamekeeper, "and it has taken six of us, with a gun apiece, to get them, and after all we have only achieved the labour which was gone through by one man some years ago." The cook had unfortunately never considered the relation between guns and grouse.

The Gadidæ family is numerous, and its members are valuable for table purposes; three of the fishes of that genus are particularly in request—viz. whiting, cod, and haddock. These are the three most frequently eaten in a fresh state; there are others of the family which are extensively captured for the purpose of being dried and salted, among which are the ling, the tusk, etc. The haddock (*Morrhua aylefinus*) has ever been a favourite fish, and the quantities of it which are annually consumed are really wonderful. Vast numbers used to be taken in the Firth of Forth, but from recent inquiries at Newhaven I am led to believe that the supply has considerably decreased of late years, and that the local fishermen have to proceed to considerable distances in order to procure any quantity.

In reference to the question, "Where are the haddocks?" asked on another page, it is right to say that this prime fish has more than once become scarce. I have been reminded of a time, in 1790, when three of these fish were sold for 7s. 6d. in the Edinburgh market; but although there have been from time to time sudden disappearances of the haddock from particular fishing-grounds, as indeed there have been of all fish, that is a different, a totally different matter from what the fisher folk and the public have now to complain of—viz. a yearly decreasing supply. I once took part in a newspaper controversy about the scarcity of the haddock, and I found plenty of opponents ready to maintain that there was no scarcity, but that any quantity



THE GADIDÆ FAMILY.

could be captured. In some degree that is the truth, but what is the hook-power required now to capture "any quantity," and how long does it take to obtain a given number as compared with former times, when that fish was supposed to be more plentiful? Why do we require, for instance, to send to Norway and other distant places for haddocks and other white fish? The only answer I can imagine is that we cannot get enough at home. As to the general scarcity of white fish, the late Mr.

Methuen, the fish-curer, wrote some few years ago:—"This morning I am told that an Edinburgh fishmonger has bought all the cod brought into Newhaven at 5s. to 7s. each. I recollect when I cured thousands of cod at 3d. and 4d. each; they were caught between Burntisland and Kincardine, on which ground not a cod is now to be got; and at the great cod emporium of Cellardyke, the cod fishing, instead of threescore for a boat's fishing, has dwindled down to about half-a-dozen cod."

The old belief in the migratory habits of fish comes again into notice in connection with the haddock. Pennant having taught us that the haddock appeared periodically in great quantities about mid-winter, that theory is still believed, although the appearance of this fish in shoals may be easily explained, from the local habits of most of the denizens of the great deep. It is said that "in stormy weather the haddock refuses every kind of bait, and seeks refuge among marine plants in the deepest parts of the ocean, where it remains until the violence of the elements is somewhat subsided." This fish does not grow to any great size; it usually averages about five pounds. I prefer it as a table fish to the cod. The very best haddocks are taken on the coast of Ireland. The scarcity of fresh haddocks may in some degree be accounted for by the immense quantities which are converted into "Finnan haddies"—a well-known breakfast luxury no longer confined to Scotland. It is difficult to procure genuine Finnans, smoked in the original way by means of peat-reek; like everything else for which there is a great demand, Finnan haddocks are now "manufactured" in quantity; and, to make the trade a profitable one, they are cured by the hundred in smoking-houses built for the purpose, and are smoked by burning wood or sawdust, which, however, does not give them the proper *gout*. In fact the wood-smoked Finnans, except that they are fish, have no more the right flavour than Scotch marmalade would have were it manufactured from turnips instead of bitter oranges. Fifty years ago it was different; then the haddocks were smoked in small quantities in the fishing villages between Aberdeen and Stonehaven, and entirely over a peat fire. The peat-reek imparted to them that peculiar flavour which gained them a reputation. The fisher-wives along the north-east coast used to pack small quantities of these delicately-cured fish into a basket, and give them to the guard of the "Defiance" coach, which ran between Aberdeen and Edinburgh, and the guard brought them to town, confiding them for

sale to a brother who dealt in provisions ; and it is known that out of the various transactions which thus arose, individually small though they must have been, the two made, in the course of time, a handsome profit. The fame of the smoked fish rapidly spread, so that cargoes used to be brought by steamboat, and Finnans are now carried by railway to all parts of the country with great celerity, the demand being so great as to induce men to foist on the public any kind of cure they can manage to accomplish ; indeed smoked codlings are extensively sold for Finnan haddocks. Genuine smoked haddocks of the Moray Firth or Aberdeen cure can seldom now be had, even in Edinburgh, under the price of sixpence per pound weight.

The common cod (*Morrhua vulgaris*) is, as the name implies, one of our best-known fishes, and it was at one time very plentiful and cheap. It is found in the deep waters of all our northern seas, but has never been known in the Mediterranean. It has been largely captured on the coasts of Scotland, and, as is elsewhere mentioned, it occurs in profusion on the shores of Newfoundland, where its plentifulness led to a great fishery being established. The cod is extremely voracious, and eats up most greedily the smaller inhabitants of the seas ; it grows to a large size, and is very prolific in the perpetuation of its kind. A cod-roe has more than once been found to be half the gross weight of the fish, and specimens of the female have been caught with upwards of three millions of eggs ; but of course it cannot be expected that in the great waste of waters all the ova will be fertilised, or that any but a small percentage of the fish can ever arrive at maturity. This fish spawns in mid-winter, but there are no very reliable data to show when it becomes reproductive. My own opinion has already been expressed that the cod is an animal of slow growth, and I would venture to say that it is at least three years old before it is endowed with any breeding power. I may call attention here to one of the causes that must tend to render the fish scarce. As if the natural enemies of the young fish were not sufficient to aid in its extirpation, and the loss of the ova from causes over which man has no control not enough in the way of destruction, there is a commerce in cod-roe, and enormous quantities of it, as I have mentioned in the preceding chapter, are used in France as ground-bait for the sardine fishery ! The roe of this fish is also frequently made use of at table ; a cod-roe of from two to four pounds in weight can unfortunately be bought for a mere trifle,

but it ought to cost a good few pounds instead of a few pence. I have elsewhere stated that the quantity of eggs yielded by a female cod is often three millions: supposing only a third of them to come to life—that is one million—and that a tenth part of that number, viz. one hundred thousand, becomes in some shape—that is, either as codling or cod—fit for table uses, what should be the value of the cod-roe that is carelessly consumed at table? If each fish be taken as of the value of sixpence, the amount would be £2500. But supposing that only twenty full-grown codfish resulted from the three millions of eggs; these, at two and sixpence each, would represent the sum of fifty shillings as the possible produce of one dish, which, in the shape of cod-roe, cost only about as many farthings!

Cuvier tells us that “almost all the parts of the cod are adapted for the nourishment of man and animals, or for some other purposes of domestic economy. The tongue, for instance, whether fresh or salted, is a great delicacy; the gills are carefully preserved, to be employed as baits in fishing; the liver, which is large and good for eating, also furnishes an enormous quantity of oil, which is an excellent substitute for that of the whale, and applicable to all the same purposes; the swimming-bladder furnishes an isinglass not inferior to that yielded by the sturgeon; the head, in the places where the cod is taken, supplies the fishermen and their families with food. The Norwegians give it with marine plants to their cows, for the purpose of producing a greater proportion of milk. The vertebræ, the ribs, and the bones in general, are given to their cattle by the Icelanders, and by the Kamtschatkians to their dogs. These same parts, properly dried, are also employed as fuel in the desolate steppes of the shores of the Icy Sea. Even their intestines and their eggs contribute to the luxury of the table.” I may just mention another most useful product of the codfish. Cod-liver oil is now well known in *materia medica* under the name of *oleum jecoris aselli*. The best is made without boiling, by applying to the livers a slight degree of heat, straining through thin flannel or similar texture. When carefully prepared it is quite pure, nearly inodorous, and of a crystalline transparency. The specific gravity at temperature 64° is about .920°. It seems to have been first used medicinally by Dr. Percival in 1782 for the cure of chronic rheumatism; afterwards by Dr. Bardsly in 1807. It has now become a popular remedy in all the slow-wasting diseases, particularly in scrofulous

affections of the joints and bones, and in consumption of the lungs. The result of an extended trial of this medicine in the hospital at London for the treatment of consumptive patients shows that about 70 per cent gain strength and weight, and improve in health, while taking the cod-liver oil; and this good effect with a great many is permanent. Skate-liver oil is likewise coming into use for medicinal purposes, and I have no doubt that the oil obtained from some of our other fishes will one day be found useful in a medicinal point of view.

The codfish is best when eaten fresh, but vast quantities are sent to market in a dried or cured state: the great seat of the cod-fishery for curing purposes is at Newfoundland. But considerable numbers of cod and ling are likewise cured on the coasts of Scotland. The mode of cure is quite simple. The fish must be cured as soon as possible after it has been caught. A few having been brought on shore, they are at once split up from head to tail, and by copious washings thoroughly cleansed from all particles of blood. A piece of the backbone being cut away, they are then drained, and afterwards laid down in long vats, covered with salt, heavy weights being placed upon them to keep them thoroughly under the action of the pickle. By and by the fish are taken out of the vat, and are once more drained, being at the same time carefully washed and brushed to prevent the collection of any kind of impurity. Next the fish are *pined* by exposure to the sun and air; in other words, they are bleached by being spread out individually on the sandy beach, or upon such rocks or stones as may be convenient. After this process has been gone through the fish are then collected into little heaps, which are technically called *steeples*. When the *bloom*, or whitish appearance which after a time they assume, comes out on the dried fish the process is finished, and they are then quite ready for market. The consumption of dried cod or ling is very large, and extends over the whole globe; vast quantities are prepared for the religious communities of Continental Europe, who make use of it on the fast-days instituted by the Roman Catholic Church.

Besides the common cod, there are the dorse (*M. callarias*), and the poor or power cod (*M. minuta*), also the bib or pout (*M. lusca*).

The whiting (*Merlangus vulgaris*) is another of our delicious table-fishes, which is found in comparative plenty on the British coasts. This fish is by some thought to be superior to all the other

Gadidæ. Very little is known of its natural history. It deposits its spawn in March, and the eggs are not long in hatching—about forty days, I think, varying, however, with the temperature of the season. Before and after shedding its milt or roe the whiting is out of condition, and should not be taken for a couple of months. The whiting prefers a sandy bottom, and is usually found a few miles from the shore, its food being much the same as that of other fishes of the family to which it belongs. It is a smallish fish, usually about twelve inches long, and on the average two pounds in weight.

I need scarcely refer to the other members of the Gadidæ: they are numerous and useful, but, generally speaking, their characteristics are common and have been sufficiently detailed.\* I will now, therefore, say a few words about the Pleuronectidæ. There are upwards of a dozen kinds of flat fish that are popular for table purposes. One of these is a very large fish known as the holibut (*Hippoglossus vulgaris*), which has been

\* A correspondent has favoured me with the following brief account of the *sillock-fishing* as carried on in Shetland:—"Sillocks are the young of the saith, and they make their appearance in the beginning of August about the small isles, and are of the size of parrs in Tweed. They continue about said isles for a few weeks, and in the months of September and October, and sometimes longer, they hover about the small isles, when the fishermen catch them for the sake of their liver, which contains oil. One boat of twelve feet of keel will sometimes catch as many as thirty bushels in a part of a day, and this year (1864), owing to the high price of oil, each bushel was worth about ls. 6d. The fish itself is taken to the dung-hill when the take is not great, but when there is a great take the liver is taken out and the fish thrown into the sea. There are no Acts of Parliament against using the net; but after some time the sillocks leave the isles and draw to the shore, where there are any edge-places. It is allowed that the island of Whalsey is about the best place in Shetland for the fish to draw to, but whenever they come there, the proprietor, Mr. Bruce, will not allow "pocking," as a week would finish them all; but the people must all fish with the rod, so that each man may get as many as keep him a day or two. The "pocking" sets them all out, but the fish don't mind the rod; it is very picturesque to see perhaps fifty men sitting round the basin with their rods, and the sillocks covering about a rood of the sea, varying from three to six feet deep, and so close together that you would think they could not get room to stir. They will continue plentiful till the end of April, at which time they take to the deep sea; and when they make their appearance the following year they are about four times larger, and are then called pillocks. But these are only taken by the rod. Mr. Bruce just says, If you pock, you cannot be my tenant; so they must either give up the one or the other, and by that way of doing every household has as many of these small fish as they can make use of during the winter."

found in the northern seas to attain occasionally a weight of from three to four hundred pounds.\* One of this species of fish of extraordinary size was brought to the Edinburgh market in April 1828 ; it was seven feet and a half long, and upwards of three feet broad, and it weighed three hundred and twenty pounds ! The flavour of the holibut is not very delicate, although it has been frequently mistaken for turbot by those not conversant with fish history.

The true turbot (*Rhombus maximus*) is the especial delight of aldermanic epicures, and fabulous sums are said to have been given at different times by rich persons in order to secure a turbot for their dinner-table. This fine fish is, or rather used to be, largely taken on our own coasts ; but now we have to rely upon more distant fishing-grounds for a large portion of our supply. The old complaint of our ignorance of fish habits must be again reiterated here, for it is not long since it was supposed that the turbot was a migratory fish that might be caught at one place to-day and at another to-morrow. The late Mr. Wilson, who ought to have known better, said, in writing about this fish :—"The English markets are largely supplied from the various sandbanks which lie between our eastern coasts and Holland. The Dutch turbot-fishery begins about the end of March, a few leagues to the south of Schevening. The fish *proceed* northwards as the season advances, and in April and May are found in great shoals upon the banks called the Broad Forties. Early in June they surround the island of Heligoland, where the fishery continues to the middle of August, and then terminates for the year. At the beginning of the season the trawl-net is chiefly used ; but on the occurrence of warm weather the fish retire to deeper water, and to banks of rougher ground, where the long line is indispensable."

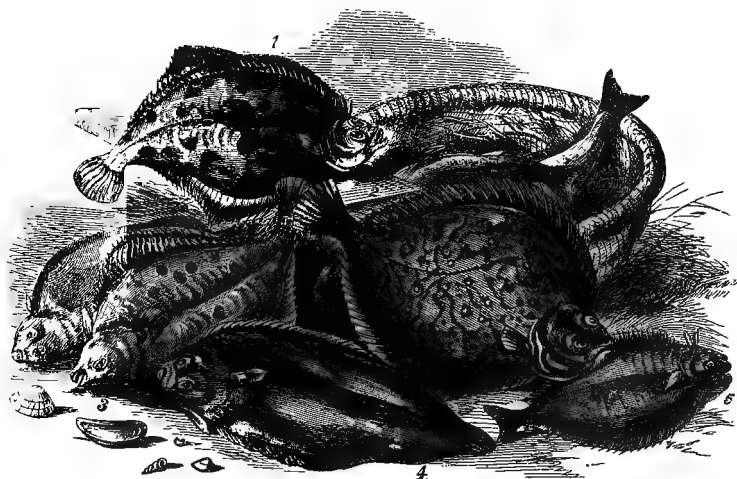
The turbot was well known in ancient gastronomy ; the luxurious Italians used it extensively, and christened it the sea-pheasant from its fine flavour. In the gastronomic days of ancient Rome the wealthy patricians were very extravagant in the use of all kinds of fish ; so much so that it was said by a satirist that

" Great turbots and the soup-dish led  
To shame at last and want of bread."

The turbot is very common on the English and Scottish coasts, and is known also on the shores of Greece and Italy. This



fish is taken chiefly by means of the trawl-net, but in some places it is fished for by well-baited lines. We derive large quantities of our turbot from Holland, so much as £100,000 having been paid to the Dutch in one year for the quantities of these fish which were brought to London, and on which, at one time, a duty of £6 per boat was exigible. This fish spawns during the autumn, and is in fine condition for table use during the spring and early summer. Yarrell says the turbot spawns in the spring; but, with due respect, I think he is wrong; I would not, however, be positive about this, for there will no



THE PLEURONECTIDÆ FAMILY.

1. Flounder. 2. Turbot. 3. Plaice. 4. Sole. 5. Dab.

doubt be individuals of the turbot kind, as there are of all other kinds, that will spawn all the year round. The turbot is a great flat fish. In Scotland, from its shape, it is called "the bannock fluke." It is about twenty inches long, and broad in proportion; and a prime fish of this species will weigh from eight to twelve pounds.

The best-known fish of the Pleuronectidæ is the sole (*Solea vulgaris*), which is largely distributed in all our seas, and used

in immense quantities in London and elsewhere. The sole is too well known to require any description at my hands. It is caught by means of the trawl-net, and is in good season for a great number of months. Soles of a moderate weight are best for the table. I prefer such as weigh from three to five pounds per pair. I have been told, by those who ought to know best, that the deeper the water from which it is taken the better the sole. It is quite a ground fish, and inhabits the sandy places round the coast, feeding on minor crustaceans, and on the spawn and young of various kinds of fish. Good supplies of this popular fish are taken on the west coast of England, and they are said to be very plentiful in the Irish seas; indeed all kinds of fish are said to inhabit the waters that surround the Emerald Isle. There can be no doubt of this, at any rate, that the fishing on the Irish coasts has never been so vigorously prosecuted as on the coasts of Scotland and England—so that there has been a greater chance for the best kinds of white fish to thrive and multiply. Seaside visitors would do well to go on board some of the trawlers and observe the mode of capture. There is no more interesting way of passing a seaside holiday than to watch or take a slight share in the industry of the neighbourhood where one may be located.

The smaller varieties of the flat fish—such as Muller's top-knot, the flounder, whiff, dab, plaice, etc.—I need not particularly notice, except to say that immense quantities of them are annually consumed in London and other cities. Mr. Mayhew, in some of his investigations, found out that upwards of 33,000,000 of plaice were annually required to aid the London commissariat! But that is nothing. Three times that quantity of soles are needed—one would fancy this to be a statistic of shoe-leather—the exact figure given by Mr. Mayhew is 97,520,000! This is not in the least exaggerated. I discussed these figures with a Billingsgate salesman, and he thinks them quite within the mark.

I have already alluded to the natural history of the mackerel, and shall now say a word or two about the fishery, which is keenly prosecuted. The great point in mackerel-fishing is to get the fish into the market in its freshest state; and to achieve this several boats will join in the fishery, and one of their number will come into harbour as speedily as possible with the united take. The mackerel is caught in England chiefly by means of the seine-net, and much in the same way as the pilchard. A

great number of this fish are however captured by means of well-baited lines, and in some places a drift-net is used. Any kind of bait almost will do for the mackerel-hooks—a bit of red cloth, a slice of one of its own kind, or any clear shiny substance. Mackerel are not quite so plentiful as they used to be.

As to when the Gadidæ and other white fish are in their proper season it is difficult to say. Their times of sickness are not so marked as to prevent many of the varieties from being used all the year round. Different countries must have different seasons. We know, for instance, that it is proper to have the close-time of one salmon river at a different date from that of some other stream that may be farther south or farther north; and I may state here, that during several winter visits which I made to the Tay, beautiful clean salmon were running in December. There are also exceptional spawning seasons in the case of individual fish, so that we are quite safe in affirming that the sole and turbot are in season all the year round.

There is no organisation in Scotland for carrying on the white fisheries, as there is in the case of the oyster or herring fisheries. So far as our most plentiful table fish are concerned, the supply seems utterly dependent on chance or the will of individuals. A man (or company) owning a boat goes to sea just when he pleases. In Scotland, where a great quantity of the best white fish are caught, this is particularly the case, and the consequence is that at the season of the year when the principal white and flat fish are in their prime condition, they are not to be procured; the general answer to all inquiries as to the scarcity being, "The men are away at the herring." This is true; the best boats and the strongest and most intelligent fishermen have removed for a time to distant fishing-towns to engage in the capture of the herring, which forms, during the summer months, a noted industrial feature on the coasts of Scotland, and allures to the scene all the best fishermen, in the hope that they may gain a prize in the great herring-lottery, prizes in which are not uncommon, as some boats will take fish to the extent of two hundred barrels in the course of a week or two. Only a few decrepit old men are left to try their luck with the cod and haddock lines; the result being, as I have stated above, a scarcity of white and flat fish, which is beginning to be felt in greatly enhanced prices. An intelligent Newhaven fishwife recently informed me that the price of white fish in Edinburgh—a city close to the sea—has been more than quadrupled within

the last thirty years. She remembers when the primest haddocks were sold at about one penny per pound weight, and in her time herrings have been so plentiful that no person would purchase them. We shall not soon look again on such times.

The cod and haddock fishery is a laborious occupation. At Buckie, a quaint fishing-town on the Moray Firth, it is one of the staple occupations of the people. At that little port there are generally about thirty or forty large boats engaged in the fishery, as well as a number of smaller craft used to fish inshore. These boats, which measure from thirty to forty feet, are, with the necessary hooks and lines, of the value of about £100. Each boat is generally the property of a joint-stock company, and has a crew of eight or nine individuals, who all claim an equal share in the fish captured. The Buckie men often go a long distance, forty or fifty miles, to a populous fishing-place, and are absent from home for a period of fifteen or twenty hours. At many of the fishing villages from which herring or cod boats depart, there is no proper harbour, and at such places the sight of the departing fleet is a most animated one, as all hands, women included, have to lend their aid in order to expedite the launching of the little fleet, as the men who are to fish must be kept dry and comfortable. Even at places where there is a harbour, it is often not used, many of the boats being drawn up for convenience on what is called the boat-shore. At Cockenzie, near Edinburgh, several of the boats are still drawn up in this rude way, and the women not only assist in launching and drawing up the boats, but they sell the produce taken by each crew by auction to the highest bidder—the purchasers usually being buyers of speculation, who send the fish by train to Edinburgh, Manchester, or London.

From the little ports of the Moray Firth, the men, as I have said, have to go long distances to fish for cod and ling. As they have none but open boats, it will easily be understood that they live hard upon such occasions. They are sometimes absent from home for about a week at a stretch, and as the weather is often very inclement the men suffer severely. The fish are not so easily procured as in former years, so that the remuneration for the labour undergone is totally inadequate. A large traffic in living codfish used to be carried on from Scotland; quick vessels furnished with wells took the cod alive as far as Gravesend, whence they were sent on to London as required.

I cannot say much about the white-fish fisheries of Ireland

from personal knowledge, but the latest report of the Irish fishery inspectors contains some interesting information on the subject which I have abridged for the benefit of my readers. I glean from it that the Irish fisheries are at present in a somewhat sensational position, and have of late attracted more than usual attention. The reason of this is their rapid decline—a decline which dates from the beginning of the Irish famine in 1846. At that period nearly 20,000 boats or other vessels of various sizes were engaged in the Irish fisheries, manned by over 100,000 men and boys. Last year [1872] the number of vessels and boats was under 8000, and the men and boys taking part in the fisheries numbered a little over 31,000, being a decrease as compared with the previous year [1871] of, in round numbers 1000 boats and 7000 men.

Statistics of the Irish sea fisheries are annually collected by members of the Coastguard, who fill up schedules supplied by the inspectors, which seem one year with another to be consistent and reliable; but in addition to the matter collected by the Coastguardsmen, much interesting information about the Irish fisheries and the decline of co-operative fishing has been interpolated by the inspectors, who, in one paragraph of their present report, confirm to some extent an opinion which is held by some earnest inquirers, to the effect that in Ireland, as in Scotland and England, the fishermen find it necessary to go farther afield for their supplies, there being a considerable falling-off in the productiveness of the inshore fisheries compared with the quantities of fish obtained about thirty years ago. In consequence of this many fishers with imperfect or weak fishing gear have been obliged to give up fishing, not daring to venture to sea with old patched-up boats and ragged netting imperfectly protected from the action of the waves because of a deficient supply of catechu with which to dye or “bark” their nets and sails.

Other two of the numerous fishing companies started in Ireland were last year compelled to haul down their flag; these were the “South of Ireland Fishing Company,” which for some years carried on operations at Kinsale so far as its chief business was concerned, but which lately engaged in the herring fishery prosecuted off Howth; and the small “Limited” company known as the “Inishbofin Fishing Company.” There is now, properly speaking, no joint-stock fishing company in Ireland. The boats and gear of the South of Ireland Company were purchased by two or three private individuals, and other undertak-

ings of a semi-joint-stock kind have generally not more than three partners. As regards the numerous fishing companies started from time to time in Ireland, the inspectors tell us that they have in the end been obliged to be wound up with great loss to their shareholders. On the other hand, while the large companies have all been obliged to succumb to the force of circumstances, smaller enterprises entered into by practical men having a thorough knowledge of the art of fishing and of the best markets in which to sell their fish, have usually proved successful; and, as a proof of this averment, the inspectors point to the boats belonging to Dublin, and three or four small enterprises now in most successful operation at Dunmore, in the county of Waterford.

As one mode of arriving at the value, or at least the quantity, of the fish taken in Ireland, the returns of the weight carried on the various lines of railway are given, which the Commissioners might annually summarise for comparison with preceding years. The following is a summary of the tonnage for 1872:—Carried on railways, 5658 tons 11 cwt.; taken away by steamers, 3974 tons 18 cwt.; total, 9633 tons 9 cwt. But it is not explained by the inspectors whether any portion or how much of the fish taken away by steamboats to Scotland and England is included in the quantity sent by railway. Taking it for granted, however, that the steamboat portion was sent direct from the ports of capture, the weight of fish carried, reduced to pounds would be 21,578,928, which, at an average (wholesale price) of 3d. per pound—a considerable portion of the fish being salmon—would yield £269,736 : 12s.

The vexed question of loans to the Irish fishermen is more directly illustrated in the present report than it was in that of 1871. It was said then by the inspectors that if the same Imperial aid had been afforded to the Irish fisheries as has for years been extended to the Scottish fisheries, and if the landed proprietary on the Irish coast had taken as much interest in fishing as the Scottish gentry, the Irish fisheries of to-day would present a very different picture from the melancholy decay of that industry which is rapidly going on over fully two-thirds of the Irish coast-line. They attribute the highly prosperous condition of the Scottish fisheries in a great measure to the generous assistance which for many years has been extended to them by the Imperial Exchequer. The Inspecting Commanders of the Irish Coastguard have so frequently reported on the

loan question that the Inspectors of Irish Fisheries did not think this year of repeating their queries, but an analysis of the replies received in 1870-71 from the thirty divisions of the coast showed that in twenty loans would be beneficial, that security could be obtained in eight, that security would be doubtful in eleven, that it could not be obtained in one, that loans would not benefit the fishermen in six of the districts, and that the benefit would be doubtful in three. From one of the districts a return was not obtained. "It is singular," say the inspectors, "that in some of the divisions in which the Coastguard officers report that security would be doubtful, or loans not likely to prove beneficial, the Society for Bettering the Condition of the Poor of Ireland has made large advances without loss, and the fishermen have been much benefited."

Prolific as our coast fisheries have been, and still are, comparatively speaking, the North Sea is at present the grand reservoir from which we obtain our white fish. Indeed, it has been the great fish-preserve of the surrounding peoples since ever there was a demand for this kind of food. All the best-known fishing banks are to be found in the German Ocean—Faroe, Loffoden, Shetland, and others nearer home—and its waters, filling up an area of 140,000 square miles, teem with the best kinds of fish, and give employment to thousands of people, as well in their capture and cure as in the building of the ships, and the development of the commerce which is incidental to all large enterprise.

It will doubtless be interesting to my readers to know something about the general machinery of fish-capture, so far as regards the British sea-fisheries. The modern cod-smack, clipper-built for speed, with large wells for carrying her live fish, costs £1500. She usually carries from nine to eleven men and boys, including the captain. Her average expense per week is £20 during the long-line season in the North Sea; but it exceeds this much if unfortunate in losing lines. Fishing has of late been a most uncertain venture. The line is chiefly used for the purpose of taking cod and haddock. The number of lines taken to sea in an open boat depends upon the number of men belonging to the particular vessel. Each man has a line of 50 fathoms (300 feet) in length; and attached to each of these lines are 100 "snoods," with hooks already baited with mussels, pieces of herring or whiting. Each line is laid "clear" in a shallow basket or "scull"—that is, it is so arranged as to

run freely as the boat shoots ahead. The 50-fathom line, with 100 hooks, is in Scotland termed a "taes." If there are eight men in a boat the length of line will be 400 fathoms (2400 feet), with 800 hooks (the lines being tied to each other before setting). On arriving at the fishing-ground the fishermen heave overboard a cork buoy, with a flag-staff fixed to it about six feet in height. The buoy is kept stationary by a line, called the "pow-end," reaching to the bottom of the water, and having a stone or small anchor fastened to the lower end. To the pow-end is also fastened the fishing-line, which is then "paid" out as fast as the boat sails, which may be from four to five knots an hour. Should the wind be unfavourable for the direction in which the crew wish to set the line they use the oars. When the line or taes is all out the end is dropped, and the boat returns to the buoy. The pow-end is hauled up with the anchor and fishing-line attached to it. The fishermen then haul in the line with whatever fish may be on it. Eight hundred fish might be taken (and often have been) by eight men in a few hours by this operation; but many fishermen now say that they consider themselves very fortunate when they get a fish on every five hooks on an eight-taes line. Many a time too the fish are all eaten off the line by "dogs" and other enemies, so that only a few fragments and a skeleton or two remain to show that fish have been caught. The fishermen of deck-welled cod-bangers use both hand-lines and long-lines such as have been described. The cod-bangers' tackling is of course stronger than that used in open boats. The long-lines are called "grut-lines," or great-lines. Every deck-welled cod-banger carries a small boat on deck for working the great-lines in moderate weather. As soon as the cod and haddock are taken off the hooks they are put into a "well," formed by a part of the smack's hold, divided from the rest of the vessel by water-tight bulkheads. The well occupies the whole breadth of the vessel, and the sea has free access to it through auger holes bored in the sides and bottom of that part of the smack. When the well has been sufficiently stored, the vessel returns to port with her cargo of live fish, which are then transferred to chests, in which they are kept afloat, and in good order, till wanted for market. Some hundreds of these cod, according to the demand, are taken out of the chests every afternoon, and after being killed by one or two blows on the head, are sent by train to Billingsgate and other markets, where they are sold as "live cod," and fetch



the highest price given for that kind of fish. Haddocks are stored and treated in a similar manner, but the supply of line-caught haddocks is trifling compared with what is provided by the trawlers. Some cod-fish are still brought home alive in welled vessels, in the way described, whilst others of the fish are crimped. They are first of all stunned by a blow when they are caught, and then laid down in cases, from which they are only removed in order to be crimped.

Hungry codfish will seize any kind of bait, and great-lines are usually baited with bits of whiting, herring, haddock, or almost any kind of fish. For hand-lines the fishermen prefer mussels or white whelks. White whelks are caught by a line on which is fastened a number of pieces of carrion or cod-heads. This line is laid along the bottom where whelks are known to abound. The whelks attach themselves to the cod-heads, and are pulled up, put into net bags, something like onion-nets, and placed in the well of the vessel, where they are kept alive till required for use. Another kind of bait used by the boat fishermen for hand-lines is that of the lug-worm. The "lug" is a sand-worm, from four to five inches long, and about the thickness of a man's finger. The head part of the worm is of a dark brown fleshy substance, and is the part used as bait, the rest of the worm being nothing but sand. The "lug" is dug from the sand with a small spade or three-pronged fork.

The principal fishing-grounds in the North Sea where cod-bangers are employed are the Dogger Bank, Well Bank, and Dutch Bank. The fishing-ground of the open boat fishermen is on the coasts of Fife, Midlothian, and Berwickshire; for haddocks, cod, ling, etc., it is around the island of May and the Bell Rock, Marrbank, Murray Bank, and Montrose Pits, etc.

Some of the fishes of the *Gadidæ* are extensively cured, as the ling and hake, large numbers of which are captured to be bleached both for the home and foreign markets. Spain obtains a great quantity of its cured fish from the Shetland Islands, where a cod and ling fishery is carried on pretty nearly all the year round, there being both a winter and a summer fishery. In the summer time the fishermen proceed with their boats to the smaller islands, where they encamp in little huts for a few days, in order to carry on their business. They generally remain out from Monday till Saturday, when they return home to spend the day of rest with their families. As a general rule, the men are very pious, and make it a point of honour to be at home on "the Lord's day."

There has been a large amount of exaggeration as to the injury done to the white-fish fishery by the trawls. Fishermen who have neither the capital nor the enterprise to engage in trawling themselves are sure to abuse those who do ; but the trawl is so formidable as to have induced various French writers to advocate its prohibition. They describe this instrument of the fishery as terrible in its effects, leaving, when it is used, deep furrows in the bottom of the sea, and crushing alike the fry and the spawn ; but there is a very evident exaggeration in this charge, because as a general rule the beam-trawl cannot be worked with safety except on a sandy or muddy bottom, and, so far as we know, fish prefer to spawn on ground that is slightly rocky or weedy, so that the spawn may have something to adhere to, which it evidently requires in order to escape destruction ; and when a quantity of spawn is discerned on a bit of sea-weed or rock, we always find that, from some viscid property of which it is possessed, it adheres to its resting-place with great tenacity. The trawl-net, however destructive its agency, cannot, I fear, be dispensed with ; and, used at proper seasons and at proper places, is the best engine of capture we can have for the kinds of fish which it is employed to secure. The trawl is very largely used by English fishermen, but it is only of late years that the trawlers have come so far north as Sunderland and Berwick, and it is the fishermen of these places who have got up the cry about that net being so injurious to the fisheries. In Scotland there are no resident trawlers, the fisheries being chiefly of the nature of a coasting industry, where the men, as a general rule, only go out to sea for a few hours and then return with their capture. Having been frequently on board of the trawling ships, I may perhaps be allowed to set down a few figures indicative of the power of the great beam-net.

A trawler, then, is a vessel of about 35 tons burden, and usually carries 7 persons—viz. 5 men and 2 apprentices—as a crew to work her.\* The trawl-rope is 120 fathoms in length

\* A Barking trawler usually carries 5 men and 3 boys, and costs when in full work £12 per week. A Hull trawler costs much less, and the owner has less risk ; because the crew, from the captain downwards, share in the catch. The Barking men refuse to enter into this arrangement, which probably helps to account for the decay of the Barking fishery, for that of Hull is comparatively prosperous. The co-operative system prevails among a few of the fisher people of England. In an account of a Yorkshire fishing-place recently published in *Once a Week*, the following statistics of the cost of boats, etc., are given :—

and 6 inches in circumference, and to this rope are attached the different parts of the trawling apparatus—viz. the beam, the trawl-heads, bag-net, ground-rope, and span or bridle. The trawler is furnished with a capstan for hauling in this heavy machine. The beam, a spar of heavy elm wood, is 38 feet in length, and 2 feet in circumference at the middle, and is made to taper to the ends. Two trawl-heads (oval rings, 4 feet by  $2\frac{1}{2}$  feet) are fixed to the beam, one at each end. The upper part of the bag-net, which is about 100 feet long, is fastened to the beam, while the lower part is attached to the ground-rope. The ends of the ground-rope are fastened to the trawl-beds, and being quite slack, the mouth of the bag-net forms a semicircle when dragged over the ground. The whole apparatus is fastened to the trawl-rope by means of the span or bridle, which is a rope double the length of the beam, and of a thickness equal to the trawl-rope. Each end of the span is fastened to the beam, and to the loop thus formed the trawl-rope is attached. The ground-rope is usually an old rope, much weaker than the trawl-rope, so that, in the event of the net coming in contact with any obstruction in the water, the ground-rope may break and allow the rest

“Each yawl, varying in tonnage from 28 to 45 tons, costs from £600 to £650, and is divided into shares; of its earnings 3s. 6d. in the pound are paid to the owner or owners, 10s. are devoted to the current expenses, and the remainder is divided among the men who find the bait. When a new boat is required, several persons—gentlemen speculators, harbour-masters, etc., and boatmen—take certain shares of it, which vary in amount from a half-quarter to a half of the cost; application is then made to a builder, sail-maker, anchor-maker, and other tradesmen; and the vessel, in due time, is paid for, equipped, and given over to the owners. Each lugger-yawl carries two masts, and is provided with three sets of sails to suit various states of weather. The foresail contains 200 or 250 yards, the mizen 100, and the mizen-topsail 40 yards; the lesser sizes being severally of 100, 60, and 50 yards. The jib is very small. On the average the yawl is of 40 tons, and measures 51 feet keel, or 55 feet over all, and is of 17 or 18 feet beam; drawing  $6\frac{3}{4}$  feet water aft, and 5 feet forward. The amount of ballast varies from 20 to 30 tons. The yawl is provided with 120 nets, each of which costs £30. Half of this number are left on shore, and changed at the end of every 12 weeks. The crew is composed of 7 men and 2 boys. For instance, the “Wear,” commanded by Colling, a first-rate seaman, carries two others, like himself part-owners, 4 men receiving, besides their food, £1, and 1 boy at 18s., and another at 11s. a week; each fisherman, who is a net-owner, receives 24s. a week. The expenses in wages and wear and tear are calculated at from £12 to £15 weekly. The herrings are valued at £2 per 1000 on an average. Sometimes 23,000 fish are caught in a single haul, occasionally as many as 60,000, but 40,000 are considered a good catch. To remunerate the crew,

of the gear to be saved. Were the warp to break instead of the ground-rope, the whole apparatus, which is of considerable value, would be left at the bottom. The trawler, as I noted while the net was in the water, usually sails at the rate of 2 or  $2\frac{1}{2}$  knots an hour. The best depth of water for trawling is from 20 to 30 fathoms, with a bottom of mud or sand. At times, however, the nets are sunk much deeper than this, but that is about the depth of water over the great Silver Pits, 90 miles off the Humber, where a large number of the Hull trawlers go to fish. When they are caught, the fish (chiefly soles and other flat fish) are then packed in baskets called pads, and are preserved in ice until brought to market. To take twelve or fourteen pads a day is considered excellent fishing. Besides these ground-fish the trawl often encloses haddocks, cod, and other round fish, when such happen to be feeding on the bottom. It sometimes happens that the beam falls to the ground, and, the ground-rope lying on the top of the bag-net, no fish can get in. This accident, which, however, seldom occurs, is called a back fall. Mr. Vivian of Hull, in a letter to the editor of a Manchester newspaper, gave two years ago a very graphic account of the trawl-fishing,

£50 or £60 a week ought to be obtained. Each net is 10 fathoms long, and is sunk 9 fathoms during the fishing, the upper part being floated by a long series of barrels, which are fitted at intervals of 15 fathoms. The warps used for laying out the nets in each vessel measure 2200 yards. Two men take up the nets, two empty the fish out of them, and one boy stows the nets while his fellow stows the warps, which are raised by a windlass worked by the men. Each net weighs about 28 pounds. In order to preserve the nets and sails, it is necessary at frequent intervals to cover them with tanning, which is prepared in large coppers. These coppers cost £40."

On the Gulf of St. Lawrence the engagements of fishermen are as follows :—

"The fishermen are brought to the fishing-station at the expense of the firm engaging them. They are furnished with a good fishing-boat, thoroughly fitted, and are besides supplied with fresh bait as long as it can be got, and they require it, but on payment of a sum of \$6 to \$8; and for each 100 codfish delivered on the stage they receive the sum of 5s. 6d., one half in money and the other half in goods and provisions. At these prices, and fish being abundant, fishermen earn \$5, \$10, \$15, and even \$20 a day; and after an absence of from 6 to 9 weeks, bring home from \$80 to \$120, and sometimes more. But they have to board themselves; and if the fish is not abundant, their account of the provisions lent to their families before their departure, their own board, the purchase of their lines, take up the greatest part of their earnings, and they very often return to Magdalen Islands with empty pockets." Great quantities of all kinds of fish are found in the St. Lawrence.

and stated that 99 out of every 100 turbot and brill, nine-tenths of all the haddocks, and a large proportion of all the skate, which are daily sold in the wholesale fishmarkets of this country, are caught by the system of trawling. Trawling is without doubt the most efficient mode of getting the white fish at the bottom of the ocean; and were it made penal, London and the large towns would at times be entirely without fish. As a matter of course, trawling must exhaust the shoals at particular places. A fleet of upwards of 100 smacks, each with a beam nearly 40 feet long, trawling night and day, disturbs, frightens, or captures whatever fish are to be found in that locality, entrapping, besides, shell-fish, anchors, stores that have been sunken with ships ages ago; even a wedge of gold has been brought up by this insatiable instrument. The only remedy is to widen the field of action.

It is best, however, in a case of dispute, as in this trawl question, to allow those interested to speak for themselves. I have gone over an immense mass of the evidence taken by a recent commission appointed by Parliament to make inquiry on the subject, and will set some parts of it before my readers, so that, if a little trouble be taken in weighing the *pros* and *cons* of the matter, they may be able to form their own judgment on this vexed question. A Cullercoats fisherman is very strong against the beam-trawl. He is certain that thirty years ago we could get double the quantity of fish, during the fishing season, that we obtain now, and that the supply has fallen away little by little; and he says that even ten years ago it was almost as good as it was thirty years ago. Some years hence England will cry out for want of fish if trawling be allowed to go on. The price of fish has doubled, he says, of late years. "When I was a young man, there were nine in family of us, and my wife could purchase haddock for twopence which would serve for our dinners. Now she could not obtain the same quantity for less than ninepence or tenpence. Of recent years the number of fishermen and fishing-boats has greatly increased. I do not think the fishermen of the present day are better off than those when I was a young man." The fishermen at Cullercoats, when they trawl, use the small trawl, and fish in shallow water. Under these circumstances they do no injury. The trawlers, with the large trawl, says a Mr. Nicholson who was examined, not only sweep away the lines of the fishermen, but also destroy the fish. At Cullercoats a man engaged in the line-fishing gets all the fish on his own lines, and his wife goes to town and disposes of them.

The beam-trawling commenced about six years ago. The number of boats and the fishing population still go on steadily increasing. Beam-trawling does two kinds of harm : in the first place, it sweeps away the fishermen's lines ; and next, it destroys the spawn. "There may be a remedy for a fisherman losing his lines, but I never heard of it. I am aware that they could recover damages, but the difficulty is to get hold of the offending parties. The only remedy I can suggest is to do away with the trawl-fishing altogether." This witness stated that ten years ago he used to take sixty or seventy codfish per day, and that now he cannot get one. The trawlers, being able to fish in all weathers, beat the local fishermen out of the field.

Templeman, a South Shields fisherman, says that when engaged in trawling he has drawn up three and a half tons of fish-spawn ! He also says in his evidence that in trawling one-half of the fish are dead, and so hashed as to be unfit for market. Has seen a ton and a half of herring-spawn offered for sale as manure. The take of fish upon the Dogger Bank has decreased very much. The fishermen cannot catch one quarter part there now that they used to do. The number of trawl-boats on the Dogger Bank has increased about 10 per cent within the last year, and yet they are getting about a quarter less fish. Some of them can scarcely make a living now at all. They have impoverished all other places, and now they have come here, and in a short time there will not be a fish left. It is the same with the other fish-banks, and that accounts for the trawlers now coming to this neighbourhood. They have destroyed the Hartlepool and Sunderland ground, and now they have come to a small patch off here, and they will sweep it clean too. A trawl-boat will sometimes catch five tons a day ; but on the average a ton and a half ; but as a great deal of that has to be thrown overboard, they only bring about ten cwt. to market. The boats belonging to Cullercoats, carrying the same number of hands as the trawlers, only catch upon the average about five stones. The fish caught in the trawl are not fit for the market, as the insides are broke, and the galls burst and running through them. "If I had my way, I would pass an Act of Parliament to do away with trawling, and oblige every man to fish with hooks and lines. I think that would increase the quantity of fish for the country, because the young fish would not take the hooks. I am not aware that if the small boats get five stones a day it would at all diminish the supply of fish for the market ; but if the trawling is allowed to continue, that very soon will."

Thomas Bolam, on being examined, said : " I have followed the herring-fishing for twenty-one years, and the white-fishing six years. In the course of those six years I have found that the supply of white fish has gradually diminished both in the number and size of the fish. In twenty years' experience in the herring-fishing I find a fearful diminution in the total quantity caught. The shoals of herring are now only about one-third the size they were when I first commenced the fishing. At that time we used to get 14,000 or 15,000 ; now the length of 4000 or 5000 is thought a good take. I attribute the falling-off to the existence of the trawling system."

Many other fishermen gave similar evidence. A fisherman named Bulmer, residing at Hartlepool, said that the white fish were not only scarcer, but that they were deteriorating in size as well. The falling off in quantity has decidedly been accompanied by a smaller size, more particularly in haddocks. Haddocks, twenty years ago, were caught from five pounds to six pounds in weight ; now they hardly average three pounds. There is scarcely a single cod to be caught now, and formerly our boats got them scores together, and had to trail them out in rows, and could only sell them for about 10s. a score ; now they realise at Christmas 5s. and 6s. each. " Of turbot-fishing I am sorry to speak. It pains me to think of the injuries we have sustained in this particular fishing by trawlers. At present we dare not cast our nets, as they are sure to be lost. I lost two 'fleets' of turbot-nets worth £25. About twenty-six years ago I have caught two hundred turbot in one day ; now there are none to be got." Another resident gave similar evidence, and thought that if trawling was persisted in, their noble bay would soon be fallow ground. John Purvis of Whitburn also says that haddocks have decreased in size as well as in quantity—thinks they are at least a third smaller now as compared with former years. Considers that the trawling system has caused the diminution of fish which has taken place during the last four years. David Archibald of Croster had bought trawled fish not for food, as they were only fit to be used as bait.

Having given a fair sample of the evidence against the trawling system, it will be but just that we now hear the other side of the case. It is unfortunate, of course, that we cannot obtain really impartial evidence on this vexed question, as the party complaining is the party said to have had their fishery prospects ruined by the use of the beam-trawl, whilst the trawlers, of

course, won't hear a bad word said of the engine by which they gain their living. A Torbay fisherman, accustomed to trawling for the last twenty-six years, flatly contradicts much that has been said against the trawl-net. He asserts that he never took or saw any spawn taken, and that only about half a hundred-weight in each two tons of the fish taken is unfit for the market. He does not think the fish are decreasing either in quantity or size.

A Hull trawler spoke to the following effect :—“ I never saw any spawn in the net. It is impossible for spawn to be caught in the net. There is often unmarketable fish, but it is only when there is a strong breeze and a difficulty in getting the gear on board. We generally get seven or eight hampers in a haul, and one basket would perhaps be unfit for the market. The hooked fish is a more saleable fish, as it has got the scales and slime on it, and the trawl fish has not got the slime on it, and the scales are sometimes rubbed off.” Some haddocks were here produced which the witness said were a fair specimen. The scales were on them, and on one being opened the inside was found to be in an unbroken state.

The following is a summary of the evidence given by William Dawson, a very intelligent fisherman of Newbiggin, who spoke from fifty years' experience :—“ He had fished cod, ling, turbot, and several kinds of shell-fish, but not oysters. He was still engaged as a fisherman. He fished with a line for soles. The number of fishermen and boats had increased. In 1808 there were eight boats, and there are now about thirty boats. Fifty years ago the boats were about one-third the size. The boats carried just about the same lines as now. The boats now carry about three times as much net as they did. The number of white fish is falling off a great deal. In 1812 every boat brought in more white fish than they could carry. We do not go much more frequently to sea now. In the size of the fish now there is not much difference—a little smaller. The haddock and herring fisheries had decreased. He had not noticed much difference in the size, only in the quantity. There was a greater number of boats engaged now in the herring-fishing—the number of herring having decreased within the last ten or twelve years. Little mackerel was caught there. Large quantities of mackerel were off this coast at times, but they had no nets to take them. Although a good many sprats were seen, they did not try to catch them. The cause of the falling off in the quantity



of fish he considered was their being destroyed farther south. No trawling vessels came here till last summer. They went about twelve miles from land, and trawled in the fishing-ground. The lines of the fishing-boats were parallel, and about a quarter of a mile apart. When there was a south-east storm they got plenty of fish, but it was not so now. With a north-east storm they had plenty of fish. In his recollection, fifty years back, there was plenty of fish with a south-east storm. There had been no interference with their nets, and no one had regulated the times of fishing. There might be some advantage if the Government made a law to prevent either the English or French fishing from Saturday morning to Monday night. That would give time for the fish to draw together. That alluded to herring. They should not allow the trawl-boats to fish on the coasts. The French boats often came within three miles of the land. Herring are caught within three miles of the shore. The French boats shifted with the herring along the coast, and have caught a great quantity. There should be a rule that herring-nets should not be shot before sunset. When the Queen's cutters came the French boats made off to more than three miles from the land. Lobsters had diminished, but not the crabs. He believed they had caught too many lobsters. The boat's crew is not so well off now as thirty years ago. Lodgings were better. They do not earn so much money now. In the course of a year (about 1825) he made £126, and a few years back he made only £78. The average for the last five years at the white fishing was about £50. Other £50 might be made at the herring-fishing. The buoys of the lines were large enough for the trawlers to see them, and they could see where the nets were. They destroyed both the fish and the lines. A line boat with fittings costs about £40, and a herring-boat with nets not less than £100. The men bought the boats with money saved. Little fish was destroyed on their lines, except what was eaten by the dog-fish. There were herring there in January and February, but were not caught. Their boats fished between Tynemouth and Dunstanborough castles. He could remember when there were no French boats on the coast; they first came about 1824. The French boats fish on the Sundays. Their boats did not. A young man ought to earn £100 a year. It would cost a full third to keep his boat and tackling up. The boats lasted about fourteen years."

I need not go on repeating similar evidence, but the witnesses

were nearly all agreed that the beam-trawl did not do the injury to the fisheries that was charged against it, especially as regards injury to spawn. I may perhaps, by way of conclusion to this contradictory evidence, be allowed to quote from the *Times* a portion of a letter on trawling, written by a "Billingsgate Salesman :"— "Seven years' experience in Billingsgate, and my lifetime previous spent among the fishermen in a seaport-town, may enable me to offer a few remarks, which through your able abilities may be sifted, and perhaps leave a portion of matter which you may consider of some value and turn to some account. My personal interest is not only in trawl-fishing, but hook-and-line, seined-net, drift-net, and other kinds ; for, being a commission agent, it is all fish that comes to my net. I cannot speak of the qualities of trawl-net fishing, either for or against, not having been connected with that branch of the trade, but after a remark or two on the information received by Mr. Fenwick, and which is conveyed in your columns from certain gentlemen professing to have a knowledge of the trade, I will give you my information as briefly as possible. The fact is this—it never will be possible to catch what we consider trawl-fish in sufficient quantities to meet the demand but by the trawl, the principal kinds being turbot, brill, soles, and plaice. A small quantity may be taken by other means, but more by accident than otherwise. As for trawl-fish being mutilated and putrid before landing, how does it happen that so many spotless and pure fish, out of the above kinds, are not only sold in London but all over the country, and exhibited on the tables both of rich and poor ? Yourself and every nobleman can speak on this point ; and when informed that they are all caught by the trawl (a fact undeniable), you will consider it wrong on the part of any one to mislead the public on a matter of so much importance. Advise him to fathom the secrets of the ocean, and discover a better mode to obtain them."

A great deal of obloquy has been thrown on the trawl, because it *hashes* the fish ; but the destruction of young fish—that is, fish unfit for human food because of their being young—is not peculiar to the trawl. When the lines are thrown out for cod the fishermen cannot command that only full-grown fish are to seize upon the bait : the tender codling, the unfledged haddock, the greedy mackerel, *will* bite—the consequence being that thousands of sea-fish are annually killed that are unfit for food, and that have never had an opportunity of adding to their

kind. But this mischance is incidental to all our fisheries, no matter what the engine of capture may be, whether net or line. Look how we slaughter our grilse, without giving them the opportunity of breeding! The herring-fishing is a notable example of this mode of doing business: the very time that these animals come together to perpetuate their species is the time chosen by man to kill them. Of course if they are to be used as food, they must be killed at some time, and the proper time to capture them forms one of those fishing mysteries which we have not as yet been able to solve. We protect the salmon with many laws at the most interesting time of its life, and why we should not be able to devise a close-time for the cod, turbot, haddock, and sole of particular coasts—for each portion of the coast has its particular season—is what I cannot understand, and can only account for the anomaly on the ground of salmon being private property.

The labour of the Scottish fishermen is greatly augmented by the want of good harbours for their boats. Time and opportunity serving, the men of the fisher class are really industrious, and this want of proper harbourage is a hardship to them. It is curious to notice the little quarry-holes that on some parts of the Moray Firth serve as a refuge for the boats. There is the harbour of Whitehills, for instance: it could not be of any possible use in the event of a stiff gale arising, for in my opinion the boats would never get into it, but would be dashed to pieces on the neighbouring rocks. I have witnessed one or two storms on the north-east coast of Scotland, and shall never forget the scenes of misery these tumults of the great deep occasioned.

Large quantities of white fish are, of course, still caught on the Scottish coasts. Almost in every little bay and firth there are some boats constantly engaged in the haddock and cod fishing, and if we ask the destination of those fish which are caught, the answer is almost sure to be "the English markets." The constant and unvarying demand for fresh fish from the larger towns of England so entices the fishermen, that local demands are entirely slighted. On the coasts of Ayrshire and Galloway, all the fish I inquired about, that is, all that were brought ashore during my visits to several fishing towns, were destined for either Manchester or London. Wherever there is a railway reaching to the sea-side, it may be accepted as a settled fact that a portion of its revenue will be derived from the carriage of fish to great seats of population.

The following tabular view of the dates when our principal fishes are in season does not refer to any particular locality, but has been compiled to show that fish are to be obtained nearly all the year round from some part of the coast:—

## FISH TABLE.

S denotes that the fish is in season; F in finest season; and O out of season.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Brill . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Carp . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Cockles . . . . .	S	S	S	S	O	O	O	O	S	S	S	S
Cod . . . . .	F	S	S	O	O	O	O	O	S	S	F	F
Crabs . . . . .	S	O	O	S	F	F	F	F	S	S	S	S
Dabs . . . . .	O	S	S	S	S	S	S	S	O	O	O	S
Dace . . . . .	F	F	O	O	O	S	S	S	F	F	F	S
Eels . . . . .	S	S	S	O	O	O	O	S	F	F	F	S
Flounders . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Gurnets . . . . .	O	O	O	O	S	S	S	S	S	O	O	O
Haddocks . . . . .	F	S	O	O	S	S	S	S	S	F	F	F
Holibut . . . . .	S	F	F	S	S	F	F	S	S	S	S	S
Herrings . . . . .	S	S	O	O	S	S	F	F	S	S	S	S
Ling . . . . .	S	S	F	S	O	O	O	O	O	S	S	S
Lobsters . . . . .	O	O	O	S	F	F	F	S	S	S	S	S
Mackerel . . . . .	O	O	O	S	S	S	S	S	S	S	O	O
Mullet . . . . .	O	O	O	S	S	S	S	O	O	O	O	O
Mussels* . . . . .	S	S	S	S	O	O	O	O	S	S	S	S
Oysters . . . . .	S	S	F	F	O	O	O	O	S	S	S	S
Plaice . . . . .	S	O	O	O	S	S	S	S	S	S	S	S
Prawns . . . . .	O	O	S	F	F	F	F	S	O	O	O	O
Salmon . . . . .	O	S	S	F	F	F	S	S	O	O	O	O
Shrimps . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Skate . . . . .	F	F	F	F	F	F	S	S	O	O	S	S
Smelts . . . . .	S	S	S	S	S	O	O	O	O	O	S	S
Soles . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Sprats . . . . .	S	O	O	O	O	O	O	O	O	O	S	S
Thornback . . . . .	O	O	O	O	O	O	S	S	S	S	S	O
Trout . . . . .	O	S	F	F	F	F	S	S	O	O	O	O
Turbot . . . . .	S	S	S	S	S	S	S	S	S	S	S	S
Whittings . . . . .	F	F	O	O	O	S	S	S	S	F	F	F

\* In the Firth of Forth mussels are collected all the year round, but curiously enough they invariably fall off in condition during a prevalence of easterly winds.

## CHAPTER XI.

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### NATURAL HISTORY OF THE OYSTER.

Description of the Oyster—Controversies about Oyster-Life—Do Oysters live upside down?—The Spawning of Oysters—Oyster-Growth—When do Oysters become reproductive for Dredging?—Sergius Orata—Lake Fusaro—Oyster-Fascines—Ile De Re, and Growth of the Park System—Economy of the Parks—Greening the Oyster—Oyster-Growth—Spat Collectors—Miscellaneous Facts.

ZOOLOGICALLY the oyster is known as *Ostræa edulis*. Its outward appearance is familiar to even very landward people, and no human engineer could have invented so admirable a home for the pulpy and headless mass of jelly that is contained within the rough-looking shell. Many curious opinions have been held about this shell-fish. At one time oysters were thought to be only masses of oily or other matter, scarcely alive and insensible to pain. Who would suppose, it was asked, that a portion of blubber like the oyster, that could only have been first eaten by some very courageous individual, would have any feeling? But we know better now, and although the organisation of the mollusca is not of a high order, it is perfect of its kind, and has within it indications of organs that in beings of a higher type serve a loftier purpose, and point out the beginnings of nature, showing how she works her way from the simplest imaginings of animal life to the complex human machine. The oyster has no doubt in its degree many joys and sorrows, and throbs with life and pleasure, as animals do that have a higher organic structure. The oyster is curiously constructed; but I fear that, comparatively speaking, very few of my readers have ever seen a perfect one, as oysters are very much mutilated, being generally deprived of their beards before they are sent to table, and otherwise hurt, both accidentally in the opening and by use and wont, as in the case of the beard. Its mouth—it has no jaws or teeth—is a kind of trunk or snout, with four lips, and leafy

coverings or gills are spread over the body to act as lungs, and keep from the action of the water the air which the animal requires for its existence. This covering is divided into lobes with ciliated edges. Four leaves or membranous plates act as capillary funnels, open at the farthest extremities. Behind the gills there is a large whitish fatty part enclosing the stomach and intestines. The vessels of circulation play into muscular cavities, which act the part of the heart. The stomach is situated near the mouth. The oyster has no feet, but can move by opening and closing its shell, and it secures food by means of its beard, which acts as a kind of rake. In fact the internal structure of the oyster, while it is excellently adapted to that animal's mode of life, is exceedingly simple.

It is not my purpose in the present work to enter into the minutiae of oyster life. Indeed, there have been so many controversies about the natural history of this animal as to render it impossible to narrate in the brief space I can devote to it a tenth part of what has been written or spoken about the life and habits of the "breedy creature." Every stage of its growth has been made the stand-point for a wrangle of some kind. As an example of the keenness with which each stage of oyster life is now being discussed, I may mention that some years ago a most amusing squabble broke out in the pages of the *Field* newspaper on an immaterial point of oyster life, which is worth noting here as an example of what can be said on either side of a question. The controversy hinged upon whether an oyster while on the bed lay on the flat or convex side. Mr. Frank Buckland, who originated the dispute, maintained that the right, proper, and natural position of the oyster, when at the bottom of the sea, is with the flat shell downwards; but the natural position of the oyster is of no practical importance whatever; and I know, from personal observation of the beds at Newhaven and Cockenzie, that oysters lie both ways,—indeed, with a dozen or two of dredges tearing over the beds it is impossible but that they must lie quite higgledy-piggledy, so to speak. A great deal that is incidentally interesting was brought up in the *Field* discussion. There have been several other disputes about points in the natural history of the oysters—one in particular as to whether that animal is provided with organs of vision. Various opinions have been enunciated as to whether an oyster has eyes, and one author asserts that it has so many as twenty-four, which again is denied, and the assertion made that the so-called eyes project-

ing from the border of the mantle have no optical power whatever; but, be that as it may, the oyster *has* a power of knowing the light from the dark.

As is well known, there is a period every year during which the oyster is not fished; and the reason why our English oyster-beds have not been ruined or exhausted by over fishing arises, among other causes, from there being a definite close-time assigned to the breeding of the mollusc. It would be well if the larger varieties of sea produce were equally protected; for it is sickening to observe the countless numbers of unseasonable fish that are from time to time brought to Billingsgate and other markets, and greedily purchased. The fact that oysters are supplied only during certain months in the year, and that the public have a general corresponding notion that they are totally unfit for food during May, June, July, and August (those four wretched months which have not the letter "r" in their names), has been greatly in their favour. Had there been no period of rest, it is almost certain that oysters would long ago—I allude to the days when there was no system of cultivation—have become extinct.

Oysters begin to sicken about the end of April, so that it is well that their grand rest commences in May. The shedding of the spawn continues during the whole of the hot months—not but that during that period there may be found supplies of healthy oysters, but, as a general rule, it is better that there should be a total cessation of the trade during the summer season, because were the beds disturbed by a search for the healthy oysters the spawn would be scattered and destroyed.

Oysters do not leave their ova, like many other marine creatures, but incubate them in the folds of their mantle, and among the laminae of their lungs. There the ova remain surrounded by mucous matter, which is necessary to their development, and within which they pass through the embryo state. The mass of ova, or "spat" as it is familiarly called, undergoes various changes in its colour, meanwhile losing its fluidity. This state indicates, it has been said, the near termination of the development and the sending forth of the embryo to an independent existence, for by this time the young oysters can live without the protection of the maternal organs. An eminent French pisciculturist says that the animated matter escaping from the adults on breeding-banks is like a thick mist being dispersed by the winds—the *spat* is so scattered by the waves

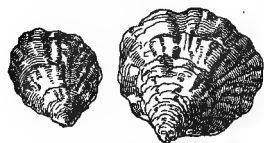
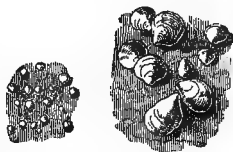
that only an imperceptible portion remains near the parent stock. All the rest is dissipated over the sea space; and if these myriads of animalculæ, tossed by the waves, do not meet with solid bodies to which they can attach themselves, their destruction is certain, for if they do not fall victims to the larger animals which prey upon them, they are unfortunate in not fixing upon the proper place for their thorough development.

Thus we see that the spawn of the oyster is well matured before it leaves the protection of the parental shell; and by the aid of the microscope the young animal can be seen with its shell perfect and its holding-on apparatus, which is also a kind of swimming-pad, ready to clutch the first "coigne of vantage" that the current may carry it against. My "theory" is, that the parent oyster goes on *brewing* its spawn for some time—I have seen it oozing from the same animal for some days—and it is supposed that the spawn swims about with the current for a short period before it falls, being in the meantime devoured by countless sea animals of all kinds. The operation of nursing, brewing, and exuding the spat from the parental shell will occupy a considerable period—say from two to four weeks. It is quite certain that the close-time for oysters is necessary and advantageous, for we seldom find this mollusc, as we do the herring and other fish, full of eggs, so that most of the operations connected with its reproduction go on in the months during which there is no dredging. As I have indicated, immense quantities of the spawn of oysters are annually devoured by other molluscs, and by fish and crustaceans of various sizes; it is well, therefore, that it is so bountifully supplied. On occasions of visiting the beds I have seen the dredge covered with this spawn; and no pen could number the thousands of millions of oysters thus prevented from ripening into life. Economists ought to note this fact with respect to fish generally, for the enormous destruction of spawn of all kinds must exercise a very serious influence on our fish supplies. I may also note that the state of the weather has a serious influence on the spawn and on the adult oyster-power of spawning. A cold season is very unfavourable, and a decidedly cold day will kill the spat.

Some people have asserted that the oyster can reproduce its kind in twenty weeks, and that in ten months it is full-grown. Both of these assertions are pure nonsense. At the age of three months an oyster is not much bigger than a pea;



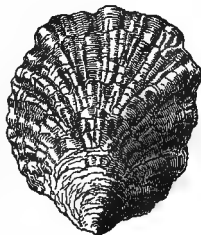
and the age at which reproduction begins has never been accurately ascertained, but it is thought to be three years. I give here one or two illustrations of oyster-growth in order to show the ratio of increase. The smallest, about the dimensions of a pin's head, may be called a fortnight old. The next size represents the oyster as it appears when three months old. The other



sizes are drawn at the ages of five, eight, and twelve months respectively. Oysters are usually four years old before they are sent to the London market. At the age of five years the oyster is, I think, in its prime; and some of our most intelligent fishermen think its aver-

age duration of life to be ten years.

In these days of oyster-farming the time at which the oyster becomes reproductive may be easily fixed, and it will no doubt be found to vary in different localities. At some places it becomes saleable—chiefly, however, for fattening—in the course of two years; at other places it is three or four years before it becomes a saleable commodity; but on the average it will be quite safe to assume that at four years the oyster is both ripe for sale and able for the reproduction of its kind.



Let us hope that the breeders will take care to have at least one brood from each batch before they offer any for sale. Oyster-farmers should keep before them the folly of the salmon-fishers, who kill their grilse—*i.e.* the virgin fish—before they have an opportunity of perpetuating their race.

Another point on which naturalists differ is as to the quantity of spawn from each oyster. Some enumerate the young by thousands, others by millions. It is certain enough that the number of young is prodigious—so great, in fact, as to prevent their all being contained in the parent shell at one time; but I do not believe that an oyster yields its young “in millions”—perhaps half a million is on the average the amount of spat which each oyster can “brew” in one season. I have examined oyster-spawn (taken direct from the oyster) by means of a

powerful microscope, and find it to be a liquid of some little consistency, in which the young oysters, like the points of a hair, swim actively about, in great numbers, as many as a thousand having been counted in a very minute globule of spat. The spawn, as found floating on the water, is greenish in appearance, and each little splash may be likened to an oyster nebula, which resolves itself, when examined by a powerful glass, into a thousand distinct animals.

The oyster, it is now pretty well determined, is hermaphrodite, and it is very prolific, as has been already observed, but the enormous fecundity of the animal is largely detracted from by bad seasons ; for, unless the spawning season be mild, soft, and warm, there is usually a very partial *fall* of spat, and of course quite a scarcity of brood ; and even if one be the proprietor of a large bed of oysters, there is no security for the spawn which is emitted from the oysters on that bed falling upon it, or within the bounds of one's own property even ; it is often enough the case that the spawn falls at a considerable distance from the place where it has been emitted. Thus the spawn from the Whitstable and Faversham Oyster Companies' beds—and these contain millions of oysters in various stages of progress—falls usually on a large piece of ground between Whitstable and the Isle of Thanet, formerly common property, but lately *given* by Act of Parliament to a company recently formed for the breeding of oysters. The saving of the spawn cannot be effected unless it falls on proper ground—*i.e.* ground with a shelly bottom is best, for the infant animal is sure to perish if it fall among mud or upon sand ; the infant oyster must obtain a holding-on place as the first condition of its own existence. Oysters have not on the aggregate spawned extensively during late years. The greatest fall of spawn ever known in England occurred forty-six years ago. On being exuded from the parental shell, the spawn of the oyster at once rises to the surface, where its vitality is easily affected, and it is often killed in certain places by snow-water or ice. A genial warmth of sunshine and water is considered highly favourable to its proper development during the few days it floats about on the surface. It is thought that not more than one oyster out of each million arrives at maturity. It is curious to note that some oysters have immense shells with very little "meat" in them. I recently saw in a restaurant several oysters, much larger externally than crown-pieces, with the "meat" about the size of a sixpence : these

were Firth of Forth oysters from Cockenzie. It is not easy to determine from the external size of the animal the amount of "meat" it will yield—apparently, "the bigger the oyster the smaller the meat." In the early part of the season only very small oysters are sold in Edinburgh—the reason assigned being that all the best dredgers are "away at the herring," and that the persons left behind at the oyster-beds are only able to skim them, so that, for a period of about six weeks, we merely obtain the small fry that are lying on the top. It is quite certain that as the season advances the oysters obtained are larger and of more decided flavour. In the "natives" obtained at Whitstable the shell and the meat are pretty much in keeping as to size, and this is an advantage.

The Abbé Diquemarc, who has keenly observed the habits of the principal mollusca, assures us that oysters, when free, are perfectly able to transport themselves from one place to another, by simply causing the sea-water to enter and emerge suddenly from between their valves; and these they use with extreme rapidity and great force. By means of the operation now described, the oyster is enabled to defend itself from its enemies among the minor crustacea, particularly the small crabs, which endeavour to enter the shell when it is half open. "Some naturalists," the Abbé says, "go the length of allowing the oyster to have great foresight," which he illustrates by an allusion to the habits of those found at the sea-side. "These oysters," he says, "exposed to the daily change of tides, appear to be aware that they are likely to be exposed to dryness at certain recurring periods, and so they preserve water in their shells to supply their wants when the tide is at ebb. This peculiarity renders them more easy of transportation to remote distances than those members of the family which are caught at a considerable distance from the shore."

The secret of there being only a holding-on place required for the spat of the oyster to insure an immensely-increased supply having been penetrated by the French people—and no doubt they are in some degree indebted to our oyster-beds on the Colne and at Whitstable for their idea—the plan of systematic oyster-culture was easy enough, as I will immediately show. A few initiatory experiments, in fact, speedily settled that oysters could be grown in any quantity. Strong pillars of wood were driven into the mud and sand; arms were added; the whole was interlaced with branches of trees, and

various boughs besides were hung over the beds on ropes and chains, whilst others were sunk in the water and kept down by a weight. A few boat-loads of oysters being laid down, the spat had no distance to travel in search of a home, but found a resting-place almost at the moment of being exuded ; and, as the fairy legends say, "it grew and it grew," till, in the fulness of time, it became a marketable commodity.

But the history of this modern phase of oyster-farming, as practised on the foreshores of France, is so interesting as to demand at my hands a rather detailed notice, for it is one of the most noteworthy circumstances connected with the revived art of fish-culture, that it has resulted in placing upon the shores of France a countless number of fish-farms for the cultivation of the oyster alone.

It is no exaggeration to say, that about twenty-five years ago there was scarcely an oyster of native growth in France ; the beds—and I cite the case of France as a warning to people at home, I mean as regards our Scottish oyster-beds—had become so exhausted from overdredging as to be unproductive, so far as their money value was concerned, and to be totally unable to recover themselves so far as their power of reproductiveness was at stake. And the people were consequently in despair at the loss of this favourite adjunct of their banquets, and had to resort to other countries for such small supplies as they could obtain. As an illustration of the overdredging that had prevailed, it may be stated that oyster-farms which formerly employed 1400 men, with 200 boats, and yielded an annual revenue of 400,000 francs, had become so reduced as to require only 100 men and 20 boats. Places where at one time there had been as many as fifteen oyster-banks, and great prosperity among the fisher class, had become, at the period I allude to, almost oysterless. St. Brieuç, Rochelle, Marennes, Rochefort, etc., had all suffered so much that those interested in the fisheries were no longer able to stock the beds, thus proving that, notwithstanding the great fecundity of these sea animals, it is quite possible to overfish them, and thoroughly exhaust their reproductive power. It was under these circumstances that M. Coste instituted that plan of oyster-culture which has been so much noticed of late in the scientific journals, and which appears to have been inspired by the plan of the mussel-farms in the Bay of Aiguillon, and the oyster-parcs of Lake Fusaro, so far at least as the principle of cultivation is

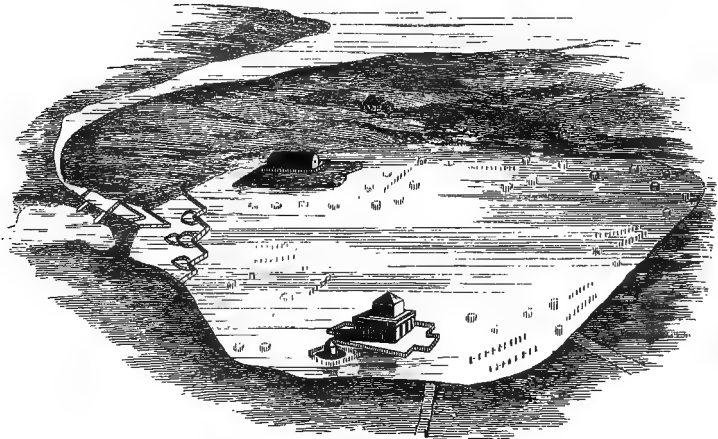
concerned. At the instigation of the French Government, he made a voyage of exploration round the coasts of France and Italy, in order to inquire into the condition of the sea-fisheries, which were, it was thought, in a declining condition. It was his "mission," and he fulfilled it very well, to see how these marine fisheries could be artificially aided, as the fresh-water fisheries had been aided through the re-discovery by Joseph Rémy of the long-forgotten plan of pisciculture, as already detailed in a preceding portion of this work.

The breeding of oysters was a business pursued with great assiduity during what I have called the gastronomic age of Italy, the period when Lucullus kept a stock of fish valued at £50,000 sterling, and Sergius Orata invented the art of oyster-culture. There is not a great deal known about this ancient gentleman, except that he was an epicure of most refined taste (the "master of luxury" he was called in his own day), and some writers of the period thought him a very greedy person, a kind of dealer in shell-fish. It was thought also that he was a housebroker or person who bought or built houses, and having improved them, sold them to considerable advantage. He received, however, an excellent character, while standing his trial for using the public waters of Lake Lucrinus for his own private use, from his advocate Lucinus Crassus, who said that the revenue officer who prevented Orata was mistaken if he thought that gentleman would dispense with his oysters, even if he was driven from the Lake of Lucrinus, for, rather than not enjoy his molluscous luxury, he would grow them on the tops of his houses.

Lake Fusaro, of which I give a kind of bird's-eye view, is highly interesting to all who take an interest in the prosperity of the fisheries, as the first seat of oyster-culture. It is the Avernus of Virgil, and is a black volcanic-looking pool of water, about a league in circumference, which lies between the site of the Lucrine Lake—the lake used by Orata—and the ruins of the town of Cumæ. It is still extant, being even now, as I have said, devoted to the highly profitable art of oyster-farming, yielding, as has often been published, from this source an annual revenue of about £1200. This classic sheet of water was at one time surrounded by the villas of the wealthy Italians, who frequented the place for the joint benefit of the sea-water baths, and the shell-fish commissariat, which had been established in the two lakes (Avernus and Lucrine). The place, which, before

then, was overshadowed by thick plantations, had been consecrated by the superstitious to the use of the infernal gods.

The mode of oyster-breeding at this place, then as now, was to erect artificial pyramids of stones in the water, surrounded by stakes of wood, in order to intercept the spawn, the oyster being laid down on the stones. I have shown these modes in the accompanying engravings. Faggots of branches were also

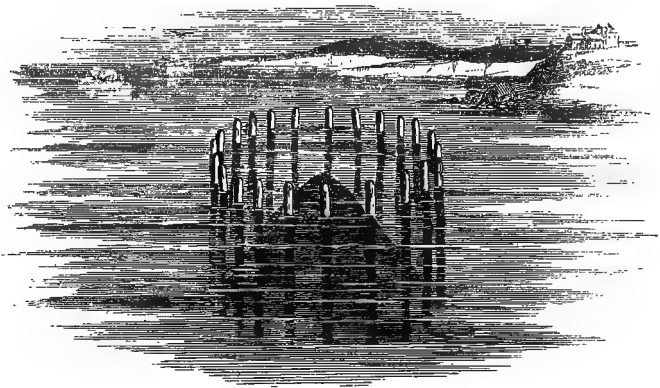


LAKE FUSARO.

The accompanying engraving gives a general view of Lake Fusaro (the Avernus of the ancients), showing here and there the stakes surrounding the artificial banks, the single and double ranges of stakes on which the faggots are suspended, and at one extremity the labyrinths, in the face of which is a canal of from  $2\frac{1}{2}$  to 3 metres broad and  $1\frac{1}{2}$  metre deep joining the lake to the sea. A small lake, believed to be the ancient Cocytus, communicates with this canal. The pavilion in the lake is the ordinary residence of the persons in charge of the fishery.

used to collect the spawn, which, as I have already said, requires, within forty-eight hours of its emission, to secure a holding-on place or be lost for ever. The plan of the Fusaro oyster-breeders struck M. Coste as being eminently practical and suitable for imitation on the coasts of France: he had one of the stakes pulled up, and was gratified to find it covered with oysters of all ages and sizes. The Lake Fusaro system of cultivation was therefore, at the instigation of Professor Coste, strongly recommended for imitation by the French Government to the French

people, as being the most suitable to follow, and experiments were at once entered upon with a view to prove whether it would be as practicable to cultivate oysters as easily among the agitated waves of the open sea as in the quiet waters of Fusaro. In order to settle this point, it was determined to renew the old oyster-beds in the Bay of St. Brieuc, and notwithstanding the fact that the water there is exceedingly deep and the winds very violent, immediate and almost miraculous success was the result.



OYSTER-PYRAMID.

The fascines laid down soon became covered with seed, and branches were speedily exhibited at Paris, and other places, containing thousands of young oysters. The experiments in oyster-culture tried at St. Brieuc were commenced early, on part of a space of 3000 acres that was deemed suitable for the reception of spat. A quantity of breeding oysters, approaching to three millions, was laid down either on the old beds or on newly-constructed longitudinal banks; these were sown thick on a bottom composed chiefly of immense quantities of old shells—the “middens” of Cancale in fact, where the shell accumulation had become a nuisance—so that there was a more than ordinary good chance for the spat finding at once a proper holding-on place. Then again, over some of the new banks, fascines made of boughs tightly tied together were sunk and chained over the beds, so as to intercept such portions of the spawn as were likely, upon

rising, to be carried away by the force of the tide. In less than six months the success of the operation in the Bay of St. Brieuc was assured ; for, at the proper season, a great fall of spawn had occurred, and the bottom shells were covered with the spat, while the fascines were so thickly coated with young oysters that an estimate of 20,000 for each fascine was not thought an exaggeration.



OYSTER-FASCINES.

Twelve months, however, before the date of the experiments I have been describing at St. Brieuc, the artificial culture of oysters had successfully commenced on another part of the coast—namely, the Ile de Re off the shore of the lower Charente (near la Rochelle), in the Bay of Biscay, which may now be designated the capital of French oysterdom, having more *parcs* and *claires* than Marennes, Arcachon, Concarneau, Cancale, and all the rest of the coast put together, and which, before it became celebrated for its oyster-growing, was only known, in common with other places in France, for its successful culture of the vine. It is curious to note the rapid growth of the industry of oyster-culture on the Ile de Re. It was begun so recently as 1858, and there are now upwards of 4000 parks and claires upon its shores, and the people may be seen as busy in their fish-parks as the market-gardeners of Kent in their strawberry-beds. Oyster-farming on the Ile was inaugurated by one Bœuf, a stone-mason. This shrewd fellow, who was a keen observer of nature, and had seen the oyster-spat grow to maturity, began thinking of oyster-culture simultaneously with Professor Coste,



and wondering if it could be carried out on those portions of the public foreshore that were left dry by the ebb of the waters. He determined to try the experiment on a small scale, so as to obtain a practical solution of his "idea," and, with this view, he enclosed a small portion of the foreshore of the island by building a rough dyke about eighteen inches in height. In this park he laid down a few bushels of growing oysters, placing amongst them a quantity of large stones, which he gathered out of the surrounding mud. This initiatory experiment was so successful, that in the course of a year he was able to sell £6 worth of oysters from his stock. This result was of course very encouraging to the enterprising mason, and the money was just in a sense found money, for the oysters went on growing while he was at work at his own proper business as a mason. Elated by the profit of his experiment, he proceeded to double the proportions of his park, and by that means more than doubled his oyster commerce, for, in 1861, he was able to dispose of upwards of £20 worth, and this without impoverishing, in the least degree, his breeding stock. He continued to increase the dimensions of his farm, so that by 1862 his sales had increased to £40. As might have been expected, Bœuf's neighbours had been carefully watching his experiments, uttering occasional sneers, no doubt, at his enthusiasm; but, for all that, quite ready to go and do likewise whenever the success of the industrious mason's experiments became sufficiently developed to show that they were profitable as well as practical. After Bœuf had demonstrated the practicability of oyster-farming, the extension of the system over the foreshores of the island, between Point de Rivedoux and Point de Lome, was rapid and effective; so much so that two hundred beds were conceded by the Government previous to 1859, while an additional five hundred beds were speedily laid down, and in 1860 large quantities of brood were sold to the oyster-farmers at Marennes, for the purpose of being manufactured into green oysters in their claires on the banks of the river Seudre. The first sales after cultivation had become general amounted to £126, and the next season the sum reached in sales was upwards of £500, and these monies, be it observed, were for very young oysters; because, from an examination of the dates, it will at once be seen that the brood had not had time to grow to any great size. So rapid indeed has been the progress of oyster-culture at the Ile de Re, that what were formerly a series of enormous and unproductive mud-banks, occupying a

stretch of shore about four leagues in length, are now so transformed, and the whole place so changed, that it seems the work of a miracle. Various gentlemen who have inspected these farms for the cultivation of oysters speak with great hopefulness about the success of the experiment. Mr. Ashworth, so well known for his success as a salmon fisher and breeder in Ireland, tells me that oyster-farming on the shores of the French coast is one of the greatest industrial facts of the present age, and thinks that oyster-farming will in the end be even more profitable than salmon-breeding. There is only one drawback connected with these and all other sea-farms in France: the farmers, we regret to say, are only "tenants at will,"\* and liable at any moment to be ejected; but notwithstanding this disadvantage the work of oyster-culture still goes bravely forward, and it is calculated, in spite of the bad spitting of the last three years, that there is a stock of oysters in the beds on the Ile de Re—accumulated in only six years—of the value of upwards of £100,000.

Much hard work had no doubt to be endured before such a scene of industry could be thoroughly organised. When the great success of Bœuf's experiments had been proclaimed in the neighbourhood, a little army of about a thousand labourers came down from the interior of the country and took possession, along with the native fishermen, of the shores, portions of which were conceded to them by the French Government at a nominal rent of about a franc a week, for the purpose of being cultivated as oyster parks and claires. The most arduous duty of these men consisted in clearing off the mud, which lay on the shore in large quantities, and which is fatal to the oyster in its early stages; but this had to be done before the shores could be turned to the purpose for which they were wished. After this preliminary business had been accomplished, the rocks had to be blasted in order to find stones for the construction of the park-walls; then these had to be built, and the ground had also to be paved in a rough-and-ready kind of way; foot-roads had also to be arranged for the convenience of the

\* Mr. Ashworth, in a communication to Mr. Barry, one of the Commissioners of Irish Fisheries, says—"No charge is made for the oyster-parks, but each plot is marked and defined on a map, and the produce is considered to be the private property of the person who establishes it. They vary in size twenty or thirty yards square, the stone or tiles are placed in rows about five feet apart, with the ends open so as to admit of the wash of the tide in and out."

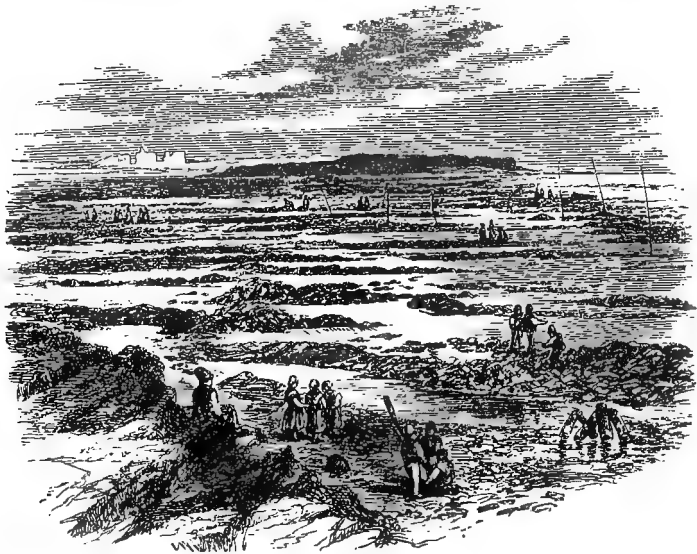
farmers, and carriage-ways had likewise to be made to admit of the progress of vehicles through the different farms. Ditches had to be contrived to carry off the mud; the parks had to be stocked with breeding oysters, and to be kept carefully free from the various kinds of sea animals that prey upon the oyster; and many other daily duties had to be performed that demanded the minute attention of the owners. But all obstacles were in time overcome, and some of the breeders have been so very



OYSTER-PARKS.

successful of late years as to be offered a sum of £100 for the brood attached to twelve of their rows of stones, the cost of laying these down being about two hundred francs! To construct an oyster-bed thirty yards square costs about £12 of English money, and it has been calculated that the return from some of the beds has been as high as 1000 per cent! The whole industry of the Ile is wonderful when it is considered that it has been all organised in a period of seven years. Except a few privately-kept oysters, there was no oyster establishment on the island previous to 1858.

Some gentlemen from the island of Jersey who visited Re report that an incredible quantity of oysters has been produced on that shore, which a few years ago was of no value, so that this branch of industry now realises an extraordinary revenue, and spreads comfort among a large number of families who were previously in a state of comparative indigence. But more interesting even than the material prosperity that has attended the introduction of this industry into the island of Re



OYSTER-CLAIRES.

is the moral success that has accrued to the experiment. Excellent laws have been enacted by the oyster-farmers themselves for the government of the colony. A kind of parliament has been devised for carrying on arguments as to oyster-culture, and to enable the four communities, into which the population has been divided, to communicate to each other such information as may be found useful for the general good of all engaged in oyster-farming. Three delegates from each of the communities are elected to conduct the general business, and to communicate with the Department of Marine when necessary.

A small payment is made by every farmer as a contribution to the general expense, while each division of the community employs a special watchman to guard the crops, and see that all goes on with propriety and good faith; and although each of the oyster-farmers of the Ile de Re cultivates his own park or claire for his own sole profit and advantage, they most willingly obey the general laws that have been enacted for the good of the community. It is pleasant to note this. We cannot help being gratified at the happy moral results of this wonderful industry, and it will readily be supposed that with both vine-culture (for the islanders have fine vineyards) and oyster-culture to attend to, these farmers are kept very busy. Indeed, the growing commerce—the export of the oysters, and the import of other commodities for the benefit of so industrious a population—incidental to such an immense growth of shellfish as can be carried on in the 4000 parks and claires which stud the foreground of Re must be arduous; but as the labour is highly remunerative, the labourers have great cause for thankfulness. It is right, however, to state that, with all the care that can be exercised, there is still an enormous amount of waste consequent on the artificial system of culture; the present calculation is, that even with the best possible mode of culture the average of reproduction is as yet only fourteenfold; but it is hoped by those interested that a much larger ratio of increase will be speedily attained. This is desirable, as prices have gone on steadily increasing since the time that Bœuf first experimented. In 1859 the sales were effected at about the rate of fifteen shillings per bushel, for the lowest qualities—the highest being double that price; these were for fattening in the claires, and when sold again they brought from two to three pounds per bushel.

One of the most lucrative branches of foreign oyster-farming may be now described—*i.e.* the manufacture of the celebrated green oysters. The greening of oysters, many of which are brought from the Ile de Re parks, is extensively carried on at Marennes, on the banks of the river Seudre, and this particular branch of oyster industry, which extends for leagues along the river, and is also sanctioned by free grants from the State, has some features that are quite distinct from those we have been considering, as the green oyster is of considerably more value than the common white oyster. The peculiar colour and taste of the green oyster are imparted to it by the vegetable

substances which grow in the beds where it is manipulated. This statement, however, is scarcely an answer to the question of "why," or rather "how," do the oysters become green? Some people maintain that the oyster green is a disease of the liver-complaint kind, whilst there are others who attribute the green colour to a parasite that overgrows the mollusc. But the mode of culture adopted is in itself a sufficient answer to the question. The industry carried on at Marennes consists chiefly of the fattening in claires, and the oysters operated upon are at one period of their lives as white as those which are grown at any other place; indeed it is only after being steeped for a year or two in the muddy ponds of the river Seudre that they attain their much-prized green hue. The enclosed ponds for the manufacture of these oysters—and, according to all epicurean authority, the green oyster becomes "*the oyster par excellence*"—require to be water-tight, for they are not submerged by the sea, except during very high tides. Each claire is about one hundred feet square. The walls for retaining the waters require therefore to be very strong; they are composed of low but broad banks of earth, five or six feet thick at the base and about three feet in height. These walls are also useful as forming a promenade on which the watchers or workers can walk to and fro and view the different ponds. The flood-gates for the admission of the tide require also to be thoroughly watertight and to fit with great precision, as the stock of oysters must always be kept covered with water; but a too frequent flow of the tide over the ponds is not desirable, hence the walls, which serve the double purpose of both keeping in and keeping out the water. A trench or ditch is cut in the inside of each pond for the better collection of the green slime left at each flow of the tide, and many tidal inundations are necessary before the claire is thoroughly prepared for the reception of its stock. When all these matters of construction and slime-collecting have been attended to, the oysters are then scattered over the ground, and left to fatten. When placed in these greening claires they are usually from twelve to sixteen months old, and they must remain for a period of two years at least before they can be properly greened, and if left a year longer they are all the better; for I maintain that an oyster should be at least about four years old before it is sent to table. In a privately-printed pamphlet on the French oyster-fisheries, sent to me by Mr. Ashworth, it is stated that oysters deposited in the claires for feeding possess

the same powers of reproduction as those kept in the breeding-ponds. "Their progeny is deposited in the same profusion, but that progeny not coming in contact with any solid body, it inevitably perishes, unless it can attach itself to the vertical sides of some erection." A very great deal of attention must be devoted to the oysters while they are in the greening-pond, and they must be occasionally shifted from one pond to another to ensure perfect success. Many of the oyster-farmers of Marennes have two or three claires suitable for their purpose. The trade in these green oysters is very large, and they are found to be both palatable and safe, the greening matter being furnished by the sea. Some of the breeders, or rather manufacturers, of green oysters, anxious to be soon rich, content themselves with placing adult oysters only in these claires, and these become green in a very short time, and thus enable the operator to have several crops in a year without very much trouble. The claires of Marennes furnish about fifty millions of green oysters per annum, and these are sold at very remunerative prices, yielding an annual revenue of something like two and a half millions of francs.

As to the kind of ground most suitable for oyster-growth, Dr. Kemmerer, of St. Martin's (Ile de Re), an enthusiast in oyster-culture, gives us a great many useful hints. I have summarised a portion of his information:—The artificial culture of the oyster may be considered to have solved an important question—namely, that the oyster continues fruitful after it is transplanted from its natural abode in the deep sea to the shores. This removal retards but never hinders fecundation. The sea oyster, however, is the most prolific, as the water at a considerable depth is always tranquil, which is a favourable point in oyster-growth; but the shore oyster-banks will also be very productive, having two chances of replenishment—namely, from the parent oysters in the *parcs*, and from those currents that may float seed from banks in the sea. Muddy ground is excellent for the *growth* of oysters; they grow in such localities very quickly, and become saleable in a comparatively short space of time. Dry rocky ground is not so suitable for the young oyster, as it does not find a sufficiency of food upon it, and consequently languishes and dies. Marl is the most esteemed, and on it the oyster is said to become perfect in form and excellent in flavour. In the marl the young oyster finds plenty of food, constant heat, and perfect quiet. Wherever there is mud and sun there will be

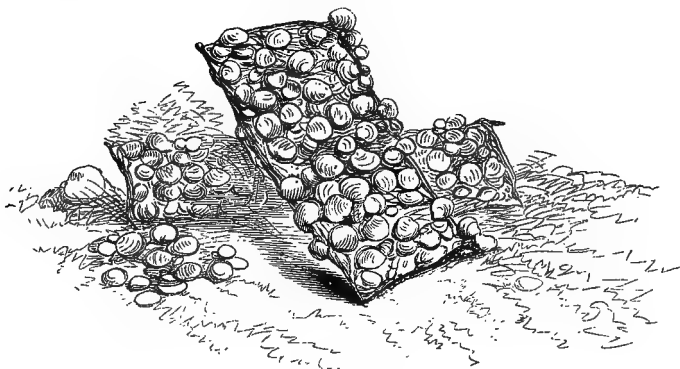
found the little molluscs, crustacea, and swimming infusoria, which are the food of the oyster. The culture of the oyster in the mud-ponds and in the marl—a culture which ought some day to become general—changes completely its qualities; the albumen becomes fatty, yellow or green, oily, and of an exquisite flavour. The animal and phosphorus matter increases, as does the osmozone. This oyster, when fed, becomes exquisite food. In effecting the culture of the sea-shores and of the marl-ponds, I am pursuing a practical principle of great importance, by the conversion of millions of shore oysters, squandered without profit, into food for public consumption. The green oyster, to this day, has only been regarded as a luxury for the tables of the rich; but, as I have indicated, there are an immense number of farms or ponds on the Seudre, and I would like to see it used as food by everyone.”

The French oyster-farmers are happy and prosperous. The wives assist their husbands in all the lighter labours, such as separating and arranging the oysters previous to their being placed on the *claires*. It is also their duty to sell the oysters; and for this purpose they leave their home about the end of August, and proceed to a particular town, there to await and dispose of such quantities of shell-fish as their husbands may forward to them. In this they resemble the fisherwomen of other countries. The Scotch fishwives do all the business connected with the trade carried on by their husbands; it is the husbands' duty to capture the fish only, and the moment they come ashore their duties cease, and those of their wives and daughters begin with the sale and barter of the fish.

Before going farther, it may be stated that the best mode of receiving the spawn of the oyster has not been determined. M. Coste, whose advice is well worthy of being followed, recommended the adoption of fascines of brushwood to be fixed over the natural oyster-beds in order to intercept the young ones; others again, as we have just seen, have adopted the *parcs*, and have successfully caught the spawn on dykes constructed for that purpose; but Dr. Kemmerer has invented a tile, which he covers with some kind of composition that can, when occasion requires, be easily peeled off, so that the crop of oysters that may be gathered upon it can be transferred from place to place with the greatest possible ease, and this plan is useful for the transference of the oyster from the collecting *parc* to the fattening *claire*. The annexed drawing will give an idea of the



Doctor's invention. The composition and the adhering oyster may all be stripped off in one piece, and the tile may be coated for future use. Tiles are exceedingly useful in aiding the oyster-breeder to avoid the natural enemies of the oyster, which are very numerous, especially at the periods when it is young and tender. The oysters may be peeled off the tiles when they are six or seven months old. Spat-collectors of wood have also been tried with considerable success. Hitherto these tiles have been very successful, although it is thought by experienced breeders that no



OYSTER-TILES.

bottom for oysters is so good as the natural one of "cultch," as the old oyster-shells are called, but the tile is often of service in catching the "floatsome," as the dredgers call the spawn, and to secure that should be one of the first objects of the oyster-farmer.

We glean from these proceedings of the French pisciculturists the most valuable lessons for the improvement and conduct of our British oyster-parks. If, as seems to be pretty certain, each matured oyster yields about two millions of young per annum, and if the greater proportion of these can be saved by being afforded a permanent resting-place, it is clear that, by laying down a few thousand breeders, we may, in the course of a year or two, have, at any place we wish, a large and reproductive oyster-farm. With reference to the question of growth, Coste tells us that stakes which had been fixed for a period of thirty months in the lake of Fusaro were quite loaded with

oysters when they came to be removed. These were found to embrace a growth of three seasons. Those of the first year's spawning were ready for the market; the second year's brood were a good deal smaller; whilst the remainder were not larger than a lentil. To attain miraculous crops similar to those once achieved in the Bay of St. Brieuc, or at the Ile de Re, little more is required than to lay down the spawn in a nice rocky bay, or in a place paved for the purpose, and having as little mud about it as possible. A place having a good stream of water flowing into it is the most desirable, so that the flock may procure food of a varied and nutritious kind. A couple of hundred stakes driven into the soft places of the shore, between high and low water mark, and these well supplied with branches held together by galvanised iron wire (common rope might soon become rotten), would, in conjunction with the rocky ground, afford capital holding-on places, so that any quantity of spawn might, in time, be developed into fine "natives." There are hundreds of places on the English and Irish coasts where such farms could be advantageously laid down.

Since the previous editions of this work were issued, bad news has been received about the French oyster farms, many of them having become exhausted through the greed of their proprietors, who at an early period began to kill the goose for the sake of its golden egg, a calamity that seems to be too frequently an attendant consequence of the present system of fishing economy. In the year 1863, as far as I can ascertain, the artificial system culminated at the *Ile de Re*, and since then the beds have yearly become less prolific.

A great amount of the miscellaneous information regarding oyster-growth and oyster-commerce, which has been circulated during the last five years, is not of a reliable nature; but many of the circumstances attendant on artificial culture are interesting, and have been proved to be correct, although they seem contradictory: as, for instance, that oysters if spawned on a muddy bottom are lost, although the same muddy bottom is highly suitable for the feeding stages of the mollusc. It is also remarkable that breeding oysters do not fatten, and that fat oysters yield no *spat*. There has been some controversy as to whether transplanted oysters will breed; opinions differ, and it is on record that such a remarkable *spat* once fell on the Whitstable grounds as to provide a stock for eleven years, including, of course, what was gathered towards the end of that period. A

close time for oysters is a law of the land ; but for all that we might have—indeed, we have now—oysters all the year round, because all oysters do not sicken or *spat* at the same period ; in fact the economy of fish growth is not yet understood either by naturalists or fishermen ; as an instance of mal-economy we have salmon rivers closed at the very time they ought to be open, some rivers being remarkable for early spawning fish, whilst others are equally so for the tardiness with which their scaly inhabitants repeat the story of their birth. In time, when we understand better how to manage our fisheries, the supplies of all kinds of round and shell fish will doubtless be better regulated than at present.

The following theory of the spat was promulgated by the author through the columns of the *Times* :—“ In an open expanse of sea the spat may be carried to great distances by tidal influence, or a sharp breeze upon the water may waft the oyster-seed many a long mile away. Every bed has its own time of spatting—thus, one of a series of scalps may be spatting on a fine warm day, when the sea is like glass, so that the spat cannot fail to fall ; while on another portion of the beds the spat may fall on a windy day, be thus left to the tender mercy of a fiercely receding tide, and so be lost, or fall mayhap on ungenial bottom a long way from the shore. On the Isle of Oleron, which supplies the green oyster breeders of Marennes with such large quantities, it is quite certain that in the course of the summer a friendly wave will waft large quantities of spat into the artificial parcs, when it is known that the oysters in these parcs have not spawned. Where does this foreign spat come from ? The men say it comes off some of the natural beds of the adjoining sea—is driven in by the tide, and finds a welcome resting-place on the artificial receivers of their parcs. It is altogether an erroneous idea to suppose that there are some seasons when the oyster does not spat, because of the cold weather, etc. Some of the parcs had spat at Arcachon this year [1866] in very ungenial weather. The spatting of the oyster does not depend on the weather at all, but the destination of the spat does, because if the tiny seedling oyster does not fall on propitious ground it is lost for ever. New oyster-beds are often discovered in places where it is certain oysters did not exist in previous years. How came they then to be formed ? The spat must have been blown upon that ground by the ill wind that carried it away from the spot where it was expected to fall. If the spat exuded by the large quantity of oysters known to be stocked in the parcs at Whitstable, in Kent, the home of the “ native,” were always to fall on the culch of Whitstable, instead of on the adjoining flats and elsewhere, the company would soon become enormously wealthy.

## CHAPTER XII.

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### ECONOMY OF AN OYSTER-FARM.

English Oyster Farms—Whitstable—Pont Oyster-Grounds—Price of Brood  
—“Natives” — Colne Oyster-Beds—Cost of Working the Beds—  
Increase of the Oyster—Demand for the Bivalve—Collecting for the  
Beds—Newhaven Oyster-Beds—The “Whisker’d Pandore”—Song of  
the Dredger—Oysters in America.

A LARGE oyster-farm requires a great deal of careful attention, and several people are necessary to keep it in order. If the farm be planted in a bay where the water is very shallow, there is great danger of the stock suffering from frost; and again, if the brood be laid down in very deep water, the oysters do not fatten or grow rapidly enough for profit. In dredging, the whole of the oysters, as they are hauled on board, should be carefully examined and picked; all below a certain size ought to be returned to the water till their beards have grown large enough. In winter, if the beds be in shallow water, the tender brood must be placed in a pit for protection from the frost; which of course takes up a great deal of time. Dead oysters ought to be carefully removed from the beds. The proprietors of private “layings” are generally careful on this point, and put themselves to great trouble every spring to lift or overhaul all their stock in order to remove the dead or diseased. Mussels must be carefully rooted out from the beds; otherwise they would in a short time render them valueless. The layings, for example, of Mr. David Plunkett, in Killery Bay, for which he had a license from the Irish Board of Fisheries, were overrun by mussels, and so rendered almost valueless. The weeding and tending of an oyster-bed requires, therefore, much labour, and involves either a partnership of several people—which is usual enough, as at Whitstable—or at least the employment of several dredgers and labourers. But, for all that, an oyster-farm

may be made a most lucrative concern. As a guide to the working of a very large oyster-farm—say a concern of £70,000 a year or thereabout—I shall give immediately some data of the Whitstable Free Dredgers' Company; but I wish first to say that the organisation which is constantly at work for supplying the great metropolis with oysters is more perfect than can be said of any other branch of the fish trade. In oyster-culture we approach in some degree to the French, although we do not, as they do, except as regards some new companies, begin at the beginning and plant the seed. All that we have yet achieved is the art of nursing the young "brood," and of dividing and keeping separate the different kinds of oysters. This is done in parks or farms on various portions of the coasts of Kent and Essex, and the whole process, from beginning to end, may be viewed at Whitstable, where there is a large oyster-ground and a fine fleet of boats kept for the purpose of dredging and planting. I have already stated that the Whitstable oyster-beds are held as by a joint-stock company, into which, however, there is no other way of entrance than by birth, as none but the free dredgemen of the town can hold shares. When a man dies his interest in the company dies with him, but his widow—if he was a married man—obtains a pension. The sales from the public and private beds of Whitstable sometimes attain a total of £200,000 per annum. The business of the company is managed by twelve directors, who are known as "the Jury." The stock of oysters held in the private layings of the company is said to be of the value of £200,000. The extent of the public and other oyster-ground at Whitstable is about twenty-seven square miles.

The oyster-farm of Whitstable is a co-operation in the best sense of the term, and has been in existence for a long period: it is the wealthiest and largest oyster corporation in the world. The layings at Whitstable occupy about a mile and a half square, and the oyster-beds there have been so very prosperous as to have attained the name of the "happy fishing-grounds." At Whitstable, Faversham, and adjoining grounds, a space of twenty-seven square miles, as I have mentioned above, is taken up in oyster-farms, and the industry carried on in this space of ground involves the annual earning and expenditure of a very large sum of money. Over 3000 people are employed in the various industries connected with the fishery, who earn capital wages all the year round—the sum paid for labour by the different

companies being set down at over £160,000 per annum ; and in addition to this expenditure for wages, there is likewise a large sum of money annually expended for the repairing and purchasing of boats, sails, dredges, and other implements used in oyster-fishing. At Whitstable the course of work is as follows :—The business of the company is to feed oysters for the London and other markets : for this purpose they buy brood or spat, and lay it down in their beds to grow. When the company's own oysters produce a spat—that is, when the spawn or “float-some” as the dredgers call it, emitted from their own beds falls upon their own ground—it is of great benefit to them, as it saves purchases of brood to the extent of what has fallen ; but this falling of the spat is in a great degree accidental, for no rule can be laid down as to when the oysters spawn or where the spat may be carried to. No artificial contrivances of the kind known in France have yet been used in Whitstable for the saving of the spawn. Very large sums have been paid in some years by the Whitstable company for brood with which to stock their grounds, great quantities being collected from the Essex side, there being a number of people who derive a comfortable income from collecting oyster-brood on the public foreshores, and disposing of it to persons who have private nurseries, or oyster-layings as these are locally called. The grounds of Pont are particularly fruitful in spat, and yield large quantities to all that require it. Pont is an open space of water, sixteen miles long by three broad, free to all ; about one hundred and fifty boats, each with a crew of three or four men, find constant employment upon it, in obtaining young oysters, which they sell to the neighbouring oyster-farmers, although it is certain that the brood thus freely obtained must have floated out of beds belonging to the purchasers. The price of brood is often as high as fifty shillings per bushel, and it is the sum obtained over this cost price that must be looked to for the paying of wages and the realisation of profit. Oysters have risen in price very much of late years, and brood has also, in consequence of the scarcity of spat, been proportionally high.

Whitstable oyster-beds are “worked” with great industry, and it is the process of “working” that gives employment to so many people (eight men per acre are employed), and improves the Whitstable oysters so much beyond those found on the natural beds, which are known as “Commons,” in contradistinction to the bred oysters of Whitstable and other grounds,

which are called "Natives." These latter are justly considered to be of superior flavour, although no particular reason can be given for their being so, and indeed in many instances they are not natives at all—that is in the sense of being spatted on the ground—but are, on the contrary, a grand mixture of all kinds of oysters, brood being brought from Prestonpans and Newhaven in the Firth of Forth, and from many other places, to augment the stock. The so-called "native" oysters—and the name is usually applied to all that are bred in the estuary of the Thames—are very large in flesh, succulent and delicate in flavour, and fetch a much higher price than any other oyster. The beds of natives are all situated on the London clay, or on similar formations. There can, however, be no doubt that the difference in flavour and quantity of flesh is obtained by the Thames system of transplanting and working that is vigorously carried on over all the beds. Every year the whole extent of the layings is gone over and examined by means of the dredge; successive portions are dredged over day by day, till it may be said that almost every individual oyster is examined. On the occasion of these examinations, the brood is detached from the cultch, double oysters are separated, and all kinds of enemies—and these are very numerous—are seized upon and killed. It requires about eight men per acre to work the beds effectually. During three days a week, dredging for what is called the "planting" is carried on; that is, the transference of the oysters from one place to another, as may be thought suitable for their growth, and also the removing of dead ones, the clearing away of mussels, and so on. On the other three days of the week it becomes the duty of the men to dredge for the London market, when only so many are lifted as are required. A bell is carried round and rung every morning to rouse the dredgers whose turn it is for duty, and who at a given signal start to do their portion of the "stint." As to this working of the oyster-beds, an eminent authority has said it is utterly useless to enclose a piece of ground and simply plant it; it is utterly useless to throw a lot of oysters down amongst every state of filth. You must keep constantly dredging, not only the bed itself, but the public beds outside, so as to keep the bottom fit for the reception and growth of the young oysters, and free of its multitudinous natural enemies.

It may as well be explained here also, that what are called native beds are all cultivated beds; the natural beds are unculti-

vated, and are generally public and free to all comers. The Colne beds, however, are an exception: they are natural beds, but are held by the city of Colchester as property. Whenever a new bed is discovered anywhere nowadays, the run upon it is so great that it is at once despoiled of its shelly treasures; and the native beds would soon become exhausted if they were not systematically conducted on sound commercial principles, and regularly replenished with brood.

As regards the oyster-cultivation of the river Colne, some interesting statistics were a few years ago made public at Colchester by Councillor Hawkins. That gentleman tells us that oyster-brood increases fourfold in three years. The quantity of oysters in a London bushel is as follows:—First year, *spat*, number not ascertainable; second year, *brood*, 6400; third year, *ware*, 2400; fourth year, *oysters*, 1600; therefore, four wash of brood (*i.e.* four pecks), purchased at say 5s. per wash, increase by growth and corresponding value to 42s. per bushel, or a sum of eight guineas. The quantity of oysters obtained from the river Colne by the company bears but a small proportion to the yield from private layings, which are in general only a few acres in extent. “The private layings,” however, we are told, “cannot fairly be made the measure of productiveness for a large fishery; as they may be compared to a garden in a high state of cultivation, while the fishery generally is better represented by a large tract of land but partially reclaimed from a state of nature.” The difference in cost of working a big fishery and a little one seems to be great. One of the owners of a private laying states that, when the expense of dredging or lifting the oysters exceeded 4s. per bushel, he gave up working, while in the Colne Fishery dredgermen are never paid less than 12s., and sometimes as high as 40s. a bushel. The Colne Company is managed by a jury of twelve, appointed by the water-bailiff, who is under the jurisdiction of the corporation of Colchester. Whenever it is time to begin the season’s operations, the jury meet and take stock of the oysters on hand, fix the price at which sales are to be made, and regulate the charge for dredging, which is paid by the wash. Under direction of the jury, the foreman of the company sets the daily stint to the men; and so the work, which is very light, goes pleasantly forward from season to season.

At Faversham, Queenborough, and Rochester, there is a large commerce carried on in this particular shell-fish. In



others of the "parks" at these places, "natives" are grown in perfection. The company of the burghers of Queenborough grow the fine Milton oyster so well known to the connoisseur, and the company's beds are well attended to. I may note the Faversham Company, said to be the oldest among the Thames companies, having been in existence for a few centuries. All of these companies grow the "natives," and I may explain that the portion of the beds set apart for the rearing of "natives" is as sacred as the waxen cells devoted to the growth of queen bees, and the coarser denizens of the mid-channel are not allowed to be mixed therewith. The management of all the Kent and Essex oyster companies is pretty much the same, but there are also gentlemen who trade solely upon their own account.

The demand for native and other oysters by the Londoners alone is something wonderful, and constitutes of itself a large branch of commerce—as the numerous shell-fish shops of the Strand and Haymarket abundantly testify. It is not easy to arrive at correct statistics of what London requires in the way of oysters; but if we set the number down as being nearly 1,000,000,000 per annum we shall not be very far wrong. To provide these, the dredgermen or fisher people at Colchester, and other places on the Essex and Kent coasts, prowl about the sea-shore and pick up all the little oysters they can find—these ranging from the size of a threepenny-piece to a shilling; and persons and companies having layings purchase them to be nursed and fattened for the table, as already described. At other places the spawn itself is collected, by picking it from the pieces of stone, or the old oyster-shells, to which it may have adhered; and it is nourished in pits, as at Burnham, for the purpose of being sold to the Whitstable people, who carefully lay that brood in their grounds. A good idea of the oyster-traffic may be obtained from the fact that, in some years, the Whitstable men have paid £30,000 for brood, in order to keep up the stock of their far-famed oysters.

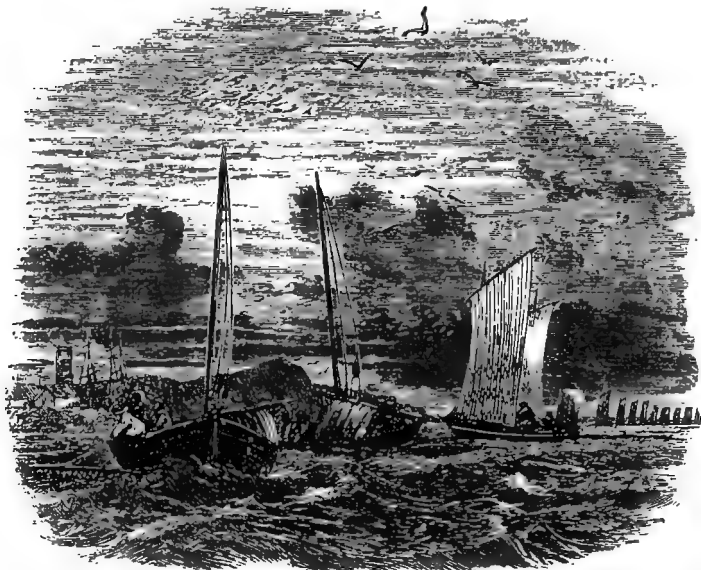
The centre in England for the distribution of oysters is Billingsgate, the chief piscatorial bourse of the great metropolis, and the countless thousands of bushels of this molluscous dainty which find their way through "Oyster Street" to this Fish Exchange mark the everlasting demand. Oysters are sold by the bushel, and every measure is made to pay a toll of fourpence, and another sum of a like amount for carriage to the shore.

All oysters sold at Billingsgate are liable to this eightpenny tax. The London oysters—and I regret to say it, for there is nothing finer than a genuine oyster—are sophisticated in the cellars of the buyers, by being stuffed with oatmeal till the flavour is all but lost in the fat. The flavour of oysters—like the flavour of all other animals—depends on their feeding. The fine *godt* of the highly-relished Prestonpans oysters is said to be derived from the fact of their feeding on the refuse liquor which flows from the salt pans of that neighbourhood. I have eaten of fine oysters taken from a bank that was visited by a rather questionable stream of water; they were very large, fat, and of exquisite flavour, the shell being more than usually well filled with “meat.” What the London oysters gain in fat by artificial feeding they assuredly lose in flavour. The harbour of Kinsale (a receptacle for much filth) used to be remarkable for the size and flavour of its oysters. The beds occupied the whole harbour, and the oysters there were at one time very plentiful, and far exceeded the Cork oysters in fame (and they have long been famous); but they were so overfished as to be long since used up, much to the loss of the Irish people, who are particularly fond of oysters, and delight in their “Pool-doodies” and “Red-banks” as much as the English and Scotch do in their “Natives” and “Pandores.”

The far-famed Scottish oysters obtained near Edinburgh, once so cheap, are becoming scarce and dear. The growth of the railway system has also extended the Newhaven men’s market. Before the railway period very few boats went out at the same time to dredge; then oysters were very plentiful—so plentiful, in fact, that three men in a boat could, with ease, procure 3000 oysters in a couple of hours; but now, so great is the change in the productiveness of the scalps, that three men consider it an excellent day’s work to procure about a fifth part of that quantity. The Newhaven oyster-beds lie between Inchkeith and Newhaven, and belong to the city of Edinburgh, and were given in charge to the free fishermen of that village, on certain conditions.

The “pandore” oysters are principally obtained at the village of Prestonpans and the neighbouring one of Cockenzie. Dredging for oysters is a principal part of the occupation of the Cockenzie fishermen. There are few lovers of this dainty mollusc who have not heard of the “whiskered pandores.” The pandore oyster is so called because of being found in the neighbourhood

of the saltpans. It is a large fine-flavoured oyster, as good as any "native" that ever was brought to table, the Pooldoodies of Burran not excepted. The men of Cockenzie derive a good portion of their annual income from the oyster traffic. The pursuit of the oyster, indeed, forms a phase of fisher life there as distinct as at Whitstable. The times for going out to dredge



OYSTER-DREDGING AT COCKENZIE.

are at high tide and low tide. The boats used are the smaller-sized ones employed in the white fishery. The dredge somewhat resembles in shape a common clasp-purse; it is formed of network, attached to a strong iron frame, which serves to keep the mouth of the instrument open, and acts also as a sinker, giving it a proper pressure as it travels along the oyster-beds. When the boat arrives over the oyster-scalps, the dredge is let down by a rope attached to the upper ring, and is worked by one man, except in cases where the boat has to be sailed swiftly, when

two are employed. Of course, in the absence of wind recourse is had to the oars. The tension upon the rope is the signal for hauling the dredge on board, when the entire contents are emptied into the boat, and the dredge returned to the water. These contents, not including the oysters, are of a most heterogeneous kind—stones, sea-weed, star-fish, young lobsters, crabs, actinæ—all of which are usually returned to the water, some of them being considered as the most fattening ground-bait for the codfish. The whelks, clams, mussels, cockles, and occasionally the crabs, are used by the fishermen as bait for their white-fish lines. Once, in a conversation with a veteran dredger as to what strange things *might* come in the dredge, he replied, “Well, master, I don’t know what sort o’ curiosities we sometimes get ; but I have seen gentlemen like yourself go out with us a-dredgin’, and take away big baskets full o’ things as was neither good for eating or looking at. The Lord knows what they did wi’ them.” During the whole time that this dredging is being carried on, the crew keep up a wild monotonous song, or rather chant, in which they believe much virtue to lie. They assert that it charms the oysters into the dredge.

“ The herring loves the merry moonlight,  
The mackerel loves the wind ;  
But the oyster loves the dredger’s song,  
For he comes of a gentle kind.”

Talking is strictly forbidden, so that all the required conversation is carried on after the manner of the *recitative* of an opera or oratorio. An enthusiastic London *litterateur* and musician, being on a visit to Scotland, determined to carry back with him, among other natural curiosities, the words and music of the oyster-dredging song. But, after being exposed to the piercing east wind for six hours, and jotting down the words and music of the dredgers, he found it all to end in nothing ; the same words were never used, the words were ever changing. The oyster-scalps are gone over by the men much in the way that a field is ploughed by an agricultural labourer, the boat going and returning until sufficient oysters are secured, or a shift is made to another bed.

The geographical distribution of oysters is most lavish ; wherever there is a seaboard there will they be found. The old stories of ancient mariners, who sailed the seas before the days

of cheap literature, will be recalled, and their boasted knowledge of the wonders of the fish world—of oysters that grew on trees, and oysters so large that they required to be carved just like a round of beef or quarter of lamb. All these tales were formerly considered so many romances. Who believed Uncle Jack when he gravely told his wondering nephews about oysters as large as a soup-plate being found on the coast of Coromandel? But, nevertheless, Uncle Jack's stories have been found to be true: there *are* large oysters which require carving, and oysters *have* been plucked off trees. There are wonderful tales about oysters that have been taken on the coast of Africa—plucked too from the very trees that our good, but ignorant, forefathers did not believe in. The ancient Romans, who knew all the secrets of good living, had the oysters of all countries brought to their fish-stews, in order that they might experiment upon them and fatten them for table purposes. Although they gave the palm to those from Britain, they had a great many varieties from Africa, and had ingenious modes of transporting them to great distances which have been lost to modern pisciculturists.

In America the oyster is an institution of great importance. On the seaboard of that vast continent they are found in natural beds of wonderful extent, and are distributed by means of railway and steamboat throughout the cities and villages of even the far inland districts. Numerous as are the shell-fish shops of London, they are but as one in ten when compared with the oyster-houses of New York, in which city oyster-eating appears to be almost the sole business of life, so many people are to be found indulging in that pleasure. The custom in America is to have the oysters cooked, and this culinary process is accomplished in a variety of ways; the mollusc being stewed, fried, or roasted, according to taste; they may be had cooked in about twenty different ways in any of the well-known oyster taverns of New York at a few minutes' notice. The great market for oysters in America is the city of Baltimore, in Maryland, where it is not uncommon for one or two firms each to "can" a million bushels in one year! Immense numbers of these "canned" oysters are dispatched all over the States, to the prairies of the far west, to the cities of New Mexico, to the military forts of the great American desert, to the restaurants of Honolulu, and to the miners searching for gold on the Rocky Mountains; whilst fresh oysters packed in ice have been sent

to great distances. In the oyster-fisheries of Maryland as many as six hundred vessels of about twenty-three tons each are engaged, in addition to two thousand small boats or canoes. These employ about seven thousand men, and if we add those engaged in the carrying trade, it would give the number of persons employed in the oyster trade of the State of Maryland as at least ten thousand, all obtaining remunerative employment.

## CHAPTER XIII.



### OUR SHELL-FISH FISHERIES.

Productive Power of Shell-Fish—Varieties of the Crustacean Family—Study of the Minor Shell-Fishes—Demand for Shell-Fish—Lobsters—A Lobster Store-Pond described—Natural History of the Lobster and other Crustaceæ—March of the Land-Crabs—Prawns and Shrimps, how they are caught and cured—A Mussel-Farm—How to grow bait.

SHELL-FISH is the popular name bestowed by unscientific persons on the Crustacea and Mollusca, and no other designation could so well cover the multitudinous variety of forms which are embraced in these extensive divisions of the animal kingdom. Fanciful disquisitions on shell-fish and on marine zoology have been intruded on the public of late till they have become somewhat tiresome; but as our knowledge of the natural history of all kinds of sea animals, and particularly of oysters, lobsters, crabs, etc., is decidedly on the increase, there is yet room for all that I have to say on the subject of these dainties; and there are still unexplored wonders of animal life in the fathomless sea that deserve the deepest study.

The economic and productive phases of our shell-fish fisheries have never yet, in my opinion, been sufficiently discussed; and when I state that the power of multiplication possessed by all kinds of Crustacea and Mollusca is even greater, if that be possible, than that possessed by finned fishes, it will be obvious that there is much in their natural history that must prove interesting even to the most general reader. Each oyster, as we have seen, gives birth to almost incredible quantities of young. Lobsters also have an amazing fecundity, and yield an immense number of eggs—each female producing from twelve to twenty thousand in a season; and the crab is likewise most prolific. I lately purchased a crab weighing within an ounce of two pounds, and it contained a mass of

minute eggs equal in size to a man's hand; these were so minute that a very small portion of them, picked off with the point of a pin, when placed on a bit of glass, and counted by the aid of a powerful microscope, numbered over sixty, each appearing of the size of a red currant, and not at all unlike that fruit: so far as I could guess the eggs were not nearly ripe. I also examined about the same time a quantity of shrimp-eggs; and it is curious that, while there are the cock and hen lobster, I never saw any difference in the sex of the shrimps: all that I handled, amounting to hundreds, were females, and all of them were laden with spawn, the eggs being so minute as to resemble grains of the finest sand.

Although the crustacean family counts its varieties by thousands, and contains members of all sizes, from minute animalculæ to gigantic American crabs and lobsters, and ranges from the simplest to the most complex forms, yet the edible varieties are not at all numerous. The largest of these are the lobster (*Astacus marinus*) and the crab (*Cancer pagurus*); and river and sea cray-fish may also be seen in considerable quantities in London shell-fish shops; and as for common shrimps (*Crangon vulgaris*) and prawns (*Palæmon serratis*), they are eaten in myriads. The violet or marching crab of the West Indies, and the robber crab common to the islands of the Pacific, are also esteemed as great delicacies of the table, but are unknown in this country except by reputation.

Leaving old and grave people to study the animal economy of the larger Crustacea, the juveniles may with advantage take a peep at the periwinkles, the whelks, or other Mollusca. These are found in immense profusion on the little stones between high and low water mark, and on almost every rock on the British coast. Although to the common observer the oyster seems but a repulsive mass of blubber, and the periwinkle a creature of the lowest possible organisation, nothing can be farther from the reality. There is throughout this class of animals a wonderful adaptability of means to ends. The turbinated shell of the periwinkle, with its finely-closed door, gives no token of the powers bestowed upon the animal, both as provision for locomotion (this class of travellers wherever they go they carry their house along with them) and for reaping the tender rock-grass upon which they feed. They have eyes in their horns, and their sense of vision is quick. Their curiously-constructed foot enables them to progress in



any direction they please, and their wonderful tongue either acts as a screw or a saw. In fact, simple as the organisation of these animals appears to be, it is not less curious in its own way than the structure of other beings which are thought to be more complicated. In good truth, the common periwinkle (*Littorina vulgaris*) is both worth studying and eating, vulgar as some people may think it.

Immense quantities of all the edible molluscs are annually collected by women and children in order to supply the large inland cities. Great sacks full of periwinkles, whelks, etc., are sent on by railway to Manchester, Glasgow, London, etc.; whilst on portions of the Scottish sea-coast the larger kinds are assiduously collected by the fishermen's wives and prepared as bait for the long hand-lines which are used in capturing the codfish or other Gadidæ. As an evidence of how abundant the sea-harvest is, I may mention that from a spot so far north as Orkney hundreds of bags of periwinkles are weekly sent to London by the Aberdeen steamer.

From personal inquiry made by the writer he estimated that for the commissariat of London alone there were required three millions of crabs and lobsters! May we not, therefore, take for granted that the other populous towns of the British empire will consume an equally large number? The people of Liverpool, Manchester, Edinburgh, Glasgow, and Dublin, are as fond of shell-fish as the denizens of the great metropolis; at any rate, they eat all they can get, and never get enough. The machinery for supplying this ever-increasing demand for lobsters, crabs, and oysters, is exceedingly simple. On most parts of the British coast there are people who make it their business to provide those luxuries of the table for all who wish them. The capital required for this branch of the fisheries is not large, and the fishermen and their families attend to the capture of the crab and lobster in the intervals of other business. The Scotch laird's advice to his son to "be always stickin' in the ither tree, it will be growin' when ye are sleepin'," holds good in lobster-fishing. The pots may be baited and left till such time as the victim enters, whilst the men in the meantime take a short cruise in search of bait, or try a cast of their haddock-lines a mile or two from the shore; or the fishing can be watched over, and when the lobsters are numerous, the pots be lifted every half-hour or so. The taking of shell-fish also affords occupation to the old men and youngsters of the fishing villages, and these folks may

be seen in the fine days assiduously waiting on the lobster-traps and crab-cages, which are not unlike overgrown rat-traps, and are constructed of netting fastened over a wooden framework, baited with any kind of fish offal, or garbage, the stench of which may be strong enough to attract the attention of those minor monsters of the deep. A great number of these lobster-pots are sunk at, perhaps, a depth of twelve or twenty fathoms at an appropriate place, being held together by a strong line, and all marked with a peculiarly-cut piece of cork, so that each fisherman may recognise his own lot. The knowing youngsters of our fishing communities can also secure their prey by using a long stick. Mr. Cancer Pagurus is watched as he bustles out for his evening promenade, and, on being deftly pitched upon his back by means of a pole, he indignantly seizes upon it with all his might, and the stick being shaken a little has the desirable effect of causing Mr. Crab to cling thereto with great tenacity, which is, of course, the very thing desired by the grinning "human" at the other end, as whenever he feels his prey secure he dexterously hauls him on board, unhooks the crusty gentleman with a jerk, and adds him to the accumulating heap at the bottom of the old boat. The monkeys in the West Indies are, however, still more ingenious than the "fisher loons" of Arran or Skye. Those wise animals, when they take a notion of dining on a crab, proceed to the rocks, and slyly insinuating their tail into one of the holes where the crustacea take refuge, that appendage is at once seized upon by the crab, who is thereby drawn from his hiding-place, and, being speedily dashed to pieces on the hard stone, affords a fine feast to his captor. This reminds me of the story told about a man's dog which was seized by a crab when passing a fish shop: *Punch* has it, "Whistle on your dog, man;" "Na, na, my man; whistle you on your partan." On the granite-bound coast of Scotland the sport of crab-hunting may be enjoyed to perfection, and the wonders of the deep be studied at the same time. A long pole with a small crook at the end will be found useful to draw the crab from his nest, or great fun may be enjoyed by tying during low-water a piece of bait to a string and attaching a stone to the other end of the cord. The crab seizes upon this bait whenever the tide flows, and drags it to its hole, so that when the ebb of the tide recurs, the stone at the end of the cord marks the hiding-place of the animal, who thus falls an easy prey to his captor. The natives are the best instructors in these arts, and seaside

visitors cannot do better than engage the services of some strong fisher youth to act as guide in such perambulations as they may make on the beach. There are few seaside places where the natives cannot guide strangers to rock pools and picturesque nooks teeming with materials for studying the wonders of the shore.

Lobsters are collected and sent to London from all parts of the Scottish shore. I have seen on the Sutherland and other coasts perforated floating chests filled with them. They were kept till called for by the welled smacks, which generally make the circuit of the coasts once a week, taking up all the lobsters or crabs they can get, and carrying them alive to London. From the Durness shores alone as many as from six to eight thousand lobsters have been collected in the course of a single summer, and sold, big or little, at threepence each to the buyers. The lobsters taken on the north-east coast of Scotland and at Orkney are now packed in seaweed and sent in boxes to London by railway. Lobsters have not been so plentiful, it is thought, in the Orkney Islands of late years; but a large trade has been done in them since the railway was opened from Aberdeen—at all events, the prices of lobsters are double what they used to be in the time of the welled smacks alluded to above. The fisher-folks of Orkney confess that the trade in lobsters pays them well. At some places in Scotland lobster-fishing is pursued at great risk. Among the groups of rocky islands on the west coast of Scotland, it is often a work of great danger to set the lobster-pots, and often enough after being set they cannot again be reached, in consequence of sudden squalls, till many days have elapsed; so that, if the remuneration for the labour is good, it is sometimes very hardly earned.

All kinds of crustaceans can be kept alive at the place of capture till “wanted”—that is, till the welled vessel which carries them to London or Liverpool arrives—by simply storing them in a large perforated wooden box anchored in a convenient place. Nor must it be supposed that the acute London dealers allow too many lobsters to be brought to market at once; the supply is governed by the demand, and the stock kept in large store-boxes at convenient places down the river, where the sea-water is strong and the liquid filth of London harmless. But these old-fashioned store-boxes will, no doubt, be speedily superseded by the construction of artificial store-

ponds on a large scale, similar to that erected by Mr. Richard Scovell at Hamble, near Southampton. That gentleman's pond has been of good service to him. It is about fifty yards square, and is lined with brick, having a bottom of concrete, and was excavated at a cost of about £1200. It will store with great ease 50,000 lobsters, and the animals may remain in the pond as long as six weeks, with little chance of being damaged. Lobsters, however, do not breed in this state of confinement, nor have they been seen to undergo a change of shell. There is, of course, an apparatus of pipes and sluices for the purpose of supplying the pond with water. The stock is recruited from the coasts of France and Ireland; and to keep up the supply Mr. Scovell has in his service two or three vessels of considerable size, which visit the various fisheries and bring the lobsters to Hamble in their capacious wells, each of which is large enough to contain from 5000 to 10,000 animals.

The west and north-west coasts of Ireland abound with fine lobsters, and welled vessels bring thence supplies for the London market, and it is said that a supply of 10,000 a week can easily be obtained. Immense quantities are also procured on the west coast of Scotland. A year or two ago I saw on board the *Islesman* steamboat at Greenock a cargo of 30,000 lobsters, obtained chiefly on the coasts of Lewis and Skye. The value of these to the captors would be upwards of £1000, and in the English fishmarkets the lot would bring at least four times that sum.

A very large share of our lobsters is derived from Norway, as many as 30,000 sometimes arriving from the fjords in a single day. The Norway lobsters are much esteemed, and we pay the Norwegians something like £20,000 a year for this one article of commerce. They are brought over in welled steam-vessels, and are kept in the wooden reservoirs already alluded to, some of which may be seen at Hole Haven, on the Essex side of the Thames. Once upon a time, some forty years ago, one of these wooden lobster-stores was run into by a Russian frigate, whereby some 20,000 lobsters were set adrift to sprawl in the muddy waters of the Thames. In order that the great mass of animals confined in these places may be kept upon their best behaviour, a species of cruelty has to be perpetrated to prevent their tearing each other to pieces; the great claw is there rendered paralytic by means of a wooden peg being driven into a lower joint.

I have no intention of describing the whole members of the crustacea ; they are much too numerous to admit of that, ranging as they do from the comparatively giant-like crab and lobster down to the millions of minute insects which at some places confer a phosphorescent appearance on the waters of the sea. My limits will necessarily confine me to a few of the principal members of the family—the edible crustacea, in fact ; and these I shall endeavour to speak about in such plain language as I think my readers will understand, leaving out as much of the fashionable “ scientific slang ” as I possibly can.

The more we study the varied crustacea of the British shores, the more we are struck with their wonderful formation, and the peculiar habits of their members. I once heard a clergyman at a lecture describe a lobster in brief but fitting terms as a standing romance of the sea—an animal whose clothing is a shell, which it casts away once a year in order that it may put on a larger suit—an animal whose flesh is in its tail and legs, and whose hair is in the inside of its breast, whose stomach is in its head, and which is changed every year for a new one, and which new one begins its life by devouring the old ! an animal which carries its eggs within its body till they become fruitful, and then carries them outwardly under its tail ; an animal which can throw off its legs when they become troublesome, and can in a brief time replace them with others ; and lastly, an animal with very sharp eyes placed in movable horns. The picture is not at all overdrawn. It is a wondrous creature this lobster, and I may be allowed a brief space in which to describe the curious provision of nature which allows for an increase of growth, or provides for the renewal of a broken limb, and which applies generally to the edible crustacea.

The habits of the principal crustacea are not pretty well understood, and their mode of growth is so peculiar as to render a close inspection of their habits a most interesting study. As has been stated, a good-sized lobster will yield about 20,000 eggs, and these are hatched, being so nearly ripe before they are abandoned by the mother, with great rapidity—it is said in forty-eight hours—and grow quickly, although the young lobster passes through many changes before it is fit to be presented at table. During the early periods of growth it casts its shell frequently. This wonderful provision for an increase of size in the lobster has been minutely studied during

its period of moulting. Mr. Jonathan Couch says the additional size which is gained at each period of exuviation is perfectly surprising, and it is wonderful to see the complete covering of the animal cast off like a suit of old clothes, while it hides, naked and soft, in a convenient hole, awaiting the growth of its new crust. In fact, it is difficult to believe that the great soft animal ever inhabited the cast-off habitation which is lying beside it, because the lobster looks, and really is, so much larger. The lobster, crab, etc., change their shells about every six weeks during the first year of their age, every two months during the second year, and then the changing of the shell becomes less frequent, being reduced to four times a year. It is supposed that this animal becomes reproductive at the age of five years. In France the lobster-fishery is to some extent "regulated." A close-time exists, and size is the one element of capture that is most studied. All the small lobsters are thrown back to the water. There is no difficulty in observing the process of exuviation. A friend of mine had a crab which moulted in a small crystal basin. I presume that at some period in the life of the crab or lobster growth will cease, and the annual moulting become unnecessary; at any rate, I have seen crabs and other crustaceans taken from an island in the Firth of Forth which were covered with parasites evidently two or three years old.

To describe minutely the exuviation of a lobster, crab, or shrimp, would in itself form an interesting chapter of this work, and it is only of late years that many points of the process have been witnessed and for the first time described. Not long ago, for instance, it was doubtful whether or not the hermit-crabs (*Anomoura*) shed their skin; and, that fact being settled, it became a question whether they shed the skin of their tail! There was a considerable amount of controversy on this delicate point, till the "strange and unexpected discovery" was made by Mr. Harper. That gentleman was fortunate enough to catch a hermit-crab in the very act, and was able to secure the caudal appendage which had just been thrown off. Other matters of controversy have been instituted in reference to the growth of various members of the crustacea; indeed, the young of the crab in an early stage have before now been described by naturalists as distinct species, so great is the metamorphosis they undergo before they assume their final shape—just as the sprat in good time changes in all probability to the herring.

Another point of controversy at one period existed in reference to the power of crustaceans to replace their broken limbs, or occasionally to dispense, at their own good pleasure, with a limb, when it is out of order, with the absolute certainty of replacing it.

When the female crustacea retire in order to undergo their exuviation, they are watched, or rather guarded, by the males ; and if one male be taken away, in a short time another will be found to have taken his place. I do not think there is any particular season for moulting ; the period differs in different places, according to the temperature of the water and other circumstances, so that we might have shell-fish (and white-fish too) all the year round were a little attention paid to the different seasons of exuviation and egg-laying.

The mode in which a hen lobster lays her eggs is curious : she lodges a quantity of them under her tail, and bears them about for a considerable period ; indeed, till they are so nearly hatched as only to require a very brief time to mature them. When the eggs are first exuded from the ovary they are very small, but before they are committed to the sand or water they increase considerably in size, and become as large as good-sized shot. Lobsters may be found with eggs, or "in berry" as it is called, all the year round ; and when the hen is in process of depositing her eggs she is not good for food, the flesh being poor, watery, and destitute of flavour.

When the British crustacea are in their soft state they are not considered as being good for food ; but, curiously enough, the land-crabs are most esteemed while in that condition. The epicure who has not tasted "soft crabs" should hasten to make himself acquainted with one of the most delicious luxuries of the table. The eccentric land-crab, which lives far inland among the rocks, or in the clefts of trees, or burrows in holes in the earth, makes in the spring-time an annual pilgrimage to the sea in order to deposit its spawn, and the young, guided by an unerring instinct, return to the land in order to live in the rocks or burrow in the earth like their progenitors. In the fish-world we have something nearly akin to this. We have the salmon, that spends one-half its life in the sea, and the other half in the fresh water ; it proceeds to the sea to attain size and strength, and returns to the river in order to perpetuate its kind. The eel, again, just does the reverse of all this : it goes down to the sea to spawn, and then proceeds up the river to live ; and

at certain seasons it may be seen in myriad quantities making its way up stream. The march of the land-crabs is a singular and interesting sight: they congregate into one great army, and travel in two or three divisions, generally by night, to the sea; they proceed straight forward, and seldom deviate from their path unless to avoid crossing a river. These marching crabs eat up all the luxuriant vegetation on their route; their path is marked by desolation. The moment they arrive at the water the operation of spawning is commenced (by allowing the waves to wash gently over their bodies. A few days of this kind of bathing assists the process of oviposition, and knots of spawn similar to lumps of herring-roe are gradually washed into the water, which in a short time finishes the operation. Countless thousands of these eggs are annually devoured by various fishes and monsters of the deep that lie in wait for them during the spawning season. After their brief seaside sojourn, the old crabs undergo their moult, and at this period thousands of them sicken and die, and large numbers of them are captured for table use, soft crabs being highly esteemed by all lovers of good things. By the time they have recovered from their moult the army of juveniles from the seaside begins to make its appearance in order to join the old stock in the mountains; and thus the legion of land-crabs is annually recruited by a fresh batch, which in their turn perform the annual migration to the sea much as their parents have done before them.

It is worth noting here that lobsters are year by year becoming "smaller by degrees and beautifully less," all the large ones are being fished up and the small ones are never allowed to become bigger in consequence of the yearly increasing demands of the public. As a general rule, the great bulk of lobsters are not much more than half the size they used to be. The remedy is a close-time. Yes; there must be a close-time instituted for the lobster and the crab as well.

Before leaving the crabs and lobsters, it is worthy of remark that an experienced dealer can tell at once the locality whence any particular lobster is obtained—whether from the west of Ireland, the Orkney Islands, or the coast of Brittany. The shelly inhabitants of different localities are distinctly marked. Indeed fish are peculiarly local in their habits, although the vulgar idea has hitherto been that all kinds of sea animals herd indiscriminately together; that the crab and the lobster crept about the bottom rocks, whilst the waving skate or the swaggering



ling fish dashed about in mid-water, the prowling "dogs" busily preying on the shoals of herring supposed to be swimming near; the brilliant shrimp flashing through the crowd like a meteor, the elegant saithe keeping them company; the whole being overshadowed by a few whales, and kept in awe by a dozen or so of sharks! Nothing can be more different than the reality of the water-world, which is colonised quite as systematically as the earth. Particular shoals of herring, for instance, gather off particular counties; the Lochfyne herring, as I have mentioned in the account of the herring-fishery, differs from the herring of the Caithness coast or that of the Firth of Forth; and any 'cute fishmonger can tell a Tweed salmon from a Tay one. The herring at certain periods gather in gigantic shoals, the chief members of the Gadidæ congregate on vast sand-banks, and the whales occasionally roam about in schools; while the Pleuronectidæ occupy sandy places in the bottom of the sea. We have all heard of the great cod-banks of Newfoundland, of the fish community at Rockall; then is there not the Nymph Bank, near Dublin, celebrated for its haddocks? have we not also the Faroe fishing-ground, the Dogger Bank, and other places with a numerous fish population? There are wonderful diversities of life in the bosom of the deep; and there is beautiful scenery of hill and plain, vegetable and rock, and mountain and valley. There are shallows and depths suited to different aspects of life, and there is life of all kinds teeming in that mighty world of waters, and the fishes live

"A cold sweet silver life, wrapped in round waves,  
Quickened with touches of transporting fear."

The prawn and the shrimp are ploughed in innumerable quantities from the shallow waters that lave the shore. The shrimper may be seen any day at work, pushing his little net before him. To reach the more distant sandbanks he requires a boat; but on these he captures his prey with greater facility, and richer hauls rewards his labour than when he plies his putting-net close inshore. The shrimper, when he captures a sufficient quantity, proceeds to boil them; and till they undergo that process they are not edible. The shrimp is "the 'Undine' of the waters," and seems possessed by some aquatic devil, it darts about with such intense velocity. Like the lobster and the crab, the prawn periodically changes its skin; and its exertions to throw off its old clothes are really as wonderful as those

of its larger relatives of the lobster and crab family. There are a great many species of shrimp in addition to the common one ; as, for instance, banded, spinous, sculptured, three-spined, and two-spined. Young prawns, too, are often taken in the "putting-nets" and sold for shrimps. Prawns are caught in some places in pots resembling those used for the taking of lobsters. The prawn exuviates very frequently ; in fact, it has no sooner recovered from one illness than it has to undergo another. Although the prawn and the shrimp are exceedingly common on the British coasts, when we consider the millions of these "sea insects," as they have been called, which are annually consumed at the breakfast tables and in the tea-gardens of London alone (not to speak of those which are greedily devoured in our watering-places, or the few which are allowed to reach the more inland towns of the country), we cannot but wonder where they all come from, or who provides them ; and the problem can only be solved by taking into account the fact that we are surrounded by hundreds of miles of a productive seaboard, and that thousands of seafaring people, and others as well, make it their business to supply such luxuries to all who can pay for them. It is even found profitable to send these delicacies to England all the way from the remote fisheries of Scotland.

The art of "shrimping" is well understood all round the English coasts. The mode of capturing this particular member of the crustacea is by what is called a shrimp-net, formed of a frame of wood and twine into a long bag, which is used as a kind of miniature trawl-net ; each shrimping-boat being provided with one or two of these instruments, which, scraping along the sand, compel the shrimp to enter. Each boat is provided with a "well," or store, to contain the proceeds of the nets, and on arrival at home the shrimps are immediately boiled for the London or other markets. The shrimpers are rather ill-used by the trade. Of the many thousand gallons sent daily to London, they only get an infinitesimal portion of the money produce. The retail price in London is four shillings per gallon, out of which the producer is understood to get only threepence ! I have been told that the railways charge at the extraordinary rate of £9 a ton for the carriage of this delicacy to London. It is an interesting sight to watch the shrimpers at their work, and such of my readers as can obtain a brief holiday should run down to Leigh. or some nearer fishing

place, where they can see the art of shrimping carried on in all its picturesque beauty.

The fresh-water cray-fish, a very delicate kind of miniature lobster, abundantly numerous in all our larger streams, and exceedingly plentiful in France, may often be seen on the counters of our fishmongers; as also the sea cray-fish, which is much larger in size, having been known to attain the weight of ten or twelve pounds, but it is coarser in the flavour than either the crab or lobster. The river cray-fish, which lodges in holes in the banks of our streams, is caught simply by means of a split stick with a bit of bait inserted at the end. The fresh-water cray-fish has afforded a better opportunity for studying the structure of the crustacea than any of the salt-water species, as its habits can be more easily observed. The sea cray-fish is not at all plentiful in the British Islands, although we have a limited supply in some of our markets.

There has hitherto been a fixed period for the annual sacrifice to crustacean gastronomy. As my readers are already aware, there is a well-known time for the supplying of oysters, which is fixed by law, and which begins in August and ends in April. During the r-less months oysters are less wholesome than in the colder weather. The season for lobsters begins about March, and is supposed to close with September, so that in the round of the year we have always some kind of shell-fish delicacy to feast upon. Were a little more attention devoted to the economy of our fisheries, we might have lobsters and crabs upon our tables all the year round. In my opinion lobsters are as good for food in the winter time as during the months in which they are most in demand. It may be hoped that we shall get to understand all this much better by and by, for at present we are sadly ignorant of the natural economy of these, and indeed all other denizens of the deep.

Considering the importance attached by fishermen to the easy attainment of a cheap supply of bait, it is surprising that no attempt has been made in this country to economise and regulate the various mussel-beds which abound on the Scottish and English coasts. The mussel is very largely used for bait, and fishermen have to go far, and pay dear, for what they require—their wives and families being also employed to gather as many as they can possibly procure on the accessible places of the coast, but usually the bait has to be purchased and carried from long distances. I propose to show our fisher-people how these

matters are managed in France, and how they may obviate the labour and expense connected with bait buying or gathering, by growing such a crop of mussels as would not only suffice for an abundant supply of bait, but produce a large quantity for sale as well.

It is no exaggeration to say that, although the British people are shy of eating the mussel, except when it is cooked for sauce—and a very excellent sauce it makes—countless millions are annually required by our fishermen for bait. There is one little fishing-village in Scotland which I know, from personal investigation, uses for its own share, for the baiting of the deep-sea lines required in the cod and haddock fishery, close on five millions of these molluscs, which have all to be sought and gathered from the natural beds, the men, and the women as well, having frequently to go long distances to obtain them. These figures will not be thought to be exaggerated when I say that each deep-sea line requires about twelve hundred mussels to bait it; and as many of the boats carry eight or ten lines, it is easy to check the calculation. The fishermen, it is hoped, may by and by come to grow their own mussels, as do the industrious men of Aiguillon; and if they do not turn mussel-farmers after what I have to tell them, they will have themselves to blame for the ultimate extinction of the mussel, for the natural scalps are giving way under the present increasing demand for bait.

“Where is Aiguillon?” was naturally enough the first question I had to answer, after determining to visit the great French mussel-farm; but no one could answer it. I asked many who are interested in fishery matters, but none of them had heard of the mussel-farm. Aiguillon, they said, was mentioned in Murray’s Guide, and doubtless the site of the fishery would be there. But the mussel-farm is not at the Aiguillon mentioned by Murray, which is a town, of nearly two thousand inhabitants, on the left bank of the Lot, about a mile above its influx into the Garonne. My Aiguillon, indeed, is not even on the same line of railway, although it is at an equally great distance from Pall Mall. In fact, Murray contains nothing at all about my Aiguillon. Murray has a soul above mussels, and, to speak the truth, doesn’t even seem to care much about oysters, seeing that he sometimes neglects to mention localities where they are grown in the greatest pro-

fusion. I found my Aiguillon at the port of Esnandes, which is itself a curious out-of-the-way place.

In order to see the mussel-farm, it is necessary first to get to Paris, and to take the Orleans Railway to Poitiers, then to change to the line for La Rochelle, after reaching which place a *voiture* must be hired for the rest of the journey, Esnandes being about seven kilomètres from Rochelle. I need not weary the reader with a description of all that is to be seen on the Orleans Railway, which, as all the travelling world at least knows, runs through the most historical part of France. Looking from the window of the railway carriage, I enjoyed for a few hours the lovely champaign scenery of the claret district of France. There are vine-fields, and big joint-stock walnut trees, and cherry orchards—and cherry orchards, walnut trees, and vineyards, over and over again, all the way to Bordeaux. Then there are little patches of water; and dark-green grassy quadrangles laid down every here and there, guarded by those tall alder trees one sees in such profusion all over the Continent. Every here and there, too, may be seen a distant château on its finely-wooded hill; then come a few old farmhouses, their inner yards alive with the minute industry of the plodding husbandmen. Anon we pass the outskirts of old historical towns, tempting one to break one's journey.

It might have well suited others to perform these pleasures of travel; my errand was to see *la moule*. History had no charms for me till I had seen the mussel-farms, which I had come so far to visit. To my exceeding astonishment, almost no one in La Rochelle knew anything about the industry of Aiguillon. I had to search far and wide to obtain information as to how to get to the place; another exemplification of the old story, that one may live all his life in London, and not be able to find his way to St. Paul's. By virtue of a little Scottish perseverance, and the expenditure of much bad French, I at length found out that it was at Esnandes that they cultivated *la moule*. So, procuring a *voiture*, and a *garçon* to drive it, I sallied away out through the gates and barriers of La Rochelle; and after a pleasant drive through the vineyards and small farms of the district, on each of which there appeared to be a little flock of black sheep, I arrived in about an hour's time at my destination, much to the astonishment of the idle poultry and young dogs of the neighbourhood, which looked and acted as if they never had seen a *voiture* or a Scotchman before.

The port of Esnandes is very much like all other fishing-villages, and the fisher-people like all other fishing-people. As you enter the town, you feel that it has the usual ancient and fish-like smell; and you see, as you suppose, the same little boys with the overgrown small-clothes that you meet with in the fishing-villages of England or Scotland. After passing a little way down the one street of the village, you observe all the way, right and left, the invariable mussel-middens, the worn-out old fish-baskets, and the various other insignia of the trade of the people, the like of which you can also see at Whitstable or Cockenzie. The people waken up the moment it is buzzed about that a stranger has arrived. At first, I thought the population were all out at sea, but I was so quickly surrounded by an inquisitive little crowd, that I speedily gave up that idea; and as soon as I had explained my errand to the buxom landlady of the village café, I was provided with a guide, who kindly escorted me to the *bouchots* (fishing hurdles), or rather to the *dépôt* of the boucholiers, which is about a quarter of a mile from the village.

Having alighted from the carriage, I looked around me with some curiosity; but I saw no farm of mussels, no appearance even of there being a common fishery. About a mile away to the right there was moored a small fleet of the common flat-bottomed fishery-boats peculiar to the coast. A few miles to the left lay the Ile de Ré, famous for its oyster-beds; but where was the object of my search—the mussel-farm? Well, to make a long story short, the farm was at that particular hour covered with water; but, as the tide was on the ebb, I speedily obtained a view of the vast mud-fields to which the people of Esnandes are indebted for their peculiar fish-commerce. The story of the translation of these vast sloughs of mud into fertile fields of industry, productive of comfort and wealth, is short and simple, for the discovery of the bouchot was purely accidental. An Irish vessel, laden with sheep, having been wrecked in the bay, so long ago as the year 1235, only one out of all the crew was saved. This man's name was Walton, and he became the founder of the present industry by means of the bouchot system of cultivation. On finding himself saved, he at once set about finding a means of earning his own food, so that he might not be a burden upon the poor fishermen who had rescued him from the ravening waters, and who were themselves at the time well-nigh destitute of every comfort of life.

All around him, however, as Walton soon perceived, was one vast expanse of liquid mud, and what could any man do on such a barren field? Walton speedily solved the problem. He first of all invented a mode of travelling upon the mud-bed, for walking was an impossibility, as at every step he sank up to the knees in the miry clay. This boat is called a *pirogue* by the boucholiers, and it is still in use. By means of this simple machine, which I will by and by describe, Walton was able to travel along and explore the muddy coast, by which he found out that vast numbers of land and sea birds used to assemble on the waters and in the mud in search of food. A kind of purse-net for the capture of these birds at once suggested itself to the hungry sailor. This being made and set on the mud as a trap to float with the tide, was found to answer admirably, and every night large numbers of aquatic birds were captured in its purse-like folds. It was out of that little example of a destitute sailor's ingenuity that the present industry of Aiguillon was developed, for it was not long before Walton found the strong posts to which he had affixed his net all covered over with the spawn of the edible mussel; these he found grew very rapidly, and when mature, had a much finer flavour than the mud-grown bivalves from whence the spawn had floated. The Irishman soon saw how he could multiply his own food-supplies, and create at the same time a lasting industry for the benefit of the poor people among whom he had been thrown by his unfortunate shipwreck; he therefore went on multiplying his stakes, till he found that there was no end to the produce; so that in due time this accidental discovery became a rich inheritance to the fisher-folks of the district, for in ten years after the shipwreck the bay was covered with an appropriate and successful mussel-collecting apparatus, out of which has grown the present extensive commerce.

The work of cultivation at Aiguillon is carried on very systematically. I shall give what I learned about it, just as I saw it myself, or as it was described to me by my guide, a very civil and immensely voluble fisherman, who had the whole theory and practice of mussel-farming at his finger-ends, or rather at the end of his tongue. It was truly curious to consider that the same mode of cultivating and working was going on that had prevailed from the beginning—the invention having been perfect from the first. One of the most curious phases of the whole industry is the mode of progression over the fields

which has been adopted by the men, for each man has not only to paddle his own canoe on these soft fields of mud, but if he have a visitor, he has to paddle his boat as well. The manner of progression is very primitive. The man kneels in his little wooden vessel with one leg, the other, being encased in a great boot, is fixed deep in the mud; a lift of the little canoe with both hands, and a simultaneous shove with the mud-engulfed leg, and lo! a progress of many inches is achieved; this action, frequently repeated by the industrious labourers, soon overcomes the distance between the different fields; and when a new *trousseau* has to be carried out to the bouchots, or a stranger has to be conducted over the fields, two men will load a canoe, and work it out between them, not, however, without a few jolts and jerks, which, like a ride on a camel's back, is rather tiring to the unaccustomed. When three of the canoes are joined together by means of pieces of stout rope, the boucholier in the first one uses his left leg as the propelling power, while the man in No. 3 uses his right leg, and by this means they get along in a straighter line and with greater speed. This peculiar boat-exercise has not a little of the comic element in it, especially when one sees a fleet of more than a hundred narrow boats all propelled in the same eccentric manner by upwards of one hundred merry boucholiers. I may mention that the mud at Aiguillon is unusually smooth and soft; there are no sun-baked furrows to interrupt the progress of the canoe, a fact that is due to the presence of a little animal, which accomplishes for the boucholier what a regiment of a thousand soldiers could not perform.

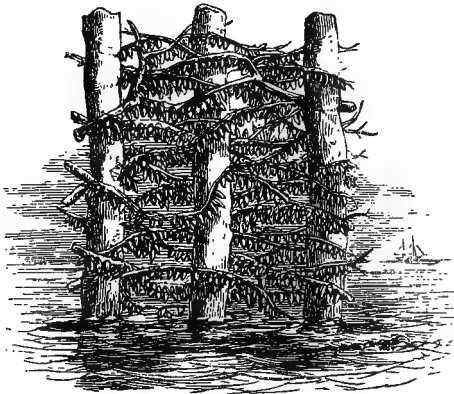
In addition to the large and strong stakes originally used as holdfasts for his bird-nets, Walton planted others, in long rows, in the form of a double V, with their apex open to the sea, the sides being interlaced with branches of trees, to which the mussels, by means of their byssus, affixed themselves with great aptitude. These bouchots were also so arranged one with another so as to serve as traps for the taking of such fish and crustaceans as frequent the coast; so that the fishermen had thus a double chance, being, of course, always assured, when there is no fish, of a canoeful of mussels.

The men in search of fish depart for the farm a little time before the tide recedes, and taking their places at the mouth or apex of the V, they affix a small net to the opening, so that they are sure to intercept any fish that may have come



in to feed with the previous tide. I made very particular inquiries into the constitution of the farm, and although disappointed at not finding it, as I was led to expect, a vast scene of perfect co-operation, I was pleased to learn that, although the bouchots had many owners, there was no violent competition among those who owned them. Some of these mussel-farmers have three or four bouchots, and the very poorest among them have a half, or at least a third share in one. The system of family co-operation prevails very largely; I found, as in the case of the celebrated walnut-trees, so often quoted, that one or two families, grandfathers, sons, and grandchildren, were often the owners of several bouchots, which they worked for their joint benefit, dividing the profits at the end of the season.

The farm occupies a very large space of ground, equal to eight kilomètres, and is laid out in four fields or divisions, each of which has its peculiar name and use. There are at least 500



MUSSEL-STAKES.

bouchots, and each one represents a length of 450 mètres, forming a total wall of strong basket-work, all for the growth of mussels, equal to a length of 225,000 mètres, and rising six feet above the mud-bed on which it is erected.

Great pains are taken to keep the bouchots in good order; repairs are continually being made; and along the protecting wall of the cliff by which the bay is bounded, there are to be seen what my guide called the trousseau of the bouchots—

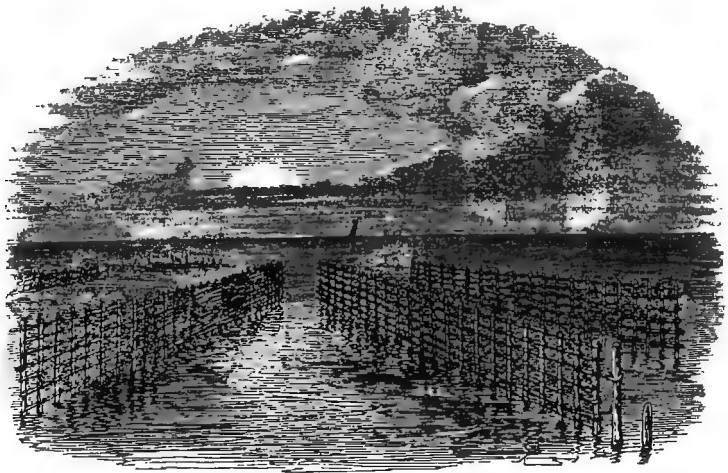
great strong wooden stakes twelve feet long, and of considerable girth. These are sunk into the mud to a depth of six feet, the upper portion being the receptacle of a garniture of strong but supple branches, twisted in the form of basket work, on which are grown the annual crops of mussels. The bouchots have different names, according to their uses and their situation. The *bouchots du bas* are those farthest away in the water: these are very seldom left uncovered by the tide; they are formed of very large and very strong solitary stakes, planted so near each other that there are three of them to each mètre. The duty of these stakes is to enact the part of spat-collectors—the spat is locally called *naissain* at the Port of Esnandes—so that there may be always a store of infant mussels for the peopling and re-peopling of such of the palisades as may accidentally become barren. My guide, in describing to me the operations of the farm, used agricultural terms, such as seeding, planting, transplanting, replanting, etc., and he told me that operations of some kind are continually going on all over the farm. When it is not seed or harvest time, the bouchots have to be repaired or the canoes mended.

As near as I could understand, the spat of the natural mussel which voluntarily fixed itself to the outer rows of posts, attains about February or March to the size of a grain of flax-seed. In May the young mussels are about as big as a lentil, and in about two months more they will attain to the dimensions of a haricot bean—the men of Esnandes then call the mussel a *renouvelain*—which is the proper time for the planting to begin; and this operation was in progress during my visit. It is simple but effective. When a few canoe-loads of these young mussels are required for the seeding of the more inland bouchots, the men proceed to the single or collecting stakes at the lowest state of the tide, armed with long poles, having blunt hooks at the end, by means of which they scrape off the seedlings. The men do not, however, scrape off more of the mussels than they require for the operation in hand, which must be completed before the flow of the next tide. Having filled a few baskets, each man paddles his canoe to the seat of work, and there commences the first stage of the work or planting, which is effected in a curious but characteristic way, the operation being called *la båtisse* by those engaged in it. Taking a good handful of the mussels, they are skilfully tied up by the boucholier in a bag of old netting or canvas, and then deftly fastened in the

interstices of the palisades, or bouchot basket-work, each group of mussels being, of course, fastened at such a distance as to have plenty of room to grow. Left there, the byssus of the animal soon forms a point of attachment; and the bag rotting away by means of the water, speedily leaves the mussels hanging in numerous vine-like clusters on the bouchots, where they increase in size with such great rapidity, as speedily to demand the performance of the next operation in mussel-culture, which is called the transplanting. It is conducted with a view to the attainment of two ends: firstly, the thinning of overcrowded bouchots; and, secondly, to bring the ripe mussels gradually nearer to the shore, so as to make their removal all the more easy at the proper time. The change of habitation is effected precisely as has already been described; the mussels are again tied up in purses of old netting, although not so particularly as before; again the mussel, whose power in this way is well known, weaves itself a new cable, and the bivalve clings to its new resting-place as tenaciously as ever. It may be asked, why the mussel-farmers should so plant the mussels as that they will require constant thinning; but the reason is, that it is desirable for the purpose of their proper fattening that the mussels should be always, if possible, covered by the salt water; this, however, is not compatible with the extent of the crop; but all that can be done is done, and the mussels are kept in the front-ranks as long as possible. A third and last change brings the mussels as near the shore as they can ever get, so long as they are ungathered.

The labour of planting and transplanting goes on incessantly, till all the spat that had found a resting-place on the solitary stakes—that is, the advanced guard—has been dealt with. The labour of all these varied operations is constant, and is carried on by old and young, male and female, both day and night, at times when the tide is suitable. Some portions of the farm are always under water; other portions of it, again, are uncovered at the ebbing of the tide; and this circumstance, I was told, has a great influence on the quality of the mussel; those being the best, as may be supposed, which are longest submerged, and kept at the greatest distance from the mud. Although the greatest possible care is taken to keep the mussels from being affected by the copious muddy deposits of the place, by means of allowing a good flow of water between the base of the bouchots and the sea-surface, yet some of the

bunches become deteriorated, in spite of all the precautions that can be taken. This, of course, distresses the boucholiers, as one of their points is the superior flavour of their produce; indeed, it was the superiority of the mussels, as discovered by accident through Walton's bird-net, which was set so as to float high above the mud—the quality of the mussel more than the quantity—that influenced Walton to commence as a mussel-farmer; and to this day it is still quality more than quantity that the boucholiers study at Esnandes. After the process of about a year's farming has been undergone, the



A MUSSEL-FARM.

mussels are considered to be ready for the market, and by the care of the farmer, the mussels are in season all the year round, although, of course, not so good for food at some periods of the year as at others; thus, the Aiguillon mussels are not so fine in the spring months as they are in the autumnal periods of the year, when they became deliciously fat and savoury; indeed, I can bear testimony, having had a feast of them, to the fact of their being better, larger in size, and more pronounced in their flavour, than any of the British mussels I have tasted. About April the mussels become milky and

unpalatable, although there are still many branches of them fit for the market. It is in the months between July and January that the great harvest goes on, and the chief money-business is done. If the mussels are to be sent to a distance, they are separated and cleared from all kinds of dirt, packed in hampers and bags, and sent away on the backs of horses or in carts; while those required for more local consumption are kept in pits dug at the bottom of the cliff, and within the enclosure where the men keep the trousseau of the bouchots. There are no less than a hundred and forty horses and about a hundred carts engaged in the trade; and the mussels are distributed within a radius of about a hundred miles of Esnandes, more than thirty thousand journeys being made in the service. In addition to this land-carrying, forty or fifty barques are in the habit of visiting the port, to bear away the mussels to still greater distances, making in all about seven hundred and fifty voyages per annum.

Does the mussel-farm pay? will, of course, be asked by practical people. Yes, it pays. I have obtained the following figures to show that mussel-farming pays very well, not to speak of what is obtained by the round and flat fish which are daily captured through the peculiar construction of the bouchots. Every bouchot will yield a load of mussels for each mètre of its length; and this load is of the value of six francs; and the whole farm at Esnandes is said to yield an annual revenue of about a million and a quarter of francs, or, to speak roundly, upwards of fifty-two thousand pounds per annum; and when it is taken into account that this large sum of money is, as nearly as possible, a gift from nature to the inhabitants, as there is no rent to pay for the farm, no seed—as is the case at the Whitstable oyster-farm—to provide, no manure to buy—only the labour necessary for cultivation to be given, British fishermen will easily comprehend the advantages to be derived from mussel-farming.

[Since my visit to Esnandes several changes have been made at the mussel-farm—more especially in the disposition of the *Bouchots*—but there is no difference in the mode of culture.]

## CHAPTER XIV.

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### FOREIGN FISHERY EXHIBITIONS AND HOME AQUARIUMS.

Amsterdam Fishery Exhibition—The Variety of Exhibits at a Fishery Exhibition—The Dutch Cure—Exhibition at Arcachon—The higher aspects of a Fishery Exhibition—Questions for Solution—The great Question, How to Capture!—Mr. Buckland's Museum of Economic Fish Culture—The Brighton and Crystal Palace Aquaria, and the Lessons which may be derived from them.

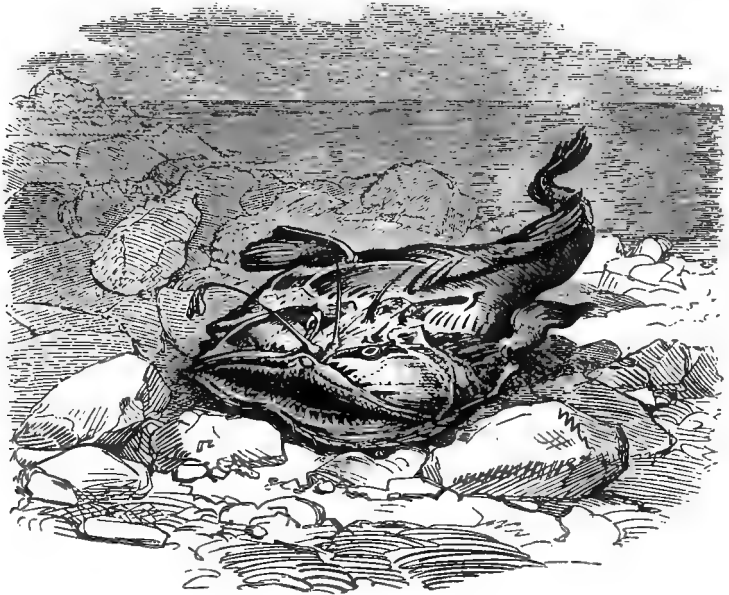
I HAVE attended no fewer than five general "Fishery Expositions." Only one of these, however—"an exhibition of salmon ladders, coupled with an inquiry into the present state of the salmon rivers of Great Britain"—has been held in this country. The others were held abroad. The first exhibition of the kind, and the one which is thought to have been the best, was held at Amsterdam. It was, as far as it went, a thoroughly practical exposition of the arts of fishing. One thing it effectually did: it brought the food-fisheries of Holland (all the continental fishes, even the most insignificant and repulsive, are used as food) into a focus, and allowed people to see what progress was being made in the arts of fishing, and what position Holland occupies as a fishing nation compared with France or Britain.

A fishery exhibition, or "exposition," as it is called, is interesting even to the uninitiated. Much taste is often displayed in showing the various nets; and there are always many curiosities in the shape of fish-traps, such as the quaint-looking cylinders used for the taking of eels, and the curious cages employed in the capture of crustaceans, not to speak of some of the unique self-acting fish-catchers which the French have invented. The little instrument that gives its death-blow to the monarch of the sea may be examined, as may the tiny hook that takes the trout a prisoner. The fishes themselves, either alive or dead, can be

seen in most fishery exhibitions; and, while the epicure may eye the tid-bits, the economic housewife is taught that all parts of a fish may be made useful. At the Hague Fishery Exposition large jars were exhibited filled with choice morsels from parts of the cod that have hitherto been thrown away as inedible. The lips, the cheeks, and the jelly from the head of that fish, afford choice eating. The merits of Dutch cured herring, *i.e.* fish pickled with a portion of the intestines left in them, were at the Hague contrasted with the British mode of curing, and the Dutch way was found in many respects the best. The fish-curers always send a good stock of preserved fish to fishery exhibitions: sardines from Concarneau, matie herrings from Vlaardingen, anchovies from Genoa, pickled mackerel, preserved oysters, fish-flour, etc. etc., are plentifully shown. The "exhibits" in the way of prepared fish-food were very heterogeneous at all the exhibitions—each curer, of course, showing on his own behalf. The collection of food-fishes in these shows was nothing like so perfect as that in the Industrial Museum of Edinburgh; where most of the food-fishes—ranging in variety of size and shape from whitebait to sturgeon—may be seen in a finely preserved state.

The ambition of the directors of the exposition at Arcachon was to show a little of everything connected with the science of the seas, even to specimens of the ground inhabited by mussels, as well as bits of rock frequented by the larger crustaceans. The uses of sea-weed were demonstrated; the guano made from those inedible fish with which the sea abounds could also be tested at the exposition of Arcachon. Various other sea products were likewise to be seen there, as ambergris, spermaceti, shagreen, the dye-shells of the Indian Ocean, etc. And, better than all, at Arcachon exposition the best fishes of the sea could be seen disporting *au naturel*. Oysters from the Ile de Ré were also there, growing on the very tiles which had intercepted them as spat. Cultivated mussels, so valuable as bait, were likewise exhibited, hanging in beautiful clusters, just as they had grown on the basket-work erected in the bay of Aiguillon. Crustacean monsters bounded to and fro in the very unimaginative aquarium which terminated the *chalet* of the exhibition, and which, although very useful, was very unlike the picturesque fish-house erected at Boulogne. One of the curiosities of the place was the Sea-angler or Fishing Frog, a drawing of which will interest those of my readers who have never seen a living specimen. Bar-

nacles flourished in some of the salt-water tanks, and the maladies of fishes were shown in numerous glass jars which studded the tables and counters of the show-room. The development of salmon, from the egg to the animal, was likewise shown. Pisciculture could be studied, either as developed at Huningue or as practised in a ruder fashion at more homely places. The arts of fishing, as known in all countries having



THE FISHING FROG.

access to the sea, were displayed at Arcachon, either by pictures or models. Pearl-fishing, coral-diving, seal-slaughtering, turtle-hunting, and the sponge harvest, can all be well represented at a fishery exhibition.

After the eye had been gratified with numerous out-of-the-way wonders, there are left for the fishery economist certain higher aspects of the show. All that could be seen, whether of products or apparatus, supplied texts on which to hang lay-



sermons about fish, and the best mode of making them useful to mankind ; about fisheries, as an outlet for capital, as a medium for the employment of labour ; not to speak of the important question—important at least to great maritime nations like England and France—how far the fisheries may be made to serve as a training school for either the imperial or the mercantile navy. Nor was the force of any of the expositions expended even so. It was attempted to illustrate the technology of fisheries, as in the arts of boat-building, rigging, sail-making, anchor-forging, and net-weaving. Attempts were likewise made to estimate and compare the productive powers of salt and fresh water, and to measure the additional ascendancy which man might obtain over the ocean if he were thoroughly to cultivate it.

None of the exhibitions have yet taught us what we most want to know as regards the food-fishes of the sea. At what age (the reader must excuse this iteration) do these animals become reproductive, and how long is it ere their eggs come to life ? Many questions bearing on the natural history of fish in general, and on the food-fishes in particular, were propounded at Arcachon ; but have they yet been answered ? Of oysters it was asked—At what age do they reproduce ? what is the average number produced by individuals at a time ? what causes may annually influence their fecundity ? what is their food ? what substances do they attach themselves to ? and how long do they live ? As to fish in general, the following questions were put :—What, in all probability, becomes of fish, both migratory and other, when they cease to show themselves on our coasts ? on what kind of bottom does each species prefer to deposit its ova ? is it possible to determine the spawning-time of most useful species ? and is it possible to cause natural and artificial spawning ? None of these questions were answered at Arcachon, nor yet at the Hague. Nor have our British naturalists ventured to grapple with them, except in a very superficial way. There was hung up in the fishery exposition at Boulogne a chart exhibiting “the grand tour” of the herring, and it was astonishing to note that many of the visitors were impressed with the belief that this grand tour was real, and was still going on year after year ! There are naturalists who think the mackerel to be also a fish of passage, making long voyages from north to south, and *vice versâ*. The turbot, too, has been described as a migratory fish, and it has been often asserted that salmon make an annual

visit to the North Pole! Then as to the spawning of fishes the most absurd ideas used to prevail. All kinds of *outré* sea substances were set down as fish-spawn; and as to the *modus operandi* of spawning, the queerest fancies were indulged in even by persons who ought to have known better.

How best to secure the fishes of the sea is still an unsolved problem. The French have invented various self-acting machines for their fisheries. One of these, a model of which was shown at Arcachon, is so contrived that, the moment a large fish is caught, it gives the signal of its capture by causing a bell to ring! An ingenious "salmon-catcher," which is used on some of the French rivers, excited the attention of the visitors to Arcachon. It is formed of three large fanners or dippers of strong network, which revolve on an axis and are driven by the water of the stream on which they are placed, and in the inner end of each of the fanners there is a funnel, through which the fishes find their way into a large reservoir, where they can be detained, in water of course, till wanted for the table. Throughout France there are numerous contrivances by which fish capture themselves. Indeed, at the productive *viviers* of Monsieur Boisère, situated at the west end of the basin of Arcachon, the working of the fishery is so planned that the lagoons form a large reservoir from which the fish can be easily ladled out as they are wanted for the market. In the construction of his *viviers*, the proprietor has so studied the economy of labour that his staff of workers consists of only half a dozen persons—a very moderate number when there are three hundred acres of water, with a great variety of gates and canals, to be looked after. In Holland there are no *viviers*; and although the numerous canals would give abundant opportunity for fish-breeding, I could not ascertain that the Dutch people carried on any system of fish-culture beyond making every canal, big or little, a reservoir for eels, of which immense quantities are captured for the Paris, Brussels, and London markets. It may be said of all these foreign fishery exhibitions that they were not what is wanted: they were mere temporary displays, forgotten a day after they were closed; but what is wanted is a permanent fishery "exposition," where the science of the sea can be always on exhibition, and where those who do not have business on the great waters may see what men have to encounter who have.

In Mr. Buckland's "Museum of Economic Fish-culture" at Kensington, the public will find an admirable nucleus of the

kind of permanent exhibition of fishery products and apparatus which we should like to see established in all countries. There are several novelties in Mr. Buckland's collection well worth seeing. The casts of large salmon and fine trout so beautifully coloured by Mr. H. L. Rolfe are exceedingly interesting. There is a collection at present on view [1873] at South Kensington which must greatly delight all anglers. I allude to the contributions of stuffed fish which have been sent to the exhibition by various angling and piscatorial societies. A trout over fourteen pounds in weight is shown, also a pike which pulled the scale at twenty-eight pounds. Numerous fine specimens of carp are likewise to be seen, as also, grayling, bream, and perch. The cast of the 72 lb. Tay salmon will at once take the eye. Mr. Rolfe has made it look as like nature as possible. Mr. Buckland has been very successful from time to time in his fish hatching operations, especially with the different kinds of salmon and hybrids of trout. The hatching was most successful this year, and a very varied stock of eggs was deposited,<sup>f</sup> as the following list will show:—*Salmo ferox* (hatched out February 22); Rhine salmon (March 9); Norway trout, Great Lake trout (hatched February 22); Tyne salmon (hatched February 26); Newstead Abbey trout (hatched March 14); Neuchâtel trout, common trout (hatched February 20); *Salmo fario* (hatched March 9); silver char, salmon and trout hybrids; sea-trout hybrids from Nunin-guen (hatched February 27). It would require many pages of this work to catalogue all the remarkable things connected with his pet subject, which Mr. Buckland has begged or borrowed for his exhibition. He stops at nothing from the whitebait to the whale. When I last visited the museum one great feature was a large skeleton of the latter animal set up on a plot of land outside, it being too large to be accommodated within. Londoners are now fortunate, for they can see at the museum of economic fish-culture, and at the aquarium at the Crystal Palace, much that will interest them in fish life and economy.

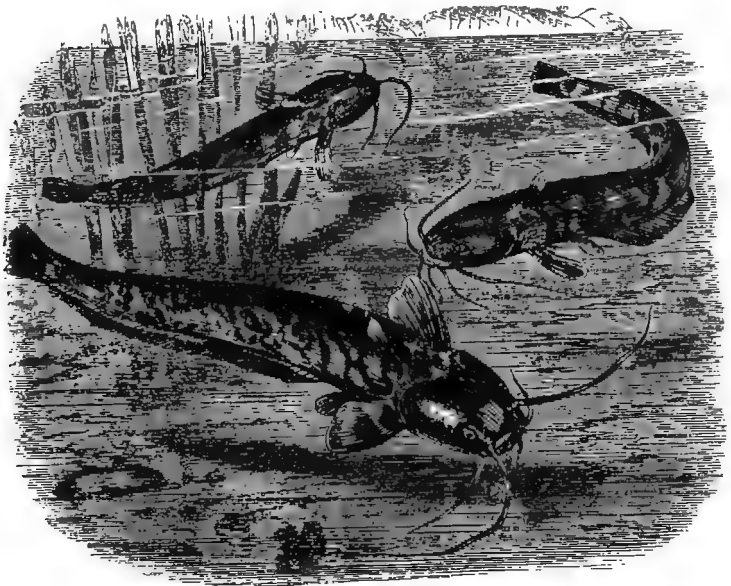
The Brighton and Crystal Palace aquaria will do much to spread a correct knowledge of the life and habits of all kinds of fish. These exhibitions are exceedingly attractive, and are daily visited by crowds of persons anxious to see how the inhabitants of the sea behave in their native element. The aquarium at Brighton is in a hall by the sea; it is large, commodious, and convenient, both for the reception of its finny population and

for obtaining the element in which they live. The Act of Parliament for the erection of the Brighton Aquarium was obtained in July 1868, and a year afterwards the building was commenced, and the aquarium was provisionally opened at Easter 1872, on the occasion of a visit of his Royal Highness Prince Arthur ; and on the following August, when the town was honoured by a visit from the British Association, the exhibition was finally thrown open to the public. The great aquarium at the Crystal Palace was opened a year earlier. Both aquariums are very large. One of the tanks in the Brighton Aquarium is 100 feet long by 40 feet in width, and holds 110,000 gallons of sea water. Another tank, the next largest, is 50 feet by 30 feet, and is situated just opposite the other large one. No one can pay a visit to either institution without being struck with the beautiful series of living portraits of fish and crustaceans which have been provided for his amusement and instruction. The marine animals which make the best show are undoubtedly the lobsters and crabs and other crustaceans : some of the lobsters are exceedingly beautiful, and the grace of movement exhibited by the shrimps and prawns as they bound through the depths of their watery home cannot be excelled by any land animal that I can name. A great variety of what are technically known as "ground fish" are exhibited in the tanks in both of these large aquaria, and in time some interesting discoveries will doubtless result from the continued observation by the resident naturalists of the haddock and the herring. It is a treat of a really scientific kind to see the latter fish in captivity. I have seen the spawn as it burst into existence, a mere thread which lived but for an instant, and died as soon as it was born, reminding one of the simile of Robert Burns

" A snowflake falling in the river,  
A moment white, then lost for ever."

It is an achievement to have captured living herrings, and it is a still greater feat to keep them alive as we see them in the Brighton aquarium. What may we not learn from that one experiment? As I have again and again iterated, what is chiefly wanted to be known with regard to all fishes is at what age they become reproductive ; that is the key to the real economy of the fisheries. Let us but ascertain how long it is ere a fish reaches the age of reproduction, and the greatest secret of the sea will then be in our keeping.

It would serve no purpose to describe the varied and everchanging inhabitants of the tanks at the Crystal Palace and Brighton; they must be seen in order to be appreciated. New forms of life are being daily added to the collections, and it is hoped that many questions of fish life and growth will be solved by those whose duty it is to watch the daily life of the inhabitants of these "ichthyological menageries," if I may be allowed such a term. It may be interesting, by the by, to note here that in America they have started travelling shows of



SILURIS GLANIS.

living fish, which visit the inland towns, and delight hundreds who never before saw a lobster or an aquatic sheep's head. I do not undervalue the study of fancy fishes, and no doubt it interests a large number of miscellaneous visitors to view the sea-horse, the butter-fish, and other curiosities of marine life; but I am in hopes that real good work will yet be achieved by means of these aquaria, and that many points

of fish life and economy, especially as regards our food fishes, will be determined by Mr. Lloyd at Brighton, and Mr. Saville Kent at the Crystal Palace. In particular, I hope that one or other of these gentlemen will solve a great many of the questions which have been promulgated during late years in regard to the acclimatisation in this country of various kinds of foreign fishes, about which a great deal was at one time spoken and written, but about which to-day all men are silent. What about the *Siluris glanis* which some seven or eight years ago was to become a British fish *par excellence*? So far as I can ascertain, notwithstanding the parade that was made at the time with regard to the introduction of the *Siluris glanis* into this country, all attempts to acclimatise it have failed. I gave a figure of the fish in the first and second editions of the *Harvest of the Sea*, and as many of my present readers may feel some curiosity about it, I beg to reproduce it.

In all probability great marine aquaria will multiply. We shall have them not only at all our great sea-side resorts, but in London and in other large inland towns as well. There is nothing to prevent their being erected at any distance from the sea. The Crystal Palace Aquarium Company have solved any riddle that might pertain to that part of the question. Indeed it is a mistake to suppose that fish or other sea animals cannot be kept in healthy life without sea-water. In the *Jardin d'Acclimatisation* at Paris there was an aquarium (and notwithstanding the events of the war it may be there yet), which was kept going in great style by means of a mixture of salt and water. In Glasgow, for instance, a large Aquarium could easily be erected, and I feel sure it would prove a great attraction, and what is of greater importance—*it would pay!* The proper site for it would be in the West-end Park. I have no intention of writing a disquisition on the scientific portion of the aquarium, more especially as regards the sweetening of the water and the best methods of aëration; these matters may be studied on the spot; the resident authorities at Brighton and Sydenham will be only too happy to give information on the subject, and excellent handbooks have been issued for both establishments. The real value, however, of these institutions will consist in their solving the problems connected with our food fishes, and it is to be hoped that at an early date lectures and illustrative descriptions of the fishes in the tanks by experts will be instituted as a feature of the exhibitions.

One problem that might be solved by means of a great aquarium is the Pearl problem. "What is a Pearl?" has been often asked. But it is a question which no man has yet been able to answer. Some say that these gems are the result of disease in the animal, while others maintain the pearl to be produced by the introduction of some foreign substance into the shell. Having studied the question a little, more especially as concerns the Scottish pearl, I have come to the conclusion that the production of the pearl is quite accidental, and that, as has been asserted by some writers on the subject, it is not a result of a hereditary kind. There is no special breed of mussels that



produces the pearl. The above drawings of Scottish pearl shells are very accurate, and give a good idea of the style of mussel which produces the most beautiful gem of Scotland. Practised collectors always select deformed or "wrinkled" shells as being more likely to contain pearls than those of a smooth surface. Scottish pearls have become scarce of late, owing to their having been so largely fished for ten years ago—another proof

of that wanton disturbance of the balance of nature which always brings its own punishment. Leaving the solution of the pearl problem, both as regards the fresh-water production and that of the sea—the Scottish gem and the Oriental one—to one or other of these great aquaria, we take leave of the subject. If either of these valuable institutions succeed in growing “ropes of pearls,” I trust the directors won’t forget who first suggested such a remunerative industry.



## CHAPTER XV.

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### THE FISHER-FOLK.

The Fisher-People the same everywhere—Growth of a Fishing Village—Marrying and giving in Marriage—Newhaven, near Edinburgh—Newhaven Fishwives—A Fishwife's mode of doing Business—Superstitions—Dunbar—Buckhaven—Scene of the *Antiquary*: Auchmithie—Smoking Haddocks—The Round of Fisher Life—Fittie and its quaint Inhabitants.

A BOOK describing the harvest of the sea must of necessity contain a chapter about the quaint people who gather in that harvest, otherwise it would be like playing "Hamlet" without the hero. I have a considerable acquaintance with the fisher-folk; and while engaged in collecting information about the fisheries, and in investigating the natural history of the herring and other food-fishes, have visited most of the Scottish fishing villages and many of the English ones, nor have I neglected Normandy, Brittany, and Picardy; and wherever I went I found the fisher-folk to be the same, no matter whether they talked a French *patois* or a Scottish dialect, such as one may hear at Buckie on the Moray Firth, or in the *Rue de Pollet* of Dieppe. The manners, customs, mode of life, and even the dress and superstitions, are nearly the same on the coast of France as they are on the coast of Fife, and used-up gentlemen in search of seaside sensations could scarcely do better than take a tour among the Scottish fisher-folks, in order to view the wonders of the fishing season, its curious industry, and the quaint people. There are scenes on the coast worthy of any sketch-book; there are also curious seaside resorts that have not yet been vulgarised by hordes of summer visitors—infant fishing villages, set down by accident in the most romantic spots, occupied by hardy men and rosy women, who have children "paidling" in the water or building castles upon the sand.

Such seascapes—for they look more like pictures than realities—may be witnessed from the deck of the steamboat on the way to Inverness or Ultima Thule.

Looking from the steamer—if one cannot see the coast in any other way—at one of these embryo communities, one may readily guess, from the fond attitude of the youthful pair who are leaning on the old boat, that another cottage will speedily require to be added to the two now existing. In a few years there will be another; in course of time the four may be eight, the eight sixteen; and lo! in a generation there is built a large village, with its adult population gaining wealth by mining in the silvery quarries of the sea; and by and by we will see with a pleased eye groups of youngsters splashing in the water or gathering seaware on the shore, and old men pottering about the rocks setting lobster-pots, doing business in the crustaceous delicacies of the season. And on glorious afternoons, when the atmosphere is pure, and the briny perfume delicious to inhale—when the water glances merrily in the sunlight, and the sails of the dancing boats are just filled by a capful of wind—the people will be out to view the scene and note the growing industry of the place; and, as the old song says—

“O weel may the boatie row,  
And better may she speed;  
And muckle luck attend the boat  
That wins the bairnies' bread.”

In good time the little community will have its annals of births, marriages, and deaths; its chronicles of storms, its records of disasters, and its glimpses of prosperity; and in two hundred years its origin may be lost and the inhabitants of the original village represented by descendants in the sixth generation. At any rate, boats will increase, curers of herrings and merchants who buy fish will visit the village and circulate their money, and so the place will thrive. If a pier should be built, and a railway branch out to it, who knows but it may become a great port?

I first became acquainted with the fisher-folk by assisting at a fisherman's marriage. Marrying and giving in marriage involves an occasional festival among the fisher-folks of New-haven of drinking and dancing—and all the fisher-folks are fond of the dance. In the more populous fishing towns there are usually a dozen or two of marriages to celebrate at the close

of each herring season ; and as these weddings are what are called in Scotland penny weddings—*i.e.* weddings at which each guest pays a small sum for his entertainment, there is no difficulty in obtaining admission to the ceremony and customary rejoicings. Young men often wait till the close of the annual fishing before they venture into the matrimonial noose ; and I have seen at Newhaven as many as eight marriages in one evening. It has been said that a “lucky” day, or rather night, is usually chosen for the ceremony, for “luck” is the ruling deity of the fishermen ; but as regards the marriage customs of the fisher-class, it was explained to me that marriages were always held on a Friday (usually thought to be an unlucky day), from no superstitious feeling or notion, as was sometimes considered by strangers, but simply that the fishermen might have the last day of the week (Saturday) and the Sunday to enjoy themselves with their friends and acquaintances, instead of, if their weddings took place on Monday or Tuesday, breaking up the whole week afterwards. I considered this a sort of feasible and reasonable explanation of the matter. On such occasions as those of marriage there is great bustle and animation. The guests are invited two days beforehand by the happy couple *in propriis personis*, and means are taken to remind their friends again of the ceremony on the joyous day. At the proper time the parties meet—the lad in his best blue suit, and the lass and all the other maidens dressed in white—and walk to the manse or church, as the case may be, or the minister is “trysted” to come to the bride’s father’s residence. There is a great dinner provided for the happy occasion, usually served at a small inn or public-house when there is a very large party. All the best viands which can be thought of are procured : fish, flesh, and fowl ; porter, ale, and whisky, are all to be had at these banquets, not forgetting the universal dish of skate, which is produced at all fisher marriages. After dinner comes the collection, when the best man, or some one of the company, goes round and gets a shilling or a sixpence from each. This is the mode of celebrating a penny wedding, and all are welcome who like to attend, the bidding being general. The evening winds up, so far as the young folks are concerned, with unlimited dancing. In fact dancing at one time used to be the favourite recreation of the fisher-folk. In a dull season they would dance for “luck,” in a plentiful season for joy—anything served as an

excuse for a dance. On the wedding-night the old folks sit and enjoy themselves with a bowl of punch and a smoke, talking of old times and old fishing adventures, storms, miraculous hauls, etc.; in short, like old military or naval veterans, they have a strong *penchant* "to fight their battles o'er again." The fun grows fast and furious with all concerned, till the tired body gives warning that it is time to desist, and by and by all retire, and life in the fishing village resumes its old jog-trot.

It would take up too much space, and weary the reader besides, were I to give in detail an account of all the fishing places I have visited. My purpose will be amply served by a glance at a few of the Scottish fishing villages, which, with the information I can interpolate about the fisher-folks of the coast of France, and the eel-breeders of Comacchio, not to mention those of Northumberland and Yorkshire, will be quite sufficient to give the general reader a tolerable idea of this interesting class of people; and to suit my own convenience I will begin at the place where I witnessed the marriage.

Newhaven is most celebrated for its "fishwives," who were declared by King George IV. to be the handsomest women he had ever seen, and were looked upon by Queen Victoria with eyes of wonder and admiration. The Newhaven fishwife must not be confounded by those who are unacquainted in the locality with the squalid fish-hawkers of Dublin; nor, although they can use strong language occasionally, are they to be taken as examples of the *genus* peculiar to Billingsgate. The Newhaven women are more like the buxom *dames* of the market of Paris, though their glory of late years has been somewhat dulled. There is this, however, to be said of them, that they are as much of the past as the present; in dress and manners they are the same now as they were a hundred years ago; they take a pride in conserving all their traditions and characteristics, so that their customs appear unchangeable, and are never, at any rate, influenced by the alterations which art, science, and literature produce on the country at large. Before the railway era, the Newhaven fishwife was a great fact, and could be met with in Edinburgh in her picturesque costume of short but voluminous and gaudy petticoats, shouting "Caller herrings!" or "Wha'll buy my caller cod?" with all the energy that a strong pair of lungs could supply. Then, in the evening, there

entered the city the oyster-wench, with her prolonged musical aria of "Wha'll o' caller ou?" But the spread of fishmongers' shops and the increase of oyster-taverns is doing away with this picturesque branch of the business. Forty years ago



NEWHAVEN FISHWIVES.

nearly the whole of the fishermen of the Firth of Forth, in view of the Edinburgh market, made for Newhaven with their cargoes of white fish; and these, at that time, were all bought up by the women, who carried them on their backs to Edinburgh in creels, and then hawked them through the city. The sight of a bevy of fishwives in the streets of the Modern Athens, although comparatively rare, may still occasionally be enjoyed; but the railways have lightened their labours, and we do not

find them climbing the *Whale Brae* with a hundredweight, or two hundredweight, perhaps, of fish, to be sold in driblets, for a few pence, all through Edinburgh.

The industry of fishwives is proverbial, their chief maxim being, that "the woman that canna work for a man is no worth ane;" and accordingly they undertake the task of disposing of the merchandise, and acting as Chancellor of the Exchequer. Their husbands have only to catch the fish, their labour being finished as soon as the boats touch the quay. The Newhaven fishwife's mode of doing business is well known. She is always supposed to ask double or triple what she will take; and, on occasions of bargaining she is sure, in allusion to the hazardous nature of the gudeman's occupation, to tell her customers that "fish are no fish the day, they're just men's lives." The style of higgling adopted when dealing with the fisher-folk, if attempted in other kinds of commerce, gives rise to the well-known Scottish reproach of "D'ye tak' me for a fishwife?" The style of bargain-making carried on by the fishwives may be illustrated by the following little scene:—

A servant girl having just beckoned to one of them, is answered by the usual interrogatory, "What's yer wull the day, my bonnie lass?" and the "mistress" being introduced, the following conversation takes place:—

"Come awa, mem, an' see what bonnie fish I hae the day."

"Have you any haddocks?"

"Ay hae I, mem, an' as bonnie fish as ever ye clappit yer twa een on."

"What's the price of these four small ones?"

"What's yer wull, mem?"

"I wish these small ones."

"What d'ye say, mem? sma' haddies! they's no sma' fish, an they're the bonniest I hae in a' ma creel."

"Well, never mind, what do you ask for them?"

"Weel, mem, its been awfu' wather o' late, an' the men canna get fish; ye'll no grudge me twentypence for thae four?"

"Twentypence!"

"Ay, mem; what for no?"

"They are too dear; I'll give—"

"What d'ye say, mem! ower dear! I wish ye kent it: but what'll ye gie me for thae four?"

"I'll give you a sixpence."

"Ye'll gie me a what?"

“ A sixpence.”

“ I daur say ye wull, ma bonny leddy, but ye'll no get thae four fish for twa sixpences this day.”

“ I'll not give more.”

“ Well, mèm, gude day ” (making preparations to go);  
“ I'll take eighteenpence an' be dune wi't.”

“ No ; I'll give you twopence each for them.”

And so the chaffering goes on, till ultimately the fishwife will take tenpence for the lot, and this plan of asking double what will be taken, which is common with them all and sometimes succeeds with simple housewives, will be repeated from door to door, till the supply be exhausted. The mode of doing business with a fishwife is admirably illustrated in the *Antiquary*. When Monkbarns bargains for “ the bannock-fluke ” (turbot) and “ the cock-padle ” (the lump-sucker), Maggie Mucklebackit asks four shillings and sixpence, and ends, after a little negotiation and much finesse, in accepting half-a-crown and a dram ; the latter commodity being worth siller just then, in consequence of the stoppage of the distilleries.

The fishwives while selling their fish will often say something quaint to the customer with whom they are dealing. I will give one instance of this, which, though somewhat ludicrous, is characteristic, and have no doubt the words were spoken from the poor woman's heart. “ A fishwife who was crying her ‘ caller cod ’ in George Street, Edinburgh, was stopped by a cook at the head of one of the area stairs. A cod was wanted that day for the dinner of the family, but the cook and the fishwife could not trade, disagreeing about the price. The night had been stormy, and instead of the fishwife flying into a passion, as is their general custom when bargaining for their fish if opposed in getting their price, the poor woman shed tears, and said to the cook, ‘ Tak' it or want it ; ye may think it dear, but it's a' that's left to me for a faither o' four bairns.’ ”

Notwithstanding, however, their lying and cheating in the streets during the week when selling their fish, there are no human beings in Scotland more regular in their attendance at church. To go to their church on a Sunday, and see the women all sitting with their smooth glossy hair and snow-white caps, staring with open eyes and mouth at the minister, as he exhorts them from the pulpit as to what they should do, one would think them the most innocent and simple creatures in

existence. But offer one of them a penny less than she feels inclined to take for a haddock, and he is a lucky fellow who escapes without its tail coming across his whiskers. Of late our fishwives have been considering themselves of some importance. When the Queen came first to Edinburgh, she happened to take notice of them, and every printshop window was then stuck full of pictures of Newhaven fishwives in their quaint costume of short petticoats of flaming red and yellow colours. They wear a dress of a peculiar and appropriate fashion, consisting of a long blue duffle jacket, with wide sleeves, a blue petticoat usually tucked up so as to form a pocket, and in order to show off their ample under petticoats of bright-coloured woollen stripe, reaching to the calf of the leg. It may be remarked that the upper petticoats are of a striped sort of stuff technically called, we believe, drugget, and are always of different colours. As the women carry their load of fish on their backs in creels, supported by a broad leather belt resting forwards on the forehead, a thick napkin is their usual headdress, although often a muslin cap, or mutch, with a very broad frill, edged with lace, and turned back on the head, is seen peeping from under the napkin. A variety of kerchiefs or small shawls similar to that on the head encircle the neck and bosom, which, with thick worsted stockings and a pair of stout shoes, complete the costume.

The sketch of fisher-life in the *Antiquary* applies as well to the fisher-folk of to-day as to those of sixty years since. This is demonstrable at Newhaven; which, though fortunate in having a pier as a rendezvous for its boats, thus admitting of a vast saving of time and labour, is yet far behind inland villages in point of sanitary arrangements. There is in the "town" an everlasting scent of new tar, and a permanent smell of decaying fish, for the dainty visitors who go down to the village of Edinburgh to partake of the fish-dinners for which it is so celebrated. Up the narrow closes, redolent of "bark," we see hanging on the outside stairs the paraphernalia of the fisherman—his "properties," as an actor would call them; nets, bladders, lines, and oilskin unmentionables, with dozens of pairs of those particularly blue stockings that seem to be the universal wear of both mothers and maidens. On the stair itself sit, if it be seasonable weather, the wife and daughters, repairing the nets and baiting the lines—gossiping of course with opposite neighbours, who are engaged in a precisely similar pursuit; and



to day, as half a century ago, the fishermen sit beside their hauled-up boats, in their white canvas trousers and their Guernsey shirts, smoking their short pipes, while their wives and daughters are so employed, seeming to have no idea of anything in the shape of labour being a duty of theirs when ashore. In the flowing gutter, which trickles down the centre of the old village, we have the young idea developing itself in plenty of noise, and adding another layer to the incrustation of dirt which it seems to be the sole business of these children to collect on their bodies. These juvenile fisher-folk have already learned from the mud-larks of the Thames the practice of sporting on the sands before the hotel windows, in the expectation of being rewarded with a few halfpence. "What's the use of asking for siller before they've gotten their denner?" we once heard one of these precocious youths say to another, who was proposing to solicit a bawbee from a party of strangers.

To see the people of Newhaven, both men and women, one would be apt to think that their social condition was one of great hardship and discomfort: but one has only to enter their dwellings in order to be disabused of this notion, and to be convinced of the reverse of this, for there are few houses among the working population of Scotland which can compare with the well-decked and well-plenished dwellings of these fishermen. Within doors all is neat and tidy. When at the marriage I have mentioned, I thought the house I was invited to was the cleanest and the cosiest-looking house I had ever seen. Never did I see before so many plates and bowls in any private dwelling; and on all of them, cups and saucers not excepted, fish, with their fins spread wide out, were painted in glowing colours; and in their dwellings and domestic arrangements the Newhaven fishwives are the cleanest women in Scotland, and the comfort of their husbands when they return from their labours on the wild and dangerous deep seems to be the fishwife's chief delight. I may also mention that none of the young women of Newhaven will take a husband out of their own community, that they are as rigid in this matrimonial observance as if they were all Jewesses.\*

\* "There fishermen and fishermen's daughters marry and are given in marriage to each other with a sacredness only second to the strictness of intermarriage observed among the Jews. On making inquiry we find that occasionally one of these buxom young damsels chooses a husband for herself elsewhere than from among her own community; but we understand

The remains of many old superstitions are still to be found about Newhaven. I could easily fill a page or two of this volume with illustrative anecdotes of sayings and doings that are abhorrent to the fisher mind. The following are given as the merest sample of the number that might be collected. They have several times "gone the round" of the newspapers, but are none the worse for that:—

If an uninitiated greenhorn of a landsman chanced to be on board of a Newhaven boat, and, in the ignorance and simplicity of his heart, talked about "salmon," the whole crew—at least a few years ago—would start, grasp the nearest *iron thowell*, and exclaim, "Cauld iron! cauld iron!" in order to avert the calamity which such a rash use of the appellation was calculated to induce; and the said uninitiated gentleman would very likely have been addressed in some such courteous terms as "O ye igrant brute, cud ye no ca'd it redfish?" Woe to the unfortunate wight—be he Episcopalian or Presbyterian, Churchman or Dissenter—who being afloat talks about "the minister:" there is a kind of undefined terror visible on every countenance if haply this unlucky word is spoken; and I would advise my readers, should they hereafter have occasion, when water-borne,

that when this occurs the bride loses caste, and has to follow the future fortunes of the bridegroom, whatever these may turn out to be. Speaking of marriages, the present great scarcity both of beef and mutton, and the consequent high price of these articles of food, seems in no way to terrify the denizens of Newhaven, for there the matrimonial knot is being briskly tied. While chatting with some of the fishermen just the other day we heard that two of these celebrations had taken place the night before, and that other four weddings were expected to come off during this week; and we both heard and saw the fag end of the musical and dancing jollification, which was held in a public-house on these two recent occasions, and which was kept up until far on in the next afternoon. We can see little to tempt the young women of Newhaven to enter into the marriage state, for it seems only to increase their bodily labour. This circumstance, however, would appear to be no obstacle in the way; but rather to spur them on; and we recollect of once actually hearing, when a girl rather delicate for a Newhaven young woman was about to be married, another girl, a strapping lass of about eighteen, thus express herself:—"Jenny Flucker takin' a man! she's a gude cheek; hoo is she tae keep him? the puir man'll hae tae sell his fish as weel as catch them." When upon this subject of inter-marriages among the Newhaven people it is proper to mention that we heard contradictory accounts regarding the point; some saying that no such custom existed, or at least that no such rule was enforced by the community, while another account was that only one marriage out of the community had, so far as had come to the knowledge of our informant, taken place during the last eight or nine years."—*North Briton*.

to speak of a clergyman, to call him "the man in the black coat;" the thing will be equally well understood, and can give offence to none. I warn them, moreover, to be guarded and circumspect should the idea of a cat or a pig flit across their minds; and should necessity demand the utterance of their names, let the one be called "Theebet" and the other "Sandy;" so shall they be landed on *terra firma* in safety, and neither their ears nor their feelings be insulted by piscatory wit. In the same category must be placed every four-footed beast, from the elephant moving amongst the jungles of Hindostan to the mouse that burrows under the cottage hearth-stone. Some quadrupeds, however, are more "unlucky" than others; dogs are detestable, hogs horrible, and hares hideous! It would appear that Friday, for certain operations, is the most unfortunate; for others the most auspicious day in the week. On that day no sane fisherman would commence a Greenland voyage, or proceed to the herring-ground, and on no other day of the week would he be married.

In illustration of the peculiar dread and antipathy of fishermen to swine, I give the following extract from a volume published by a schoolmaster, entitled *An Historical Account of St. Monance*. The town is divided into two divisions, the one called Nethertown and the other Overtown—the former being inhabited entirely by fishermen, and the latter by agriculturists and petty tradesmen:—"The inhabitants of the Nethertown entertained a most deadly hatred towards swine, as ominous of evil, insomuch that not one was kept amongst them; and if their eyes haplessly lighted upon one in any quarter, they abandoned their mission and fled from it as they would from a lion, and their occupation was suspended till the ebbing and flowing of the tide had effectually removed the spell. The same devils were kept, however, in the Uppertown, frequently affording much annoyance to their neighbours below, on account of their casual intrusions, producing much damage by suspension of labour. At last, becoming quite exasperated, the decision of their oracle was to go in a body and destroy not the animals (for they dared not hurt them), but all who bred and fostered such demons, looking on them with a jealous eye, on account of their traffic. Armed with boat-hooks, they ascended the hill in formidable procession, and dreadful had been the consequence had they not been discovered. But the Uppertown, profiting by previous remonstrance, immediately let loose their swine, whose

grunt and squeak chilled the most heroic blood of the enemy, who, on beholding them, turned and fled down the hill with tenfold speed, more exasperated than ever, secreting themselves till the flux and reflux of the tide had undone the enchantment. . . . According to the most authentic tradition, not an animal of the kind existed in the whole territories of St. Monance for nearly a century ; and, even at the present day, though they are fed and eaten, the fisher people are extremely averse to looking on them or speaking of them by that name ; but, when necessitated to mention the animal, it is called ' the beast,' or ' the brute,' and, in case the real name of the animal should accidentally be mentioned, the spell is undone by a less tedious process—the exclamation of ' cauld iron ' by the person affected being perfectly sufficient to counteract the evil influence. Cauld iron, touched or expressed, is understood to be the first antidote against enchantment."

The system of merchandise followed by the fishwives in the old days of creel-hawking, and even yet to a considerable extent, was very simple. Having procured a supply of fish, which having bestowed in a basket of a form fitted to the back, they used to trudge off to market under a load which most men would have had difficulty in carrying, and which would have made even the strongest stagger. Many of them still proceed to the market, and display their commodities ; but the majority, perhaps, perambulate the streets of the city, emitting cries which, to some persons, are more loud than agreeable, and which a stranger would never imagine to have the most distant connection with fish. Occasionally, too, they may be seen pulling the door-bell of some house where they are in the habit of disposing of their merchandise, with the blunt inquiry, " Ony haddies the day ? "

While treating of the peculiarities of these people, I may record the following characteristic anecdote :—" A clergyman, in whose parish a pretty large fishing-village is situated, in his visitations among the families of the fish-carriers found that the majority of them had never partaken of the sacrament. Interrogating them regarding the reason of this neglect, they candidly admitted to him that their trade necessarily led them so much to cheat and tell lies, that they felt themselves unqualified to join in that religious duty." It is but justice, however, to add that, when confidence is reposed in them, nothing can be more fair and upright than the dealings of the fisher class ; and, as

dealers in a commodity of very fluctuating value, they cannot perhaps be justly blamed for endeavouring to sell it to the best advantage.

At Prestonpans, and the neighbouring village of Cockenzie, the modern system, as I may call it, for Scotland, of selling the fish wholesale, may be seen in daily operation. When the boats arrive at the boat-shore, the wives of those engaged in the fishing are in readiness to obtain the fish, and carry them from the boats to the place of sale. They are at once divided into lots, and put up to auction, the skipper's wife acting as the George Robins of the company, and the price obtained being divided among the crew, who are also, generally speaking, owners of the boat. Buyers, or their agents, from Edinburgh, Glasgow, Liverpool, Manchester, etc., are always ready to purchase, and in a few hours the scaly produce of the Firth of Forth is being whisked along the railway at the rate of twenty miles an hour. This system, which is certainly a great improvement on the old creel-hawking plan, is a faint imitation of what is done in England, where the owners of fishing-smacks consign their produce to a wholesale agent at Billingsgate, who sells it by auction in lots to the retail dealers and costermongers.

Farther along on the Scottish east coast is North Berwick, now a bathing resort, and a fishing town as well; and farther east still is Dunbar, the seat of an important herring-fishery—grown from a fishing village into a country town, in which a mixture of agricultural and fishing interests gives the place a somewhat heterogeneous aspect; and between St. Abb's Head and Berwick-on-Tweed is situated Eyemouth, a fishing-village pure and simple, with all that wonderful filth scattered about which is a sanitary peculiarity of such towns. The population of Eyemouth is in keeping with the outward appearance of the place. As a whole, they are a rough uncultivated people, and more drunken in their habits than the fishermen of the neighbouring villages. Coldingham Shore, for instance, is only three miles distant, and has a population of about one hundred fishermen, of a very respectable class, sober, well-dressed, and "well-to-do." A year or two ago an outburst of what is called "revivalism" took place at Eyemouth, and seemed greatly to affect it. The change produced for a time was unmistakable. These rude unlettered fishermen ceased to visit the public-houses, refrained from the use of oaths, and instead sang psalms and said prayers. But this wave of revivalism, which passed over other

villages besides Eyemouth, has rolled away back, and in some instances left the people worse than it found them.

Crossing the Firth of Forth, the coast of Fife, from Burnt-island to "the East Neuk," will be found studded at intervals with quaint fishing-villages; and the quaintest among the quaint is Buckhaven. Buckhaven, or, as it is locally named, Buckhyne, as seen from the sea, is a picturesque group of houses sown broadcast on a low cliff. Indeed, most fishing villages seem thrown together without any kind of plan. The local architects had never thought of building their villages in rows or streets; as the fisher-folks themselves say, their houses are "a' heids and thraws," that is, set down here and there without regard to architectural arrangement. The origin of Buckhaven is rather obscure: it is supposed to have been founded by the crew of a Brabant vessel, wrecked on that portion of the Fife coast in the reign of Philip II. The population are, like most of their class, a peculiar people, living entirely among themselves; and any stranger settling among them is viewed with such suspicion that years will often elapse before he is adopted as one of the community. One of the old Scottish chap-books is devoted to a satire of the Buckhaven people. These old chap-books are now rare, and to obtain them involves a considerable amount of trouble. Thirty years ago the chapmen were still carrying them about in their packs: now it is pleasing to think they have been superseded by the admirable cheap periodicals which are so numerous and so easy to purchase. The title of the chap-book referred to above is, *The History of Buckhaven in Fifeshire, containing the Witty and Entertaining Exploits of Wise Willie and Witty Eppie, the Ale-wife, with a description of their College, Coats of Arms, etc.* It would be a strong breach of etiquette to mention the title of this book to any of the Buckhaven people; it is difficult to understand how they should feel so sore on the point, as the pamphlet in question is a collection of very vulgar witticisms tinged with such a dash of obscenity as prevents their being quoted here. The industrious fishermen of Buckhaven are moral, sober, and comparatively wealthy. As denoting the prosperous state of the people of Buckhaven, it may be stated that most of the families there have saved money; and not a few of them have a bank account, as well as considerable capital in boats, nets, and lines. Fishermen, being much away from home, at the herring-fishery or out at the deep-sea fishing, have no temptation to spend their earnings or

waste their time in the tavern. Indeed, in some Scottish fishing villages there is not even a public-house. The Buckhaven men delight in their boats, which are mostly "Firth-built,"—*i.e.* built at Leith on the Firth of Forth. Each boat with its appurtenances has generally more than one owner; in other words, it is held in shares. This is rather an advantage than otherwise, as every vessel requires a crew of four men at any rate, so that each boat is usually manned by two or three of its owners—a pledge that it will be looked carefully after and not be exposed to needless danger. With all the youngsters of a fishing village it is a point of ambition to obtain a share of a boat as soon as ever they can; so that they save hard from their allowances as extra hands, in order to attain as early as possible to the dignity of proprietorship. We look in vain, except at such wonderful places as Rochdale, to find manufacturing operatives in a similar financial position to these Buckhaven men: in fact, our fishermen have been practising the plan of co-operation for years without knowing it, and without making it known. The co-operative system seems to prevail among the English fisher-folk as well. At Filey, on the Yorkshire coast, many of the large fishing yawls—these vessels average about 40 tons each—are built by little companies and worked on the sharing principle: so much to the men who find the bait, and so much to each man who provides a net; and a few shillings per pound of the weekly earnings of the ship go to the owners. In France there are various ways of engaging the boats and conducting the fisheries. There are some men who fish on their own account, who have their own boat, sail, and nets, etc., and who find their own bait, whether at the sardine-fishery or when prosecuting any other branch of the sea-fisheries. Of course these boat-owners hire what assistance they require, and pay for it. There are other men again who hire a boat, and work it on the sharing plan, each man getting so much, the remainder being left for the owner. A third class of persons are those who work off their advances: these are a class of men so poor as to be obliged to pawn their labour to the boat-owners long before it is required. We can parallel this at home in the herring-fishery, where the advance of money to the men has become something very like a curse to all concerned.

The retired Buckhaven fishermen can give interesting information about the money value of the fisheries. One, who was a young fellow five-and-thirty years ago, told me the

herring-fishery was a kind of lottery, but that, on an average of years, each boat would take annually something like a hundred crans—the produce, in all cases where the crew were part owners, after deducting a fifth part or so to keep up the boat, being equally divided. “When I was a youngster, sir,” said this person, “there was lots o’ herrin’, an’ we had a fine winter fishin’ as well, an’ sprats in plenty. As to white fish, they were abundant five-an’-twenty years ago. Haddocks now are scarce to be had ; being an inshore fish, they’ve been a’ ta’en, in my opinion. Line-fishin’ was very profitable from 1830 to 1840. I’ve seen as many as a hunder thousand fish o’ ae kind or anither ta’en by the Buckhyne boats in a week—that is, countin’ baith inshore boats an’ them awa at the Dogger Bank. The lot brocht four hunder pound ; but a’ kinds of fish are now sae scarce that it taks mair than dooble the labour to mak the same money that was made then.”

I will now carry the reader with me to a very quaint place indeed, the scene of Sir Walter Scott’s novel of *The Antiquary*—Auchmithie. The supposed scene of Sir Walter Scott’s novel of *The Antiquary*, on the coast of Forfarshire, presents a conjunction of scenic and industrial features which commends it to notice. At Auchmithie, which is distant a few miles from Arbroath, there is often some cause for excitement ; and a real storm or a real drowning is something vastly different from the shipwreck in the drama of *The Tempest*, or the death of the Colleen Bawn. The beetling cliffs barricading the sea from the land may be traversed by the tourist to the music of the everlasting waves, the dashing of which only makes the deep solitude more solemn ; the sea-gull sweeps around with its shrill cry, and playful whales gambol in the placid waters.

The village of Auchmithie, which is wildly grand and romantic, stands on the top of the cliffs, and as the road to it is steep, a great amount of labour devolves on the fishermen in carrying down their lines and nets, and carrying up their produce, etc. One customary feature observed by strangers on entering Auchmithie is, that when met by female children they invariably stoop down, making a very low curtsy, and for this piece of polite condescension they expect that a few halfpence will be thrown to them. If you pass on without noticing them they will not ask for anything, but once throw them a few halfpence and a pocketful will be required to satisfy their importunities. There are two roads leading to Auchmithie



from Arbroath, one along the sea-coast, the other through the country. The distance is about  $3\frac{1}{2}$  miles in a north-east direction, and the country road is the best; and approaching the village in that direction it has a very fair aspect. Two rows of low-built slate-roofed houses, and a school and chapel, stand a few yards off by themselves. On the north side of the village is a stately farm-house, surrounded by trees, and on the south side a Coast-Guard station, clean, whitewashed, and with a flag-staff, giving the whole a regular and picturesque appearance. Entering the village of Auchmithie from the west, and walking through to the extreme east end, the imagination gets staggered to think how any class of men could have selected such a wild and rugged part of the coast for pursuing the fishing trade—a trade above all others that requires a safe harbour where boats can be launched and put to sea at a moment's warning if any signals of distress be given. The bight of Auchmithie is an indentation into rocky cliffs several hundred feet in perpendicular height. About the middle of the bight there is a steep ravine or gully with a small stream, and at the bottom of this ravine there is a small piece of level ground where a fish-curing house is erected, and where also the fishermen pull up their boats, that they may be safe from easterly gales. There are in all about seventeen boats' crews at Auchmithie. Winding roads with steps lead down the side of the steep brae to the beach. There are a few half-tide rocks in the bight that may help to break the fury of waves raised by easterly winds; but there is no harbour or pier for the boats to land at or receive shelter from, and this the fishermen complain of, as they have to pay £2 a year for the privilege of each boat. The beach is steep, and strewed with large pebbles, excellently adapted, they say, for drying fish upon.

The visitor, in addition to studying the quaint people, may explore one of the vast caves which only a few years ago were the nightly refuge of the smuggler. Brandy Cove and Gaylet Pot are worth inspection, and inspire a mingled feeling of terror and grandeur. The visitor may also take a look at the "Spindle"—a large detached piece of the cliffs, shaped something like a corn-stack, or a boy's top with the apex uppermost. When the tide is full this rock is surrounded with water, and appears like an island. Fisher-life may be witnessed here in all its unvarnished simplicity. Indeed nothing could well be more primitive than their habits and

mode of life. I have seen the women of Auchmithie "kilt their coats" and rush into the water in order to aid in shoving off the boats, and on the return of the little fleet carry the men ashore on their brawny shoulders with the greatest ease and all the *nonchalance* imaginable, no matter who might be looking at them. Their peculiar way of smoking their haddocks may be taken as a very good example of their other modes of industry. Instead of splitting the fish after cleaning them, as the regular curers do, they smoke them in their round shape. They use a barrel without top or bottom as a substitute for a curing house. The barrel being inserted a little distance in the ground, an old kail-pot or kettle, filled with sawdust, is placed at the bottom, and the inside is then filled with as many fish as can conveniently be hung in it. The sawdust is then set fire to, and a piece of canvas thrown over the top of the barrel: by this means the females of Auchmithie smoke their haddocks in a round state, and very excellent they are when the fish are caught in season. The daily routine of fisher-life at Auchmithie is simple and unvarying; year by year, and all the year round, it changes only from one branch of the fishery to another. The season, of course, brings about its joys and sorrows: sad deaths, which overshadow the village with gloom; or marriages, when the people may venture to hold some simple *fete*, but only to send them back with renewed vigour to their occupations. Time, as it sweeps over them, only indicates a period when the deep-sea hand-lines must be laid aside for the herring-drift, or when the men must take a toilsome journey in search of bait for their lines. Their scene of labour is on the sea, ever on the sea; and, trusting themselves on the mighty waters, they pursue their simple craft with persevering industry, never heeding that they are scorched by the suns of summer or benumbed by the frosts of winter. There is, of course, an appropriate season for the capture of each particular kind of fish. There are days when the men fish inshore for haddocks; and there are times when, with their frail vessels, the fishermen sail long distances to procure larger fish in the deep seas, and when they must remain in their open boats for a few days and nights. But the El-dorado of all the coast tribe is "the herring." This abounding and delightful fish, which can be taken at one place or another from January to December, yields a six weeks' fishing in the autumn of the year, to which, as has already been stated, all the fisher-folk look forward with

hope, as a period of money-making, and which, so far as the young people are concerned, is generally expected to end, like the third volume of a love-story, in matrimony.

Footdee, or "Fittie" as it is locally called, is a quaint suburb of Aberdeen, figuring not a little, and always with a kind of comic quaintness, in the traditions of that northern city, and in the stories which the inhabitants tell of each other. They tell there of one Aberdeen man, who, being in London for the first time, and visiting St. Paul's, was surprised by his astonishment at its dimensions into an unusual burst of candour. "My stars!" he said, "this maks a perfect feel (fool) o' the kirk o' Fittie." Part of the quaint interest thus attached to this particular suburb by the Aberdonians themselves arises from its containing a little colony or nest of fisher-folk of immemorial antiquity. There are about a hundred families living in Fittie, or Footdee Square, close to the sea, where the Dee has its mouth. This community, like all others made up of fishing-folk, is a peculiar one, and differs of course from those of other working-people in its neighbourhood. In many things the Footdee people are like the gipsies. They rarely marry except with their own class; and those born in a community of fishers seldom leave it, and very seldom engage in any other avocation than that of their fathers. The squares of houses at Footdee are peculiarly constructed. There are neither doors nor windows in the outside walls, although these look to all the points of the compass; and none live within the square but the fishermen and their families, so that they are as completely isolated and secluded from public gaze as a regiment of soldiers within the dead walls of a barrack. The Reverend Mr. Spence, of Free St. Clement's, lately completed plans of the entire "toun," giving the number and the names of the tenants in every house; and from these exhaustive plans it appears that the total population of the two squares was 584—giving about nine inmates for each of these two-roomed houses. But the case is even worse than this average indicates. "In the South Square only eight of the houses are occupied by single families; and in the North Square only three, the others being occupied by at least two families each—one room apiece—and four *single* rooms in the North Square contain *two* families each! There are thirty-six married couples and nineteen widows in the twenty-eight houses; and the number of distinct families in them is fifty-four." The Fittie men seem poorer

than the generality of their brethren. They purchase the crazy old boats of other fishermen, and with these, except on very fine weather, they dare not venture very far from "the seething harbour-bar;" and the moment they come home with a quantity of fish the men consider their labours over, the duty of turning the fish into cash devolving, as in all other fishing communities, on the women. The young girls, or "queans," as they are called in Fittie, carry the fish to market, and the women sit there and sell them; and it is thought that it is the officious desire of their wives to be the treasurers of their earnings that keeps the fishermen from being more enterprising. The women enslave the men to their will, and keep them chained under petticoat government. Did the women remain at home in their domestic sphere, looking after the children and their husbands' comforts, the men would then pluck up spirit and exert themselves to make money in order to keep their families at home comfortable and respectable. Just now there are many fishermen who will not go to sea as long as they imagine their wives have got a penny left from the last hawking excursion. There is no necessity for the females labouring at out-door work. There are few trades in this country where industrious men have a better chance to make money than fishermen have, especially when they are equipped with proper machinery for their calling. At Arbroath, Auchmithie, and Footdee (Fittie), the fishing population are at the very bottom of the scale for enterprising habits and social progress. When the wind is in any way from the eastward, or in fact blowing hard from any direction, the fishermen at these places are very chary about going to sea unless dire necessity urges them.

The people of "Fittie" are progressing in morals and civilisation. One of the local journalists, who took the trouble to visit the place lately in order to describe truthfully what he saw, says:—"They have the reputation of being a very peculiar people, and so in many respects they are; but they have also the reputation of being a dirtily-inclined and degraded people, and this we can certify from personal inspection they are not. We have visited both squares, and found the interior of the houses as clean, sweet, and wholesome as could well be desired. Their whitewashed walls and ceiling, their well-rubbed furniture, clean bedding, and freshly-sanded floors, present a picture of tidiness such as is seldom to be met with among classes of the population reckoned higher in the social

scale. And this external order is only the index of a still more important change in the habits and character of our fisher-toun, the population of which, all who know it agree in testifying, has within the past few years undergone a remarkable change for the better in a moral point of view. Especially is this noticed in the care of their children, whose education might, in some cases, bring a tinge of shame to the cheek of well-to-do town's folks. Go down to the fisher squares, and lay hold of some little fellow hardly able to waddle about without assistance in his thick made-down moleskins, and you will find he has the Shorter Catechism at his tongue-end. Ask any employer of labour in the neighbourhood of the shore where he gets his best apprentices, and he will tell you that for industry and integrity he finds no lads who surpass those from the fisher squares. Inquire about the families of the fishermen who have lost their lives while following their perilous occupation, and you will find that they have been divided among other families in the square, and treated by the heads of these families as affectionately as if they had been their own."

As regards the constant intermarrying of the fisher class, and the working habits of their women, I have read an Italian fable to the following effect:—"A man of distinction, in rambling one day through a fishing-village, accosted one of the fishermen with the remark that he wondered greatly that men of his line of life should chiefly confine themselves, in their matrimonial connections, to women of their own caste, and not take them from other classes of society, where a greater security would be obtained for their wives keeping a house properly, and rearing a family more in accordance with the refinement and courtesies of life. To this the fisherman replied, that to him, and men of his laborious profession, such wives as they usually took were as indispensable to their vocation as their boat and nets. Their wives took their fish to market, obtained bait for their lines, mended their nets, and performed a thousand different and necessary things, which husbands could not do for themselves, and which women taken from any other of the labouring classes of society would be unable to do. 'The labour and drudgery of our wives,' continued he, 'is a necessary part of our peculiar craft, and cannot by any means be dispensed with, without retailing irreparable injury upon our social interests.' MORAL—This is one among many instances, where the solid and the useful must take precedence of the showy and the elegant."

## CHAPTER XVI.

### STORIES OF FISHER-LIFE.

Signs and Tokens—A French Fishwoman—The Fishwives of Paris—The Story of a Prestonpans Widow—Psalm John of Whelkholes—Jean Cowie's Story—Fisher Names—Dramatic Sketch—Growth of a Storm—The last Scene of all.

As has been already mentioned, the fishers are intensely superstitious. No matter where we view them, they are as much given to signs and omens at Portel near Boulogne as at Portessie near Banff. For instance, whilst standing or walking they don't like to be numbered. Rude boys will sometimes annoy them by shouting—

“Ane, twa, three ;  
What a lot o' fisher mannies I see !”

It is also considered very offensive to ask fisher-people, whilst on their way to their boats, where they are going to-day ; and they do not like to see, considering it unlucky, the impression of a very flat foot upon the sand ; neither, as I have already explained, can they go to work if on leaving their homes in the morning a pig should cross their path. This is considered a particularly unlucky omen, and at once drives them home. Before a storm, it is usually thought, there is some kind of warning vouchsafed to them ; they see, in their mind's eye doubtless, a comrade wafted homeward in a sheet of flame, or the wraith of some one beckons them with solemn gesture landward, as if saying, “Go not upon the waters.” At one time when an accident happened from an open boat, and any person was drowned, that boat was never again used, but was laid up high and dry, and allowed to rot away—rather a costly superstition. Then, again, some fisher-people perform a kind of “rite” before going to the herring-fishery, in drinking

to a "white lug"—that is, that when they "pree" or examine a corner or lug of their nets, they may find it glitter with the silvery sheen of the fish, a sure sign of a heavy draught.

But the fishermen of other coasts are quite as quaint, superstitious, and peculiar, as those of our own. The residents in the *Faubourg de Pollet* of Dieppe are just as much alive to



A FRENCH FISHWOMAN.

the signs and tokens of the hour as the dwellers in the Square of Fittie, or those who inhabit the fishing quarter of Boulogne. It is a pity that the guide-books say so little about these and similar places. The fishing quarter of Boulogne is not unlike Newhaven: there is the same "ancient and fish-like smell," the same kind of women with very short petticoats, the only

difference being that our Scottish fishwives wear comfortable shoes and stockings. We can see too the dripping nets hung up to dry from the windows of the tumble-down-like houses, and the *gamins* of Boulogne lounge about the gutters, squat on the large side stones, or run up and down the long series of steps, just the same as the fisher-folks' children do at home.

It is only, however, by penetrating into the quaint villages situated on the coasts of Normandy and Brittany, that we can gain a knowledge of the manners and customs of those persons who are daily engaged in prosecuting the fisheries. The clergymen of their districts, as may be supposed, have great power over them, and all along the French coast the fisher-people have churches of their own, and they are constantly praying for "luck," or leaving propitiatory gifts upon the altars, as well as going pilgrimages in order that their wishes may be realised. A dream is thought of such great consequence among these people, that the women will hold a conference, early in the day, in order to its interpretation. Each little village has its storied traditions, many of them of great interest, and some of them very romantic. I can only briefly allude, however, to one of these little stories. Some of my readers may have heard of the Bay of the Departed on the coast of Brittany, where, in the dead hour of night, the boatmen are summoned by some unseen power to launch their boats and ferry over to a sacred island the souls of men who had been drowned in the surging waters. The fishermen tell that, on the occasion of those midnight freights, the boat is so crowded with invisible passengers as to sink quite low in the water, and the wails and cries of the shipwrecked are heard as the melancholy voyage progresses. On their arrival at the Island of Sein, invisible beings are said to number the invisible passengers, and the wondering awe-struck crew then return to await the next supernatural summons to boat over the ghosts to the storied isle, which was in long back days the chief haunt of the Druidesses in Brittany. A similar story may be heard at Guildo on the same coast. Small skiffs, phantom ones it is currently believed, may be seen when the moon is bright darting out from under the castle cliffs, manned by phantom figures, ferrying over the treacherous sands the spirits whose bodies lie engulfed in the neighbourhood. Not one of the native population, so strong is the dread of the scene, will pass the spot after nightfall, and strange stories are told of phantom lights and woful demons that lure the unsuspecting wayfarer to a treacherous death.



The Parisian fishwives are clean and buxom women, like their sisters of Newhaven, and they are quite as celebrated if not so picturesque in their costume. About a century and a half ago—and I need not go further back—there were a great number of fishwives in Paris, there being not less than 4000 oyster-women, who pursued their business with much dexterity, and were able to cheat their customers as well, if not better, than any modern fishwife. One of their best tricks was to swallow many of the finest oysters under the pretence of their not being fresh. Among the Parisian fishwives of the last century we are able to pick out Madame Picard, who was famed for her poetical talent, and was personally known to many of the eminent Frenchmen of the last century. Her poems were collected and published in a little volume, and ultimately by marriage this fishwife became a lady, having married a very wealthy silk merchant. The fishwives of Paris have long been historical: they have figured prominently in all the great events connected with the history of that city. Deputations from these market-women, gorgeously dressed in silk and lace, and bedecked with diamonds and other precious stones, frequently took part in public affairs. Mirabeau was a great favourite of the Parisian fishwives; at his death they attended his funeral and wore mourning for him. These Poissardes took an active part in the revolution of 1789, and did deeds of horror and charity that one has a difficulty in reconciling. It was no uncommon sight, for instance, to see the fishwives carrying about on poles the heads of obnoxious persons who had been murdered by the mob.

The short and simple annals of the fisher-folk are all tinged with melancholy—there is a skeleton in every closet. There is no household but has to mourn the loss of a father or a son. Annals of storms and chronicles of deaths form the talk of the aged in all the fishing villages. The following narrative is a sample of hundreds of other sad tales that might be collected from the coast people of Scotland. It was related to a friend by a woman at Musselburgh:—“Weel, ye see, sir, I haena ony great story till tell. At the time I lost my guidman I was livin’ doon by at the Pans (Prestonpans, a fishing village). The herrin’ season was ower about a month, and my guidman had laid by a guid pickle siller, and we had skytched oot a lot o’ plans for the futur’. We had nae bairns o’ oor ain, although we had been married for mony years; but

we had been lang thinkin' o' takin' in a wee orphint till bring up as oor ain; and noo that the siller was geyan' plenty, we settled that Marion M'Farlane should come hame till us by the beginnin' o' November. My guidman was thinkin' about buyin' a new boat, although his auld ane was no sae muckle the waur for wear. I was thinkin' aboot askin' the guidman for a new Sunday's goon: in fac', we were biggin' castles in the air a' on the foundation o' the herrin' siller; but hech, sir, its ower true that man—ay, and woman tae—purposes, but the Great Almighty disposes. The wee orphint wasna till find a new faither and mither in my guidman and me; the auld boat wasna till mak' room for a new ane; and my braw Sunday goon, which, gin I had had my choice, would hae been a bricht sky-blue ane, was changed intae black—black as nicht, black as sorrow and as death could mak' it. There was a fine fishin' o' the haddies, and the siller in the bank was growin' bigger ilka week, for the wather was at its best, and the fish plentiful'. Aweel, on the nicht o' the seventeenth o' November, after I had put a' the lines in order, and gien Archibald his supper, aff he gangs frae the herbour wi' his boat, and four as nice young chiels as ye ever set an ee on for a crew. An' there wasna muckle fear o' dirty wather, although the sun had gaen doon rayther redder than we could hae wished. Some o' the new married, and some o' the lasses that were sune to be married, used tae gang doon tae the herbour, and see their guidmen and their sweethearts awa'. I was lang by wi' that sort o' thing; no that my love was less, but my confidence was mair, seein' that it had been tried and faund true through the lang period o' fourteen years. As I was tidyin' up the hoose afore gangin' till my bed, I heard the men in the boats cryin' till ane anither, as they were workin' oot intae the firth. Tae bed I gaed, and lookin' at the lowe o' the fire, as it keepit flichterin' up and deein' awa', sune set me soond asleep. What daftlike things folks think, see, and dae in their sleep. I dreamt that nicht that I was walkin' along the sands till meet my guidman, wha had landed his boat at Morrison's Haven. The sun was shinin' beautifu', and the waves were comin' tumlin' up the sand, sparklin' and lauchin' in the sunlight, dancin' as if they never did only ill. I saw my guidman at the distance, and I put my best fit forrit till meet him. I was as near him as tae see his face distinckly, and was aboot tae cry oot, 'Archibald, what sort o' fishin' hae

ye had?' when a' on a suddint a great muckle hand cam' doon frae the sky, and puttin' its finger and thoom roond my guidman, lifted him clean oot o' my sicht jist in a meenit. The fright o' the dream waukened me, and I turned on my side and lookit at whaur the fire ought tae be, but it was a' blackness. The hoose was shakin' as if the great muckle hand had gruppit it by the gavel, and was shakin' it like a wunnelstraw. Hech, sir, ye leeve up in a toon o' lands, and dinna ken what a storm is. Aiblins ye get up in the mornin' and see a tree or twa lyin' across the road, and a lum tummilt ower the rufe, and a kittlin' or twa smoot aneath an auld barrel; but bless ye, sir, that's no a storm sic as we folk on the seaside ken o'. Na, na! The sky—sky! there's nae sky, a' is as black as black can be; ye may put your hand oot and fill your nieve wi' the darkness, exceppin' the times when the lichtnin' flashes doon like a twisted threid o' purple gowd; and then ye can see the waves lookin' ower ane anither's heads, and gnashin' their teeth, as ye might think, and cryin' oot in their anger for puir folk's lives. Siccan a nicht it was when I waukened. My guidman had been oot in mony a storm afore, sae I comforted mysel' wi' thinkin' that he would gey and likely mak for North Berwick or Dunbar when he saw the wather airtin for coorse. I wasna frightened, yet I coudna sleep for the roarin' o' the wind. Mornin' cam'. I gaed doon till the shore, and a' the wives and sweethearts o' the Pans gaed wi' me. There was a heavy fog on the sea, sae thick that neither Inchkeith nor the Law were to be seen. Naething was there but the sea and the muckle waves lowpin' up and dashin' themselves tae death on the rocks and the sands. Eastwards and westwards we lookit, an' better lookit, but naething was till be seen but the fog and the angry roarin' sea—no a boat, no a sail was visible on a' the wild waters. Weel, we had a lang confab on the shore as tae what our guidmen and our sweethearts might aiblins hae dune. It was settled amang us without a doot that they had gane intill North Berwick or Dunbar, and sae we expekit that in the afternoon they would maybe tak' the road and come hame till comfort us. After denner we—that is, the wives and sweethearts—took the gait and went as far as Gosfort Sands till meet our guidmen and the lads. The rain was pourin' doon like mad; but what was that till us? we were lookin' for what was a' the world till our bosoms, and through wind and weet we went tae find it, and

we nayther felt the cauld blast nor the showers. Caudly and greily the short day fell upon the Berwick Law. Darker and darker grew the gloamin', but nae word o' them we loo'd afore a' the world. The nicht closed in at lang and last, and no a soond o' the welcome voices. Eh, sir, aften and aften hae I said, and sang ower till mysel', the bonny words o' poetry that says—

"His very foot has music in't,  
As he comes up the stair."

But Archibald's feet were never mair till come pap, pappin, in at the door. Twa sorrowfu' and lang lang days passed awa', and the big waves, as if mockin' our sorrow, flang the spars o' the boats up amang the rocks, and there was weepin' and wailin' when we saw them, or in the grand words o' The Book, there was 'lamentation and sorrow and woe.' We kent then that we nicht look across the sea, but ower the waters would never blink the een that made sunshine around our hearths; ower the waters would never come the voices that were mair delightfu' than the music o' the simmer winds when the leaves gang dancing till their sang. My story, sir, is dune. I hae nae mair tae tell. Sufficient and suffice it till say, that there was great grief at the Pans—Rachel weepin' for her weans, and wouldna be comforted. The windows were darkened, and the air was heavy wi' sighin' and sabbin'."

The following sketches of life and character as seen in Scottish fishing communities may prove of interest to those who are unfamiliar with such scenes.

At Whelkholes the great specialty is "the herring." There are curers at the "Holes," and about seventy boats go out during the season to obtain that most abundant fish, which is captured in its season in the immediate vicinity. Great excitement always prevails during the herring season. It is looked forward to as a time of money-making, and much speculation as to whether the season will or will not be a "lucky" one prevails from an early period. Psalm John, the village oracle, has made the herring his peculiar study. He is the authority of Whelkholes on all things pertaining to fishing economy. He tells his brethren when it is time to start for the herring; he knows full well what signs indicate the appearance of that fish. When he sees the dolphin sporting in the bay or the birds skimming the water, then he knows that herrings are there. For some days before

the general launching of the boats for the herring harvest, Psalm John is wont to parade on the high cliff above the village, looking over the water for the expected and ever-welcome herring. Many a weary vigil has been held on that cliff. Many a weary foot has wandered over it during the fierce storms of the spring time, and many a beacon fire has been lighted there, as the women of the village sat at midnight looking across the turbulent sea, questioning with their anxious eyes each rolling billow that broke upon the shore, as to the fate of those afar off on the ravening deep. That cliff was the *via dolorosa* of Whelkholes. Many a painful tragedy had been witnessed from its pathway; and it led as well to that last resting-place of the villagers, the churchyard. It was from the pathway on the cliff, one hot autumn night, that Psalm John saw seven corpse-candles move from the village in a weird procession to the cemetery, and his prediction, that a wreck would occur, and that here would be seven corpses, was too surely fulfilled. John always saw a corpse-candle before a death, and all the people of the “Holes” believed in the superstition. The fisher folk, as a body, are great believers in apparitions and wraiths, and whenever a calamity of any kind occurs, there is always some man or woman who was sure it was to take place, as they had seen a funeral procession in the clouds, seven days before, or heard the eerie tick of the death-watch at midnight, or some other admonitory sign.

Psalm John was a man who never took spirits, and who attributed to them all the ills that came upon the people. After the great storm, he persuaded most of the male inhabitants to become temperance men. He then conducted a revival in the village, which was much talked of even in places at a great distance from Whelkholes. It was at the close of one very scanty herring harvest, that the village broke out into a great excitement. Psalm John had enunciated that the short fishing was a judgment put upon the people for their sins, and one day, while attending the funeral of an old friend, he felt impelled to kneel down among the mourners and pour out his soul in prayer. The scene was impressive. The gloaming was beginning to obscure the scene; the waves broke slow and murmuringly on the beach as the beautiful words of the Hundredth Psalm,

“ All people that on earth do dwell,”

broke on the stillness that had hitherto reigned around. One of the women then stood out and addressed the little crowd in

an earnest manner, enjoining them to leave off the evil tenor of their ways, and at once seek the path to heaven. From that night there was a striking change in the village; after that it was no uncommon thing to hear a motley crowd of fishermen, coopers, and herring-gutters, singing a hymn in the curing-yard after they had finished the labours of the day. The revival was a great triumph to Psalm John, for next season the herrings were more abundant in the bay than they had ever before been known to be.

The reader is assured that this is a true sketch; all that is fanciful in it is the name of the village. The revival movement was very general on the shores of the Moray Firth; and although some very inexcusable extravagances were perpetrated, a residue of good has been left behind.

“Preaching Cowie” had been left fatherless at the early age of eight years, his father having been drowned in one of those awful storms of the north-east coast, and his boat, with all its dearly-bought fishing gear, lost; but, in spite of all the disadvantages his son laboured under in consequence, he became at length a comparatively rich man, in the community of Shellbraes. Jean Cowie, his mother, Bull Cowie’s widow, had since her bereavement grown a business of her own. She travelled for many years to all the neighbouring towns, both with fresh and cured fish, and only gave up doing so when her well-doing son had become a curer, and when she had herself, by means of her indomitable industry, become in the circumstances a wealthy woman. During the latter years of her life she was a rollicking self-possessed widow, with a great “gift of the gab.” She bought fresh haddocks by the hundred from the fishers, and smoked them yellow in old barrels with smouldering pinewood, then packing up the fish in creels and other baskets, she carried them by rail or cart to market, where she chattered and bargained, and sold and exchanged, and laughed and joked, or wept, according to her humour, with all whom she met. But those who scanned her countenance in the early years of her widowhood could easily observe the deep furrows that had been worn by the tears in her face. There was a perpetual sadness under Jean’s forced gaiety, even when she was in the busy market-place; and where, in the intervals of business, when she could gain a solitary place, she “smoked like mad” to stifle thought and tranquillise her feelings. No one who encountered widow Cowie, as she sallied forth to the nearer

towns, would have fancied that during one fatal morning her boy son, her husband, and her father, had all been borne into her house in a melancholy procession, drowned! They had sailed away the day before to a distant fishing-bank, and while returning home were overtaken by a sudden storm, which dashed their boat upon the rocks within a few yards of the landing-place. There was great lamentation in the village over that calamity, for both Bull Cowie and his wife's father had been favourites in the Braes. Dancing Flucker, her father, had only a few days before he met his own death saved the life of a little child who had fallen into the sea. Thus Jean was suddenly left a widow with four young children; and when the first keenness of her grief had been somewhat deadened, she felt nerved to work as she had never worked before, for the sake of her young ones—*his* children. Jean scorned to ask assistance, or to go before "the Board." "Na, na," said the young widow; "neen o' my bairns 'ill ever hear it said that their mither geed on the parish. I can work—I can mak' nets or gather mussels, an' there's a kind Providence aboon us a', an' neen that hae hands needs to starve." Like all her countrywomen, Jean Cowie had an abhorrence of receiving parochial relief, or "going on the parish," as the Scottish peasantry call it—even out-door relief is distasteful to them. And as to going into the poor-house, it is looked upon by some of the poorest of the poor as worse than death.

Perhaps my readers would like to hear Jean's story as told by herself to a young lady who was buying fish from her. It was as follows:—"What did ye say, mem, saxpence—saxpence! Saxpence for they eight bonnie haddies just new oot o' the water, as clean and caller as yersel', mem! Na, na; gang till yer flesher, and see what he'll gie for saxpence. They haddies, mem, cost me a clear white shillin' oot o' ma ain hand this mornin', mem, without the word o' a lee; ay, mem, it's true; but div ye ken what jist sic another creelfu' o' fish as this cost me aince no lang ago? I'll tell ye if ye dinna ken. It cost me a faither, a guidman, an' a son,—yes, a' the three at aince were brocht in till me, stark starin' drooned corpses, wi' the saut sea faim rinnin' frae their hair, and dreepin' frae their claes. Fish, ye see, mem, are no fish, they're lives o' men; an' yet ye wad offer me a saxpence for a' they bonnie haddies! ye valey men's lives but cheaply, you leddies. Ay, a blithe hale auld chap was my faither. My mither de'ed o' the cholera.

An' wha in a' the Braes had a lichter step or a merrier heart than my guidman? He was nane o' yer skulking men that dread the blast on the tumlin' waves, and wad let their wives an' their weans gang naked an' hungry. Ay, he's faced the angriest sea that ever was seen, an' he could tak a dram or sing a sang wi' the best; an' as for dancin', he was the best dancer in the Braes; he was that. An', oh, tae think, mem, o' ma drooned laddie, ma bonnie laddie wi' his hair like lint an' his cheek like rosy aiples, as braw an' soople a son as ever helpit tae trim a sail or cast a net; he was ma auldest born, an' the ane I loo'ed aboon them a'. Oh! weary day that brocht me sae mickle grief; the Lord only can tell hoo I lived through it a'—a faither, a guidman, an' a son, a' drooned at aince, an' a' jist for sic a creelfu' as Sandy Flucker's boat fush in this mornin'. It's fine wather the day, say ye; ay 'tweel is't, an' the sun nae doot gladdens your heart though it vexes mine. It shines bricht an' bonny i' the noo, but wha kens what it may be afore nicht? for it was jist a day like this that the three gae'd awa as happy an' as licht o' heart as the wee waves seem'd that lapp'd and kissed the sides o' oor boat as she rocked at the shore, while I stood wi' Jamie in my airms an' Jenny at my feet, watchin' them set oot, an' wishin' them gude speed. Ah, dinna tell me, for I ken hoo clear the sky was, wi' no a cloud tae be seen on't ava, an' the sea wi' jist a bit ripple on its breist that caa'd the boat frae side tae side; but then a darkness cam an' covered a' the bonny blue lift, an' the thunder, burstin' ower oor hoose, as I sat mendin' my guidman's claes, sent the needle richt intae my hand an' wakened up Jamie in his creddle wi' a skreich; an' as the lichtnin' flashed in at the window I thoct on my faither, an' on ma laddie, an' on ma guidman, an' I prayed God help them an' bring them safe hame; safe hame, ah! they never were tae be that, for the boat was already strugglin' 'gainst the awfu' waves that dash in at our coast-side, an' tryin' tae mak for the landin' place; then, wives, an' men, an' bairns ran fast, an' gathered on the shore wi' mony a prayer an' cry for help. Wi' Jamie in my airms, I ran as weel, an', kneelin' on the rough stanes, the wind lashin' the water about me, an' wi' my bairn held ticht tae ma breast, I cried on Heaven tae save them; but, O! my leddy, I saw them whirled roon by the waves, an' drooned afore ma vera een. Then what a fecht has been mine sin' syne! sic loads tae carry, an' sic weary roads tae tramp! but there's Ane aboon that keeps us a'



richt, an' I'm thankfu' for a' the mercies I hae gotten. Thank ye, mem ; thank ye, mem ; but eh, they're cheap at tenpence. Gude day, mem."

As I have indicated, Jean prospered in her own way. In the early days of her widowhood, she was up with the lark, she washed for some of her neighbours, she gathered bait, she knitted nets, and nets in those days were made at home of home-spun twine. She also made and mended for the bairns. Meantime her son became an apt scholar, being quick at arithmetic and apt at such learning as was taught by Dominie Brewster in the school of Shellbraes. When the boy reached the age of eleven, he went out in his uncle's boat to the herring, and the season being a productive one, he earned no less than six pounds as his share of the venture. At that time most of the herring boats of Shellbraes were managed on the sharing system, or by "the deal," as it was called. When but a lad, John Cowie went two voyages to the whale fishery, and again earned quite a large sum of money, as his mother said everything he put his hand to was blessed. By and by he became the half proprietor of a herring boat, along with one of his cousins, and so, little by little, his prosperity increased till he became the owner of no less than three fishing-boats, after which he started in business as a curer, and found his industry rewarded with still greater success.

Resuming our tour, I may hint to the reader that it is well worth while, by way of variety, to see the fishing population of the various towns on the Moray Firth. Taking the south side as the best point of advantage, it may be safely said that from Gamrie to Portgordon there may be found many studies of character, and bits of land, or rather sea scape, that cannot be found anywhere else. Portsoy, Cullen, Portessie, Buckie, Portgordon, are every one of them places where all the specialties of fisher life may be studied. Buckie, from its size, may be named as a kind of metropolis among these ports ; and it differs from some of them inasmuch as it contains, in addition to its fisher-folk, a mercantile population as well. The town is divided and subdivided by means of its natural situation. There is Buckie-east-the-burn, New Buckie, Nether Buckie, Buckie-below-the-brae, Buckie-aboon-the-brae, and, of course, Buckie-west-the-burn. A curious system of "nicknames" prevails among the fisher-people, and most notably among those on the Moray Firth, and in some of the Scottish weaving villages as well. In all communications with the people their "to"

(*i.e.* additional), or, as the local pronunciation has it, "tee" names, must be used. At a public dinner held at Buckie several of the fishermen were present; and it was noticeable that the gentlemen of the press were careful, in their reports of the proceedings, to couple with the real names of the men the appellations by which they were best known—as "Mr. Peter Cowie, 'langlegs,' proposed the health, etc." So, upon all occasions of registering births, marriages, or deaths, the "tee" name must be recorded. If a fisherman be summoned to answer in a court of justice, he is called not only by his proper name, but by his nickname as well. In many of the fishing villages, where the population is only a few hundreds, there will not, perhaps, be half-a-dozen surnames, and the whole of the inhabitants, therefore, will be related "throughither," as such intermixture is called in Scotland. The variety of nicknames, therefore, is wonderful, but necessary in order to the identification of the different members of the few families who inhabit the fishing villages. The different divisions of Buckie, for instance, are inhabited by different clans; on the west side of the river or burn there are none but Reids and Stewarts, while on the east side we have only Cowies and Murrays. Cowie is a very common name on the shores of the Moray Firth; at Whitehills, and other villages, there are many bearing that surname, and to distinguish one from the other, such nicknames as Shavie, Pinchie, Howdie, Doddies, etc., are employed. In some families the nickname has come to be as hereditary as the surname; and when Shavie senior crosses "that bourne," etc., Shavie junior will still perpetuate the family "tee" name. All kinds of circumstances are indicated by these names—personal blemishes, peculiarities of manner, etc. There is, in consequence, Gley'd Sandy Cowie, Gley'd Sandy Cowie dumpie, and Big Gley'd Sandy Cowie; there is Souples, Goup-the-Lift, Lang-nose, 'Brandy, Stottie, Hawkie, etc. Every name in church or state is represented—kings, barons, bishops, doctors, parsons, and deacons; and others, in countless variety, that have neither rhyme nor reason to account for them.

As an instance of the many awkward *contretemps* which occur through the multiplicity of similar names in the northern fishing villages, the following may be recorded:—In a certain town lived two married men, each of them yclept Adam Flucker, and their individuality was preserved by those who knew them entitling them as Fleukie (Flounder) Flucker, and Haddie

(Haddock) Flucker. Fleukie was blessed with a large family, with probable increase of the same, and cursed with a wife who ruled him like a despot. Haddie had possessed for many years a treasure of a wife, but prospect of a family there was none. Now these things were unknown to the carrier, who had newly entered on his office. From the store of an inland town he had received two packages, one for Haddie (a fashionable petticoat of the gaudiest red), and the other for Fleukie (a stout wooden cradle) to supply the place of a similar article worn out by long service. The carrier, in simplicity of ignorance, reversed the destination of the packages, which, of course, were returned to the inland merchant, with threats of vengeance and vows never to patronise his store again.

Let the reader take, as an example of the quaint ways and absurd superstitions of the Moray Firth fisher-folk, the following little episode, which took place in the Small-Debt Court at Buckie, at the instance of a man who had been hired to assist at the herring-fishery, and who was pursuing his employer for his wages:—

On the case being called, the pursuer stated that he had been dismissed by the defender from his employment without just cause, indeed without any cause at all; and the defender, on being asked what he had to say, at once admitted the dismissal, and to the great astonishment of the Sheriff, confessed that he had nothing to assign as a reason for it, except the fact that the pursuer's name was "Ross."

"Ye see, my Lord, I did engage him, though I was weel tauld by my neibors that I sudna dee't, and that I cudna expect te hae ony luck wi' him, as it was weel kent that 'Ross' was an unlucky name. I thocht this was nonsense, but I ken better noo. He gaed te sea wi' us for a week, and I canna say but that he did's wark weel eneuch; but we never gat a scale. Sae the next week I began to think there beet te be something in fat my neibors said; sae upo' the Monday I wadna tak' him oot, and left him ashore, and that very night we had a gran' shot; and ye ken yersel', my Lord, that it wad hae been ower superstitishus to keep him after that, and sae I wad hae naething mair te dae wi' him, and pat him aboot's business."

The Sheriff was much amused with this novel application of the word "superstitious;" but, in spite of that application he had no difficulty in at once deciding against the defender, with expenses, taking occasion while doing so to read him a severe

lecture upon his ignorance and folly, and to declaim, with some vigour, against the many absurd superstitions of the fisher-folk. The lecture, however, has not been of much use, for I have ascertained that the "freit" in question is still as rife as ever, and that there is scarcely an individual among the communities of white-fishers on the Banffshire coast, who, if he can avoid it, will have any transaction with any one bearing the obnoxious name of "Ross."

I should now like to give my readers a specimen of the patois or dialect spoken by the Moray Firth fisher-folk, although it is somewhat difficult to do it effectively on paper, as the mode of spelling does not always represent the sound; but I will try, taking a little dialogue between the fishermen and the curer about a herring-fishing engagement, as the best mode of giving an idea of the language and pronunciation of the Buckie bodies:—

SCENE—*A Curer's office.* PRESENT—*The CURER and the three "SHAVIES."*

*Curer*—Well, Shavie, ye've had a pretty good fishing this year.

*Shavie senior*—Ou ay, it's been geyan gweed.

*Shavie tertius*—Fat did ye say, man? gweed—it's nae been better than last.

*Curer*—Well, laddie, what was wrong with last year's fishing?

*Bowed Shavie*—Well awat, man, it was naething till brag o', an' fat's mair, I lost my beets at it; ye'll be gaun till gie's a new pair neist fishin'?

*Shavie senior*—Ay, that was whan he *k*-nockit his *k*-nee again the boat-shore and brak his cweet.

*Curer*—Well, but, lads, what about next fishing?

*Shavie senior*—Ou, is't neist fishin' ye're wantin' till speak o'?

*Curer*—Yes; will you engage?

*Shavie junior*—Fat are ye gaun till offer?

*Curer*—Same as last.

*Bowed Shavie*—Fat d'ye say, man?

*Curer*—Fourteen shillings a cran and fifteen pound bounty.

*Shavie senior*—Na na, Maister Cowie; that winna dee ava, man.

*Bowed Shavie*—We can get mair nor that at Fitehills.

*Shavie junior*—I'll be fuppit, lathie, if I dinna hae mair siller an' mair boonty tee.

*Curer*—Well, make me an offer.

*Shavie senior*—Ou ay, man; we'll tak' saxteen shillin' the cran an' a boonty o' twunty pound, an' a pickle cutch, an a drappie whisky; an' that's ower little siller.

*Curer*—Well, I suppose I must give it.

*Bowed Shavie*—Gie's oor five shillin' then, an we're fixed wi' you, an' clear o' a' ither body.

And so, on the payment of these five shillings by way of arles, the bargain is settled, and the men engaged for the next herring-season.

The British fisher-people as a class are very sober and industrious, and they are becoming more intelligent, and, it is to be presumed, less superstitious. The children in the fishing villages are being educated; and in time, when they grow to man's and woman's estate, they will no doubt influence the fisheries for the better. Many of the seniors are now teetotal, and while at the herring-fishery prefer tea to whisky. The homes of some of the fisher-folks, on the Berwickshire and Northumberland coasts, are clean and tidy, and the proprietors seem to be in possession of a great abundance of good cheer.

It is, no doubt, considered by some to be an easy way to wealth to prosecute the herring or white fisheries, and secure a harvest grown on a farm where there is no rent payable, the seed of which is sown in bountiful plenty by nature, which requires no manure to force it to maturity, and no wages for its cultivation. But it is not all gold that glitters. There are risks of life and property connected with the fishery which are unknown to the industries that are followed on the land. There are times, as I have just been endeavouring to show, when there is weeping and wailing along the shore. The days are not always suffused in sunshine, nor is the sea always calm. The boats go out in the peaceful afternoon, and the sun, gilding their brown sails, may sink in golden beauty in its western home of rosy-hued clouds; but anon the wind will freshen, and the storm rise apace. The black speck on the distant horizon, unheeded at first, soon grows into a series of fast-flying clouds; and the wind, which a little ago was but a mere capful, soon begins to rage and roar, the waves are tossed into a wilder and wilder velocity, and in a few

hours a great storm is agitating the bosom of the wondrous deep. The fishermen become alarmed ; hasty preparations are made to return, nets are hauled on board, sails are set and dashed about by the pitiless winds, forcing the boats to seek the nearest haven. Soon the hurricane bursts in relentless fury ; the fleet of fishing-boats toss wildly on the maddening waves ; gloomy clouds spread like a pall over the scene ; while on the coast the waters break with ravening fury, and many a strong-built boat is dashed to atoms on the iron rocks in the sight of those who are powerless to aid, and many a gallant soul spent in death, within a span of the firm-set earth. Morning, so eagerly prayed for by the disconsolate ones, who have all the long and miserable night been watching from the land, at length slowly dawns, and reveals a shore covered with fragments of wood and clothes, which too surely indicate the disasters of the night. The *débris* of boats and nets lie scattered on the rocks and boulders, dumb talebearers that bring sorrow and chill penury to many a household. Anxious children and gaunt women—

“ Wives and mithers maist despairin’ ”—

with questioning eyes, rush wildly about the shore, piercing with their frightened looks the hidden secrets of the subsiding waters ; and here and there a manly form, grim and stark and cold, cold in the icy embrace of death, his pale brow bound with wreaths of matted seaweed, gives silent token of the majesty of the storm.

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