A. Agassiz

FIFTH

ANNUAL REPORT

OF THE

FISHERY BOARD FOR SCOTLAND

Being for the Year 1886.

Presented to both Houses of Parliament in pursuance of
Act 45 and 46 Vict., cap. 78.

EDINBURGH:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE.
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TO THE MOST HONOURABLE

THE MARQUIS OF LOTHIAN, K.T.,

Her Majesty's Secretary for Scotland.

FISHERY BOARD FOR SCOTLAND,
EDINBURGH, *2nd May* 1887.

MY LORD MARQUIS,

We, the Members of the Fishery Board for Scotland, appointed under the Fishery Board (Scotland) Act, 1882, have the honour to submit our Fifth Annual Report, in terms of the fifth section of that Act, and of the fifth section of the Secretary for Scotland Act, 1885.

THE SEA AND SALMON FISHERIES OF SCOTLAND.

Fisheries very productive.

Great and increasing yield of Herring Fishery.

Statistics showing this.

The Fisheries of Scotland continue to be very productive. Nothing, however, is more striking in connection with them than the great and increasing yield of the herring fishery. Previous to the constitution of the present Board, no account was kept of the takes of herrings which were captured and consumed *fresh;* and it is therefore not possible to form anything like a correct estimate of the quantity which, year by year, has been landed and thus used. Statistics, however, have been annually collected, beginning with 1809, up to the present time, of the quantity which has been caught and *cured;* and the returns show that, with yearly fluctuations, it has gone on increasing in an extraordinary degree. In the year 1809, the quantity of herrings cured was 90,185½ barrels; in 1829, or twenty years thereafter, it had increased to 355,979½; in 1849, or in other twenty years, it was 644,368¼; while last year, it had still further increased to 1,312,223¼ barrels, the value of which was £1,377,834, 8s. 3d.

Proved great boon to Community.

Notwithstanding, however, such a large progressive increase in the produce of this fishery, and which, from the low prices at which herrings have been sold, has proved a great boon to the com-

Fish-curers recently sustained great losses.

Causes thereof.

munity, especially to the poorer classes, it is deeply to be regretted that the curers recently sustained very great losses. For some years previous to 1884, the herring-curing business had been in a prosperous state, and in that year, in accordance with previous usage, arrangements were entered into, before the season opened, under which the herrings landed were to be bought by the curers from the fishermen at certain fixed rates, which, with bounty money in addition, made the prices very high. The fishing of that year was the most abundant ever known; the price of herrings fell to a very low point, and the curers sustained great losses. For the fishing of 1885, arrangements were entered into on somewhat similar terms to those made in the previous year, with the exception that the bounty money to be paid was smaller. The fishing of that year was also a very large one; the market got glutted with cured herrings; the price continued extremely low; and the fish-curers again suffered very severely. Considerable losses have been incurred in many previous years by those persons engaged in this trade; but no two years ever came together before which proved so disastrous to them as 1884 and 1885.

Arrangements as to when Fishing in 1886 should begin, and regarding sale of Herrings.

Arrangements not adhered to.

With regard to last year, a very strong desire was expressed on the part of fish-curers, long before the summer herring fishing commenced, that it should not begin on the East Coast before the 20th of July, and a general understanding was entered into among them to this effect; and also that the prices of the fish to be captured should not be fixed beforehand, as had hitherto been the practice, but that the takes should be bought, day by day, as they were landed. These arrangements seemed to find favour for some time, but they were not adhered to. On the contrary, the fishing was begun at the usual period, the middle of July, and before the 20th of that month the great bulk of the boats had been engaged to fish during the whole season, on fixed terms, as formerly. The other boats, which had made no engagement, sold their takes as they were landed.

Owing to low prices of Herrings, Fishing less extensively prosecuted.

1000 fewer Boats employed, and smaller quantity of Herrings landed.

Results to Fish-curers.

In consequence of the low prices of cured herrings which had prevailed during the preceding two years, the fishing of 1886 was prosecuted to a more limited extent than would otherwise have been the case. In numerous instances, owners of boats arranged to form crews among themselves, and man one of their boats, leaving the others unlaunched, rather than hire strangers and man them all. At nearly every station along the coasts, a number of boats were left on the beach. At Buckie, for instance, there were 174, and at Banff, 40; and, altogether, the boats employed last year were about 1000 fewer than in 1885. In these circumstances, the quantity of herrings landed was, as might have been expected, considerably less than in either of the two preceding years; and as the fish-curers made their purchases at lower rates than in these years, it is hoped that the business of the season was fairly remunerative to them.

In 1885, Herrings returned to In-shore Grounds where large portion of Fishing was got.

A striking feature of the summer herring fishery of 1885, was that many in-shore grounds, where herrings had been found in great abundance in previous years, but which had recently been all but deserted, were restored to their former fertility. These grounds principally lay from one to eight miles from land in the districts of Eyemouth, Peterhead, Banff, Buckie, Findhorn, Cromarty, Helmsdale, Lybster, Wick, and Orkney; and it was in them where a large portion of that season's fishing was got. The return of herrings to the in-shore grounds was even more marked in the season of 1886, as all along the East Coast, from Montrose to the Pentland Firth, there seemed to be one immense unbroken shoal of herrings, lying from one to ten miles off land. At no former period in the history of this fishery were the catches so heavy. During the month of August individual takes, ranging from 100 to 120 crans and upwards, were very frequently landed. On the 4th of that month the total catch was very great, amounting in the twelve districts embraced in the last named area to 50,422 crans; while in the week ending 7th August, 162,731 crans were landed. The gross catch over all the East Coast during August amounted to 472,470 crans. Before the end of that month fears were entertained that, if the industry was further prosecuted with any degree of energy, too many fish would be brought to market, and there would be a great fall in prices, as had been the case in the two preceding years; and on this ground, although there were still plenty of herrings upon the coast, the fishing was practically closed at most of the stations.

This more marked in 1886.

Very heavy Fishing in August.

Owing to a fear of fall in prices, Fishing closed before Herrings left Coast.

Seven fishing boats, propelled by steam, were employed at Aberdeen last season. Owing, however, to the herring shoals having been found upon the in-shore grounds, steam power was comparatively not so advantageous, as if the fishing had been prosecuted far out at sea.

Steam Fishing Boats used.

Speaking generally, the herrings landed last year were of superior quality. The takes had a larger proportion of full and spent herrings than those caught in the two preceding years, and they contained only about half the quantity of maties.

Quality of Herrings.

The winter herring fishery on the East Coast was the most productive ever known, and yielded a total catch of 128,441 crans. In January, great shoals of herrings were found all along the East Coast from the Firth of Forth to Wick, lying from one to five miles off land. Formerly herrings taken in winter were made into kippers or bloaters, or consumed fresh or in a lightly salted state. Owing, however, to the great quantity landed last winter, there was difficulty in getting them disposed of in this way at anything like fair prices; and curers, in the hope of turning them to more profitable account, cured a considerable portion for exportation to the Continent.

Winter Herring Fishery on East Coast most productive ever known.

How Herrings were disposed of.

With regard to the quantity of herrings branded, it is of importance to state that, although the total quantity of herrings cured and exported in 1886 was less than in 1885, the proportion of barrels branded to the number cured greatly exceeded the average of recent years. The number branded was 518,994½. The fee charged is 4d. a barrel, and the amount received by the Board for this service last year was £8649, 18s. 2d. As the taking of the brand is entirely optional on the part of curers, the large continued demand for branded herrings is gratifying to the Board, as showing the estimation in which the standard of cure required is held.

Quantity of Herrings Branded.

Amount of Brand Fees received.

The total quantity of cured herrings exported last year was

Cured Herrings exported.

938,369½ barrels, of which 908,896½ barrels were sent to Germany and other places on the Continent; 27,538½ to Ireland; and 1934½ to places out of Europe.

Quantity of White Fish sold for consumption *fresh.*

The total quantity of white fish landed and sold for consumption *fresh*, amounted to 1,714,453 cwts., as compared with 1,725,459 cwts. in 1885, being a decrease of 11,006 cwts., but an increase against 1884 of 220,411 cwts. The fish which exhibited the largest decrease were the herring, cod, ling, whiting, turbot, and skate; and those which showed the greatest increase were the haddock and saithe—the former to the extent of 148,852 cwts., and the latter 17,372 cwts. The total value of white fish landed and sold for use fresh was £685,973. Of shell fish landed, the total value was £73,287. Thus the aggregate value of both white fish and shell fish amounted to £759,260. The prices, however, last year, were believed to have been much lower than for a great many years past.

Total value thereof, and of Shell Fish.

State of Weather.

Seventy persons Drowned.

During 1886, the weather generally was more suitable for fishing than in the average of recent years. Notwithstanding this, however, it has unhappily to be recorded that seventy persons, connected with the Scottish fisheries, were drowned at sea. This number is fifty-six less than in the previous year, which, without doubt, was greatly owing to the fact that the weather was better and that the grounds fished lay nearer land. Forty boats were totally wrecked and 132 sustained damage, the aggregate loss being estimated at £12,650. In addition, there was a loss of nets and other fishing material, the value of which was about £51,200.

Boats wrecked and damaged, and loss of Fishing Gear.

Salmon sent to London.

During the season of 1886, 23,407 boxes of salmon were sent to Billingsgate market. The total number of boxes sent to London since the constitution of this Board has been as follows, viz.:—

Boxes of Scotch Salmon sent to Billingsgate; average of 4 years.

Years.	Boxes of Scotch Salmon.
1883	35,506
1884	27,219
1885	30,362
1886	23,407
Total in 4 years,	116,494

This gives the large average for these four years of 29,127 boxes of Scotch salmon sent to London alone; and, if to this is added a fair allowance for the number of fish consumed in Scotland, and sent from thence elsewhere than to London, the total average production of salmon in Scotland for these four years may be estimated at 40,000 boxes. In Note VI. to Appendix G. there will be found a table of the boxes of salmon sent to London from Scotland, for each year from 1834 to 1886, both inclusive.

Average production of Salmon in Scotland in last four years.

In a subsequent part of the Report it will be seen that the value of the cured herrings last year was £1,377,834, 8s. 3d., and of the herrings which were sold fresh, £83,417, making together £1,461,251, 8s. 3d.; that the value of cod and ling cured was £132,800; of other white fish sold fresh, £602,556; of shell fish, £73,287; and of salmon, £280,884—the gross total value of the sea and salmon fisheries of Scotland for the year 1886 thus being £2,550,778, 8s. 3d.

Value of Sea and Salmon Fisheries.

It will be further seen by this Report that the number of persons employed in connection with the deep-sea fisheries last year was 97,612; that the number of boats and vessels engaged was 15,344; and that the estimated amount of capital invested in boats and vessels, nets, and lines, was £1,794,957.

Persons employed.

Boats and Capital invested.

BYE-LAW FOR CLOSING CERTAIN TERRITORIAL WATERS AGAINST BEAM TRAWLING.

The Bye-Law which came into force on 5th April 1886, regarding which full information was given in the Board's last Report, prohibiting beam trawling in the Firth of Forth, St Andrews Bay, the Firth of Tay, and Aberdeen Bay, has been in full operation since that time.

Bye-Law in full operation.

After it was passed, its provisions were publicly made known, and all persons warned of the penalties to which they were liable if they infringed them. This was done by advertisements in the newspapers, by placards posted up at the different districts along the coasts of the prescribed waters, and by the fishery officers. The closed area was protected in the first instance by the Board's cruiser 'Vigilant,' under Captain M'Donald; and on her services being temporarily required for fishery superintendence at another part of the coast, her place was filled during her absence by H.M. cutter 'Active,' granted for the purpose by the Admiral Superintendent of Naval Reserves. The 'Active' was under the command of Mr William Sherlock.

Its Provisions made publicly known, and enclosed waters protected.

In the meantime a number of complaints were made that the Bye-Law was being infringed. Into each of these complaints the Board made full inquiry, and on its being ascertained that several trawlers had been fishing in the closed waters on the Aberdeenshire and Forfarshire coasts, legal proceedings were taken against the masters in the Sheriff Court of Aberdeen, and the result was that they were all convicted and fined. In consequence, however, of further complaints being made that the Bye-Law was disregarded, it was arranged that, as the 'Vigilant' is a sailing vessel, and unable to follow up any steam trawlers who might be seen illegally fishing in the prescribed area, H.M. steam ship 'Jackal' be transferred from the West Coast to the East Coast, and that the 'Vigilant' take her place on the West Coast. It is hoped that this arrangement will have the desired effect.

Infringement of Bye-Law by Beam Trawlers, and Masters prosecuted and fined.

In connection with this matter, it may be here mentioned that the steam tender 'Garland,' which, as stated in last year's report, had been purchased by the Board to make systematic examination of the enclosed waters, with the view of ascertaining whether beam trawling is an injurious mode of fishing, was fitted up with the necessary appliances for this purpose, and that she has been engaged in carrying on the work contemplated. Particulars regarding this

'Garland' engaged in making examination of enclosed waters work will be found in another part of the Report under ' Scientific ' Investigations ' (page lxxiii.).

HARBOURS.

Harbours constructed or improved since constitution of Board.

As stated in last year's Report, the Board, since their constitution in October 1882, have given assistance towards the construction or improvement of the following harbours, viz., Rosehearty, Aberdeenshire; Findochty, Banffshire; Ness, Island of Lewis; Crovie, Banffshire; and St Monance, Fifeshire.

Total expenditure.

Of these harbour works, Rosehearty and Findochty were undertaken by the old Board, the former having been begun in 1881, and the latter in 1882. This Board have expended £18,713, 5s. on the above five works; and if to this amount is added the sum of £3573, 15s. 1d., paid by the old Board on the harbours of Rosehearty and Findochty, it will be seen that the total expenditure on the harbours which this Board have assisted in constructing or improving has amounted to £22,287, 0s. 1d., towards which £5800 was contributed on behalf of the different localities.

Board arranged to give assistance in construction of a Harbour at Portknockie.

We have recently arranged to give assistance in the construction of a harbour at Portknockie. Portknockie is a natural creek a little to the west of Scarnose Point—the most projecting point on the coast of Banffshire—within about three miles of the town of Cullen on the east, and about six miles of Buckie on the west. There is a population of 1250, and there are 118 boats. The fishermen are a hardy, reliant, adventurous, and deserving class; and considering the number of families who have gone to other points along the coast, Portknockie may be said to have been the mother of several other fishing communities in the neighbourhood.

Reasons for doing this.

By the gale of the 31st March last, the most severe which has been experienced for a long time, and which caused much destruction to the fishing craft in the Moray Firth, including the loss of twelve lives—eight belonging to Buckie, three to Findochty, and one to Cullen—attention has again been drawn to the great necessity of providing a convenient refuge to which fishermen, when caught in a storm, may run for shelter in all states of the tide.

Plan of Harbour, estimated cost, and how money is to be paid.

Of the numerous proposals which have come before the Board, the creek of Portknockie appears to us to offer most facilities for the construction of what would serve the double purpose of a harbour for the local fishermen as well as a harbour of refuge, and this at a comparatively small expense. By running a breakwater to connect a series of outlying rocks on the east side of the creek, as shown on a plan prepared by Messrs D. & T. Stevenson (9th February 1886), a large area would be enclosed with a depth of 12 feet and under at low water. The estimated cost of this work is about £10,000. The promoters offered to provide £3500, and the Board undertook to pay the balance which may be necessary. They have accordingly accepted a contract for the execution of the work. The amount is considerably below the estimated cost, £7234, exclusive of engineer's fees, &c., and the Board may be able to carry out a more complete scheme than was originally intended. It only falls to be added that Portknockie is now connected by railway with all the southern markets.

Board favourably disposed to aid Harbour Works at Broadford and Balintore.

We are also favourably disposed to assist in the construction of a pier at Broadford, in Skye, the centre of a large population; and we have come to a clear opinion as to the claims of Balintore, in Ross-shire, for harbour accommodation there. At present we are in communication with persons who are promoting the erection of works at these places, and we trust that, in the course of the present season, arrangements will be made for their being carried out.

Stonehaven Harbour; greatly in need of improved accommodation.

Exceeding all other applications in importance is Stonehaven. The present harbour accommodation consists of an outer harbour measuring 2½ acres, and an inner harbour measuring 2¼ acres. These harbours are quite dry at low water of spring tides, and only the inner one is considered safe in bad weather. With the exception of a small pier inside the harbour, no works of any kind have been undertaken at Stonehaven since those carried out according to the design of the late Mr Robert Stevenson in 1812. It is somewhat surprising that, for so long a period as seventy-five years, the undoubtedly great capabilities of this bay for harbour extension should not have been taken advantage of, and turned to account for the encouragement of the fisheries and the general trade. Situated immediately opposite the centre of very rich fishing grounds, it has a large fishing population; while at the same time, as it lies on an exposed and rock-bound coast, and is perhaps the most sheltered spot of any place between Cromarty and the Firth of Forth, it could easily be made into an excellent harbour of refuge. It is also to be observed that, owing to the dangerous character of the neighbouring creeks, and the enlargement of fishing boats, many fishermen have been obliged to remove to Stonehaven with their boats, with the result that the accommodation there is insufficient for the increasing fishing population, and the progress of the industry is in consequence greatly retarded.

Position of matters.

Two designs submitted by Engineers.

Some years ago a marine survey, with relative soundings and probe borings, in order to ascertain the nature of the bottom of the bay, was made by Messrs D. & T. Stevenson, engineers, and two designs, with relative report, were submitted by them for the improvement and extension of the harbour—the one estimated to cost £24,000, and the other about £67,000; but they very strongly advised that, if it were possible to raise the necessary funds, it would in every way be preferable to adopt the larger scheme.

Extremely desirable that larger design should be carried out, but cost beyond resources of Board.

While the construction of some such design as this lesser scheme would tend in no small degree towards developing the fisheries, still, if carried out, it would not afford facilities for fishing boats entering the harbour at low water, and it is, therefore, not unreasonable to suppose that, after a time, it might be found necessary to build additional works, so that boats could get into the harbour at all states of the tide, and thus the money expended on the smaller scheme would practically be thrown away. Altogether, therefore, it is extremely desirable that some such plan as that shown in the larger design should be carried out, but to face so large an outlay is wholly beyond the existing resources of the Board, even with considerable local assistance.

Other Harbours for which Application for Aid has been made.

A list is given below of other harbours for which application has been made to the Board for aid in their construction or improvement, but as to which we have as yet come to no conclusion, except as regards Fraserburgh. The merits of this harbour are beyond question, but it does not appear to us that, looking at the small amount of funds at the disposal of the Board, they should be drawn upon merely to complete so large an undertaking which is already nearly finished.

Ness Harbour.

Harbours at Bayable, Portnaguran, and Gress.

As formerly reported, the Board recently built a harbour at Ness in Lewis, at a cost of about £6000, of which the trustees of the late Sir James Matheson generously contributed £1500. Applications have been made for the construction of other harbours in that Island. It is desired that one should be built at Bayable, Portnaguran, and Gress; or, if this cannot be done, then at one of these places. The erection of three harbours would cost a very large sum of money. The expense of one at Portnaguran, for instance, which, in all the circumstances of the case, we think is the best site if only one harbour is to be provided, into which boats could enter at all states of the tide, has been roughly estimated at from £20,000 to £28,000; but the Board are quite unable to provide this money, even with a large contribution from the locality.

List of Harbours above referred to:—

List of Harbours above referred to.

1. Auchmithie, Forfarshire.
2. Avoch, Ross-shire.
3. Ballantrae, Ayrshire.
4. Banff, Banffshire.
5. Burnmouth, Berwickshire.
6. Cairnbulg, Aberdeenshire.
7. Coldingham, Berwickshire.

8 Cowie, Kincardineshire.

9. Dunbeath, Caithness-shire.
10. Eyemouth, Berwickshire.
11. Fair Isle, Shetland.
12. Foula Island, Shetland.
13. Fraserburgh, Aberdeenshire.
14. Girvan, Ayrshire.
15. Golspie, Sutherlandshire.
16. Inverallochy, Aberdeenshire.
17. Keiss, Caithness-shire.
18. Kinlochbervie, Sutherlandshire.
19. Lochbuy, Island of Mull.
20. Port Errol, Aberdeenshire.

21 Port Hopeman, Elginshire.

22. Portmahomack, Ross-shire.
23. St Andrews, Fifeshire.
24. St Colmbs, Aberdeenshire.
25. Scoraig, Ross-shire.
26. Stonehaven, Kincardineshire.
27. Stroma Island, Pentland Firth.
28. Tyree.
29. Waternish, Island of Skye.

No progress made for constituting, by Provisional Orders, Local Authorities to manage Harbours.

Proposed general Measure to enable Fishermen to organise a Local Authority for this purpose.

No further progress has been made with the question, adverted to in our Fourth Annual Report (p. lxxiv), of constituting, by means of Provisional Orders, local authorities for the management of harbours which have been built to a greater or less extent with money granted by this Board from the public funds. The recent decision of the Lords of Her Majesty's Treasury to assist in the formation of fishing harbours by loans at 3¼ per cent. for the term of 50 years, wherever the security was fairly sufficient, gives a new importance to this subject; and we have come to the conclusion, that a general measure, not very extensive in its scope and purely permissive in its character, ought to be passed for the purpose of enabling fishermen from amongst themselves to organise, under the name of District Fishery Boards, a local authority, which should be empowered to manage harbours and levy dues to be expended in their repair and maintenance.

Provisions which such a Measure might contain.

It has been suggested that such a measure might contain provisions to the following effect:—

(1) It shall be the duty of the Fishery Board officer, on receiving a requisition signed by ten persons resident in his district, to convene a public meeting to consider as to the adoption of the Act.

(2) The Fishery officer shall preside at the said meeting, and, in the event of its being resolved by a majority of those present to adopt the Act, he shall forthwith communicate the resolution to the Fishery Board.

(3) The Fishery Board shall thereupon define the limits of the district, make up a list of fishermen entitled to vote, fix the number of the District Board, and the manner in which they are to be elected, and arrange for taking a poll on the question whether the Act shall be adopted.

(4) In the event of its being settled to adopt the Act, the District Board shall be elected in the manner appointed by the Fishery Board. They shall be elected for the space of two years, and shall be eligible for re-election.

(5) The District Boards so appointed shall have vested in them all the harbours in the district, provided any persons having interests therein shall be willing to concede the same. They shall have the entire management thereof, and sue or be sued in name of their clerk.

(6) With the consent of the Fishery Board, the District Board may fix the dues leviable on the fish or other cargoes landed at the harbour, and on the boats using the same; and they shall be entitled to recover these dues in a summary form in the name of their clerk. The proceeds to be applied to the maintenance, repair, and improvement of the harbour.

(7) The District Board may contract for the purchase of land, not exceeding one acre, within their district, and may enter into contracts for the building, improvement, maintenance, or repair of harbours, and may borrow at interest for this purpose, on the security of the dues leviable as aforesaid, such sum or sums as the Fishery Board may from time to time think requisite, but they shall not sell, mortgage, or alienate the said harbour or its dues without the consent of the Board.

Lastly, if the village is already constituted, or is in a position to get itself constituted into a police burgh, the local authority might be empowered to adopt the Act, and in that event monies borrowed for harbour purposes might be secured by the police rates as well as the harbour dues.

It is obvious that such a measure would be a great boon to fishermen. Already in several instances, through the instrumentality of local committees and with the help of a voluntary assessment, supplemented with the assistance of well-wishers in the neighbourhood, considerable sums have been raised, and even harbours have been built and finished by the almost unaided efforts of the fishermen themselves. The harbour of Portknockie in

Harbour at Portnockie good example of what may be done by self-reliant and well-directed effort.

Banffshire, which, as already stated, we are about to take in hand, is a good example of what may be accomplished by self-reliant, well-directed effort. The movement began some four or five years ago with the holding of a bazaar at Cullen, the proceeds of which realised well on to £500. The fishermen voluntarily assessed themselves at the rate of £1 per Lewis boat, £1 per summer boat, and 6d. per £1 on all other fishings. The sums thus raised, as they accumulated, were lodged in the hands of Lady Seafield, who allowed 4 per cent. interest half-yearly. These sums at the present date, with interest accrued, amount to nearly £1800.

The late Lord Seafield, with the view of stimulating the efforts of the fishermen, promised that, when they had raised £3000, he would add to it another £1000. Lady Seafield generously agreed to carry out the excellent purpose of her lamented son by at once contributing the amount which he promised, and this, with another handsome contribution of £100, makes a total of £2900.

It is understood that the balance of the sum required by the Board to be found in the locality has been obtained from the North of Scotland Bank on a cash account bond, which is in process of being signed by the representative fishermen of the village and others. The case may be taken as a typical example of what our fishermen are ready to accomplish for themselves, and the public benefit which would result from such efforts in a more organised form.

St. Monance Harbour another instance of a like character.

The case of St Monance harbour is another instance which may be referred to.

The harbour is the property of the Town Council as representing the community, but there is no municipal or harbour revenue available to extend or repair it. About twenty-three years ago the harbour had become so dilapidated and unsafe, that the fishermen were compelled to make an effort to obtain larger and safer accommodation. Applications for aid were made in various directions, but unsuccessfully, and the fishermen then unanimously agreed to undertake the duty themselves. In public meeting they elected a Harbour Improvement Committee out of their own number, and unanimously agreed to subject themselves to a weekly voluntary tax of sixpence per man, as a first charge on their earnings. The nucleus of a fund was thus created. Messrs D. & T. Stevenson, C.E., were instructed to prepare plans for a new harbour, and the National Bank of Scotland, on the personal bond of each skipper and fisherman in St Monance, and on the further security of the common good of the burgh, advanced sufficient funds, and the harbour was built. In 1879 the whole of the borrowed money, along with all interest on the loan, was finally paid off, the total amount being £8577. At that date the boats had again increased so greatly in size and number that additional space and protection became indispensable. Application was again made to the bank for a new loan, and an addition to the harbour with an area of about two acres was built. Towards the liquidation of principal and interest on this new loan a large sum has already been paid. During the past twenty-three years the fishermen, unaided, have collected and paid £10,450 for the harbour, and they are at present due to the bank a balance of £7500, making in all £17,950 provided by them, or for which they are responsible. In 1884–5 some further improvements were made on the harbour of St Monance, at an expense of about £2000—of which £500 was raised in the locality, and the balance defrayed by this Board.

Benefits which would be derived from proposed Measure.

The proposed measure would enable fishermen, resident in the locality, to dispense with the voluntary committee by creating from amongst themselves a body possessing corporate privileges, which could act under the advice of this Board as the central Authority. The harbour being no longer dependent on a purely voluntary assessment, the revenue, for a term of years, could be calculated with reasonable certainty, and on the security thereof it would be possible to borrow. Thus the locality would be enabled to provide itself with suitable harbour accommodation, without being in any way dependent on public grants, which necessarily inadequate at all times, sometimes retard rather than promote public effort by giving rise to hopes, often in the end disappointed, and which, moreover, as a gratuitous application of public money, are, on sound principles of public finance, not altogether free from doubt. It is evident also that the system proposed is capable of being made to embrace other matters in which fishermen have a special interest.

TELEGRAPHIC EXTENSION TO REMOTE FISHERY DISTRICTS.

Benefits of Telegraphic Extensions.

We are again able to report most favourably of the benefits conferred upon the sea fisheries by the extension of telegraphic communication to the remote districts of Castle Bay, in the Island of Barra ; St Mary's, Burra, and St. Margaret's Hope, in Orkney ; and Reawick and Vaila Sound (Walls) in Shetland, referred to in the Board's last Report, which are each year becoming more apparent.

Extension to Barra of great advantage to Fishing Community and to inhabitants generally.

The extension to Barra has not only been of great advantage to the fishing community, but also to the inhabitants generally. That island has been the seat of a most prosperous herring fishery for many years, and the herrings landed there have long been justly celebrated for their high quality both in this country and on the Continent. Previous to the establishment of telegraphic communication, curers and fishermen, owing to the remote situation of the island, and to the want of suitable postal arrangements, laboured under great disadvantages in prosecuting their trade, especially with foreign countries. Now, however, these drawbacks have to a large extent been overcome. The greater part of the herrings cured at the different stations are shipped direct for the Russian and German markets. The annual export to these places usually amounts to about 30,000 barrels, and it is of primary importance to the consigners that they should get early information as to the state of the different foreign markets, both with regard to the current prices and the stocks of herrings on hand, so that they may be able to judge as to what ports they can most advantageously send their consignments. This knowledge they have now the means of at once obtaining. Further, when the fishing turns out more productive than was anticipated, the curers can bring to the spot

Particulars thereof.

extra supplies of barrels and salt, and the other necessary materials for carrying on their trade, in a much shorter time than before; and they can also more quickly charter additional vessels, when such are required, and get their goods insured. As showing the extent to which the telegraph has been used, it may be stated that, during the year 1884, when the wire was first extended to Barra, 10,000 messages were transmitted to and from that island and South Uist; that in 1885 the number increased to 15,000; and in 1886, when the reduction of the tariff took place, as many as 21,000 messages were sent. Altogether, the extension of the wire to this remote district has tended in no small degree to promote the prosperity of the fishing industry there.

Extent to which Telegraph is used.

Telegraph to Orkney and Shetland a great boon to Fishermen.

At the stations in the Orkney and Shetland Islands, where the telegraph system was also established with the assistance of the Board, the extension continues to be a great boon to the fishermen, especially during the season when the herring fishing is being carried on, by enabling them to get early information as to the places where shoals of fish appear, so that they can remove from one island to another and more successfully prosecute the industry. As an illustration of this, it may be mentioned that in Orkney district last year, the Board's officer at Saint Margaret's Hope received information by telegram from his correspondent at Stronsay, that a heavy fishing was going on in the in-shore grounds off that island, and that the fishermen at once proceeded there, when fully 500 crans of herrings were captured, which would not otherwise have been got. Again in Shetland district, about the beginning of July, information was telegraphed to Walls that an excellent fishing was being prosecuted at Scalloway and neighbouring stations. The boats went to these places, and landed several hundred crans of herrings in one night, while on the Walls grounds where they had been not a single fish was found. The telegraph both in Orkney and Shetland has in addition been productive of like benefits to the fishing industry in those places as have been stated in connection with the island of Barra, and the number of messages is yearly increasing, nearly all of which relate to the fishing industry.

Illustrations thereof.

Further, it may mentioned, with regard to the distribution of fish over the country for consumption fresh, that it is of great importance that those engaged in this trade should know, day by day, at what centres of the population suitable supplies are being delivered, and where supplies are required, so that they may be able to regulate their trade in a way which must be attended with greater benefit to themselves and also to the country, than when they have to send their fish to different markets without knowing whether they are wanted or not.

Extension of Telegraph to other remote Fishery Districts under consideration.

A strong desire has been expressed, with the view of still further aiding the fisheries, that the telegraphic system should be extended to other remote districts; and Mr A. J. Balfour, when Secretary for Scotland, opened communications with the Lords Commissioners of Her Majesty's Treasury on the subject. This led to a correspondence between their Lordships and the Postmaster-General, as to the terms and conditions on which the telegraph could be connected with certain places mentioned; and it has since been arranged that the sum of £1000, authorised to be applied each year out of the surplus brand fees towards telegraphic extension, should in future be increased to £1500. The Board have at present under consideration in what way this additional sum of £500 can be best used towards carrying out what is so greatly desired.

In Appendix E will be found an account of the sums paid by the Board to the Postmaster-General last year, under the guarantees formerly reported as having been given to him, for making the above-mentioned extensions.

LOANS TO FISHERMEN TO PURCHASE BOATS AND GEAR.

Treasury to advance money to Board for being lent to Fishermen to buy Boats and Gear.

By the 32nd section of the Crofters' Holdings (Scotland) Act, 1886, the Lords of the Treasury are empowered to advance to this Board such sums as may from time to time be placed at their disposal by Parliament, for the purpose of enabling them to make advances, by way of loan, to persons engaged in the prosecution of the fishing industry in crofting parishes abutting upon the sea in certain counties to which the Act applies. The purposes to which such loans may be applied are to include the building, purchase, or repair of vessels, boats, and gear for fishing purposes, and any other purpose of the like nature, for the benefit or encouragement of the fishing industry, which may be sanctioned by the Board, with consent of the Secretary for Scotland. The loans are to be made upon such terms as to repayment, security, rate and payment of interest and otherwise, as the Secretary for Scotland, with the consent of the Treasury, shall determine; and by the 5th section of the Public Works Loans Act, 1886, a grant of £20,000 was made to the Board for the above purposes. Thereafter the Sea Fishing Boats (Scotland) Act, 1886, was passed, in which further provision is made for the registration and mortgage of fishing boats, so that they may become a valid security for loans; and under the authority of this Act, an Order in Council was issued for carrying out its provisions. It is right to explain, however, that owing to the novelty and intricacy of the subject, and to the number of public departments which had to be consulted, considerable delay arose before the terms of this Order in Council could be adjusted. Rules were made by the Secretary for Scotland, with the consent of the Treasury, as to the terms on which the Board may make loans; and forms of proposals, with instructions for filling them up, were sent to those fishermen who applied for money; and we are about to deal with the applications which have been lodged up to this date. These applications amount in all to 188, and the total sum asked for is £22,617, 17s. 8d.

Secretary for Scotland, with consent of Treasury, to settle the terms on which Loans are to be made.

Rules made accordingly.

Applications received and sum asked for.

Parishes to which Act applies.

The parishes which have been defined by the Commissioners under the Crofters' Act to be crofting parishes are situated in the following counties, viz., Argyll, Inverness, Ross and Cromarty, Sutherland, Caithness, Orkney and Shetland.

The population living on the seaboard in these counties, and

Fishing population wretchedly poor, and measure framed in a highly benevolent spirit. The difficulty in dealing with matter, and intended action of Board.

more or less dependent on the sea for the means of subsistence, are wretchedly poor, and there is no doubt that the measure under which it is now proposed to help them with public money to get larger and better boats and proper fishing gear has been framed in a highly benevolent spirit. The difficulty is that the people are not in a position to offer any security for a loan of money which a banker would accept, and unless the advance to be made by this Board on behalf of the Government was to be regarded as purely charitable relief, it became necessary to place some restriction on the distribution. If the boat to be built or purchased by the borrower was to be the only available security (as in most cases we fear it will be), it was reasonable to ask that he and his friends should provide some part of the cost; accordingly, in the Rules which your Lordship's predecessor framed with consent of the Treasury, we are prohibited from lending more than three-fourths of the value of the boat when it is new, and a less proportion when the purpose is to buy gear or to buy or repair a boat already built.

It is evident, however, from the nature of the applications already lodged, that a general feeling prevails that the meaning of the Act was that the borrower was not expected to do anything for himself, and that the Government was to set him up in business at the public expense. We do not intend to give any encouragement to this idea, but shall try to stimulate thrift and industry by helping those only who help themselves.

HERRING FISHERY.

Herring Fishery

Herrings Cured in each of last seven years.

The Herring Fishery of 1886 was very productive. It, however, yielded less than either of the preceding two years or the year 1880. The following is a statement of the total quantity of herrings cured in each of the last seven years:—

Years.	Barrels cured.
1880,	1,473,600¼
1881,	1,111,155¼
1882,	1,282,973½
1883,	1,269,412½
1884,	1,697,077¼
1885,	1,572,952¼
1886,	1,312,223¼

Decrease in 1886 under 1885.

These returns show that the quantity of herrings cured in 1886 was 260,729 barrels less than in the former year, being a decrease of 16·5 per cent. That quantity is also under the average of the preceding six years by 6·3 per cent. On the East Coast the deficiency in 1886, against 1885, was 176,542¾ barrels, and on the West Coast 84,186¼ barrels, making the gross reduction stated above.

Results of 1885 and 1886 compared.

The particulars of the results of the fishing of last year, when compared with those of 1885, in the herrings cured, branded, and exported, and in the amount of brand fees received, are as follow:—

Years.	Barrels Cured.	Barrels Branded.	Barrels Exported.	Brand Fees.
1885, . . .	1,572,952¼	689,325	1,128,589½	£11,488 15 0
1886, . . .	1,312,223¼	518,994½	938,369½	8,649 18 2
Decrease in 1886, .	260,729	170,330½	190,220	£2,838 16 10

A comparison of the results of 1886 with the average of those of the preceding ten years, shows a large increase in all the items, viz.:—

Increase in 1886 over average of preceding ten years.

Years.	Barrels Cured.	Barrels Branded.	Barrels Exported.	Brand Fees.
Average of ten years, 1876–1885, .	1,160,065	490,963	792,358	£8,182 14 4
Year 1886, .	1,312,223¼	518,994½	938,369½	8,649 18 2
Increase in 1886, .	152,158¼	28,031½	146,011½	£467 3 10

WEATHER AND DISASTERS AT SEA.

Importance of suitable weather, especially as regards Summer Herring Fishery.

The quantity of sea fish landed on the coasts week by week throughout the year is, to a large extent, affected by the state of the weather; and, as regards the great summer herring fishery, it is of the utmost consequence that there should be suitable weather during the short season in which it is carried on. When great shoals of herrings are discovered, it not unfrequently happens that, if the boats can get regularly to and from the fishing grounds, a large part of the season's catch is landed in a few continuous days, before the shoals remove to other waters; while, of course, if the boats have now and again to remain in harbour, the result is different.

Weather favourable upon the whole.

The weather during last year was upon the whole favourable for prosecuting the fishing industry. During the great summer herring fishery, there were no severe gales on the East Coast, and nearly every night during the season a considerable number of boats were able to go to sea. High winds were occasionally experienced shortly after the fishing opened in July; but thereafter, until it closed, the weather was all that could be desired. Orkney and Shetland, however, were less fortunate in this respect, more particularly in Unst in Shetland. The boats there, on account of gales, were frequently obliged to remain in port, or, after they had gone to sea, return without shooting their nets.

Seventy persons Drowned.

The Board have to express much regret that, during last year, 70 persons connected with the fishing industries of Scotland were drowned at sea—45 on the East Coast, and 25 on the West Coast. In 1885, 126 persons met a like fate—82 on the East Coast, and 44 on the West Coast. The decrease last year was no doubt owing to the fine weather which prevailed during the summer and autumn months, and to the herring shoals having frequented the in-shore grounds along the coast. The loss in boats was also less than in the previous year. 40 boats, valued at £10,751, were totally wrecked, and 132 others sustained damage to the extent of £1899. The loss of nets and other fishing material, mainly caused by the great weight of fish which were frequently captured, amounted to the large sum of £38,551. The gross loss in boats and fishing material during the year was thus £51,201, being £7624 less than that in 1885.

Boats wrecked and damaged. Loss of Nets., and other Fishing Material.

Detailed particulars of these disasters will be found in Table V. Appendix D, to which reference is made; and it may be mentioned that this is the third year during which such information has been collected in Scotland.

EAST COAST HERRING FISHERY.

Seventeen East Coast Districts.

Following the course which has been adopted for the last few years, some details will now be given, taken from the reports of the inspectors and district officers, regarding the herring fishery of 1886, in each of the twenty-six districts into which the coasts of Scotland are divided for fishery purposes, beginning at the south with the seventeen on the East Coast. These are—Eyemouth, Leith, Anstruther, Montrose, Stonehaven, Aberdeen, Peterhead, Fraserburgh, Banff, Buckie, Findhorn, Cromarty, Helmsdale, Lybster, Wick, Orkney Isles, and Shetland Isles.

Eyemouth District.

Boundary of District.

From Amble, in the county of Northumberland, to the east side of St Abb's Head, both inclusive, with Coquet Island, Holy Island, and the Farne Islands.

District Fishery Office—Berwick-on-Tweed.

Fishing not begun with usual Enterprise.

In consequence of the severe depression which existed in the herring trade during the previous two years, the curers and fishermen in Eyemouth district did not enter upon the fishing in 1886 with their usual enterprise and spirit; nor, indeed, after it was begun, owing to the low prices of herrings which still prevailed, was it prosecuted with the same amount of industry which would otherwise have been the case. Notwithstanding this, however, a large quantity of herrings was landed at the ten stations in the district. The total quantity cured was 62,376 barrels, being nearly 29,000 in excess of that of 1885, and about 12,000 crans were sent fresh to inland towns for immediate consumption. 302 boats were employed, being 44 less than in the previous year. Their average catch was 212 crans per boat, and the total catch of each varied from 50 to 400 crans. A great many individual takes, ranging from 80 to 136 crans, were landed.

Large quantity of Herrings landed.

How disposed of.

Particulars of Fishing.

The week ending 21st August yielded the largest fishing, when upwards of 14,000 crans, or an average of nearly 50 crans to each boat, were caught. The early fishing commenced at Eyemouth in the beginning of June. It was very productive, and gave to each of 30 boats employed an average of 100 crans. The fishing was not general in the district until towards the end of July, being a week later than usual, and the industry closed on 21st September. In June and July, shoals of herrings were met with both on the inshore and distant fishing grounds, and along the entire coast of the district, extending from the Coquet Islands northwards to St Abb's Head; and in August and September herrings were abundant in the vicinity of the Farne Islands and southwards along the coast from two to ten miles from land. The average quality of the season's catch was inferior, having largely consisted of small and spent fish. Prices ranged from 2s. to 48s. per cran, the average being only 8s. 6d. During the season a number of takes, for which no purchaser could be found, were returned to the sea; about 300 crans were sold for manure; and 1500 crans of inferior maties were thrown amongst the offal as not worth curing. The season's fishing was productive of little or no profit either to the great majority of fishermen or curers. The weather was occasionally boisterous in June and July, but very fine in August and September. One fisherman from Holy Island was knocked overboard by the sail of the boat and was drowned. No fewer than 620 nets, valued at £1240, were lost or seriously injured by the great quantities of herrings which they meshed. Owing to the low price realised for the small-sized herrings captured during the preceding few years, the new nets used by the fishermen in this district are generally made with a wider mesh than the old ones. Only seven steam tugs were employed for towing boats to and from the fishing grounds, against thirty-three in 1885, as towage was seldom found necessary owing to the principal fishing grounds lying in close proximity to the land, and besides, the low prices of herrings discouraged the fishermen from hiring such vessels. In the previous year £3700 was paid for the use of the steam tugs then engaged.

Fishing Grounds.

Quality and prices of Herrings.

Takes returned to Sea or sold for Manure.

One Fisherman drowned.

Loss of Nets.

Nets with wider Mesh used.

Steam Tugs employed.

LEITH DISTRICT.

From the west side of St Abb's Head, inclusive, westwards, and including all the south side of the Firth of Forth; and its north side to Buckhaven exclusive.

Boundary of District.

District Fishery Office—Leith.

There is both a summer and a winter herring fishery in Leith district. The summer fishing of 1886 began in June, and was prosecuted till the middle of September. About 54 boats were at one time employed, but 35 was the average number. Besides these 54 boats fishing at home, there were 164 large first-class boats and 12 steam fishing boats belonging to the district prosecuting the herring fishing at other places on the East and West Coasts of Scotland, and on the Coasts of England and Ireland. The only stations in Leith district from which this fishing was carried on were Dunbar and Newhaven. The greater part of the catch

Summer Fishing and Boats employed.

Other Boats of District fished elsewhere.

Fishing Grounds and Particulars of Fishing.
Quality of Herrings and quantity landed.

was taken at a distance of from 20 to 30 miles at sea. The inshore fishing grounds were unproductive. The largest take was 101½ crans, and the best week of the season yielded 810 crans. The average catch per boat was 133 crans, as compared with 128 crans in 1885. The herrings were of poor quality, and contained a large proportion of small maties and spent fish. The total amount of the fishing was 4660 crans.

Winter Fishing.
Particulars thereof.
Disposal of Herrings.
Total Catch.
Six Fishermen drowned.

The winter herring fishing was prosecuted with indifferent success from October 1885 till March 1886, when it was brought to a close for the season. One hundred boats were employed. The herrings landed were chiefly caught between Inchkeith and Queensferry, and they were of a fair average quality. With the exception of a small proportion which was kippered, they were all sent to the home markets fresh. The total quantity captured was 3820 crans, as compared with 5505 in the previous year; and the aggregate catch of both the winter and summer fishings amounted to 8480 crans, against 10,635 crans in 1885. During 1886, six fishermen were drowned belonging to this district while prosecuting their calling.

ANSTRUTHER DISTRICT.

Boundary of District.

From Buckhaven to the south side of Tay, both inclusive.

District Fishery Office—Anstruther.

Summer Fishing, its duration and Boats employed.
Grounds fished and Crans landed.
500 District Boats fished elsewhere.

There is both a summer and a winter herring fishery in Anstruther district. The summer fishing was begun on 12th July and prosecuted till 4th September. The average number of boats employed was 31, and the total catch amounted to 6464 crans. This fishing in the Firth of Forth was, as in many preceding seasons, almost a blank. Herrings have deserted the Fluke Hole and Auld Haikes fishing grounds, which were occasionally so productive. A few crans were got in the beginning of the season at the entrance to the Firth; but the grounds principally fished lay from 20 to 60 miles outside of the May Island. The takes were of fairly good quality up to the first week in August; after that time they were mainly composed of spent and matie herrings. More than 500 first class boats belonging to the district fished at the principal stations from Shields in England to the Shetland Islands.

Winter Fishing successfully prosecuted by 220 Boats.
Particulars thereof.
Quality, Prices and disposal of Herrings.
Grounds Fished.

The winter herring fishing was very successful, and was prosecuted by 220 boats. The catch from 1st January till the end of March amounted to 25,300 crans, and during December 1436 crans were landed, making a total fishing for the winter season of 26,736 crans. This exceeded the average catch of the last ten winters by 12,099 crans. The most productive week was that which ended 6th February, when 9610 crans were landed. The quality was better than usual. In the former months mentioned the herrings realised an average price of 10s. 8½d. per cran, and in December 20s. 3d. A small part of the catch was bloated or kippered, and the remainder sent to market fresh or slightly salted. As had been the case in 1885, the cost of railway carriage to the markets exceeded the price paid to the fishermen for the herrings. The industry was as usual prosecuted all over the Firth of Forth, but principally near Fifeness and the Island of May.

MONTROSE DISTRICT.

From the north side of Tay to Bervie, both inclusive.

Boundary of District.

District Fishery Office—Montrose.

Summer Fishery and Boats engaged.
Duration of Season.
Fishing successful.
Particulars thereof.
Total Catch.
Fishing Grounds.
Average Catch per Boat.

Montrose district had 110 boats engaged in the summer herring fishery of 1886, as compared with 107 in 1885, of which 106 belonged to Scotland and 4 to England. Of these, 41 were stationed at Gourdon, 12 at Johnshaven, 42 at Montrose, 13 at Arbroath, and 2 at Broughty Ferry and Dundee. A few crews began to fish in the course of July, and at the end of that month the industry became general. The season closed on 4th September, and proved a successful one. The heaviest fishing was landed in the week ending 7th August, when the high average of about 95 crans per boat was got. During that week numerous takes, ranging from 75 to upwards of 100 crans, were caught. One boat, fishing from Gourdon, landed a take of 127 crans from a portion of its nets. The remainder of them, in which were got upwards of 40 crans, it handed over to another boat. In the four succeeding weeks the average takes were 33, 50½, 19½, and 6 crans per boat respectively. During the season, owing to the weight of herrings which they meshed, nets valued at £1800 were lost. The total catch was 23,918 crans, and the average per boat 217¼ crans, as compared with a total catch of 16,809 crans and an average of 148½ crans, in 1885. The highest aggregate catch of any one boat was 318 crans, and the lowest 40½ crans. The fish were generally caught on grounds lying from 5 to 33 miles from land, the best waters being between Arbroath and Montrose, and Gourdon and Stonehaven. The total averages per boat at the several curing stations were—Gourdon, 213¼ crans; Johnshaven, 208; Montrose, 216; Arbroath, 243; and Broughty Ferry and Dundee, 206½ crans. The herrings generally were of better quality than in 1885, especially the maties, which were much larger and stronger.

Winter Fishing successful.

The winter and spring herring fishing of the district was more than usually successful, and the herrings were of excellent quality. The total catch was 3533 crans, as compared with 265 crans in 1885.

STONEHAVEN DISTRICT.

From Bervie, exclusive, to Skateraw, inclusive.

Boundary of District.

District Fishery Office—Stonehaven.

Fleet of 82 Boats.
Duration of Summer Fishing.
Its Produce.
Particulars of Fishing.

Stonehaven district had a fleet of 82 boats employed in 1886—of which 72 belonged to Kincardine and Fife, and 10 to Cornwall—as compared with 91 boats in 1885. The summer herring fishing began on 12th July, and was continued until 4th September, when it was brought to a close in terms of a general concurrence of opinion between the fishermen and curers. The season produced 16,000 crans. During the first week the catch was light. Afterwards the weekly averages per boat were 13¼, 5¼, 70, 41¾, 33¾, 15¾, and 10¼ crans respectively. The average total catch per boat for the season was 195 crans, as compared with 181 in 1885. The highest aggregate catch of any one boat was 350 crans, and the lowest 50 crans. The best fishing of the season was made in the first week of August. On one of the days of that week the average take was 35 crans; while individual takes, ranging from 70 to 95½ crans, were quite general throughout the week. From the commencement of the season till the middle of August the herrings were of good rich quality, but afterwards the takes were largely mixed with spent and immature fish. The fishing grounds extended from 3 to 50 miles at sea, but the most fertile locality lay between 5 and 15 miles distant. The season consisted of forty-one nights. Of these five were stormy, when no boats left the harbours, while during the other thirty-six nights prolonged calms greatly interrupted the fishing. A large herring shoal, which was discovered far out at sea in June, afterwards, fortunately removed towards the coast, and the boats were thus enabled to reach it, which they could not otherwise have done.

Quality of Herrings.

Fishing Grounds.

Weather.

The winter, spring, and autumn fisheries yielded 3025 crans, all of which were sent to market fresh for immediate consumption. Prices varied from 5s. to 50s. per cran. The winter catch of 1885 produced only 200 crans. During the summer fishing nets to the value of £500 were lost by the great quantity of herrings which they captured; and in winter nets worth £250 were lost or destroyed by stormy weather.

Winter, Spring and Autumn Fisheries.

ABERDEEN DISTRICT.

From Skateraw, exclusive, to Aberdeen, inclusive.

Boundary of District.

District Fishery Office—Aberdeen.

Aberdeen district had a fleet of 350 boats in 1886, of which 296 were Scottish, 33 English, 20 Isle of Man, and 1 Irish, as compared with 301 Scottish, 74 English, and 3 Irish in 1885, being a gross decrease of 28 boats. The summer fishing opened early in July, and closed in the beginning of September, after a very successful season. The best fishing grounds lay from 8 to 25 miles off shore, and the herrings were generally landed in good condition. The most productive week was that which ended on 7th August. It yielded an average catch for the fleet of 55 crans per boat. The highest individual take was 140 crans. The most successful boat landed 525 crans during the season; the average catch per boat was 233⅔ crans. The average in 1885 was 158½ crans. The fleet included 7 steam fishing boats, but their takes were under the general average, while all the sailing boats were successful. The quality of the herrings until 6th August was fairly good, showing an improvement on the catch of 1885; but thereafter the takes were largely mixed with spent fish. The total quantity of herrings cured was 117,182 barrels, being an increase of 35,367 on the cure of 1885. The weather in July was unfavourable, and in that month five nights were lost on account of gales; but during the rest of the season fine weather prevailed. Two fishermen were unfortunately drowned. A considerable number of nets were lost from being overweighted with herrings.

Fleet of 350 Boats.

Summer Fishing very successful.

Particulars thereof.

Quantity of Herrings Cured.

Two Fishermen drowned.

The winter herring fishing was prosecuted from 1st January till February, during which time it yielded 1709 crans. It was resumed in December, and in that month the catch was 427 crans. With the

Winter Herring Fishery.

exception of a small quantity which was kippered, all the winter herrings were sent to the markets to be used fresh.

PETERHEAD DISTRICT.

From Aberdeen to Rattray Head, both exclusive.

Boundary of District.

District Fishery Office—Peterhead.

Number of Boats less than since 1868, but average catch per boat highest on record.

In Peterhead district, the number of boats engaged in the summer fishing of 1866 was 555, of which 480 fished from Peterhead, 68 from Boddam, and 7 from Port Erroll, being 172 less than the fleet of 1885, and the smallest number employed in any season since 1868. But, on the other hand, the average catch per boat was among the highest on record. At Peterhead it was 250 crans, at Boddam 174, and at Port Erroll 209½, which gave a general average of 240½ crans per boat over the fleet. The weeks ending 7th August and 4th September were the most successful of the season. The great bulk of the catch of these weeks was got on the inshore grounds at a distance of from two to six miles from land. These grounds proved more productive than they had done for a number of the preceding years, but, unfortunately, nets to the value of £2800 were lost. The shoals of herrings were very dense, and the area in which they lay being circumscribed, the boats were so much crowded together that they seldom shot their whole drift of nets on account of the risk they would run of losing some of them by fouling or by the weight of fish which they might mesh. On several occasions boats were completely loaded by the catch of from ten to fifteen nets; and, perhaps, in no previous season were heavy takes so common. A number of boats landed individual takes of 100 crans and upwards. One boat got 140 crans, which was supposed to be the largest take ever landed in the district. The greatest total catch of any boat during the season was 607 crans, but a considerable number of boats caught from 300 to 400 crans. The quality of the herrings was exceptionally good, about one-half of them being full fish—the largest proportion landed for a number of years. Nets of a wider mesh than those used recently have been gradually introduced by the fishermen, which without doubt materially led to such a favourable result. As illustrative of the amount of work accomplished by the women employed in connection with this industry and the money they earned, it may be mentioned that one company of three gutted and packed, during the six or seven weeks of the season, herrings which filled the large number of 660 barrels. The number of fish thus dealt with would be about 590,000, and the wages of each woman were between £11 and £12. Four vessels were employed in the deep-sea fishing. They succeeded remarkably well, having landed altogether 3235 crans, of which a considerable quantity was prepared for the official brand. The fishing was closed on the 4th September by stormy weather. The total quantity of herrings cured in the district during the season amounted to 223,533 barrels, as compared with 224,087 in 1885, being a decrease of only 554 barrels. Thus the catch of 555 boats in 1886 was almost as great as that of 722 boats in 1885.

Particulars of Fishings.

Quality of Herrings.

Larger Mesh Nets used.

Work and Earnings of Women employed.

Vessels employed in Deep-Sea Fishings.

Results of Season.

Development of Winter Fishery.

Cause thereof.

Particulars of Fishing.

Quality and prices of Herrings.

The more extensive prosecution of the great line fishing during the past few years has led to the development of the winter herring fishery. Herrings are excellent bait for great lines, and in using nets to obtain herrings for bait, more were caught than required for this purpose. The surplus quantity taken generally met with a ready sale, either for being consumed fresh or for kippering, and a good many of the fishermen in consequence devoted increased attention to the winter herring fishing. During the months of January and February, upwards of 2000 crans were landed, which were sold at from 10s. to 20s. per cran. A number of boats resumed this fishing in December, and met with gratifying success, more herrings having been landed during that month than had ever previously been the case. The fish were of a large size, and of good quality, and realized from 20s. to 44s. per cran. They were caught close to the land between Boddam and Port Erroll.

FRASERBURGH DISTRICT.

Boundary of District.

From Rattray Head, inclusive, to Troup Head, exclusive.

District Fishery Office—Fraserburgh.

Fleet of Boats.

Number at each Station.

Particulars of Fishing.

Great loss of Nets owing to weight of Fish Meshed.

Quality of Herrings.

Season's Catch now disposed of.

In Fraserburgh district a fleet of 655 boats was engaged in the herring fishing of 1886, of which 626 were at Fraserburgh, and 29 at Pittulie, being a decrease of 233 boats from the number in 1885. Of these 419 were engaged to curers, and 236 disposed of their fish by auction. The average catch per boat was 207 crans, as compared with 176 crans in 1885. The highest total catch of any one boat during the season was 725 crans. Three boats landed altogether upwards of 1800 crans. The fishing opened in the middle of July, being the same time as in 1885, and proved highly successful till 4th September, when it virtually closed. The best fishing grounds extended from 5 to 55 miles N.N.E. of Fraserburgh, and the inshore waters proved more productive than for many years past. Only five nights were lost by adverse weather during the whole season. The largest takes were landed on the weeks ending 24th July, 7th August, 14th August, and 28th August, which yielded an average of 34¼, 60¾, 39½, and 40¾ crans per boat respectively. Throughout August great loss of netting was sustained, owing to the weight of fish captured; so dense, indeed, were the shoals during that month, that individual takes of from 100 to 127 crans were very frequently landed. By the middle of the season many crews of the engaged boats had completed their complements of herrings, which was 200 crans. Some of these crews re-engaged themselves to deliver their future takes at from 12s. to 14s. per cran, while others disposed of them by auction. Up to the end of August the herrings were superior in quality to the catch of 1885, particularly the maties, which were chiefly medium-sized full fish. From that time till the end of the season, the shoals were largely mixed with inferior spent fish. The season's catch was disposed of thus:—226,927½ barrels were cured; 2592 barrels were cured ungutted or in bulk; 5752¼ crans were kippered; and 626½ were preserved in tins, or cured as red herrings. The total loss in nets and other fishing material during the season amounted to upwards of £4500. On the 10th September a fisherman was knocked overboard and drowned off St Combs.

Winter Fishing.

There were 712 crans of herrings landed during the winter and spring months, which were chiefly used for bait.

BANFF DISTRICT.

Boundary of District.

From Troup Head, inclusive, to Cullen, exclusive.

District Fishery Office—Macduff.

Number of Boats employed.

Forty left on Beach.

Opening, progress, and close of Fishing.

Grounds Fished.

Quality of Herrings.

Quantity Cured.

In Banff district 70 boats were employed in the season of 1886, being 37 less than in 1885. A larger number than usual of the district boats went to the Shetland herring fishery, while 40 first-class boats were left on the beach, their owners preferring to associate themselves with other boats rather than engage hands to man their own. The fishing opened on 20th July, and closed about the end of August, with an average catch of 188½ crans per boat, as compared with 177½ crans in 1885. The greatest success was got in the week ending 7th August, when in four days the whole fleet averaged 66 crans per boat. In that week several boats landed individual takes ranging from 80 to 112 crans, and one boat had 120 crans. This boat landed a total catch for the season of 600 crans. The grounds principally fished extended from 2 to 10 miles from land, but those which yielded the great bulk of the season's catch lay from 2 to 4 miles from shore. Distant grounds were seldom visited. The quality of the takes was much better than in 1885, and contained a larger proportion of full fish. The total quantity cured was 21,158 barrels, as compared with 26,230 barrels in 1885, being a decrease of 5072 barrels.

Winter Fishing.

The winter herring fishing made a good beginning, but owing to the continued low prices of herrings, it was soon abandoned for other fishing, which it was thought would be more remunerative.

BUCKIE DISTRICT.

Boundary of District.

From Cullen to east side of Spey, both inclusive.

District Fishery Office—Buckie.

Fleet of Boats larger than in any other District, but bulk Fish at other Stations.

Opening and close of Fishing.

Grounds frequented and particulars of Fishing.

Buckie has 640 first-class boats, being more than any other district in Scotland. The great bulk of the boats, however, fish at other stations. Last year, only 88 remained at home, of which 12 fished from Cullen, 10 from Findochty, 62 from Buckie, and 4 from Portgordon, being a decrease of 6 boats under the number which remained in the district in the previous year. The average catch per boat during the summer fishing, at each of these stations, was 211⅔, 173½, 161¾, and 110 crans respectively; and the general average was 167 crans per boat, as compared with 152 crans in 1885. The fishing commenced on 13th July, and was continued till 28th August. A large portion of the herrings landed during the first week of the season was caught from 20 to 25 miles off shore, and they were generally large full fish. Thereafter the grounds frequented were inshore, lying from 2 to 8 miles from land; but the fish taken there were of rather inferior quality—about two-thirds of them being small sized full herrings and the remainder maties and spent fish. The most abundant fishing was made in the week ending 7th August, and yielded the high average of $90\frac{1}{2}$ crans per boat. A number of individual takes ranged from 60 to 80 crans. During the rest of the season the weekly averages varied from 12 to 27 crans per boat. Quantity of Herrings Cured. The gross quantity cured was 38,521 barrels, as compared with 25,175 in 1885, being an increase of 13,346 barrels. Weather. The weather was generally very good throughout the season, and the fishing was regularly prosecuted, except on five nights, when the boats were kept in harbour by storms.

Winter Herring Fishing. The winter herring fishing commenced on 1st January, and was continued till about the end of March. It was prosecuted during most of the time in close proximity to the land by 169 boats, Particulars thereof. and proved the most successful winter fishing ever made in the district. The total catch was 15,675 crans. Of these about 3700 crans were cured as kippers or bloaters, and the remainder was sent to market in *a roused* state. Quality and prices of Herrings. The quality of the herrings taken in winter was good during the greater part of the season, and prices varied from 1s. to 40s. a cran, the average being about 9s. The fishing was resumed in December, during which month 601 crans were landed.

FINDHORN DISTRICT.

Boundary of District. From west side of Spey to south side of Kessock Ferry, both inclusive.

District Fishery Office—Burghead.

Fleet of Boats. In Findhorn district, 55 boats were engaged in the summer herring fishing last year, of which 23 were stationed at Lossiemouth, 9 at Hopeman, and 23 at Burghead, being an increase of 5 boats over the number in 1885. There are altogether 320 large first-class boats belonging to this district, but all the others fished elsewhere. Particulars of Fishing. The average catch per boat, of the 55 which remained at home, was 149 crans, as compared with 125 crans in 1885; and the average quantity per boat landed at Lossiemouth, Hopeman, and Burghead, was $149\frac{3}{4}$, 195, and 130 crans respectively. The fishing opened about the middle of July, being the same time as in the previous year, and closed on 28th August. The week ending 7th August was the most productive of the season, and yielded an average of $67\frac{1}{2}$ crans per boat. The highest aggregate catch of any one boat was 300 crans, and the lowest 60 crans. Quantity of Herrings Cured. The total quantity of herrings cured was 13,268 barrels,, as compared with 7687 in 1885, being an increase of 5581 barrels. Of the herrings landed, nearly three-fourths were maties or spent fish. Fishing Grounds. The principal fishing grounds lay from 5 to 10 miles off shore, but occasionally the boats went to grounds 25 miles distant. Weather. The weather was remarkably fine all the season, and the fishing was regularly prosecuted.

Winter Fishing most abundant, but prices very low. The winter herring fishing was most abundant, and yielded 7764 crans, being the highest catch ever recorded for the district. Prices, however, were very low, ranging from 2s. to 25s. a cran—the average being about 6s. Indeed, the fishermen often experienced difficulty in getting their takes sold at any price, and sometimes they had to throw the fish overboard, or land them on the quay to be carted away for manure.

CROMARTY DISTRICT.

From north side of Kessock Ferry to south side of Meikle Ferry, both inclusive. Boundary of District.

District Fishery Office—Cromarty.

Boats employed. The summer herring fishing was prosecuted only to a very limited extent in Cromarty district. 135 first-class boats belong to the district, but, with the exception of 23, all of them fished elsewhere. These 23 boats were employed at Portmahomack, and the herrings they landed gave an average catch of 100¾ crans to each. In 1885, Particulars of Fishing. the average catch per boat was 149 crans. The herrings landed were of fairly good quality. The fishing grounds lay from 4 to 6 miles off shore. The weather was remarkably fine all the season, and the industry was regularly prosecuted. The most successful week was that ending 7th August, when the average catch was 52 crans per boat, being more than one-half of the whole season's fishing. Prices were generally low, ranging from 5s. to 12s. a cran. Prices low.

Winter Fishing. The winter herring fishing was fairly successful. It was prosecuted during the months of January, February, and March chiefly by strange boats. About 1166 crans were landed, all of which were sent off fresh for immediate consumption.

HELMSDALE DISTRICT.

From north side of Meikle Ferry to Dunbeath, both inclusive. Boundary of District.

District Fishery Office—Helmsdale.

Fleet of Boats. Helmsdale district had a fleet of 84 boats in 1886, of which 75 fished at Helmsdale and 9 at Dunbeath, being a decrease of 4 boats, as compared with the number in 1885. Opening and closing of Fishing. The fishing opened on 20th July—about the same time as in the previous year—and closed on 28th August. It was prosecuted chiefly on the inshore grounds lying from 4 to 6 miles off land. Particulars of Fishing. Trials were occasionally made in waters 10 to 25 miles seaward, but the takes got there were small. The fishing was interrupted two nights in July by stormy weather; but with this exception the season was remarkably fine, and the boats got regularly to sea. The average catch per boat was 126¾ crans, as compared with 121 crans in 1885. The most successful boat landed altogether 200 crans, and the least successful 50 crans. More than half of the season's catch was got during the week ending 7th August, which gave the high average of 81¼ crans per boat. Quality of Fish. The quality of the fish was fairly good, and above the average of recent years. Barrels Cured. The quantity cured was 18,336 barrels, against 16,039 barrels in 1885.

Winter Fishing. The winter herring fishing was carried on from 1st January till the middle of March. The total catch amounted to 2527 crans, as compared with 1069 crans in 1885. Particulars thereof. At first, the takes brought from 28s. to 32s. a cran; but thereafter, owing to the southern markets becoming glutted with herrings, sales could scarcely be effected at all, and the average price for the whole season would not exceed 4s. a cran. Both fishermen and buyers became much discouraged in consequence, and little energy was afterwards shown in prosecuting the fishing.

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LYBSTER DISTRICT.

Boundary of District.

From Dunbeath, exclusive, to East Clyth, inclusive.

District Fishery Office—Lybster.

Boats employed and average Catch for each.

Particulars of Fishing.

Quality of Herrings.

Most productive Grounds.

Barrels Cured.

Loss of Netting.

In Lybster district, 90 boats were employed in the summer herring fishing of 1886, being 22 less than in 1885. The average catch per boat was 116 crans, as compared with 138 crans in 1885. The season opened on the 20th July, and closed on 1st September. The weather was favourable, and the boats got regularly to sea. The most productive week was the first one in August, when the unusually high average of 95 crans per boat was landed. Notwithstanding this large catch, the work of gutting and curing the fish was on the whole satisfactorily accomplished. A few takes of spent fish were landed on the 4th and 5th of August, but, with this exception, the quality was fairly good throughout the season, fully one-half of the whole catch being fine large full fish. The most productive grounds lay from 1 to 3 miles off land between Bruan and Lybster, and individual takes, of from 60 to 90 crans, were occasionally brought ashore. The season closed rather suddenly, only 150 crans having been landed after August 14th. The highest aggregate catch of any one boat was 300 crans, and the lowest 14 crans. The quantity of herrings cured was 15,050 barrels, as compared with 19,099 in 1885, being a decrease of 4049 barrels. The loss of netting, caused by the weight of fish captured, was the greatest ever known in the district. A number of boats lost their entire trains, and few escaped without considerable loss or damage. During the first week of August not less than 1200 nets, valued at £1900, were left on the fishing grounds.

Winter Fishing. Herrings plentiful, but prices very low.

Produce of Season.

The winter herring fishing began on 1st January, and ended about the middle of March. Herrings were unusually plentiful on the coast during the season, and takes of from 30 to 50 crans were occasionally landed. The demand, however, being limited, prices, which opened at 20s. a cran, soon fell to 5s. a cran, and ultimately to 1s. The fishery produced 2125 crans, which realised an average price of 5s. a cran, as compared with 814 crans in 1885, which brought an average of 21s. During the season one boat, with 70 crans of herrings on board, was run down at sea and lost. Happily, the crew were saved.

WICK DISTRICT.

Boundary of District.

From East Clyth, exclusive, to Cape Wrath, inclusive, including the Island of Stroma in the Pentland Firth.

District Fishery Office—Wick.

448 Boats employed.

Particulars of Fishing.

In the summer fishing of 1886, 448 boats were employed in Wick district, of which 393 fished at Wick, 17 at Boathaven and Staxigoe, 15 at Kiess, and 23 at Scrabster, being a decrease of 35 boats from the number in the previous year. The average catch per boat was 140 crans, as compared with 173½ crans in 1885. The fishing began on 10th July, and was prosecuted till 15th September. The boats were at sea on 45 nights during the season;

owing to fogs and stormy weather, all of them remained in harbour on other 10 nights. From 10th July till the close of that month, the fishing was carried on with fair success from 20 to 50 miles from land, and the herrings taken were of good quality. Thereafter it was mainly prosecuted on grounds lying from 2 to 7 miles off-shore, and with good results. On 4th August, 400 boats landed 20,800 crans, or the high average of 52 crans per boat. Four-fifths of this great catch, however, unfortunately consisted of spent fish. During the remainder of the season, spents and maties formed the largest portion of the takes. The highest individual take was 145 crans, but takes, varying from 90 to 130 crans, were frequently landed. The total quantity of herrings cured was 102,611 barrels, being 15,143 barrels less than in 1885. The loss of nets, caused by the weight of fish which they captured, was estimated at the large sum of £3260. Happily, no lives were lost, nor were any boats wrecked during the season. There are two establishments at Wick for the manufacture of fish offal into manure, but only one was working last year.

Quality of Herrings.

Barrels Cured.

Loss of Nets.

The winter herring fishing of 1886 was attended with unprecedented success. It was prosecuted in January, February, and March, and during most of that time 130 boats were engaged. The total catch amounted to 22,184 crans, while the greatest yield of any preceding winter was 6494 crans. Owing to the abundant fishing, prices were low, the average being estimated at 10s. per cran, but which would give a return of £11,092 for the season's fishing. 3000 barrels of herrings were cured for exportation. The remainder of the catch was either cured as kippers or red herrings, or sold for consumption fresh.

Winter Fishing most successful.

Particulars thereof.

Disposal of Herrings.

ORKNEY DISTRICT.

The Orkney Islands; and Swona in the Pentland Firth.

District Fishery Office—St Margaret's Hope.

Boundary of District.

In Orkney district, 168 boats were engaged in the fishing of 1886, being 92 less than in 1885. The average catch per boat was 90¼ crans, as compared with 154 crans in 1885. The fishing began on 13th July, but, owing to the stormy state of the weather, and to the low price of herrings, it was not at first prosecuted to any great extent. The total catch landed in July was only 1157 crans, of which 900 crans were captured on the 29th. The best week of the season was that ending 7th August, when fully one-third of the season's catch was landed; the average per boat being 32 crans. At Stronsay, the best fishing was made on the in-shore grounds; and the herrings were of better quality than those taken on the distant grounds. At the South Isles stations, no herrings were found in-shore, and the bulk of the catch there was got about 40 miles to the south-east. The quality of the herrings was inferior to that of most former years, the takes containing a much larger proportion of spent fish than was usual in the district. The weather was stormy throughout the season, and the boats got regularly to sea only during one week. The quantity of herrings cured was 18,949 barrels, as compared with 53,300 in

Boats engaged and average catch per Boat.

Particulars of Fishing.

Quality of Herrings.

Quantity of Herrings Cured.

1885, being a decrease of 34,351 barrels. There was no loss of life in connection with the fishing.

SHETLAND DISTRICT.

Boundary of District.

Comprising the Shetland Isles, and Fair Isle, and Foula Island.

District Fishery Office—Lerwick.

Fleet of 840 Boats employed.

Average catch per Boat.

Total Catch.

Particulars of Fishing.

Shetland district had a fleet of 840 boats employed in the herring fishing of 1886, being 15 more than in 1885, of which 504 fished in Lerwick section, and 336 in Unst section. The fleet comprised 400 boats belonging to the district, including 25 small six-oared boats, and 440 boats which came from different parts of the East Coast, the Isle of Man, and Ireland. The average catch for the season was 147 crans per boat, while the previous year yielded the high average of 280 crans. The aggregate catch was about 124,000 crans, as compared with 231,000 crans in 1885, showing a decrease of 107,000 crans. This large falling off was attributed to the stormy weather which prevailed during the beginning of the season, interrupting the early fishing on the west side of the Islands, and also to the bad weather which was experienced in Unst section during nearly the whole time the fishing was prosecuted. At least, in so far as it appeared, there were plenty herrings upon the coast; but night after night gales came on, which caused the boats to return from sea—many of them without even having shot their nets. Lerwick section had better weather after the first week of August, and the fishing there proved more successful. The season opened about the end of June—a week later than in the previous year—and closed in the first week of September, being a fortnight sooner than usual. The best fishing was made at Lerwick during the week ending 14th August, when the fleet averaged 58 crans per boat. In that week a number of individual takes were landed, ranging from 100 to 120 crans. The herrings captured throughout the season were rather superior in quality to those got in the previous year, and fully maintained the high character which Shetland herrings bear in the foreign markets. The gross quantity of herrings cured amounted to 198,051 barrels, as compared with 370,238 in 1885, being a decrease of 172,187 barrels. The quantity cured last year, however, shows an increase on the average cure of the preceding ten years of 78,468 barrels, and an increase on the average of the preceding twenty years of 136,298 barrels. Nothing is more striking in the history of the Scottish fisheries than the extraordinary development of the herring fishery in Shetland in recent times; its yield rising, as it has done, from 1180 barrels in 1874, to 370,238 in 1885; and it is hoped that the stoppage of such progress last year will only be temporary.

Herrings of superior quality.

Quantity Cured.

Development of Fishery.

SUMMARY OF EAST COAST HERRING FISHING.

Seven Districts show an increase, and ten a decrease.

The returns of the herring fishing on the East Coast of Scotland for 1886 show an increase in seven districts, on the total quantity of herrings cured in 1885, of 99,009½ barrels, and a decrease in ten districts, of 275,552¼ barrels, resulting in a net decrease of 176,542¾ barrels in 1886, as compared with 1885. The districts which exhibit the largest decrease are Fraserburgh, Wick, Orkney, and Shetland. Those which mainly contributed to the increase, are Eyemouth, Montrose, Aberdeen and Buckie. The greatest increase, however, is due to Eyemouth and Aberdeen, and the largest decrease to Fraserburgh, Orkney, and Shetland.

Net decrease in 1886 under 1885.

The official returns of herrings cured on the whole of the East Coast of Scotland for the fifty years preceding last year, on the average of each period of ten years, show a large and continuous increase. They are as follow:—

East Coast Fishing of preceding 50 years.

Periods of Ten Years.	Yearly Average of Barrels cured.
1836 to 1845 inclusive,	429,175
1846 „ 1855 „	517,392
1856 „ 1865 „	496,875
1866 „ 1875 „	641,754
1876 „ 1885 „	950,361

Barrels cured in 1886, 1,142,439¾.

Yearly average of Barrels cured in periods of ten years.

The quantity of herrings cured in 1886, when compared with 1885, shows a decrease of 13·46 per cent.; but when compared with the average of the preceding ten years, it shows an increase of 20·21 per cent.; of twenty-five years, 54·15 per cent.; and of fifty years, 88·17 per cent.

Decrease in 1886 under 1885, but increase over preceding 50 years.

WEST COAST HERRING FISHERY.

The nine fishery districts on the west of Scotland are:—Stornoway, Loch Broom, Loch Carron and Skye, Fort-William, Campbeltown, Inveraray, Rothesay, Greenock, and Ballantrae.

Nine West Coast Districts.

Stornoway District.

The Islands of Lewis, Harris, North Uist, Benbecula, South Uist, Barra, and the smaller Islands within this range; also St Kilda.

Boundary of District.

District Fishery Office—Stornoway.

Stornoway district had a fairly successful herring fishing in 1886. About the beginning of February, herrings appeared in large quantities on the East Coast of Lewis; and the district crews then prosecuted the industry with satisfactory results. This early fishing was continued, with slight interruptions, until May 20th—the generally recognised proper time for beginning the summer fishing. A fleet of 1129 boats were employed, being an increase of 48 boats over the number in the preceding season. Of these about 200 belonged to the district, and the remainder came from numerous other places. The average catch for the season was 67 crans per boat. Of the two sections into which the district is divided, Stornoway section had 521 boats, and Barra section 608; and their gross average catches were estimated at 106 and 33¾ crans per boat respectively. The regular season closed at the end of June, but a few Lewis boats continued fishing with

Fishing fairly successful.

Boats employed.

Average catches in the two Sections.

Herrings cured, kippered, sold fresh, and tinned.

fair success for two months longer. The total quantity of herrings cured at the thirteen stations in the district was 91,431½ barrels against 114,781¾ in 1885, of which 64,311½ barrels were cured in Stornoway section, and 27,121 in Barra section, showing a falling off in the two sections of 7107¼ and 15,243 barrels respectively. 19,126½ crans were kippered, 7251 were sold fresh or lightly salted, and 30 crans were tinned; while in 1885, 28,274 crans were kippered or lightly salted.

Grounds fished in Stornoway Section.

The fishing grounds embraced all parts of the North Minch; but the favourite and most productive grounds, and where the greatest portion of the season's catch was obtained, lay off the Butt of Lewis, near the Island of North Rona; and midway between the Butt and Cape Wrath. In Stornoway section 12,149 crans were landed in the week ending 12th June, being the largest fishing of any week in the season, of which 6020 crans were delivered at Stornoway on one day. In Barra section, the best fishing was got during the week ending 5th June, when 8561 crans were taken.

Cured Herrings exported direct to Continent.

38,385½ barrels were exported direct to the Continent, of which 27,006 went to St Petersburgh. In 1885 the quantity exported direct to the Continent exceeded the above number by 20,128 barrels.

High prices realised there.

The herrings were generally superior to the takes of the two preceding seasons. Those landed in Barra section were of prime quality, and obtained high prices abroad. Stornoway kippered herrings continue to be much prized in the home markets, and this department of the trade is of great and increasing importance.

Weather and loss of Life at Sea.

The sailing of the boats to and from the fishing ground was often delayed from want of wind; but on the whole, the weather throughout the season was favourable for the prosecution of the industry. During the year, 10 fishermen were unhappily drowned while pursuing their calling.

LOCH BROOM DISTRICT.

Boundary of District.

From Cape Wrath to Diebeg, both exclusive; including the lochs and islands within this range of coast.

District Fishery Office—Ullapool.

Poor Fishing.

Total Catch.

In Loch Broom district, the herring fishing of 1886 was the poorest recorded for many years. The total catch only amounted to 1618 barrels, as compared with 8948 in 1885. The quality of the herrings was inferior, and prices ranged from 11s. to 20s. per cran.

Fishing confined to Lochs.

The fishing in Loch Glendhu, which was so prosperous three years ago, was a complete failure. The industry in this district is entirely confined to the lochs, but comparatively few herrings came there during the year.

Curing Vessels.

Two steamers and seven curing vessels were fitted out in the district for the herring fishery. Their catches yielded only 622 barrels. Most of the local fishermen take part in the herring fishing upon the East Coast, so that the yield of Loch Broom district, even when the fish are plentiful, is comparatively small.

LOCH CARRON AND SKYE DISTRICT.

From Diebeg, inclusive, to Loch Nevis, exclusive; including the lochs and smaller islands within this range of coast; also the islands of Skye, Scalpa, Raasay, Rona, and Croulin.

Boundary of District.

District Fishery Office—Broadford.

In Loch Carron and Skye district, the winter herring fishing of 1886 was fairly successful; but the summer fishing was almost a failure. The former was carried on during the months of January and February, and also in October, November, and December. The total catch amounted to 4055 crans, being 85 less than in 1885. The summer fishing was prosecuted in July, August, and September. At one time 410 boats were employed in the district, but the average number was 146. The herrings were principally caught in the Sounds of Scalpa and Raasay, and Dunvegan. Good takes were sometimes landed in Lochs Slapin, Eyshort, and Carron. The fishing in Loch Hourn was again unsuccessful. The quality of the herrings landed throughout the year was good, and prices ranged from 8s. to 33s. a cran. The total quantity of herrings cured was 8734 barrels as compared with 15,950 in 1885. There were 20 vessels fitted out in the district for the herring fishery, and the number of barrels they cured on board was 4199. Six steamers were engaged during the season in buying herrings, and conveying them to Strome Ferry, Oban, and Glasgow.

Winter Fishing fairly successful, but Summer Fishing almost a failure.

Boats employed.

Particulars of Fishing.

Herrings cured.

Curing Vessels.

FORT WILLIAM DISTRICT.

From Loch Nevis to Oban, both inclusive; including the lochs within this range of coast; also the islands of Canna, Rum, Eig, Muck, Coll, Tyree, Iona, Mull, Lismore, Kerrera, and the smaller islands.

Boundary of District.

District Fishery Office—Oban.

The herring fishery in Fort William district was prosecuted in 1886 with very indifferent success. 50 boats were at one time employed, the average number being 37, as compared with 197 and 70 respectively in 1885. Small takes of herrings were landed by native crews at Loch Linnhe and Loch Eil in August and September; at Loch Scriddan, Mull, in the early part of October; and at Arisaig and Loch Nevis during September and October; but the fishing being unremunerative, a number of the boats left and went to Loch Slapin or Loch Hourn, in the Loch Carron district, to prosecute the industry there. The total quantity of herrings cured in Fort William district was 615 barrels, as compared with 2412 in 1885; and 575 crans were sent to market for consumption fresh. Prices of herrings ranged during the season from 20s. to 80s. per cran. Four curing vessels were fitted out in the district for the herring fishery. By the capsizing of their boat on September 30th, while proceeding to the cod and ling fishing, three fishermen out of a crew of five, belonging to Tyree were drowned; the other two were washed ashore in a very exhausted condition.

Fishing not successful.

Boats employed.

Particulars of Fishing.

Herrings cured and sold fresh.

Curing Vessels.

Loss of Life.

CAMPBELTOWN DISTRICT.

Boundary of District.

From Tayinloan, inclusive, round the Mull of Cantyre to Skipness Point inclusive; including the islands of Colonsay, Jura, Islay, Gigha, and Sanda.

District Fishery Office—Campbeltown.

Boats employed. Season successful. Barrels cured. Particulars of Fishing.

Campbeltown district had a fleet of 432 boats employed in the herring fishing of 1886. Both drift and seine or circle-nets were used. The season was a most successful one, the aggregate quantity of herrings landed being very large. The total number of barrels cured, or sent to market lightly salted for immediate use, was 42,312, as compared with 45,342 in 1885, being a decrease of 3030 barrels. As regards this decrease, however, it is important to note that the fishing of 1885 was one of the greatest ever made in the district. Large shoals of herrings appeared in Kilbrannan Sound early in the spring of 1886, and the fishing began in April, which was much before the usual time, and was continued till about the end of the year. In the week ending December 18th the takes landed were exceptionally heavy, more particularly by the boats which used seine or circle-nets. Several crews of two boats, using these nets and fishing together, landed takes ranging from 112 to 165 crans; and one double crew realised £1100 for the season's catch. On 17th December a gross catch of about 8000 crans was landed, which was understood to be the largest fishing ever made in the district in one day. The principal fishing grounds lay in Kilbrannan Sound, and in Lochindaal, Islay. The latter ground, in so far as known, had never been fished for herrings before except for bait, and large quantities of them were found in that loch from August till December. With the exception of those landed in April and May, the quality of the herrings taken throughout the season was generally good, and fully above the average of recent years. The prices, however, were usually lower, and ranged from 8s. or less, to 40s. a cran. The total value of the entire catch—fresh and cured—was £57,000. As many as twelve steamers were occasionally employed in the district, buying and taking the herrings to market.

Earnings of Seine-net Boats. Fishing Grounds. Quality, prices and total value of Catch. Steamers employed.

INVERARAY DISTRICT.

Boundary of District.

From Oban to Tayinloan, both exclusive; including the lochs and islands within this range of coast, and from Skipness Point and Ardlamont Point, both exclusive, for both sides of Loch Fyne, to the head of the loch.

District Fishery Office—Ardrishaig.

Fleet of Boats and Nets used. Particulars of Fishing.

In Inveraray district the herring fishing of 1886 was engaged in by a fleet of 236 boats, about two-thirds of which used seine or circle-nets, and the remainder drift-nets. The fishing opened about May 1st, and closed early in September. From May till the middle of June, it was prosecuted along the west side of Loch Fyne, between Skipness and Ardrishaig; and thereafter, till the middle of July, between Otter Spit and the head of Loch Fyne. The most successful fishing was made in July, in the neighbourhood of Inveraray, where very few herrings had been caught for many years. The boats fishing with the seine-nets were the most successful; but the drift-net boats landed heavier takes than they had done in recent seasons. Crews of two boats, using seine-nets and fishing together, landed takes of from 50 to 103 crans, which realised sums ranging from £80 to £130. One double crew earned £800 for the season; but these results are small, when compared with those of some preceding years. The quality of the herrings was inferior during the first part of the fishing, but it afterwards improved and became equal to the average of ordinary years. Prices ranged from 8s. to 60s. a cran, the average being 30s. In 1885, the average price was 25s. a cran; in 1884 it was 38s.; and in 1883, 45s. The total quantity of herrings cured, or sent to market lightly salted for immediate use, was 18,405 barrels, being a decrease, as compared with 1885, of 7974 barrels. From 10 to 14 swift steamers, specially built for the herring trade, were employed in carrying the takes to Greenock and Glasgow, for distribution over the country.

Earnings of Crews.

Quality and Prices of Herrings.

Herrings cured

Carrying Steamers employed.

ROTHESAY DISTRICT.

From Ardlamont Point, inclusive, to Roseneath Point, exclusive; including the lochs within this range of coast; also Bute and Arran.

Boundary of District.

District Fishery Office—Rothesay.

The herring fishing in Rothesay district was begun in July and ended in October. The number of boats engaged varied from time to time. During one week of the season as many as 284 were employed, and this was the maximum number which took part in the fishing. There was no shoal of herrings on the coast, and the fishing during the whole season was unproductive. The aggregate catch amounted to only 6909 crans, as compared with 9974 crans in 1885, which was likewise an unsuccessful year. The grounds which yielded the best takes were Loch Long, Loch Striven, Machrie Bay, and along the Arran coast. Both drift and seine or circle-nets were used. The latter captured more fish than the former. The most successful double crew of eight men, however, with two boats, and using seine-nets, only realised about £170 for the season, as compared with £520 in 1885. On account of the limited catch, prices were well maintained, and might average about 27s. a cran, although the quality of the fish was usually inferior. The fishing was prosecuted with the usual amount of vigour and perseverance; but it was understood that most of the boats did not clear their expenses.

Duration of Fishing and Boats employed.

Season unproductive. Total Catch.

Seine-nets more successful than drift-nets.

Prices well maintained although quality of Herrings inferior.

GREENOCK DISTRICT.

From Glasgow, westwards, on the north side of the River Clyde, to Roseneath Point, both inclusive, including Gareloch; on the south and east side of the River and Firth of Clyde to Ayr, exclusive, including the Cumbraes.

Boundary of District.

District Fishery Office—Greenock.

In Greenock district the herring fishing of 1886, which was carried on from June to December, was a failure. At one time 56 boats were employed, but very few herrings were found upon the coast; and the weather being often unsuitable, the industry was only prosecuted in a casual manner. The gross catch did not exceed 907

Fishing a failure, few Herrings being on the Coast and Weather unsuitable.

Total catch and prices.
Curing Vessels.

crans, as compared with 9507 crans in the previous year. It was all disposed of in the local markets for consumption fresh. The herrings were generally of good quality, and always commanded high prices—the average being fully 40s. a cran. Three curing vessels were fitted out in the district, but on account of the comparative scarcity of herrings in the Loch Carron and Fort William districts, where they were principally engaged, their success was very limited, as well as that of some other vessels which transhipped their takes to them.

BALLANTRAE DISTRICT.

Boundary of District.

From Ayr to Sark River, Solway Firth, both inclusive.

District Fishery Office—Girvan.

Winter Fishing less productive than on preceding twelve years.
Boats employed.
Total catch of Herring.
Quality and Prices.
Causes thereof.
Summer Fishing Boats employed.
Crans caught and the value.

The winter herring fishing in Ballantrae district in 1886 was less productive than in any of the preceding twelve years. The weather in the early part of the season was stormy; the herrings lay on the exposed banks of Ballantrae; and the fishing was suspended for several weeks in succession. Afterwards prices were so low that the seine or circle-net fishermen purposely remained in harbour, and not more than a third of the boats were at any time fishing. Three modes of fishing are practised in the district, viz., drift-net, seine or circle-net, and set trammel-net. In the winter fishing 296 boats were employed, and the total catch was 4760 crans, value £5168. The herrings were inferior and generally small. Prices, in comparison with other years, were low, not averaging more than 21s. 9d. a cran. In former seasons the average was from 30s. to 60s. This falling off in prices was mainly owing to the great takes of winter herrings which were landed on the East Coast, from the Firth of Forth to Wick, and to large importations of partially-preserved herrings from Norway into the home markets. The winter fishing was confined to the Ayrshire coast, and prosecuted from January to the end of March. The summer herring fishing was carried on in Luce Bay and on the Ayrshire coast by drift-nets. The largest number of boats fishing was 116. The quantity of herrings landed was 2582 crans, value £3621. The total winter and summer catch amounted to 7342 crans, value £8789. In 1885 the produce of the winter fishing was 27,671 crans, value £46,673; of the summer fishing 3051 crans, value £4751; being together 30,722 crans, value £51,424, showing the large decrease in the quantity of herrings landed in 1886 of 23,380 crans, and in the value £42,635. A still greater decrease appears when compared with the fishing of 1884, which returned a catch of 31,374 crans, valued at £78,435.

Article on Herring Fishing in District.

An interesting article on the herring fishing in this district, by Mr Peter Wilson, fishery officer, Girvan, will be found in Appendix H.

SUMMARY OF WEST COAST HERRING FISHING.

Total decrease in Herrings Cured.
Scarcity of Herrings over Coast except at Campbeltown.

The official returns of the herring fishing on the West Coast of Scotland show that the total quantity of herrings cured in 1886 was 169,783½ barrels, as compared with 253,969¾ in the previous year, being a decrease of 84,186¼ barrels. The whole of the nine districts show a falling off, which is especially marked in Stornoway and Ballantrae. There seemed to have been a scarcity of herrings all over the West Coast during 1886, except in the district of Campbeltown, which yielded an abundant catch, immense shoals of herrings having been found in Kilbrannan Sound and on the coast of Islay. This catch, although slightly under the yield of 1885, was greatly in excess of that of the preceding years. Of the herrings taken on the West Coast in 1886, and disposed of for use fresh, there was likewise a decrease, when compared with 1885, the falling off being 6869 crans.

Decrease also in quantity sold fresh.

The official returns of all the herrings cured on the West Coast of Scotland in the fifty years preceding last year, on the average of each period of ten years, exhibit a continuous large increase. The following statement shows the particulars :—

Yearly average of Herrings cured in periods of ten years.

Periods of Ten Years.	Yearly Average of Barrels cured.
1836 to 1845 inclusive,	72,145
1846 „ 1855 „	83,500
1856 „ 1865 „	114,997
1866 „ 1875 „	165,982
1876 „ 1885 „	209,703

SUMMARY OF HERRING FISHING ON BOTH COASTS.

The following tabular statement gives the total quantities of all the herrings cured in 1885 and 1886, in each of the twenty-six districts, embracing the whole Coasts of Scotland, and shows the respective increases or decreases in 1886 :—

Summary of Fishing on both Coasts.

The Twenty-six Fishery Districts. Herrings cured in 1885 and 1886, and respective Increases and Decreases.

The Twenty-Six Fishery Districts.	Year 1885, Barrels cured.	Year 1886, Barrels cured.	Increase in 1886.	Decrease in 1886.
Eyemouth, ...	33,387	62,376	28,989	...
Leith, ...	5,253½	4,635	...	618½
Anstruther, ...	9,022	11,021	1,999	...
Montrose, ...	24,776	36,206½	11,430½	...
Stonehaven, ...	24,125	22,704	...	1,421
Aberdeen, ...	81,815	117,182	35,367	...
Peterhead, ...	224,087	223,533	...	554
Fraserburgh, ...	276,319	235,898¼	...	40,420¾
Banff, ...	26,230	21,158	...	5,072
Buckie, ...	25,175	38,521	13,346	...
Findhorn, ...	7,687	13,268	5,581	...
Cromarty, ...	4,676	2,940	...	1,736
Helmsdale, ...	16,039	18,336	2,297	...
Lybster, ...	19,099	15,050	...	4,049
Wick, ...	117,754	102,611	...	15,143
Orkney Isles, ...	53,300	18,949	...	34,351
Shetland Isles, ...	370,238	198,051	...	172,187
Stornoway, ...	114,781¾	91,431½	...	23,350¼
Loch Broom, ...	8,948	1,618	...	7,330
Loch Carron and Skye, . .	15,950	8,734	...	7,216
Fort-William, ...	2,412	615	...	1,797
Campbeltown, ...	45,342	42,312	...	3,030
Inveraray, ...	26,379	18,145	...	8,234
Rothesay, ...	3,673	2,168	...	1,505
Greenock, ...	8,813	...	...	8,813
Ballantrae, ...	27,671	4,760	...	22,911
Totals, ...	1,572,952¼	1,312,223¼	99,009½	359,738½

Totals of Decreases and Increases.

Net Decrease in 1886 under 1885, and Increase during preceding fifty years.

These statistics show that the gross quantity of herrings cured in 1886, on both the East and West Coasts, was less than in 1885 by 260,729 barrels; but the returns for the fifty years preceding last year, on the average of each period of ten years, show a continuous large increase. The following statement gives the particulars of this increase:—

Yearly Average Increase in periods of ten years.

Periods of Ten Years.	Average Number of Barrels Cured Yearly in each Period.	Increase in Average Number of Barrels Cured Yearly in each Period.	Increase per cent. in Average Number of Barrels Cured Yearly in each Period.
1836 to 1845 inclusive,	501,321	...	...
1846 ,, 1855 ,,	600,894	99,573	19·86
1856 ,, 1865 ,,	610,972	10,078	1·67
1866 ,, 1875 ,,	807,736	196,764	32·2
1876 ,, 1885 ,,	1,160,065	352,329	43·61
Barrels cured in 1886, .		1,312,223¼	

Value of Herring Fishery to People of Scotland.

Nothing is more striking in the history of the Scottish fisheries than the increasing productiveness of the herring fishery; and some idea may be formed of the great value of this industry to the people of Scotland from a perusal of the above statement. The gross number of barrels cured in 1886, when compared with the average of the preceding ten years, shows an increase of 13·11 per cent.; when compared with the average of the preceding twenty-five years, it shows an increase of 42·96 per cent; and of the preceding fifty years, 78·24 per cent. The increasing productiveness of this fishery appears even more remarkable when the fact is borne in mind, which has already been stated, that in the year 1809, when the first returns were compiled by the former Fishery Board, the whole number of barrels cured was only 90,185½; while the number cured last year, as shown above, was 1,312,223¼.

Increase per cent. of year 1885, over average of preceding ten, twenty-five, and fifty years.

Great Development of Fishery since 1809.

HERRINGS CURED ON BOARD OF VESSELS AND ON SHORE.

Vessels; and Herrings cured on Board.

Table I. Appendix A, shows the number of vessels fitted out in Scotland last year for the herring fishing; the districts from which they were fitted out; their tonnage, and the number of men; the quantity of netting, salt, and empty barrels shipped; and the total number of barrels of white herrings cured on board; distinguishing those cured gutted from those cured ungutted.

This Industry declining.

This branch of the herring fishing industry, chiefly carried on among the sea lochs on the West Coast of Scotland, has been gradually declining for a number of years past; but quite recently, it has to some extent revived on the East Coast. Only 47 vessels were fitted out last year; whereas, at one time, the number varied from 90 to upwards of 300.

Herrings cured on Shore.

Table II. Appendix A, shows the number of barrels of white herrings cured or salted in Scotland last year by fish-curers on shore, and the districts in which they were cured; distinguishing the herrings cured gutted from those cured ungutted; also the quantity of herrings cured as kippers, bloaters, or red herrings; or preserved in tins.

The curing of herrings as kippers, bloaters, or red herrings, or preserved in tins, having now become an important branch of business in connection with the herring fishery of Scotland, the herrings treated in this way are distinguished in the table above referred to from those cured in the ordinary manner. Last year, 69,089¾ crans were kippered; 14,872 crans were cured as bloaters or red herrings; and 4759½ crans were preserved in tins.

Herrings Cured as Kippers, Bloaters, or Red Herrings, or preserved in Tins.

Table III. Appendix A, shows the total number of barrels of white herrings cured or salted in Scotland last year, both on board of vessels and on shore, distinguishing the herrings cured gutted from those cured ungutted; and also the quantity of herrings cured as kippers, bloaters, or red herrings; or preserved in tins. To this table is added a supplementary note, showing the number of barrels of white herrings cured or salted last year on the West Coast of Scotland, as stated according to the districts where the herrings were caught.

Total of Herrings Cured in Vessels and on Shore.

Herrings Cured on West Coast.

BRANDING OF HERRINGS.

A desire was expressed by fish-curers in Scotland and by herring merchants on the Continent, that the regulations of the Board for branding herrings should be made somewhat more stringent, so that herrings obtaining the brand, would be of a higher quality than those which had hitherto received it. The Board made full inquiry into the whole circumstances of the case, and gave the matter their most anxious consideration. It seemed to them, however, that, speaking generally, the standard of quality of herrings which, under their regulations, were entitled to the brand, is sufficiently high to fulfil the purpose for which the brand was intended; with the exception that the minimum length of 'Full' and 'Matie' herrings should be somewhat increased. The practice hitherto had been to affix the Crown Full Brand to such full herrings as were not less than about 9½ inches long, and to give the 'Matie' brand to matie herrings, if fairly well matured, irrespective of their length. The resolution to which the Board came to on the matter was, that thereafter no full herrings should be branded which were less than about 10 inches long, nor any maties measuring less than about 9 inches; and they gave their officers instructions accordingly. These changes were in operation during last year, and it is gratifying to state that they have given general satisfaction.

Desire that Herrings Branded should be of higher quality than hitherto.

Board's decision thereon.

Changes made gave general satisfaction.

The Board need scarcely say that they continue to do everything in their power to maintain the high character which the brand has earned. For this purpose the district officers are strictly enjoined, before granting it, to satisfy themselves that the herrings for which it is desired are, in respect of quality, selection, cure, and packing, conformable to the requirements of the Fishery Acts and the regulations of the Board, and that the barrels are of the statutory size.

Means used to maintain high character of Brand.

Quantity of Herrings entitled to Brand.

Of the herrings cured last year, 518,994½ barrels, after being examined by the Board's officers, were found entitled to the brand, being a decrease under the number branded in the previous year of 170,330½ barrels, but about the same proportion of the gross quantity cured. The number of barrels, however, branded last year, when compared with the average of the preceding ten years, shows an increase of 5·7 per cent.; and when compared with the average of the years since 1859, when the brand fee was imposed, it shows an increase of 36·99 per cent. Such enlarged demands for the brand are most gratifying to the Board, as showing the high estimation in which the standard of quality and cure required by them is held. Although the herrings landed in 1886 were generally superior in quality to those taken in the previous year, the great quantities caught at a number of the stations during the first and second weeks of August, amounting to the high daily average of from 40 to 52 crans per boat, prevented them being all delivered in sufficient time to be assorted and cured while they were sufficiently fresh. Had it not been for this, a much larger number of barrels would no doubt have been branded. The work of inspection for the brand was, during the height of the season, very arduous, and the requests for branding unusually urgent, particularly at the principal stations, such as Shetland, Wick, Fraserburgh, Peterhead, and Aberdeen. The Board, however, have reason to be satisfied that their officers, generally, did everything in their power to meet the requirements of the trade.

Increased demand for Branded Herrings.

Inspection for Brand difficult and arduous.

Particulars of Herrings Branded.

Table IV. Appendix A, shows the total number of barrels of white herrings which were branded in Scotland last year, and of the brandings in each district. To this table there is added a note showing the total number of barrels therein given, which were branded 'Full,' 'Matie,' or 'Spent'; and the total amount of fees collected.

Comparison of Brandings with previous years.

From this table it will be seen that in the year 1886, as compared with 1885, there was an increase of 3585 barrels in the quantity of herrings branded 'Full'; a decrease of the large number of 197,306½ barrels in those branded 'Matie'; an increase of 40,079½ barrels in 'Spent'; and a decrease of 16,688½ barrels in mixed herrings branded 'P.' It may be interesting to note that the quantity of herrings branded 'Full' in 1886, as compared with those branded 'Full' in 1884 and 1883, shows an increase of 26,980½ and 80,336½ barrels respectively; but that as regards maties, the number of barrels branded in 1886 was not one-half of the quantity branded in any one of the preceding three years; thus showing that the quality of the herrings landed in 1886 was superior to those taken in the preceding three years.

HERRINGS EXPORTED.

Quantity of Cured Herrings Exported.

The total quantity of cured herrings exported from Scotland in 1886 amounted to 938,369½ barrels, which, although a decrease under the quantity exported in the previous year of 190,220 barrels, shows, when compared with the average of the preceding

Comparison with previous years.

ten years, an increase of 18·42, per cent.; when compared with the average of the preceding twenty years, an increase of 41·88 per cent; and of the preceding forty years, 87·25 per cent.

Places to which Exported.

From the following table it will be seen that Germany and other places on the Continent imported 195,809 barrels fewer than in the previous year; but that Ireland and places out of Europe took 4827½ and 761½ barrels additional respectively.

Barrels of Cured Herrings Exported from Scotland in 1885 *and* 1886.

Exports in 1885 and 1886 compared.

Years.	To Ireland.	To the Continent.	To Places out of Europe.	Total Number of Barrels Exported.
1885, ...	22,711	1,104 705½	1,173	1,128,589½
1886, ...	27,538½	908,896½	1,934½	938,369½
Increase in 1886, . .	4,827½	...	761½	...
Decrease in 1886, . .	...	195,809	...	190,220

Particulars of Barrels Exported.

Table V. Appendix A, shows the total number of barrels of white herrings exported from Scotland last year; distinguishing the export to Ireland, to the Continent, and to places out of Europe; and distinguishing also herrings cured gutted from herrings cured ungutted, and herrings bung-packed from herrings repacked. To this table is appended a supplementary note showing the ports or places to which the herrings exported to the Continent were shipped, and the total quantity exported.

Herrings Cured, Branded, and Exported, 1809 to 1886.

Table VI. Appendix A, gives an abstract of the total quantity of white herrings cured, branded, and exported, year by year, *in so far as brought under the cognizance of the fishery officers,* from 1st June 1809 to 31st December 1886; distinguishing the export to Ireland, to the Continent, and to places out of Europe.

WINTER HERRING FISHERY.

Winter Herring Fishing now an important Industry.

During the last two years the winter herring fishing has become an important industry nearly all along the East Coast of Scotland, from the Firth of Forth to the Pentland Firth; while, formerly, it was not much prosecuted, except in the Leith and Anstruther districts, and on the West Coast in Ballantrae district.

Districts where prosecuted on East Coast.

Particulars of Fishing.

The districts upon the East Coast, where it was most extensively carried on last year, are Leith, Anstruther, Montrose, Stonehaven, Aberdeen, Peterhead, Fraserburgh, Banff, Findhorn, Cromarty, Helmsdale, Lybster, and Wick. The fishing was opened about the beginning of January and closed in the end of March. Immense shoals of herrings were found along the coasts of the above districts, lying generally from one to six miles off shore.

Boats very successful.

The boats were very successful, and some of them landed individual takes of from 50 to 100 crans. In Anstruther district 26,736 crans were caught, being 12,099 crans above the average of the last ten years. In Wick district 22,184 crans were landed, and in Buckie district 15,675 crans. The herrings, although fairly good, were not so rich as those taken in summer. They were usually sent fresh or lightly salted to the markets for immediate use, or cured as kippers or bloaters. Sometimes, however, when the takes landed were very great, the markets became glutted, and the prices fell to so low a point, that considerable quantities were cured in the regular way and shipped to the Continent, in the hope that this would prove more remunerative than disposing of them at home.

How Herrings were disposed.

Winter Herring Fishing on West Coast.

Upon the West Coast the most important winter herring fishing was in Ballantrae district. The catch for 1886, however, was very small, having only yielded 4760 crans, as compared with 27,671 crans in 1885. This falling off was in a great degree owing to the stormy weather which prevailed during the fishing season, the boats having been frequently unable to proceed to the exposed banks of Ballantrae where the herrings lay. In Stornoway district about 9000 crans were landed.

Gross Catch of Winter Herrings in excess of any former year.

Altogether, the gross catch of winter herrings was greatly in excess of that in any former year. It amounted to 128,441 crans, of which 95,266 crans were landed on the East Coast, and 33,175 on the West Coast. Unfortunately, the average prices realised were exceedingly low, as compared with those of previous seasons.

HOOPING OF HERRING BARRELS.

Curers Petition that Herring Barrels may be hooped with either Wooden or Iron Hoops.

As formerly reported, the Board received petitions from a number of fish-curers at some of the principal stations in Scotland, regarding the hooping of herring barrels. Under the regulations in force, it was lawful to hoop barrels, for the packing, shipping, or exporting of cured white herrings, with wooden hoops only, and the petitioners wished that an additional regulation should be passed, making it optional to hoop such barrels either with wooden or iron hoops. The reasons urged for this additional regulation being made were, that great difficulty had been frequently experienced in procuring, at a moderate price, the necessary quantity of wooden hoops for the manufacture of the largely increased number of barrels which were required, consequent upon the development of the herring fishery; while an unlimited supply of iron hoops could at all times be obtained; and also that barrels hooped with iron could be made much stronger and more easily tightened than those hooped with wood, and that their cost would probably be less. The Board had no power to comply with the prayer of the petitioners; but after giving full consideration to the views expressed by them, and having received reports from their district officers on the subject, in which a general expression of opinion was given that the desired change would be for the benefit of the trade, they got the Government to insert in the Sea Fisheries (Scotland) Amendment Bill, 1885, which was afterwards passed, a clause authorising them to do what was wished. The clause in this Act makes it law-

Reasons urged for change.

Board got Statutory Power to do what was wished.

ful to pack, ship, or export cured white herrings in barrels made in such manner and of such materials, and with such hoops as may be approved by the Board, who are empowered to make regulations on the subject, and from time to time to alter the same. The Board thereafter made additional regulations, which are now in force, under which every barrel or half-barrel for cured white herrings may be hooped entirely with iron hoops, or partly with wooden and partly with iron hoops.

Additional Regulations made.

During 1886, the new regulations were taken advantage of in fourteen of the twenty districts where herring barrels are manufactured. The gross number of barrels made in Scotland in that year was 926,768 ; of which about 42,860 were hooped, either in whole or in part, with iron hoops. The use of iron hoops is thus having a fair trial, and in the meantime the trade generally seem to be satisfied with the results, both as to the barrels themselves, and the price at which they can be supplied.

To what extent taken advantage of.

STANDARD MEASURE FOR HERRINGS.

In the course of last year representations were made to the Board, by large numbers of fishermen at different parts of the coasts, that the mode adopted for the measurement of fresh herrings, as between buyer and seller, was of a very unsatisfactory character, and they asked that the Board would take steps to put matters on a better footing, and especially that they would frame a regulation for making quarter cran measures of basket work, and legalise their use.

Fishermen desire that a Quarter Cran Measure be legalised.

The fishermen complained that, when delivering herrings from their boats, baskets were frequently used for measuring them, which, while being represented as of the capacity of a quarter cran, were of larger size ; and that they thereby sustained considerable loss by giving more herrings than the quantity for which they were paid. The only standard measure for the sale of fresh herrings is the cran, the capacity of which is 37½ imperial gallons, and it would not be practicable also to legalise as a standard a quarter cran, of the fourth part of that capacity, as herrings would not lie proportionately so compactly together in the smaller measure as in the larger one. Accordingly, when a quarter cran is referred to in the Act 14 and 15 Vict. cap. 26, it does not mean a measure equal to one-fourth of the capacity of a cran, but such 'as on being 'filled four times with herrings shall make a complete cran.'

Reasons therefor.

How matter now stands.

The Board, after giving the whole matter their full consideration, deemed that the best way of remedying the grievance complained of, would be to keep a cran measure, officially stamped, in each of their twenty-six district offices along the coasts, so that fishermen and fish merchants might be able to test by this standard the size of all baskets or other measures used. This course was accordingly adopted, and it is gratifying to know that it has given satisfaction to the fishermen generally.

Board resolve to keep a Stamped Cran Measure in District Offices to test size of other measures.

It may be added, that a measure of the capacity of about 10 gallons, if filled 4 times with herrings, will make a complete cran of 37½ gallons ; and it would be well if every fishing boat provided itself with such a measure, so that the size of any baskets or boxes used by purchasers of herrings could be at once tested.

COD, LING, AND HAKE FISHERY.

Returns in 1886 against recent years.

Quantity Cured in Vessels, about twice as much as in 1885.

Yield of Districts.

Rich Fishing Grounds.

Swedish Vessels engaged.

The returns of the cod, ling, and hake fishing of 1886 show a decrease in the catch, when compared with that of 1885; but an increase over the average of recent years. The quantity of fish cured dried amounted to 121,075 cwt., and the quantity cured in pickle to 6700 barrels, being a decrease under the previous year of 4277½ cwt. dried, and in pickle of 400 barrels. Of the above quantity, 23,770 cwt. dried, and 95 barrels pickled, were cured on board of vessels. This is nearly twice as much as in the previous year, although the number of vessels employed was only 45, as compared with 59. With the exception of 3, all these 45 vessels were fitted out at Orkney and Shetland. The cod fishing at Faroe having proved a failure last year, the vessels went to Rockall. Fish were found there in extraordinary abundance, and full cargoes were got in a few days. Some of the vessels made four or five successful voyages. One of these voyages, including the time spent in fishing, occupied only twenty-one days. Shetland district yielded 61,067 cwt. of fish dried, being about one-half of the total quantity cured at all the stations in Scotland. Of the other districts, Stornoway and Orkney show the best returns. The grounds lying contiguous to these three districts abound with superior cod and ling; and it is to be regretted that this fishing is not more extensively prosecuted. There were also ten or twelve Swedish vessels engaged in the industry upon the coast of Shetland during the summer months. Some of these vessels disposed of their takes to local curers; whilst others, considering the prices too low, carried them home.

Cod, Ling, and Hake cured and exported in 1885 and 1886.

The following is a statement of the total quantity of cod, ling, and hake cured and exported in 1885 and 1886, showing the increases or decreases in the latter year:—

Total Quantity Cured.			Total Quantity Cured Dried, and in Pickle, Exported.				
Years.	Dried.	In Pickle.	To Ireland. Dried.	To the Continent.		To Places out of Europe. Dried.	Total Quantity Exported.
				Dried.	Pickled.		
	Cwt.	Barrels.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
1885, . . .	125,352½	7,100	30,144	6,689	...	10,408	47,241
1886, . . .	121,075	6,700	38,845	8,033	177	9,494	56,549
Increase in 1866,	...	...	8,701	1,344	177	...	9,308
Decrease in 1886,	4,277½	400	...	...	...	914	...

The total quantity of these fish exported in 1886 shows a considerable increase as compared with that of 1885, although the catch was smaller. For many years the largest quantity exported went to Spain; but owing to the differential duties charged there, the demand has greatly diminished during the last three or four years.

Export to Spain diminished owing to differential duties.

Table I. Appendix B, shows the number of vessels fitted out in Scotland last year for the cod and ling fishery; the districts from which they were fitted out; the tonnage of the vessels; and the number of men; also the quantity of cod, ling, and hake cured on board; distinguishing whether cured dried or cured in pickle.

Cod, Ling, and Hake cured on Board of Vessels.

Table II. Appendix B, shows the total quantity of cod, ling, and hake taken at the cod and ling fishery in Scotland last year by open boats, and cured on shore, distinguishing the fish cured dried and the fish cured in pickle; and distinguishing also the districts in which they were cured.

Cod, Ling, and Hake cured on Shore.

Table III. Appendix B, shows by districts the total quantity of cod, ling, and hake taken, both by vessels and by open boats, at the cod and ling fishery in Scotland, and cured last year; distinguishing the fish cured dried and the fish cured in pickle.

Total of Cod, Ling, and Hake cured in Vessels and on Shore.

Table IV. Appendix B, shows the total quantity of cod, ling, and hake exported from Scotland last year; the quantities thereof exported from different districts; distinguishing the export to Ireland, to the Continent, and to places out of Europe; and also whether cured dried or cured in pickle.

Cod, Ling, and Hake exported.

Table V. Appendix B, gives an abstract of the total quantity of cod, ling, and hake cured, punched, or branded, and exported, year by year, *in so far as brought under the cognizance of the fishery officers,* from 10th October 1820, when the system for the encouragement and improvement of the cod and ling fishery commenced, to 31st December 1886.

Cod, Ling, and Hake cured and exported, 1820 to 1886.

FISH SOLD FRESH.

In Appendix C will be found a statement of the total quantity and value of the different kinds of white and shell fish returned as landed in Scotland, but excluding those herring, cod, and ling accounted for *as cured,* in Appendices A and B, in the year 1886, compared with 1885, distinguishing the respective quantities returned as landed in each of the twenty-six districts into which the coasts of Scotland are divided for fishery purposes, and the value thereof.

Quantity and Value of White and Shell Fish landed.

These statistics have been compiled from returns collected by the Board's officers in the twenty-six districts, assisted by a number of correspondents resident at different harbours and creeks.

Returns collected by Board's Officers, but at first without Statutory Power.

With reference to such collection, the Act of 1882, under which the Board is constituted, directs that their Annual Reports shall contain a statistical account of the fisheries of Scotland, thus requiring them to make returns of the quantities of the different kinds of white fish which are landed and used *fresh,* as well as of those which are *cured,* and also of shell-fish; while the former Fishery Board collected and published statistics of only those fish which were *cured.*

As soon as the necessary arrangements could be made, the Board addressed themselves to this duty. The work was begun in April 1883, and thereafter regularly carried on; and there have been inserted in the Board's Annual Reports the statistics which were collected.

The Board, however, had no statutory power to compel parties who might possess it, to give the necessary information, and their fishery officers had sometimes considerable difficulty in getting the particulars required, indeed occasionally they were refused any information whatever; although, altogether, the Board considered the result as correct as could have been reasonably expected.

In view of importance of reliable Statistics being published, Parliamentary Power got to enforce returns.

In the circumstances of the case, and in view of the great importance of reliable statistics being regularly published, the Board deemed it extremely desirable that they should get statutory authority to enforce the necessary returns being made. This authority was conferred upon them by the 6th section of the Sea Fisheries (Scotland) Amendment Act, 1885, under which they can require all persons belonging to British sea-fishing boats, and fishcurers, catching or curing sea fish in Scotland, or in any part of the sea adjoining Scotland, to make returns, in such form and at such periods as they may prescribe, with the sanction of the Secretary for Scotland, of all sea fish caught or cured by them respectively. Thereafter, as authorised by the Act, suitable forms were prepared for the collection of the statistics, and issued to the fishery officers who get the returns made; and full publicity was given to the powers conferred upon the Board by printed notices posted up in conspicuous places along the coasts. In a few cases, persons, to whom application was made to supply returns, declined or delayed doing so; but on the provisions of the Act being explained to them, and it being stated that there was no intention on the part of the Board to make known the quantities of fish landed by the different boats respectively, or cured by individual persons or firms the object being only to publish the aggregate quantity landed and cured at the creeks, the officers experienced no difficulty in getting the returns. As early in each month as possible, a statement has been published of the total quantity and value of the different kinds of white and shell fish landed during the preceding month, distinguishing the respective quantities landed in each district and the value thereof; and a copy of this statement was regularly sent to the Board of Trade for publication in their Monthly Journal.

Result satisfactory.

Returns published monthly.

I. White Fish.

White Fishing most prosecuted on East Coast; reasons therefor.

Of the three divisions into which the twenty-six fishery districts are grouped in Appendix C, viz., East Coast, Orkney and Shetland, and West Coast, the white fishing continues to be prosecuted with the greatest energy in the first. This is in no small degree owing to there being better facilities on the East Coast for getting the takes sent quickly to the different markets, than in either of the other divisions, so that they can be consumed fresh; and the returns show that the largest quantity of white fish was captured on that coast.

Large quantities of Fish landed by BeamTrawlers.

Large takes of white fish continue to be landed by beam trawl vessels. The number of these vessels employed last year belonging to Scotland was 109, and they fished for the most part in the districts of Leith and Aberdeen. In 1885 the number was 105, and in the previous year 61. In addition, a large fleet of English trawlers prosecuted the industry off the coasts of Scotland. The trawlers usually delivered their takes at Berwick, Eyemouth, Newhaven, Granton, Montrose, Aberdeen, Fraserburgh, and Wick, upon the East Coast; and at Ayr and Stranraer, on the West Coast.

Where their Takes are delivered.

Quantity and value of White Fish landed and sold fresh in 1885 and 1886. Coasts where landed.

The aggregate quantity of white fish landed in Scotland during 1886, and sold for consumption fresh, amounted to 1,714,453 cwts., valued at £685,973, as compared with 1,725,459 cwts., valued at £737,824 in the previous year. Of this total quantity, 1,394,422 cwts. were taken on the East Coast; 125,546 cwts. in Orkney and Shetland; and 194,485 cwts. on the West Coast,—showing, as compared with 1885, an increase of 62,380 cwts. on the East Coast; an increase of 25,175 cwts. in Orkney and Shetland; and a decrease of 98,561 cwts. on the West Coast. The greatest increase of white fish was in haddocks, amounting to 148,852 cwts. This was mainly owing to the large quantity landed by the beam trawl vessels belonging to the ports of Leith, Montrose, and Aberdeen. There was also an increase in saithe, halibut, soles, eels, and in some other kinds of fish. The decrease was chiefly in herrings, sprats, mackerel, cod, ling, whitings, turbot, flounders, and skate. Some particulars will now be given of the quantity and value of the principal kinds of white fish landed.

The Herring Fishery.

HERRING.—The quantity of herrings landed last year, and sold for consumption fresh or lightly salted, amounted to 129,136 crans, valued at £83,417, being 10,739 crans less than in 1885. Owing to the low prices which prevailed during the year, the value shows the large decrease of £38,617. The districts which forwarded the largest quantities of herrings to market fresh were Anstruther, Wick, Peterhead, Shetland, and Stornoway. The total quantity these districts sent was 66,611 crans.

The Sprat Fishery.

SPRAT.—The Sprat fishing of last year yielded 7323 crans, valued at £3714, as compared with 22,426 crans in 1885, the value of which was £4190. This fishing was prosecuted in the upper reaches of the Firth of Forth, the Firth of Tay, and the Moray Firth, in January, February, November, and December. It proved, however, a complete failure during the first two months in the Forth and Tay.

The Mackerel Fishery.

MACKEREL.—The total quantity of mackerel landed last year was 2925 cwts., valued at £1893, being a decrease, as compared with that of 1885, of 9444 cwts., and of £2102 in value. The fish were principally taken on the West Coast, which yielded 2885 cwts. In Orkney and Shetland only 24 cwts. were caught, and on the East Coast 16 cwts. The fishing of mackerel, however, can scarcely be said to be prosecuted in Scotland, and those landed last year were mostly taken in nets which had been set for herrings.

The Cod Fishery.

COD.—The quantity of cod sent fresh to market shows a decrease under that of the previous year. It amounted to 198,093 cwts., valued at £84,593, as compared with 201,108 cwts. in 1885, valued at £93,456. Of the gross quantity landed, more than three-fourths were caught on the East Coast. Leith district was the most successful; but the districts of Buckie, Wick, Anstruther, Aberdeen, and Findhorn also made excellent fishings. On the West Coast the districts which landed the largest quantities were Ballantrae, Stornoway, and Loch Broom.

The Ling Fishery.

LING.—The quantity of ling landed for consumption fresh was 39,708 cwts., valued at £17,924, being a decrease under 1885 of 9382 cwts., and of £9295 in value. The districts which contributed the largest quantities were Wick, Buckie, Aberdeen, and Leith. The total quantity caught on the whole of the West Coast was not equal to the takes of either Wick or Buckie.

The Torsk (Tusk) Fishery.

TORSK (TUSK).—Torsk are not plentiful on the coasts of Scotland. The quantity sent fresh to market last year was 888 cwts., valued at £292, being an increase as compared with the preceding year of 357 cwts., and of £111 in value. More than one-half of the catch was got on the East Coast; and of the remainder a large portion was taken at Orkney and Shetland. Fourteen districts landed no torsk at all.

The Saithe (Coal Fish) Fishery.

SAITHE (COAL FISH).—Saithe were taken in greater or less abundance last year on all the coasts of Scotland. The aggregate weight landed and used fresh was 64,468 cwts., valued at £10,310. This is an increase as compared with the previous year of 17,372 cwts., but a decrease in value of £96. Orkney contributed more than one-half of the total quantity caught, and the remainder was landed in about equal portions on the East and West Coasts.

The Haddock Fishery.

HADDOCK.—The haddock has become the most important of the white fish taken and consumed fresh in Scotland, both as regards quantity and value. Last year's haddock fishing was a very abundant one, and yielded the high aggregate quantity of 671,316 cwts., valued at £327,023, being an increase of 148,852 cwts., over the great produce of the previous year, and £22,411 in value. Haddocks were caught in greater or less numbers at all the stations; but Leith district had the best fishing, and landed 169,251 cwts., or more than one-fourth of the whole quantity captured in Scotland. Large takes were also got in the districts of Montrose, Aberdeen, Banff, Buckie, Anstruther, Eyemouth, and Findhorn. Shetland is now beginning to develop its haddock fishery. Last year 21,017 cwts. were landed there, being nearly double the quantity caught at all the West Coast stations.

The Whiting Fishery.

WHITING.—Of whitings, the quantity caught was 74,933 cwts., valued at £28,954, being a decrease, as compared with the previous year, of 24,705 cwts., and of £9597 in value. Leith contributed the largest catch of this fish, as well as of the haddock, amounting to fully one-third of the gross quantity landed at all the other stations. The districts of Aberdeen, Montrose, and Anstruther also had excellent fishings.

The Turbot Fishery

TURBOT.—Turbot are never got in abundance on the coasts of Scotland. The total catch last year amounted to 3882 cwts., valued at £9774, being a decrease, as compared with the previous year, of 3468 cwt., and £3761 in value. The districts which yielded the best fishings were Aberdeen, Leith, Stornoway, and Fraserburgh.

The Halibut Fishery.

HALIBUT.—The quantity of halibut taken last year was 29,885 cwts., valued at £22,136, being an increase over that of the previous year of 1458 cwts., and £2083 in value. Orkney and Shetland still land the largest catch of this fish, having yielded last year more than one-half of the total quantity taken in all the districts. Orkney captured 4873 cwts., and Shetland 10,721 cwts. Stornoway got 5302 cwts. Nearly the whole catch of these three districts was forwarded to market in ice. The districts of Inveraray, Rothesay, and Greenock yielded no halibut; and only a few were caught at Fort William, Cromarty, Helmsdale, and Lybster.

The Sole (Lemon Sole) Fishery.

SOLE (LEMON SOLE).—Soles are found only in a few districts in Scotland. The total catch last year amounted to 7573 cwt., valued at £9372, being greater than that of 1885 by 1675 cwts., and £1886 in value. More than one-half of the whole catch, as had been the case in the previous year, was landed at Aberdeen. Leith, Montrose, and Fraserburgh were fairly successful; but scarcely any soles were got in the other districts.

The Flounder, Plaice, and Brill Fishery.

FLOUNDER, PLAICE, AND BRILL.—The total quantity of flounders, plaice, and brill landed last year was 81,164 cwts., valued at £50,198, being less than in the previous year by 2646 cwts. and £2667 in value. Aberdeen district was the most successful, and landed one-third of the aggregate catch. Leith district also made an excellent fishing; and the districts of Montrose, Findhorn, Ballantrae, and Fraserburgh were fairly successful.

The Eel Fishery.

EEL.—Eels are not found in abundance on the coasts of Scotland. The gross quantity landed was 1308 cwts., valued at £728. Last year they were only caught in six districts, viz., Wick, Montrose, Peterhead, Shetland, Leith, and Buckie. Wick got more than one-half of the total catch.

The Skate Fishery.

SKATE.—Skate are found on all the Scottish coasts. The total quantity landed last year was 52,046 cwts., valued at £10,519, being about one-half of the catch of the previous year, and less valuable by £5246. Stornoway, as was also the case in 1885, had the most successful fishing, and after it, the districts which contributed the largest quantities were Aberdeen, Orkney, Leith, Buckie, and Wick.

Other White Fisheries.

OTHER KINDS OF WHITE FISH.—The other kinds of white fish, of which returns are given in Appendix C, include bream, gurnard, hake, and cat-fish. The total quantity landed was 76,887 cwts., valued at £25,126, showing an increase over the catch of the previous year of 2664 cwts., and of £1650 in value. The largest quantities were landed at Leith, Montrose, Buckie, Aberdeen, and Wick districts.

II. SHELL FISH.

Quantity and value of Shell Fish landed in 1885 and 1886.

The total quantity of shell fish landed last year was much larger than in the previous year, but the value was £15,906 less. The greatest increase was in mussels and clams, and the principal decrease in lobsters and crabs. The value of all the shell fish taken was £73,287. Some particulars will now be given of the quantity and value of the different kinds of shell fish landed.

The Oyster Fishery.

OYSTER.—The whole oyster fisheries of Scotland yielded in 1886 only 2956½ hundreds, valued at £1295, being an increase over the quantity landed in the previous year of 754½ hundreds, and £486 in value. This fishery was prosecuted in seven districts, but only to a very limited extent, except in Leith, Ballantrae, and Stornoway. Ballantrae yielded nearly three-fourths of the total quantity taken in the year.

The Mussel Fishery.

MUSSEL.—The total quantity of mussels landed in 1886 was 261,262 cwts., valued at £14,864, being an increase over the take of the previous year of 17,000 cwts., but a decrease in value of £503. The principal mussel scalps are situated in the Firths of Clyde, Forth, and Tay, the Moray Firth, and in Montrose district; but there are also scalps at many other places, particularly on the West Coast.

The Clam Fishery.

CLAM.—The total quantity of clams landed in 1886 was 9100 cwts., valued at £1256. These fish were all got in the prolific clam beds lying off Prestonpans and Cockenzie, in the Firth of Forth, extending to several square miles. Limited quantities are occasionally taken in the districts of Stornoway, Campbeltown, Inveraray, Cromarty, and Orkney.

The Lobster Fishery.

LOBSTER.—The number of lobsters landed amounted to 749,350, valued at £30,505, being less than in the previous year by 206,950, and by £4576 in value. The best fishings were got in the districts of Stornoway and Orkney, which yielded 217,570 and 107,750 lobsters respectively. The former number shows a decrease, as compared with that of the previous year, of 304,530, and the latter an increase of 34,950. The districts which, next in order, yielded the best fishings, were Campbeltown, Loch Broom, and Wick. All the others contributed, more or less to the total quantity landed, except Shetland, where no lobsters could be found. Those caught on the West Coast were superior in quality to those taken on the East Coast.

The Crab Fishery.

CRAB.—Of crabs the total number landed last year was 2,384,650, valued at £13,544, being a decrease, as compared with 1885, of 865,250, and £10,196 in value. The best crab fishing was got in the districts of Leith, Anstruther, Montrose, and Eyemouth. Except Shetland, where neither crabs nor lobsters are found, all the other districts contributed, in a greater or less degree, to the gross quantity caught. Crabs found on the West Coasts, more particularly at the Outer Hebrides, are of inferior quality to those landed on the East Coast. They are seldom used as food by the inhibitants of the districts where they can be got, and they are not worth the cost of carriage to the centres of population.

Other Shell Fisheries.

OTHER KINDS OF SHELL FISH.—Of the other kinds of shell fish, the most important are the cockle, whelk, limpet, and razor-fish. Of these, 63,231 cwts. were landed in 1886, valued at £11,823, being an increase over the take of the previous year of 9035 cwts., and a decrease of £2373 in value. The districts which contributed the largest quantity were Stornoway, Shetland, Loch Carron and Skye, Orkney, Ballantrae, Anstruther, Fort William, Wick, and Inveraray. Cockles are found in great abundance upon the West Coast, where they are much used as an article of food, and occasionally for bait. The most productive beds are in the Outer Hebrides, especially at the north end of the Island of Barra. Very large quantities of excellent quality have been annually landed there for a number of years past, and shipped to various towns in the country, especially in the midland counties of England, where they find a ready sale. Steamers now touch at Barra three times a week; and this has greatly tended to develop the cockle fisheries, which have in no small degree alleviated the poverty which often prevails at Barra during the winter and spring months. Whelks are plentiful on many parts of the coast, and large quantities are gathered and sent to market every year. Limpets are also found in considerable numbers on all the coasts, and are regularly gathered for bait. Razor-fish are rarely got except in the sands on the West Coast, during low tide. They are sometimes very plentiful at Broad Bay, in the island of Lewis, where they are used for food, and from whence occasionally considerable quantities are shipped to other places.

Gross value of White and Shell Fish.

From what has been already stated, it will be seen that the aggregate value of both white fish and shell fish landed was £759,260, being a decrease as compared with the previous year of £67,757. The values given are the amounts received by the fishermen for their takes; but, with reference thereto, it is of importance to mention that the prices last year of all kinds of sea fish were exceedingly low.

Inspection of Fishery Districts.

The twenty-six fishery districts were, in the course of the year, inspected and reported on as to the manner in which the duties of the officers had been carried on—those on the East Coast by Mr George Reiach, general inspector, and those on the West Coast by Mr James Low, assistant inspector. The Board gladly bear testimony to the careful and efficient manner in which the district officers discharged their several duties, and to the able superintendence exercised by the inspectors.

OYSTER, CRAB, LOBSTER, AND MUSSEL FISHERIES, AND CLAM AND BAIT BEDS.

Powers of Board of Trade as to these Fisheries in Scotland transferred to this Board.

It was stated in the last Report of the Board, that by the 11th section of the Sea Fisheries (Scotland) Amendment Act, 1885, which had come into operation, all the powers and duties of the Board of Trade, under the Sea Fisheries Act of 1868 and the Fisheries Acts of 1877 and 1881, so far as they can be exercised in Scotland, in respect to the oyster and mussel fisheries, the crab and lobster fisheries, and the clam and and bait beds, had been transferred to this Board, who were therefore in a position to receive and consider any applications that might be made to them by persons desirous of cultivating the oyster and mussel fisheries, and to afford every facility for their doing so. The Board are also prepared to receive and consider applications for Temporary Orders to restrict or prohibit dredging for and taking oysters on certain banks or beds under sections 5 and 6 of the Act of 1877; Temporary Orders to restrict or prohibit fishing for and taking of crabs and lobsters in certain areas under section 10 of the same Act; and Temporary Orders to protect clam or other bait beds in certain areas from injury by any beam trawl not being a dredge for oysters under the Act of 1881.

Board now in position to receive and consider applications regarding these Fisheries.

Regulations made as to Fishery Orders can now be had.

Regulations have been made for the instruction and guidance of persons applying for Fishery Orders under the provisions of the above mentioned Acts for the purpose of facilitating and systematising their applications, to which are appended specimen forms of Orders. A copy of these regulations will be found in Appendix I., and a separate print of them will be supplied on application to the Secretary of the Board.

It has been already stated that the quantity of oysters taken in Scotland is very small indeed. The total number landed last year only amounted to 2956½ hundred; but it is to be hoped that the passing of the above mentioned Act will have the effect of greatly increasing the supply, as well as that of mussels, by inducing individuals or companies to engage in their cultivation.

Board in communication with parties regarding Fishery Orders.

The Board have been in communication with several parties in regard to fishery orders, and after full consideration they resolved to entertain an application from Messrs William Hay and others, at Tarbert, Lochfyne, for an order for the establishment, maintenance, and regulation of an oyster and mussel fishery on the sea-bed of West Loch Tarbert, in the county of Argyll, and decided to proceed with the case, but the arrangements in regard thereto were not completed within the period embraced by this Report.

MARINE POLICE AND FISHERY SUPERINTENDENCE.

Instructions to Officers regarding lettering and numbering of Boats, efficiently carried out.

Number of Boats detained.

The instructions issued by the Board to their officers, which were specially adverted to in their last Report, for the enforcement of the regulations regarding the lettering and numbering of all British sea fishing boats, as required by the Sea Fisheries Acts and the relative Orders in Council, were efficiently carried out; and the officers explained the provisions of the Acts to the fishermen, and encouraged them to observe the regulations. The number of boats detained in 1886 for contravention of the regulations was 698, being an increase of 267 over the preceding year. These detentions, although numerous, were generally only for a few hours, but they proved sufficient for the enforcement of the regulations without measures being resorted to for having the fishermen fined, as authorised by the Acts.

Registration of Boats. Certificates issued, examined, and endorsed.

The proceedings in connection with the registration of fishing boats (for police purposes), during the year 1886, were as follow, viz.:—The number of applications made to the officers of the Board for certificates of registration was 599; the number of applications transmitted to collectors of customs, and of certificates issued, was 603; and the number of registers examined and indorsed was 5600.

In Appendix D., Table VI., will be found particulars, classified by districts, of these applications to register, and of the registers issued, and examined and endorsed, and of the boats detained by the 'Vigilant' cruiser and H.M.S. 'Jackal.'

Duties of Board in protecting Fisheries with Admiralty vessels, now carried on under the Admiral Superintendent of Naval Reserves.

Swifter and more powerful Vessel substituted for H.M.S. 'Jackal.'

The duties of the Board in connection with the protection of the fisheries, which, in so far as they related to H.M.S. 'Jackal' and the other Admiralty vessels placed at the service of the Board, had hitherto been carried on under the directions of the Lords of the Admiralty, were last year, by instructions from their Lordships, placed under the orders of the Admiral Superintendent of Naval Reserves, with whom the Board were requested in future to communicate direct in all matters relating to the protection of the fisheries, but upon the understanding that any points of difference which might arise should be settled between the Admiralty and the Secretary for Scotland. The commanders of these vessels were ordered to act, as had hitherto been the case, on the direct instructions of the Board. Their Lordships were pleased to substitute for H.M.S. 'Jackal,' the 'Woodcock' (re-named 'Jackal'), which is a swifter and more powerful vessel. She has also the advantage of being provided with the electric light, so that she will be enabled to sight vessels at a considerable distance during the night, and thus

Vessels employed in protecting the Fisheries

more effectually carry out the duties with which she is charged. The vessels employed by the Admiral Superintendent in the above work during the year 1886, in addition to H.M.S. 'Jackal,' Lieut. J. W. Osborne in command, and the 'Vigilant' cruiser, Mr Alex. M'Donald in command, both of which are permanently in the service of the Board, were the tenders from the guard ship at Leith, viz., H.M. gunboat, 'Firm,' Lieut. J. W. Brant in command, and H.M. cutters 'Eagle' and 'Active,' Mr Henry Miller and Mr William Sherlock in command. These vessels were engaged during the great summer herring fishery on the East Coast and in the Shetland and Orkney Islands, and their services were much appreciated by those engaged in the fisheries.

Services of 'Jackal.'

The 'Jackal' was employed during the year in superintending the herring fishery in Loch Fyne, at Ballantrae on the Ayrshire coast, and at Barra in the Hebrides. She was also engaged at the summer herring fishery on the East Coast, where she was stationed at Wick, and had charge of that part of the coast from Duncansbay Head on the north to Troup Head on the south, including both sides of the Moray Firth. Her services at all these places were performed under Lieut. Osborne, with great assiduity and watchfulness. Upon her return to the West Coast, she was employed, along with her tender 'Daisy,' in putting a stop to herring fishing on Sunday at Kilbrannan Sound, and in the upper parts of Loch Fyne, regarding which complaints had been made to the Board. By the exertions of the commander, a check was put to this illegal practice, to the satisfaction of the general body of the fishermen, who tendered their thanks to the Board for the prompt action taken in the matter. While engaged on fishery duty, the 'Jackal' was, by orders of the Admiral Superintendent, detached for a short time to convey the Examiner of Registers of Births and Deaths to Fair Isle and Foula Island, and also to carry out special duties of the Admiralty at Portree in Skye. During her absence the superintendence in Loch Fyne was carried on in an efficient manner by Mr Boughton in command of the tender 'Daisy,' who was also usefully employed in investigating complaints against beam trawlers in Luce Bay and at Ballantrae of damaging the nets and lines of fishermen.

Services of 'Vigilant.'

The 'Vigilant' cruiser was engaged during the year in superintending the fisheries in the Firths of Forth, Tay, and Beauly; at Stornoway in the Lewis, and at the summer herring fishery on the East Coast. She was stationed at Aberdeen, and had charge of the coast from Troup Head on the north to Red Head on the south. In the performance of the duty assigned to the commander for the protection of all engaged in the fisheries, he showed great zeal and energy in keeping order among the fishermen; in enforcng the regulations regarding the lettering and numbering of boats; investigating complaints from fishermen, and settling disputes which arose among them; and in protecting the waters closed by the bye-law made by the Board against beam trawling. In connection with these duties, the commander examined 2000 certificates of registers. He also detained 578 fishing boats and 18 trawl vessels for non-compliance with the regulations, and he warned 450 boats to carry lights.

In the last Report of the Board, special attention was called to

Prosecution for offences at Sea, and as to obtaining Compensation for Damage.

important changes made upon the law by the Sea Fisheries (Scotland) Amendment Act, 1885, for the prosecution of offences committed by any person against the provisions of the Sea Fisheries Acts, and also as to the mode to be adopted for obtaining compensation for damage caused by such offences. The 7th section of the Act provides that, where an offence has been committed by any person belonging to a British sea-fishing boat in Scotland, or in any part of the sea adjoining Scotland, against the Sea Fisheries Acts, whereby any injury is done by one sea-fishing boat to another, or the nets, lines, or gear thereof, or its apparatus used in fishing, it shall be lawful for any sea fishery officer of the Board, to whom complaint is made by the party injured, to inquire into the complaint, and, after affording the person charged with the offence an opportunity of being heard, to make a report to the Board, setting forth the facts of the case, and the amount of the damage done.

Officers to enquire and report to Board.

Fishermen sustaining Damage should make complaint to Officers.

The Board would therefore repeat the strong recommendation which they made in their last Report, that any fisherman whose boats, nets, lines, or fishing gear are damaged by any trawler or other fishing boat, should immediately make his complaint known to the fishery officer of the district, or to any of the commanders of the superintending cruisers, who will, in terms of the Act of Parliament, inquire into the circumstances of the complaint, and issue a report setting forth the particulars thereof, and stating the amount of damage done, and who is in fault. In the event of both parties being satisfied with the report, the matter may be settled in terms thereof; but if an arrangement is not made, then the injured party may take the case into Court, and have the question tried and decided by the Sheriff, the statutory report being part of the evidence.

Return of complaints investigated and reported on.

In their last Report, the Board gave a return up to the date of its issue of the complaints investigated and reported on since the passing of the Act in 1885, and showing in what way each case was disposed of. In Appendix H. of the present Report will be found a like return for the year 1886.

Great importance of this new law to Fishermen.

It is almost unnecessary to remark that this amendment of the law has been of great importance to fishermen, as by such inquiries and reports they are enabled in many cases to get a satisfactory settlement of the damage they sustain without having recourse to legal proceedings or incurring any expense; and, indeed, it would appear that the cases already decided have had the effect of making trawlers and fishing boats more careful than hitherto in avoiding doing injury to each other.

BOATS AND VESSELS.

Fishing Boats employed in Herring Fishery in selected week.

Table I. Appendix D, gives an account of the number of boats, decked and undecked, *irrespective* of the places to which they belong, employed in the herring fishery of Scotland, in the season of 1886, in a selected week for each district; with the number of fishermen and boys by whom they were manned; of coopers, gutters, packers, and labourers employed at the said fishery in the week so selected; and the total number of such fishermen and other persons so employed.

Boats and Vessels, Fishermen, and other persons employed in 1885 and 1886.

The following table shows the number of boats, decked and undecked, and beam trawl vessels employed in the herring and other sea fisheries of Scotland; the number of fishermen and boys by whom they were manned; the number of fish-curers, coopers, and other persons employed, in the years 1885 and 1886 :—

Years.	Fishing Boats and Beam Trawl Vessels.	Fishermen and Boys.	Fish-curers.	Coopers.	Other Persons (estimated).
1885, . . .	15,532	51,097	1,130	2,806	46,004
1886, . . .	15,344	48,919	1,073	2,697	44,206
Decrease in 1886, .	188	2,178	57	109	1,798

With reference to the above statistics, it may be noted that for many years previous to 1886, the number of boats and fishermen engaged in the sea fisheries was constantly increasing ; but that in 1886, owing to the great reduction in the prices of fish, which had prevailed in the two years immediately preceding, the number of boats employed in the fishing industry was reduced.

Capital employed in 1885 and 1886.

The amount of capital employed last year in boats, beam trawl vessels, and nets was less than in 1885, but the sum employed in lines was greater. The particulars of this decrease and increase are given in the following table :—

Years.	Value (estimated).			
	Boats and Beam Trawl Vessels.	Nets.	Lines.	Total.
1885, . . .	£923,956	£784,726	£119,764	£1,828,446
1886, . . .	916,017	756,579	122,361	1,794,957
Increase in 1886, .	...	...	£2,597	...
Decrease in 1886, .	£7,939	£28,147	...	£33,489

The decreases in 1886, as shown above, have been caused by the low prices of fish in the previous two years ; and the increase has arisen from line fishing having been prosecuted to a greater extent than before.

Details of Boats, Vessels, &c., and Capital employed.

Table II. Appendix D, shows the number and tonnage of boats, decked and undecked, and beam trawl vessels, employed in the herring and other sea fisheries of Scotland last year, with the districts to which they belong ; the number of fishermen and boys by whom they were manned ; the number of fish-curers, coopers, and other persons employed ; with the estimated value of boats, beam trawl vessels, nets, and lines.

Table III. Appendix D, shows the tonnage of shipping and the

Tonnage of Shipping, and number of Seamen engaged.

number of seamen engaged in the trade of the herring, and cod, and ling fisheries of Scotland, last year, distinguishing those employed in importing stave wood, hoops, and salt, in carrying herrings or cod-fish coastwise, or exporting them abroad; and distinguishing British from foreign tonnage and men.

Tonnage of Boats and Vessels, and number of persons employed.

The following table shows the total tonnage of boats and vessels, and the number of persons employed in the herring, cod, ling, and other sea fisheries of Scotland in 1886, as compared with 1885 :—

ABSTRACT.	Total Tonnage of Boats and Vessels, and Number of Persons employed.			
	British.		Foreign.	
Years.	Tons.	Persons.	Tons.	Persons.
1885, . . .	328,802½	113,007	63,534	3,140
1886, . . .	287,366	106,906	52,916	2,728
Decrease in 1886, .	41,436½	6,101	10,618	412

Abstract Return of Tonnage and persons employed.

Table IV. Appendix D, gives abstract returns of the tonnage of vessels and number of men; the tonnage of boats and number of fishermen and boys; and the number of other persons employed in the herring, cod, and ling, and other sea fisheries of Scotland last year.

Lives lost at Sea, and Loss in Boats, Nets, &c.

Table V. Appendix D, shows the number of lives lost in connection with the sea fisheries of Scotland; the number of boats totally wrecked, and the value thereof; the number of boats damaged, and the amount of damage; and the loss on nets and other fishing material lost or damaged, last year.

Number of Boats, and Beam Trawl Vessels, and Resident Fishermen in Scotland.

Table VI. Appendix D, is a return, by fishing villages or creeks, for the coasts of Scotland, of the number of first, second, and third class fishing boats, beam trawl vessels, and resident fishermen and boys, in the year 1886. It will be seen that in Table II. of Appendix D, the fishermen and boys returned are 8832 more than the above-mentioned number. This is, however, in consequence of that additional number, who were non-resident, having been employed in the herring fishery at the various stations, when the return was made up.

BUILDING OF FISHING BOATS AND STEAM TRAWLERS.

Industry in very depressed state.

This branch of the fishing industry has been in a very depressed state during the past two or three years, owing to the low prices for which herrings could be sold. Only a few boats of the largest size, four steam trawlers, and one or two steam line boats were built in 1886.

SALMON FISHERIES.

Mr Young's Inspections.

In the course of last year Mr Young, Inspector of Salmon Fisheries, by the direction of the Board, inspected the fisheries in the Orkney and Shetland Islands, having previously, since the beginning of 1883, inspected and reported upon all the salmon fisheries on the Mainland of Scotland and in the Inner and Outer Hebrides. Mr Young's Report on the Orkney and Shetland Fisheries forms Appendix G. The Board approved generally of this Report after having given it careful consideration.

Value of Scotch Salmon sent to Billingsgate Market.

23,407 boxes of Scottish salmon were sent to Billingsgate market in 1886, which, at £8 per box, represents a value of £187,256; and, adding a half for salmon consumed at home and sent out of the country, elsewhere than to London, gives £280,884 as the total value of the Scotch salmon fisheries in 1886. The following are the returns of the number of boxes of Scotch salmon sent to London during the last 10 years :—

Years.	Boxes of Salmon sent to London.	Years.	Boxes of Salmon sent to London.
1877	28,189	1882	22,968
1878	26,465	1883	35,506
1879	13,929	1884	27,219
1880	17,457	1885	30,362
1881	23,905	1886	23,407*

Salmon angling in Scotch rivers.

On several of the Scotch rivers the salmon angling was good. On the Tweed, for example, on the Floors waters about 400 fish were landed; the heaviest being one killed by Mr Pryor, which weighed 57½ lbs. This is probably about the largest salmon ever killed with the fly in Scotland, except one whose capture is narrated in Mr Young's Report on the rivers of the Scotch shore of Solway Firth. Mr Young writes as follows—

Heaviest Salmon ever killed by the rod in Scotland.

> Very large salmon have occasionally been taken on the Nith, and one of the heaviest ever captured by the rod was caught in 1812, in that part of the river belonging to the estate of Barjarg, by an old poacher of the name of Jock Wallace, who was celebrated for never having done a hand's turn of work in his life, except cutting his own firewood, which he generally did in other people's plantations. The salmon was hooked about 8 in the morning in a pool called the 'Clog,' and was gaffed in the 'Boat Pool of Barjarg' by some men coming home from their work at 6 in the evening. It was then found that only two hairs of Wallace's casting line remained. The salmon was taken to Barjarg Tower, and weighed immediately afterwards in presence of the proprietor, Mr Hunter Arundell, who along with some other persons who were present signed a certificate of its weight, a copy of which is now in the possession of his son, the present proprietor of Barjarg. The weight of this monster was 67 lbs.

On other angling waters in the Tweed District, for which returns have been received, at least 1700 fish were killed with the rod last year; and in the Aberdeenshire Dee, the Tay, the Earn, the Annan, the North Esk, and some other rivers, the angling season for 1886 was a fairly good one.

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* In the Notes to Mr Young's Report (Appendix G) there will be found a table giving the number of boxes of Scotch salmon sent to Billingsgate, in each year, from 1834 to 1886, both years inclusive.

On Loch Leven the angling season of 1886 was below the average, only 11,938 trout, weighing 11,294 lbs., or nearly an average of 1 lb. per fish, having been taken, as against 15,568 in 1885 15,734 in 1884, 14,191 in 1883, 9032 in 1882, and 16,383 in 1881. The heaviest basket of the year was taken on the 10th June last, and contained 52 trout, weighing 44 lbs. On the same day, 9 boats had excellent sport, catching 174 trout, weighing 142 lbs.; and on the previous day 319 trout, weighing 272 lbs., were killed by 36 rods. The heaviest trout of the season was 3½ lbs., and the second was 3 lbs. 7 ounces. Looking to the sustained and altogether abnormal and exceptional production of Loch Leven, it seems quite impossible to doubt that it is in a great measure due to the systematic stocking of the tributaries of the Loch with artificially bred trout fry, of which from 200,000 to 240,000 are put in annually.

The History of Howietoun.

The great work that has so long and so successfully been carried on by Sir James Ramsay Gibson Maitland, Bart., at Howietoun Hatchery, near Stirling, has culminated in the publication by Sir James of the first part of *The History of Howietoun,* which marks an era in the science and art of fish-culture. The remaining part of the work, which will bring the history down to 1st January 1887, is stated to be in an advanced state of preparation. It will contain a chapter on the construction of Redds, chapters on British and Foreign Fish-Culture, &c., and also a voluminous Appendix.

Salmon Disease in South Esk.

The worst outbreak of salmon disease that occurred in 1886, considering the smallness of the river, was in the South Esk, which falls into the sea at Montrose. Between the 20th November 1886 and the 16th February 1887, 407 fish afflicted with the fungoid disease were taken out of the South Esk, of which 148 were males and 259 were females. A Report on the Salmon Disease in the South Esk by the Superintendent to the District Board of that river will be found in the Notes to Mr Young's Report (Appendix G).

Important decisions regarding the Salmon Fishing in the Solway Firth and in the river Doon.

An important decision affecting the Salmon Fisheries in the Solway Firth was given by Lord Trayner in December last. It has not been reclaimed against, and may therefore be held as, in the meantime, fixing the law on the subject. The action was brought by the Duke of Buccleuch and others against Lord Herries and others, with the view of having it found and declared that certain nets termed paidle-nets—which are fully described in Mr Young's Report of March 1884 on the rivers falling into the Scotch shore of the Solway Firth—are illegal in the River Nith and its estuary. These nets, which are practically small stake-nets, set nominally for the purpose of taking white fish, but really taking large quantities of salmon, are now declared to be illegal in the river and estuary of the Nith; and there can be little doubt that this suppression of destructive and illegal engines will speedily produce a favourable effect upon the salmon fisheries in the district.

Another important case (Bowie *v.* the Marquis of Ailsa), with regard to conflicting rights of Salmon Fishery and White Fishing, was decided last March by the Second Division of the Court of Session, in which it was held that the Doon is a private and not a public river, even in that part of it which is tidal.

Further details of these important cases will be found in the Notes to Mr Young's Report (Appendix G).

SCIENTIFIC INVESTIGATIONS.

Scientific Investigations. Trawling Experiments.

During the past year the scientific work consisted chiefly in carrying on the trawling experiments required by the recent Act of Parliament [Sea Fisheries (Scotland) Amendment Act, 1885], but in addition investigations were made as to the development, artificial hatching, structure, and food of some of the more important useful fishes.

The bye-law (dated 1st February 1886) made by the Board to prevent beam trawling in the Firth of Forth, St Andrews and Aberdeen Bays, having been confirmed on 5th April following, arrangements were at once made to carry on systematic observations in the three restricted areas. To render this possible, a small steamer was purchased, and provided with a trawl, dredges, and other appliances. After preliminary trials, the regular trawling operations were begun on the 16th June, and continued to November, when the trawling part of the work had to be suspended for want of funds.

An account of the trawling operations, accompanied with a number of important statistical tables, will be found in the Appendix (p. 43).

The 'Garland.'

The 'Garland' trawled periodically over twenty different 'stations.' Nine of these stations are in the Forth district, five in St Andrews Bay, and six in Aberdeen Bay. The position of the Forth and St Andrews Stations is indicated in the chart (Plate I.), Appendix, page 60, and the number and kinds of fish captured are given in table A, page 61.

In the absence of previous data, it is not yet possible to arrive at any conclusions as to whether fish are increasing at any of the stations under observation. It is evident that each month of each year will require to be considered separately, and attention paid not only to the numbers of fish taken, but especially to the conditions under which they are captured.

Trawling Stations.

A short account of the trawling stations will be found in the Appendix (p. 52).

An important part of the inquiry as to the influence of trawling consisted in arranging to obtain statistics showing the quantities of fish landed from the restricted areas, and the conditions under which they were captured.

Statistics of Fish Landed from the Restricted Area.

This was an extremely difficult matter to arrange, but since December last reliable statistics have been obtained for the Firth of Forth and St Andrews Bay. It has been found impossible to obtain accurate statistics of Aberdeen Bay, owing to the limited nature of the area closed, and for the same reason the takes of the 'Garland' have been extremely variable, and the results were not considered of sufficient importance to warrant Aberdeen Bay being further closed for experimental purposes. The fish captured in the Firth of Forth and St Andrews Bay by the net and line fishermen during the months of January, February, and March are given in the Appendix (table C, p. 82). There are no statistics with which these tables can be compared, and it is difficult to estimate accurately their importance at present, but attention may be called to the fact that the takes in most districts were meagre, while the fish in the inshore waters were either of a medium or small size. Another table (D) shows the number of haddocks, whiting, and cod landed at one of the fishing stations (Buckhaven) in the Forth district during the several months of the years 1884 to 1887. From this table it appears that the Firth of Forth serves as a nursery and feeding ground for young haddocks and whiting, and that during 1886 a larger number of young fish sought the shelter of the Forth than in previous years. In addition to the above statistics, there are tables showing the daily take of a number of East Coast fishing boats during the months of December (1886) and the months of January, February, and March (1887). In table G the amount of fish taken by beam trawlers may be compared with those taken by the net and line fishermen at the principal fishing stations between Newhaven and Aberdeen. Table H shows that the fish landed in the Leith district have increased since trawling has been conducted solely without the closed area of the Firth of Forth.

The Firth of Forth a Nursery and Feeding-ground for Fish.

Prevention of Trawling, effect of.

The evidence already collected seems to indicate that, by regulating trawling in the territorial waters, they will in course of time yield more mature fish, and serve as nurseries and feeding grounds during certain months of the year for shoals of herring, haddock, cod, and other valuable fish.

During August the 'Garland' was engaged for some weeks in the Moray Firth, partly in physical work and partly in making observations with a view to determining whether the trawling experiments might be extended so as to include certain portions of the Moray Firth.

Bye-law restricting Beam-trawling.

After the visit of the 'Garland' to the Moray Firth, it was considered that valuable scientific results might be obtained were beam trawling restricted in that district, and the following bye-law was made, which, if confirmed by the Secretary for Scotland, will take effect on and after 4th July next:—

I. This bye-law shall extend and apply to that part of the sea inside of a line drawn from the Ord of Caithness along the coast at a distance of three miles to a point opposite Brora; thence to Tarbet Ness Lighthouse; thence along the coast at a distance of three miles to a point opposite Ballintore; thence to a point a mile west of the mouth of the Findhorn River; and thence along the coast at a distance of three miles to a point due north (magnetic) from Kinnaird Head Lighthouse.

II. Within the aforesaid limits, no person, unless in the service of the Fishery Board for Scotland, shall, at any time from the date when this bye-law comes into force, use any beam trawl for taking sea fish; and the master or the person actually in command of any vessel acting in contravention of this bye-law shall, on conviction, be liable to a fine not exceeding £100; and failing immediate payment of the fine, to imprisonment for a period not exceeding sixty days, without prejudice to diligence by poinding or imprisonment, if no imprisonment has followed on the conviction—all in terms of the said Act.

III. This bye-law shall come into force on Monday the 4th of July next.

Alterations on Bye-law.

The migration of flat fish in St Andrews Bay rendered it extremely desirable to slightly increase the closed area. It was decided to alter the present bye-law as follows:—

I. The bye-law, dated 1st February 1886, and confirmed by the Secretary for Scotland 5th April 1886, is hereby revoked.

II. This bye-law shall extend and apply to—(1) The Firth of Forth inside or to the west of a straight line drawn from Tantallon Castle on the south shore of the Firth to the lighthouse on the Isle of May, and thence to Fifeness; (2) That part of the coast including St Andrews Bay and the Firth of Tay which lies inside or to the west of a straight line drawn from Fifeness to the Fairway Buoy at the mouth of the Tay, and thence at a distance of three miles along the coast to a point three miles due east (magnetic) from Red Head, in Forfarshire.

III. Within the foresaid limits, no person, unless in the service of the Fishery Board for Scotland, shall at any time, from the date when this bye-law comes into force, use any beam trawl for taking fish; and the master or the person actually in command of any vessel acting in contravention of this bye-law shall, on conviction, be liable to a fine not exceeding £100; and failing immediate payment of the fine, to imprisonment for a period not exceeding sixty days, without prejudice to diligence by poinding or imprisonment, if no imprisonment has followed on the conviction—all in terms of the said Act.

IV. This bye-law shall come into force on Monday the 4th of July next.

The work on the East and West Coasts.

The work on the East Coast has been under the general superintendence of Mr Duncan Matthews, assisted by Mr Calderwood; while the West Coast work was under the general superintendence of Mr Brook, assisted by Mr Scott, and for a time by Mr J. C. Lamont. Mr Matthews' time has been largely devoted to tabulating the statistics collected in connection with the trawling experiments, but in addition he has found time for several important investigations. Mr Calderwood acted as naturalist on board the 'Garland,' and devoted the time not occupied with trawling operations to studying the fauna of the various fishing grounds under observation. Mr Brook has devoted his time chiefly to studying the migration of Loch Fyne herring, collecting the crustacea and other minute forms which serve as food for the edible fishes, and continuing his investigation as to the development and life-history of the herring.

As in former years, the progress of the West Coast work was greatly interfered with, and at last quite arrested, for want of a suitable steam tender—the small sailing cutter 'Daisy,' tender to H.M.S. 'Jackal,' being quite incapable of rendering any assistance in carrying on the scientific work, more especially in assisting in making out the migration of the herring.

The work at St Andrews Laboratory.

The Board's marine station at St Andrews has again been under the direction of Professor M'Intosh, whose Report shows that important work on the life-histories and development of the food fishes has been done at this station by him and Mr E. E. Prince, by Dr Schaff on the intra-ovarian eggs of food fishes, and by Mr Wilson on the development of the common mussel. Some experiments suggested by Mr Stephen Williamson, M.P., have also been made on the preservation of mussels for bait.

The memoir first mentioned, viz., that on the Development and

Life-Histories of the Food Fishes is now ready for publication, and is illustrated by 31 quarto plates. Its size and the nature of the illustrations, of course, render it unsuitable for a Parliamentary Blue Book.

The new 'Jackal.'

The new 'Jackal' has been fitted with a deck-house, containing a laboratory and sleeping cabin with three berths, and all the usual fittings, so as to enable her to assist in investigating the fishing grounds said to exist off the Outer Hebrides, but she is not in all respects suitable for scientific work. From the West Coast many representations have been received in regard to beam trawling, seine and trammel net fishing, an annual weekly close time, and daylight fishing, and it was remitted to Sir James Maitland and Professor Ewart to inquire as to the various modes of fishing in the Firth of Clyde. Their Report has not yet been received by the Board, but the question of the migration of the Loch Fyne herring is intimately involved, and its solution will remove many of the difficulties which at present stand in the way of regulating the fishings in the estuary of the Clyde. Owing to the limited sum provided for inquiries during the present year, the further investigation of the movements of the Loch Fyne herring has been temporarily suspended.

Migration of the Loch Fyne Herring.

Proposed work for next year.

During the present year, in addition to the trawling and other inquiries in progress, the following work will be, as far as possible, prosecuted:—

1. The examination of the fishing grounds lying to the west of the Lewis, within the hundred-fathom line, with a view to ascertain whether they are likely to yield an abundant supply of useful fishes.

2. An inquiry as to the nature and abundance of the fauna which live on and in the waters above the chief fishing grounds of the Firth of Forth during the different months of the year, and also of the surface and other forms which frequent St Andrews Bay throughout the year.

PRODUCE AND VALUE OF THE SEA AND SALMON FISHERIES OF SCOTLAND.

The total produce and value of the Sea and Salmon Fisheries of Scotland, for the year 1886, are as follow :—

CURED FISH—

Cured Fish.

Herrings, 1,312,223¼ barrels at 21s., . . .	£1,377,834	8	3
Cod, Ling, and Hake, 121,075 cwts. at 20s., .	121,075	0	0
Cod, 6700 barrels cured in pickle at 35s., . .	11,725	0	0
Total Value of Cured Fish, . .	£1,510,634	8	3

FISH SOLD FRESH—

Fish sold Fresh.

White Fish—

White Fish.

Herrings, .	387,408 cwts.,	£83,417	0	0
Sprats, .	21,969 „	3,714	0	0
Mackerel, .	2,925 „	1,893	0	0
Cod, . .	198,093 „	84,593	0	0
Ling, . .	39,708 „	17,924	0	0
Torsk (Tusk),	888 „	292	0	0
Saith (Coal Fish),	64,468 „	10,310	0	0
Haddocks, .	671,316 „	327,023	0	0
Whitings, .	74,933 „	28,954	0	0
Turbot, .	3,882 „	9,774	0	0
Halibut, .	29,885 „	22,136	0	0
Sole (Lemon Sole), .	7,573 „	9,372	0	0
Flounder, Plaice, and Brill,	81,164 „	50,198	0	0
Eel, . .	1,308 „	728	0	0
Skate, .	52,046 „	10,519	0	0
Other kinds of White Fish,	76,887 „	25,126	0	0
Total Produce and Value of White Fish sold fresh,	1,714,453 cwts.,	£685,973	0	0

Shell Fish—

Shell Fish.

Oysters, . .	£1,295	0	0			
Mussels, . .	14,864	0	0			
Clams, . .	1,256	0	0			
Lobsters, .	30,505	0	0			
Crabs, . .	13,544	0	0			
Other kinds of Shell Fish, .	11,823	0	0			
Total Value of Shell Fish, .				73,287	0	0

Total Value of Fish sold Fresh,	759,260	0	0
SALMON, ...	280,884	0	0
GROSS TOTAL Value of the Sea and Salmon Fisheries of Scotland for the year 1886,	£2,550,778	8	3

Salmon.

Total value of Fisheries.

The Board regret to record the retirement of Mr Williamson, one of their number, who found it necessary to resign his office soon after he ceased to represent the St Andrews Burghs in Parliament.

Explanation as to length of Appendices.

An apology is due for the length of the Appendices which follow the Report; but every effort has been made to keep them within reasonable limits by the exclusion of several papers not without interest,—and it will be observed that the unusual size of the volume is mainly caused by the elaborate statistics connected with Trawling, which, in the present state of the controversy, we felt it our duty to give entire.

We have the honour to be,

My Lord,

Your Lordship's most obedient Servants,

THOMAS J. BOYD, *Chairman.*
JOHN GUTHRIE SMITH, *Deputy-Chairman.*
GEO. H. M. THOMS.
ALEXR. FORBES IRVINE.
J. R. G. MAITLAND.
J. COSSAR EWART.
J. MAXTONE GRAHAM.
JAS. J. GRIEVE.

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APPENDIX F.

SCIENTIFIC INVESTIGATIONS.

APPENDIX G.—SALMON FISHERIES.

APPENDIX H.

APPENDIX I.

APPENDIX J.

APPENDIX A.—TABLE I.

HERRING FISHERY.—RETURN of the Number of Vessels fitted out in SCOTLAND for the HERRING FISHERY in the Year 1886; the Districts from which fitted out; the Tonnage and Number of Men; the Netting, Salt, and Barrels Shipped; and the Barrels of White Herrings Cured on Board.

DISTRICTS.	Vessels.	Tonnage.	Men.	Netting.	Salt.	Barrels.	Herrings Cured on Board.				Total Cured on Board of Vessels.
							Gutted.		Ungutted.		
							Gutted and Packed within 24 hours after being caught.	Gutted and Packed; but *not* within 24 hours after being caught.	Barrels.	Barrels of Bulk.	
	Number.	*Tons.*	*Number.*	*Sq. Yards.*	*Bushels.*	*Number.*	*Barrels.*	*Barrels.*	*Number.*	*Number.*	*Barrels.*
Peterhead,	4	268	44	256,000	7,475	3,235	2,062	1,173	...	...	3,235
Buckie,	1	30	8	46,800	1,000	509	70	439	...	...	509
Stornoway,	2	130	18	39,300	1,140	450	337	...	...	...	337
Loch Broom,	9	214	60	55,000	1,152	271	184	...	...	438	622
Loch Carron and Skye,	20	478	61	121,000	6,674	3,200	1,843	...	...	205	2,048
Fort William,	4	32	13	17,800	126	134	230	...	...	16	246
Campbeltown,	1	31	5	...	760	555	196	...	359	...	555
Inveraray,	2	71	8	...	550	362	260	...	...	54	314
Rothesay,	1	27	3	...	320	110	11	...	...	...	11
Greenock,	3	46	10	...	460	205	1,919	...	...	107	2,026
Total,	47	1,327	230	535,900	19,657	9,031	7,112	1,612	359	820	9,903

Note.—The above 47 Fishing Vessels made 65 voyages.

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX A.—TABLE II.

HERRING FISHERY.—RETURN of the Number of Barrels of WHITE HERRINGS Cured or Salted in SCOTLAND by Fish-Curers on Shore in the Year 1886; and the Districts in which Cured, distinguishing the Herrings Cured Gutted from those cured Ungutted, showing also the quantities cured as Kippers, Bloaters, or Red Herrings; or Preserved in Tins.

DISTRICTS.	Herrings Cured Gutted.		Herrings Cured Ungutted.					Total Cured on Shore.
	Gutted & Packed within 24 hours after being caught.	Gutted and Packed but *not* within 24 hours after being caught.	Barrels.	Barrels or Crans of Bulk.	Barrels or Crans Kippered.	Barrels or Crans cured as Bloaters or Red Herrings.	Barrels or Crans Tinned.	
	Barrels.	*Barrels.*	*Number*	*Number.*	*Number.*	*Number*	*Number*	*Barrels.*
Eyemouth, . .	36,540	2,955	727	222	15,595	6,337	...	62,376
Leith, . . .	810	103	23	57	3,589	53	...	4,635
Anstruther, . .	4,332	450	1,110	2,282	620	2,227	...	11,021
Montrose, . .	26,700½	4,499	242	3,035	202	1,528	...	36,206½
Stonehaven, . .	17,181	1,637	461	2,163	1,257	5	...	22,704
Aberdeen, . .	97,632	4,334	3,666	2,569	4,575	427	3,979	117,182
Peterhead, . .	206,674	4,991	1,687	378	6,260	81	227	220,298
Fraserburgh, . .	225,453½	1,474	78	2,514	5,752¼	189	437½	235,898¼
Banff, . . .	19,646	459	...	36	891	126	...	21,158
Buckie, . . .	19,268	2,455	528	11,612	1,960	2,189	...	38,012
Findhorn, . .	11,314	39	1,880	35	...	...	...	13,268
Cromarty, . .	2,940	...	...	...	...	...	...	2,940
Helmsdale, . .	13,559	1,126	415	2,527	45	664	...	18,336
Lybster, . . .	11,651	1,352	566	...	1,131	350	...	15,050
Wick, . . .	78,338	2,987	4,390	12,408	3,781	621	86	102,611
Orkney, . . .	17,820	944	176	...	9	...	...	18,949
Shetland, . . .	193,626	118	32	2,693	1,582	...	...	198,051
Stornoway, . .	62,991	...	...	9,151	19,126½	...	30	91,298½
Loch Broom, . .	914	40	...	...	...	...	...	954
Loch Carron & Skye,	3,482	...	819	29	...	...	...	4,330
Fort-William, . .	515	...	...	...	...	...	...	515
Campbeltown, . .	1,791	...	...	39,825	21	...	...	41,637
Inveraray, . .	1,254	...	...	16,837	...	..	...	18,091
Rothesay, . .	244	...	...	1,200	520	75	...	2,039
Ballantrae, . .	...	...	...	2,587	2,173	...	...	4,760
Total, . .	1,054,676	29,963	16,800	112,160	69,089¾	14,872	4,759½	1,302,320¼

DUGALD GRAHAM, *Secretary.*

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

APPENDIX A.—TABLE III.

HERRING FISHERY.—RETURN of the Total Number of Barrels of WHITE HERRINGS Cured or Salted in SCOTLAND, on Board of Vessels and on Shore, in the Year 1886; distinguishing the Herrings Cured Gutted from those Cured Ungutted; showing also the quantities cured as Kippers, Bloaters, or Red Herrings; or Preserved in Tins.

DISTRICTS.	Herrings Cured Gutted.		Herrings Cured Ungutted.					Total Herrings Cured on board of Vessels and on Shore.
	Gutted and Packed within 24 hours after being caught.	Gutted and Packed but *not* within 24 hours after being caught.	Barrels.	Barrels or Crans of Bulk.	Barrels or Crans Kippered.	Barrrels or Crans cured as Bloaters or Red Herrings.	Barrels or Crans Tinned.	
	Barrels.	*Barrels.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	*Barrels.*
Eyemouth, . .	36,540	2,955	727	222	15,595	6,337	...	62,376
Leith, . . .	810	103	23	57	3,589	53	...	4,635
Anstruther, . .	4,332	450	1,110	2,282	620	2,227	...	11,021
Montrose, . . .	26,700½	4,499	242	3,035	202	1,528	...	36,206½
Stonehaven, . .	17,181	1,637	461	2,163	1,257	5	...	22,704
Aberdeen, . . .	97,632	4,334	3,666	2,569	4,575	427	3,979	117,182
Peterhead, . .	208,736	6,164	1,687	378	6,260	81	227	223,533
Fraserburgh, . .	225,453½	1,474	78	2,514	5,752¼	189	437½	235,898¼
Banff, . . .	19,646	439	...	36	891	126	...	21,158
Buckie, . . .	19,338	2,894	528	11,612	1,960	2,189	...	38,521
Findhorn, . . .	11,314	39	1,880	35	...	...	...	13,268
Cromarty, . . .	2,940	...	...	...	...	...	...	2,940
Helmsdale, . .	13,559	1,126	415	2,527	45	664	...	18,336
Lybster, . . .	11,651	1,352	566	...	1,131	350	...	15,050
Wick, . . .	78,338	2,987	4,390	12,408	3,781	621	86	102,611
Orkney, . . .	17,820	944	176	...	9	...	...	18,949
Shetland, . . .	193,626	118	32	2,693	1,582	...	...	198,051
Stornoway, . .	63,328	...	...	9,151	19,126½	...	30	91,635½
Loch Broom, . .	1,098	40	...	438	...	...	...	1,576
Loch Carron & Skye,	5,325	...	819	234	...	...	...	6,378
Fort William, . .	745	...	...	16	...	...	...	761
Campbeltown, . .	1,987	...	359	39,825	21	...	...	42,192
Inveraray, . .	1,514	...	...	16,891	...	...	...	18,405
Rothesay, . . .	255	...	...	1,200	520	75	...	2,050
Greenock, . . .	1,919	...	...	107	...	...	...	2,026
Ballantrae, . .	...	...	...	2,587	2,173	...	...	4,760
Total, . .	1,061,788	31,575	17,159	112,980	69,089¾	14,872	4,759½	1,312,223¼

SUPPLEMENTARY NOTE, showing the Number of Barrels of WHITE HERRINGS Cured or Salted on the West Coast of Scotland in the Year 1886, stated according to the Districts where the Herrings were caught.

DISTRICTS.	Barrels.
Stornoway, ...	91,431½
Loch Broom, ...	1,618
Loch Carron and Skye, ...	8,734
Fort William, ...	615
Campbeltown, ...	42,312
Inveraray, ...	18,145
Rothesay, ...	2,168
Ballantrae, ...	4,760
Total, ...	169,783½

DUGALD GRAHAM, *Secretary.*

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

APPENDIX A. –TABLE IV.

HERRING FISHERY.—RETURN of the Total Number of Barrels of WHITE HERRINGS Branded in SCOTLAND in the Year 1886; and of the Brandings in each District.

DISTRICTS.	Total Branded.
Eyemouth, ...	6,932
Anstruther, ...	1,337
Montrose, ...	10,941
Stonehaven, ...	10,958½
Aberdeen, ...	56,290½
Peterhead, ...	145,493
Fraserburgh, ...	106,960½
Banff, ...	13,104
Buckie, ...	11,798
Findhorn, ...	7,469½
Cromarty, ...	2,334
Helmsdale, ...	10,471½
Lybster, ...	6,345½
Wick, ...	36,403½
Orkney, ...	10,539
Shetland, ...	81,617
Total, . . .	*518,994½

* Of this number, 224,076½ Barrels were branded Crown FULL.
,, 115,951½ ,, were branded ,, MATIES.
,, 126,824 ,, were branded ,, SPENT.
,, 52,142½ ,, were branded ,, MIXED.
518,994½ Barrels. The Fees thereon amounted to £8649 18 2

NOTE, showing the Total Number of Barrels in the foregoing Account Branded 'Full,' 'Maties,' or 'Spent.'

DISTRICTS.	Number of Barrels assorted and Branded.		
	Crown *Full.*	*Maties.*	*Spent.*
Eyemouth, ...	2,079	1,222	3,198
Anstruther, ...	220	44	290
Montrose, ...	2,593	2,918½	4,590½
Stonehaven, ...	4,213	3,608	2,213½
Aberdeen, ...	20,245½	16,131½	14,651
Peterhead, ...	71,509½	37,430½	31,038½
Fraserburgh, ...	43,721	26,649½	26,729½
Banff, ...	5,043	2,676½	2,567½
Buckie, ...	2,632	3,404½	2,632
Findhorn, ...	2,065½	3,920½	189½
Cromarty, ...	1,485½	627½	221
Helmsdale, ...	5,648	2,079	2,117½
Lybster, ...	5,063	18	655
Wick, ...	17,339½	3,633½	12,800½
Orkney, ...	4,190½	1,688	1,161
Shetland, ...	36,028½	9,900	21,769
Total, ...	224,076½	115,951½	126,824

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX A.—TABLE V.

HERRING FISHERY.—RETURN of the Number of Barrels of WHITE HERRINGS Exported from SCOTLAND in the Year 1886; distinguishing the Export to Ireland, to the Continent, and to places out of Europe; distinguishing also Herrings Cured Gutted from Herrings Cured Ungutted; and Herrings Bung-Packed from Herrings Repacked.

DISTRICTS.	BARRELS OF HERRINGS EXPORTED.							
	To Ireland.			To the Continent.		To Places out of Europe.		Total Exported.
	Bung-Packed.		Barrels of Bulk.	Bung-Packed.		Bung-Packed.	Repacked.	
	Gutted.	Ungutted.		Gutted.	Ungutted.	Gutted.	Gutted.	
	Barrels.	*Barrels.*	*Number.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*
Eyemouth,	4,286	261	...	18,661½	...	...	...	23,208½
Leith,	...	...	...	44,520¼	416	266	50	45,252¼
Anstruther,	...	...	...	2,427½	...	...	...	2,427½
Montrose,	...	...	...	25,872	...	...	...	25,872
Stonehaven,	...	...	...	9,393½	272	...	...	9,665½
Aberdeen,	...	...	...	93,544	...	313	187½	94,044½
Peterhead,	...	...	...	188,867½	...	...	...	188,867½
Fraserburgh,	...	...	...	184,474½	...	...	..	184,474½
Banff,	...	...	...	12,794½	...	...	...	12,794½
Buckie,	434	321	...	11,752½	...	...	...	12,507½
Findhorn,	...	...	...	8,301½	...	...	...	8,301½
Cromarty,	...	...	...	2,385	...	...	...	2,385
Helmsdale,	...	...	...	12,250½	...	...	...	12,250½
Lybster,	936½	326	...	10,967½	...	...	...	12,230
Wick,	6,504½	965	...	66,793	...	...	...	74,262½
Orkney,	4,072½	...	...	14,449½	...	...	...	18,522
Shetland,	575	...	...	162,368¼	...	...	...	162,943¼
Stornoway,	...	...	...	38,385½	...	...	...	38,385½
Greenock,	7,496	6	1,355	...	...	145	973	9,975
Total,	24,304½	1,879	1,355	908,208½	688	724	1,210½	938,369½

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

SUPPLEMENTARY NOTE, showing the Ports or Places to which the Herrings Exported to the Continent were Shipped.

DISTRICTS.	BARRELS OF HERRINGS EXPORTED.														Total Exported to the Continent.
	Russia.				Germany.							Holland.		Other Places on the Continent.	
	Odessa.	Peters-burg.	Riga.	Libau.	Memel.	Königs-berg.	Elbing.	Danzig.	Stettin.	Ham-burg.	Bremen.	Rotter-dam.	Amster-dam.		
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*
Eyemouth,	...	...	...	360	...	2,037	...	1,581	6,137	8,546½	...	...	...	...	18,661½
Leith,	...	3,571	...	...	...	1,705	...	628	11,120	25,754¼	370½	1,745½	10	32	44,936¼
Anstruther,	...	...	...	...	...	...	...	2,427½	...	...	...	...	...	...	2,427½
Montrose,	...	...	...	...	...	1,105	...	9,504	15,263	...	...	...	...	...	25,872
Stonehaven,	...	...	...	1,179	...	1,405	...	1,940	3,776½	1,365	...	...	...	...	9,665½
Aberdeen,	52½	1,691½	...	3,794½	...	20,270	...	19,502½	45,177½	3,055½	...	...	...	...	93,544
Peterhead,	...	1,076	5,910	36,379	1,758	21,684	...	36,295	60,427½	25,338	...	...	...	...	188,867½
Fraserburgh,	...	1,250	8,854	25,949	3,720½	40,653	750	15,217½	50,329	36,645½	1,106	...	...	...	184,474½
Banff,	...	...	...	...	...	809	...	4,212	7,773½	...	...	...	...	...	12,794½
Buckie,	...	...	...	2,463	...	1,018	...	2,072	6,199½	...	...	...	...	...	11,752½
Findhorn,	...	...	...	...	...	...	...	2,212½	6,089	...	...	...	...	...	8,301½
Cromarty,	...	...	...	...	...	...	...	...	2,385	...	...	...	...	...	2,385
Helmsdale,	...	483½	...	875	...	1,518	...	2,615½	5,201½	1,557	...	...	...	...	12,250½
Lybster,	...	...	...	...	...	...	...	4,798½	5,070	1,099	...	...	...	...	10,967½
Wick,	...	...	1,037	871	2,414½	6,228	...	18,022	33,683½	4,537	...	...	...	...	66,793
Orkney,	...	...	...	...	...	1,135½	...	5,306	7,366	642	...	...	...	...	14,449½
Shetland,	...	2,569	2,781	950	1,047	20,053½	...	15,018	97,845¾	22,104	...	...	...	...	162,368¼
Stornoway,	...	27,006	...	...	...	760½	...	...	8,025½	2,593½	...	...	...	...	38,385½
Total,	52½	37,647	18,582	72,820½	8,940	120,381½	750	141,352	371,869¾	133,237¼	1,476½	1,745½	10	32	908,896½

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX A.—TABLE VI.

HERRING FISHERY.—ABSTRACT showing the Total Quantity of WHITE HERRINGS Cured, Branded, and Exported, year by year, *in so far as brought under cognizance of Fishery Officers*, from the 1st of June 1809 to the 31st of December 1886; distinguishing the Export to Ireland, to the Continent, and to places out of Europe.

PERIODS.	Total Quantity of Herrings Cured.			Total Quantity of Herrings Branded.	Total Quantity of Herrings Exported.			Grand Total Exported.
	Gutted.	Ungutted including Bulk.	Total Cured.		To Ireland.	To the Continent.	To places out of Europe.	
	Barrels.	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Barrels.*
Period extending from 1st June 1809 to 5th April 1810,	42,548	47,637½	90,185½	34,701	28,014	...	7,834	35,848
Year ended 5th April 1811,	65,430	26,397½	91,827½	55,662½	28,212	...	9,921	38,133
Year ended 5th April 1812,	72,515½	39,004	111,519½	58,430	30,417½	4,730	27,672½	62,820
Year ended 5th April 1813,	89,900¾	63,587½	153,488¼	70,027½	57,980	11,046½	40,699	109,725½
Year ended 5th April 1814,	52,931½	57,611	110,542½	38,184½	43,061½	23,943	51,399	118,403½
Year ended 5th April 1815,	105,372¼	54,767	160,139¼	83,376	49,635¾	35,891	55,778½	141,305¼
Year ended 5th April 1816,	135,981	26,670¾	162,651¾	116,436	29,456½	15,563	62,668½	107,688
Year ended 5th April 1817,	155,776	36,567½	192,343½	140,018½	36,341	44,432½	57,855	138,628½
Year ended 5th April 1818,	204,270¼	23,420¾	227,691	183,089½	53,386½	43,896	65,057	162,339½
Year ended 5th April 1819,	303,777½	37,116½	340,894	270,022½	89,704	52,333	85,125	227,162
Year ended 5th April 1820,	347,190½	35,301	382,491½	309,700½	101,109½	64,302½	88,104	253,516
Year ended 5th April 1821,	413,308	28,887¾	442,195¾	363,872	125,445	89,524	79,836½	294,805½
Year ended 5th April 1822,	291,626½	24,897¾	316,524¼	263,205½	102,719	34,752	77,485	214,956
Year ended 5th April 1823,	225,037	23,832	248,869	203 110	56,528	38,002½	75,914½	170,445
Year ended 5th April 1824	335,450	56,740¾	392,190¾	299,631	116,747½	40,231	82,652	239,630½

APPENDIX A.—TABLE VI.—*Continued.*

PERIODS.	Total Quantity of Herrings Cured.			Total Quantity of Herrings Branded.	Total Quantity of Herrings Exported.			Grand Total Exported.
	Gutted.	Ungutted including Bulk.	Total Cured.		To Ireland.	To the Continent.	To places out of Europe.	
	Barrels.	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Barrels.*
Year ended 5th April 1825, . . .	303,397	44,268¼	347,665¼	270,844½	96,409½	35,029½	70,577½	202,016½
Year ended 5th April 1826, . . .	340,118	39,115¾	379,233¾	294,422½	121,386½	28,167¾	67,519	217,073¼
Year ended 5th April 1827, . . .	259,171¼	29,324	288,495¼	223,606	78,735	16,701	70,970	166 406
Year ended 5th April 1828, . . .	339,360	60,418	399,778	279,317½	109,108½	24,489½	78,061	211,659
Year ended 5th April 1829, . . .	300,242½	55,737	355,979½	234,827	107,651	28,280½	69,944	205,875½
Year ended 5th April 1830, . . .	280,933½	48,623½	329,557	218,418½	89,680½	24,302	67,672	181,654½
Year ended 5th April 1831, . . .	371,096	68,274¼	439,370¼	237,085	130,300½	61,655½	72,947	264,903
Year ended 5th April 1832, . . .	313,113¾	49,547	362,660¾	157,839½	128,458	31,100¼	57,941½	217,499¾
Year ended 5th April 1833, . . .	353,684½	63,279¾	416,964¼	168,259½	114,137	47,556½	58,991	220,684½
Year ended 5th April 1834, . . .	382,677½	68,853¾	451,531¼	178,000½	149,254	55,852	66,987½	272,093½
Year ended 5th April 1835, . . .	217,242½	60,074½	277,317	85,079½	73,960	34,050	50,795½	158,805½
Year ended 5th April 1836, . . .	399,334	98,280¾	497,614¾	192,317	168,960	48,451½	55,982	273,393½
Year ended 5th April 1837, . . .	290,169	107,660¼	397,829¼	114,192	102,968½	46,777	39,520	189,265½
Year ended 5th April 1838, . . .	382,400	125,374¾	507,774¾	141,552	139,095	57,388½	38,674½	235,158
Year ended 5th April 1839, . . .	382,229	173,330¾	555,559¾	153,659½	149,926	64,870	24,934½	239,730½
Year ended 5th April 1840 . . .	405,379½	138,565½	543,945	152,231	157,359	82,515½	12,647½	252,522
Year ended 5th April 1841, . . .	431,157	126,105¼	557,262¼	154,189	150,517½	90,951½	8,668	250,137
Year ended 5th April 1842, . .	489,620½	177,624¾	667,245¼	190,922½	187,953	91,069½	5,713½	284,736

APPENDIX A.—TABLE VI.—*Continued.*

PERIODS.	Total Quantity of Herrings Cured.			Total Quantity of Herrings Branded.	Total Quantity of Herrings Exported.			Grand Total Exported.
	Gutted.	Ungutted including Bulk.	Total Cured.		To Ireland.	To the Continent.	To places out of Europe.	
	Barrels.	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Barrels.*
Year ended 5th April 1843, . . .	442,290	181,129¾	623,419¾	162,713	165,327½	120,136½	6,336½	291,800½
Year ended 5th April 1844, . . .	473,556¾	191,803	665,359¾	182,988	127,770	181,953	3,793½	313,516½
Period extending from 5th April 1844 to 5th January 1845, . . .	393,312	132,720¾	526,032¾	140,632	120,293	143,754	2,326½	266,373½
Year ended 5th January 1846, . . .	411,271	121,375	532,646	142,473½	127,027½	113,678	2,488½	243,194
Year ended 5th January 1847, . . .	414,915¼	192,535¾	607,451	156,278½	102,585	148,363½	4,765½	255,714
Year ended 5th January 1848, . . .	372,989½	189,754	562,743½	146,500½	102,690	142,532	4,959	250,181
Year ended 5th January 1849, . . .	392,827	251,541¼	644,368¼	153,944	78,262½	168,049	3,682½	249,994
Year ended 5th January 1850, . . .	507,024½	263,673¾	770,698¼	213,286½	78,889¾	257,108	4,258½	340,256¼
*Year ended 5th January 1851, for Scotland and the Isle of Man only, . . .	378,187	165,822½	544,009½	172,924½	66,138	198,403	2,367	266,908
Year ended 5th January 1852, for do. do. .	417,233¼	176,797¾	594,031	201,636½	81,340½	182,659	205	264,204½
Year ended 31st December 1852, for do. do. .	375,693	123,094½	498,787½	169,159½	60,414	221,979	1,133	283,526
Year ended 31st December 1853, for do. do. .	560,367	217,672¾	778,039¾	248,136½	95,339	242,853¼	4,438½	342,630¾
Year ended 31st December 1854, for do. do. .	458,579½	177,982¾	636,562¼	211,844	121,883¾	237,893½	1,919½	361,696¾
Year ended 31st December 1855, for do. do. .	582,715¼	183,988¼	766,703½	280,581½	97,377	344,029	858	442,264
Year ended 31st December 1856, for do. do. .	466,429½	143,559	609,988½	223,281	89,670¾	256,741	1,199½	347,611¼
Year ended 31st December 1857, for do. do. .	465,292½	115,521¼	580,813¾	218,992	58,534	307,275½	1,351	367,160½

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* The Collection of Returns for England ceased from the 5th of January 1850, and for the Isle of Man from the 1st of January 1869.

APPENDIX A.—TABLE VI.—*Continued.*

PERIODS.	Total Quantity of Herrings Cured.			Total Quantity of Herrings Branded.	Total Quantity of Herrings Exported.			Grand Total Exported.
	Gutted.	Ungutted including Bulk.	Total Cured.		To Ireland.	To the Continent.	To places out of Europe.	
	Barrels.	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Barrels.*
Year ended 31st December 1858, for Scotland and the Isle of Man only,	470,393¼	165,730¼	636,124	233,374	79,054	269,819	1,331½	350,204½
*Year ended 31st December 1859, for do. do. .	381,059¼	110,428	491,487¼	158,676	68,882	203,349½	748	272,979½
Year ended 31st December 1860, for do. do. .	496,414½	184,778¾	681,193¼	231,913½	86,413	291,401½	156	377,970½
Year ended 31st December 1861, for do. do. .	519,173	149,655½	668,828½	265,347	81,595½	308,334¼	384	390,313¾
Year ended 31st December 1862, for do. do. .	656,048	174,856	830,904	346,712	70,879¾	423,182¾	847½	494,910
Year ended 31st December 1863, for do. do. .	507,223	147,593½	654,816½	276,880½	72,074½	333,074¼	2,612¾	407,761½
Year ended 31st December 1864, for do. do. .	478,781½	164,868¾	643,650¼	217,392	55,420½	307,282	1,805	364,507½
Year ended 31st December 1865, for do. do. .	470,559½	151,203½	621,763	216,785	42,063	309,626	1,012	352,701
Year ended 31st December 1866, for do. do. .	497,814½	160,332¼	658,146¾	249,510	47,319	328,272½	4,474½	380,066
Year ended 31st December 1867, for do. do. .	631,759½	193,829½	825.589	317,421	42,364¼	432,994½	3,345½	478,704¼
Year ended 31st December 1868, for do. do. .	445,468½	205,965¼	651,433¾	209,462½	43,414½	323,479¾	1,850½	368,744¾
†Year ended 31st December 1869, for Scotland only	488,831	186,312	675,143	244,522½	32,342½	346,793¾	2,197½	381,333¾
Year ended 31st December 1870, for do. .	657,059½	176,101	833,160½	299,381½	41,524	486,064	2,970	530,558
Year ended 31st December 1871, for do. .	668,489½	156,986¼	825,475¾	346,633½	46,347	502,534¼	2,724	551,605¼
Year ended 31st December 1872, for do. .	671,703½	102,156	773,859½	422,731½	24,147	523,540½	1,943½	549,631
Year ended 31st December 1873, for do. .	796,902	142,331½	939,233½	435,274½	32,465½	633,681	1,861½	668,008
Year ended 31st December 1874, for do. .	887,002½	113,558½	1,000,561	517,558½	28,137¼	706,967¾	2,209¾	737,314¾

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* By Act 21st and 22nd Vict. cap. 69 (1858), there was imposed upon the Branding of Barrels and Half-Barrels of Herrings a Fee of *Fourpence* per Barrel and *Twopence* per Half-Barrel.

† The Collection of Returns for England ceased from the 5th of January 1850, and for the Isle of Man from the 1st of January 1869.

APPENDIX A.—TABLE VI.—*Continued.*

PERIODS.	Total Quantity of Herrings Cured.			Total Quantity of Herrings Branded.	Total Quantity of Herrings Exported.			Grand Total Exported.
	Gutted.	Ungutted including Bulk.	Total Cured.		To Ireland.	To the Continent.	To places out of Europe.	
	Barrels.	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Bls. or Crans.*	*Barrels.*	*Barrels.*	*Barrels.*
Year ended 31st December 1875, for Scotland only,	834,822½	108,157½	942,980	523,789½	33,434	624,137½	3,399	660,970½
Year ended 31st December 1876, for do.	486,238½	111,959	598,197½	252,979½	20,333	378,740	1,350½	400,423½
Year ended 31st December 1877, for do.	716,871¼	130,847½	847,718¾	397,795	16,085½	543,908¼	1,992	561,985¾
Year ended 31st December 1878, for do.	771,556	134,212	905,768	456,708	17,445¾	608,969¼	2,519	628,934
Year ended 31st December 1879, for do.	655,991	185,805	841,796	342,323	8,857½	536,380½	755½	545,993½
Year ended 31st December 1880, for do.	1,224,198½	249,401¾	1,473,600¼	689,286	32,482½	976,300½	1,028½	1,009,811½
Year ended 31st December 1881, for do.	915,098	196,057¼	1,111,155¼	494,182½	33,459¼	711,448	972½	745,879¾
Year ended 31st December 1882, for do.	980,755½	302,218	1,282,973½	462,612½	40,377	782,576¼	3,029½	825,982¾
Year ended 31st December 1883, for do.	1,033,087	236,325½	1 269,412½	470,995½	25,870	863,644½	1,246	890,760½
Year ended 31st December 1884, for do.	1,452,213	244,864¼	1,697,077¼	653,425	35,299½	1,148,956½	964½	1,185,220½
Year ended 31st December 1885, for do.	1,352,449	220,503¼	1,572,952¼	689,325	22,711	1,104,705½	1,173	1,128,589½
Year ended 31st December 1886, for do.	1,093,363	218,860¼	1,312,223¼	518,994½	27,538½	908,896½	1,934½	938,369½

N.B.—In the Six Years ended 5th April 1815, the Bounty on Herrings Cured Gutted was 2s. per Barrel, while there was a Bounty at the same time of 2s. 8d. per Barrel, payable by the Excise on the Exportation of Herrings, whether Cured Gutted or Ungutted, but which ceased on the 1st June 1815; in the Eleven Years ended 5th April 1826, the Bounty on Herrings Cured Gutted was 4s. per Barrel; in the Four succeeding Years the Bounty was reduced 1s. per Barrel each Year till the 5th of April 1830, when it ceased altogether.

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX B.—TABLE I.

COD AND LING FISHERY.—RETURN, by Districts, of the Number of Vessels fitted out in Scotland for the Cod and Ling Fishery, in the Year 1886; of the Tonnage of the Vessels, and the Number of Men; also of the Quantity of Cod, Ling and Hake Cured on board; distinguishing whether Cured Dried or Cured in Pickle.

DISTRICTS.	Vessels.	Tonnage.	Men.	Total Quantity of Cod, Ling and Hake Cured on board of Vessels.		
				Number of Fish.	Cured Dried.	Cured in Pickle.
	Number.	*Tons.*	*Number.*	*Number.*	*Cwts.*	*Barrels.*
Leith, . . .	1	76	13	13,000	130	95
Fraserburgh, . .	2	34	12	5,145	205	...
Orkney, . . .	21	1,376	225	227,456	7,160	...
Shetland, . . .	21	1,055	237	401,397	16,275	...
Total, . .	45	2,541	487	646,998	23,770	95

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX B.—TABLE II.

COD AND LING FISHERY.—RETURN, by Districts, of the Cod, Ling and Hake taken at the Cod and Ling Fishery in Scotland by Open Boats and Cured on Shore, in the Year 1886; distinguishing the Fish Cured Dried and the Fish Cured in Pickle.

DISTRICTS.	Total Quantity of Cod, Ling and Hake Cured on Shore.		
	Number of Fish.	Cured Dried.	Cured in Pickle.
	Number.	*Cwts.*	*Barrels.*
Anstruther, ...	165,783	6,637	310½
Montrose, ...	37,669	1,245	8
Stonehaven, ...	15,089	524½	...
Aberdeen, ...	75,664	2,352	233
Peterhead, ...	28,207	362	663
Fraserburgh, ...	66,707	2,391	160
Banff, ...	43,593	1,599	153
Buckie, ...	74,419	2,471	2,048
Findhorn, ...	11,134	126½	302
Cromarty, ...	1,459	...	62½
Helmsdale, ...	1,640	40	20
Lybster, ...	4,875	...	201
Wick, ...	59,969	576	2,055
Orkney, ...	260,195	10,070	197
Shetland, ...	1,168,495	44,792	...
Stornoway, ...	397,301	18,038	192
Loch Broom, ...	71,764	2,554	...
Loch Carron and Skye, . . .	46,803	1,991	...
Fort William, ...	28,310	1,042	...
Campbeltown, ...	13,377	494	...
Total, . .	2,572,453	97,305	6,605

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX B.—TABLE III.

COD AND LING FISHERY.—RETURN, by Districts, of the Total Quantity of Cod, Ling and Hake taken, both by Vessels and by Open Boats, at the Cod and Ling Fishery in Scotland, and Cured, in the Year 1886; distinguishing the Fish Cured Dried and the Fish Cured in Pickle.

DISTRICTS.	Total Quantity of Cod, Ling and Hake Cured.		
	Number of Fish.	Cured Dried.	Cured in Pickle.
	Number.	*Cwts.*	*Barrels.*
Leith,	13,000	130	95
Anstruther,	165,783	6,637	310½
Montrose,	37,669	1,245	8
Stonehaven,	15,089	524½	...
Aberdeen,	75,664	2,352	233
Peterhead,	28,207	362	663
Fraserburgh,	71,852	2,596	160
Banff,	43,593	1,599	153
Buckie,	74,419	2,471	2,048
Findhorn,	11,134	126½	302
Cromarty,	1,459	...	62½
Helmsdale,	1,640	40	20
Lybster,	4,875	...	201
Wick,	59,969	576	2,055
Orkney,	487,651	17,230	197
Shetland,	1,569,892	61,067	...
Stornoway,	397,301	18,038	192
Loch Broom,	71,764	2,554	...
Loch Carron and Skye,	46,803	1,991	...
Fort William,	28,310	1,042	...
Campbeltown,	13,377	494	...
Total,	3,219,451	121,075	6,700

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX B.—TABLE IV.

COD AND LING FISHERY.—RETURN of the Total Quantity of Cod, Ling and Hake Exported from Scotland, in the Year 1886; with the Districts from which Exported; distinguishing the Export to Ireland, to the Continent, and to places out of Europe; also whether Cured Dried or Cured in Pickle.

DISTRICTS.	Cod, Ling and Hake Exported.					
	To Ireland.	To the Continent.		To Places out of Europe.	Total Exported.	
	Cured Dried.	Cured Dried.	Cured in Pickle.	Cured Dried.	Cured Dried.	Cured in Pickle.
	Cwts.	*Cwts.*	*Barrels.*	*Cwts.*	*Cwts.*	*Barrels.*
Leith,	16,413	4,941	71	2,715	24,069	71
Aberdeen,	...	...	...	2,765	2,765	...
Orkney Isles,	488	...	...	389	877	...
Shetland Isles,	16,496	3,060	...	...	19,556	...
Stornoway,	1,270	...	...	...	1,270	...
Campbeltown,	272	...	...	...	272	...
Greenock,	3,906	32	...	3,625	7,563	...
Total,	38,845	8,033	71	9,494	56,372	71

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX B.—TABLE V.

COD AND LING FISHERY.—ABSTRACT, showing the Total Quantity of COD, LING, and HAKE Cured, Punched, or Branded, and Exported, year by year, *in so far as brought under cognizance of Fishery Officers*, from the 10th of October 1820, when the System for Encouragement and Improvement of the Cod and Ling Fishery commenced, to the 31st of December 1886.

PERIODS.	Total Quantity of Cod, Ling and Hake Cured.			Total Quantity of Cod Ling and Hake Punched or Branded.		Total Quantity of Cod, Ling and Hake Exported.			
	Cured Dried.	Cured in Pickle.		Cured Dried.	Cured in Pickle.	Cured Dried.			Cured in Pickle.
	Cwts.	*Cwts.*	*Barrels.*	*Cwts.*	*Barrels.*	*Cwts.*	*qrs.*	*lbs.*	*Barrels.*
Period extending from 10th Oct. 1820 to 5th April 1822,	...	...	...	50,235¼	4,919½	19,578	3	,,	...
Year ended 5th April 1823,	...	...	...	54,573	3,691	19,398	3	,,	...
Year ended 5th April 1824,	...	...	...	63,590	5,437	23,098	,,	3	..
Year ended 5th April 1825,	..	...	...	52,135	3,531	14,087	2	19	...
Year ended 5th April 1826,	69,136½	3,634¾	5,621	66,315¾	5,337	7,281	1	14	...
Year ended 5th April 1827,	95,161½	9,273	9,025	82,185¾	8,008½	14,051	2	27	...
Year ended 5th April 1828,	82,515¼	6,726	6,142½	74,103¾	5,609½	13,208	2	,,	...
Year ended 5th April 1829,	81,321¼	5,786	6,819	73,500½	6,204	20,587	3	4	...
Year ended 5th April 1830,	101,914	5,652½	8,836½	92,314½	8,464	16,369	3	15	...
Year ended 5th April 1831,	37,674	...	2,950½	34,337½	2,459½	11,920	1	1	...
Year ended 5th April 1832,	50,293	...	3,779½	13,879¾	3,230	20,168	3	16	47
Year ended 5th April 1833,	58,461½	...	6,467½	13,581¼	4,393½	14,754	1	26	67
Year ended 5th April 1834,	52,710½	...	5,522½	14,255½	3,829	16,298	3	,,	24
Year ended 5th April 1835,	44,152¾	...	3,767½	9,492¼	2,235	10,632	2	24	..
Year ended 5th April 1836,	38,040	...	6,276½	6,766	3,018	10,992	2	20	...

APPENDIX B.—TABLE V.—*Continued.*

PERIODS.	Total Quantity of Cod, Ling and Hake Cured.			Total Quantity of Cod, Ling and Hake Punched or Branded.		Total Quantity of Cod, Ling and Hake Exported.			
	Cured Dried.	Cured in Pickle.		Cured Dried.	Cured in Pickle.	Cured Dried.			Cured in Pickle.
	Cwts.	*Cwts.*	*Barrels.*	*Cwts.*	*Barrels*	*Cwts.*	*qrs.*	*lbs.*	*Barrels.*
Year ended 5th April 1837,	66,892½	...	7,273	9,589½	3,206	10,195	2	11	1½
Year ended 5th April 1838,	84,996¾	...	10,303	9,259½	4,373	22,166	2	12	36
Year ended 5th April 1839,	85,279¾	...	10,051½	23,936¼	5,093	26,701	3	,,	150
Year ended 5th April 1840,	93,560¾	..	6,053	21,695½	3,205	29,656	1	,,	24
Year ended 5th April 1841,	91,494¾	...	9.480	21,029¼	3,891	30,550	1	,,	44
Year ended 5th April 1842,	76,849	...	7,038½	13,283¾	2,164	25,293	1	,,	...
Year ended 5th April 1843,	77,207¼	...	6,431	10,030¼	1,342	23,737	3	,,	70
Year ended 5th April 1844,	92,813½	...	5,123	20,810¼	2,226½	35,476	,,	,,	4
Period extending from 5th April 1844 to 5th Jan. 1845,	83,919	...	1,726	17,940¼	229	28,815	,,	,,	20
Year ended 5th January 1846,	92,323	...	5,037	14,372½	935	29,352	,,	,,	...
Year ended 5th January 1847,	90,783¾	...	6,431½	12,387½	1,492	34,435	1		15
Year ended 5th January 1848,	86,624¼	...	2,247½	8,145¼	955	25,662	3	,,	...
Year ended 5th January 1849,	85,463	...	6,810½	9 520	1,681	22,608	3	,,	...
Year ended 5th January 1850,	98,903	...	6,588	15,556	997	24,154	1	,,	20
*Year ended 5th January 1851, for Scotland and the Isle of Man only,	90 658¾	...	5,032	†...	...	22,304	1	,,	...
Year ended 5th January 1852, for do. do.	92,083¼	...	7,019¾	...	...	17,141	2	,,	...
Year ended 31st December 1852, for do. do.	102,976¼	...	6,886	...	...	18,994	2	,,	...
Year ended 31st December 1853, for do. do.	105,596	...	5,122½	...	...	22,650	3	,,	14

* The Collection of Returns for England ceased from the 5th of January 1850.

† The Punching and Branding of Cod and Ling ceased from the 5th of January 1850.

APPENDIX B.—TABLE V.—*Continued.*

PERIODS.	Total Quantity of Cod, Ling and Hake Cured.			Total Quantity of Cod, Ling and Hake Punched or Branded.		Total Quantity of Cod, Ling and Hake Exported.			
	Cured Dried.	Cured in Pickle.		Cured Dried.	Cured in Pickle.	Cured Dried.			Cured in Pickle.
	Cwts.	*Cwts.*	*Barrels.*	*Cwts.*	*Barrels.*	*Cwts.*	*qrs.*	*lbs.*	*Barrels.*
Year ended 31st December 1854, for Scotland and the Isle of Man only, ...	109,684¼	...	6,166½	...	...	19,557	2	,,	...
Year ended 31st December 1855, for do. do. .	113,561¼	...	6,316½	...	...	29,154	2	,,	25
Year ended 31st December 1856, for do. do. .	110,504¾	...	6,642	...	...	29,629	3	,,	...
Year ended 31st December 1857, for do. do. .	104,668½	...	4,393½	...	...	34,310	,,	,,	...
Year ended 31st December 1858, for do. do. .	95,596	...	4,584	...		32,152	,,	,,	...
Year ended 31st December 1859, for do. do. .	118,383	...	5,362½	...	...	35,923	,,	,,	...
Year ended 31st December 1860, for do. do. .	115,688	...	4,339½	...	...	32,221	,	,,	...
Year ended 31st December 1861, for do. do. .	82,344¾	...	4,145½	...	...	26,961	,,	,,	...
Year ended 31st December 1862, for do. do. .	100,657½	...	7,735½	...	...	32,969	3	,,	...
Year ended 31st December 1863, for do. do. .	129,725¾	...	7,337	...	...	53,736	,,	,,	...
Year ended 31st December 1864, for do. do. .	107,758¼	...	7,963½	...	...	46,461	,,	,,	...
Year ended 31st December 1865, for do. do. .	112,807	..	7,678	...	...	44,928	3	,,	...
Year ended 31st December 1866, for do. do. .	115,819	...	9,957½	...	...	47,753	,,	,,	15
Year ended 31st December 1867, for do. do. .	119,638¼	...	10,819	...	...	46,225	,,	,,	...
Year ended 31st December 1868, for do. do. .	113,831	...	9,659	...	...	52,403	,,	,,	...
*Year ended 31st December 1869, for Scotland only, .	135,585¼	...	10,319	...	...	51,864	2	,,	...
Year ended 31st December 1870, for do. .	145,288¾	...	9,945	...	...	56,400	2	,,	...
Year ended 31st December 1871, for do. .	119,030	...	9,283	...	...	54,171	1	,,	...

* The Collection of Returns for the Isle of Man ceased from the 1st of January 1869.

APPENDIX B.—TABLE V.—*Continued.*

PERIODS.	Total Quantity of Cod, Ling and Hake Cured.			Total Quantity of Cod, Ling and Hake Punched or Branded.		Total Quantity of Cod, Ling and Hake Exported.			
	Cured Dried.	Cured in Pickle.		Cured Dried.	Cured in Pickle.	Cured Dried.			Cured in Pickle.
	Cwts.	*Cwts.*	*Barrels.*	*Cwts.*	*Barrels.*	*Cwts.*	*qrs.*	*lbs.*	*Barrels.*
Year ended 31st December 1872, for Scotland only,	145,976½	...	11,940½	...	...	53,631	,,	,,	...
Year ended 31st December 1873, for do.	160,716½	...	12,381½	...	...	70,101	2	,,	...
Year ended 31st December 1874, for do.	143,466¼	...	6,754	...	...	60,913	,,	,,	...
Year ended 31st December 1875, for do.	187,788½	...	8,503½	...	...	81,880	2	,,	...
Year ended 31st December 1876, for do.	111,457	...	6,109	...	...	59,886	,,	,,	...
Year ended 31st December 1877, for do.	187,200½	...	8,619½	...	...	73,368	2	,,	...
Year ended 31st December 1878, for do.	183,809¼	...	9,219	...	...	94,969	2	,,	...
Year ended 31st December 1879, for do.	162,365	...	8,737	...	...	78,868	2	,,	...
Year ended 31st December 1880, for do.	155,745¼	...	7,794½	...	...	79,946	,,	,,	...
Year ended 31st December 1881, for do.	115,513½	...	4,075½	...	...	61,426	,,	,,	...
Year ended 31st December 1882, for do.	121,337	...	7,737	...	...	56,497	,,	,,	2
Year ended 31st December 1883, for do.	120,335¾	...	7,310	...	...	56,525	2	,,	...
Year ended 31st December 1884, for do.	124,506½	...	5,907½	...	...	56,716	1	,,	...
Year ended 31st December 1885, for do.	125,352½	...	7,100	...	...	47,241	,,	,,	...
Year ended 31st December 1886, for do.	121,078	...	6,700	...	...	56,372	,,	,,	71

N.B.—The Books of this department do not exhibit the Total Quantity of Cod, Ling and Hake *Cured* till the Year commencing 5th April 1825. The Bounty, from the commencement of this Abstract to the 5th April 1830, was 4s. per cwt. for Fish cured Dried, and 2s. 6d. per Barrel for Fish cured in Pickle, taken by the Crews of Vessels or Boats *not* on the Tonnage Bounty; while the Bounty for Vessels licensed for the Cod and Ling Fishery, on the *Tonnage* Bounty, was 50s. per Ton, for Tonnage and Cargo to the 5th of July 1826; 45s. from thence to the 5th of July 1827; 40s. to the 5th of July 1828, and 35s. to the 5th of April 1830, when the Bounties ceased altogether.

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX C.—(See separate Table hereto appended).

APPENDIX D.—TABLE I.

FISHERY STATISTICS.—RETURN of the Number of Boats, Decked and Un-decked, *irrespective* of the places to which they belong, employed in the Herring Fishery in SCOTLAND, in the Season of 1886, in a selected Week for each District; with the Number of Fishermen and Boys by whom manned; of Coopers, Gutters, Packers, and Labourers employed at the said Fishery in the Week so selected; and the Total Number of all such Fishermen and other persons so employed.

Districts where the Boats were employed at the Herring Fishery.	Boats.	Fishermen and Boys.	Coopers.	Gutters and Packers.	Labourers.	Total Persons Employed.
Eyemouth, . .	302	1,718	150	1,270	306	3,444
Leith, . . .	54	295	53	160	60	568
Anstruther, . .	220	1,365	60	130	60	1,615
Montrose, . .	110	715	79	477	91	1,362
Stonehaven, . .	85	595	47	330	53	1,025
Aberdeen, . .	350	2,275	143	1,427	316	4,161
Peterhead, . .	555	3,582	409	2,109	218	6,318
Fraserburgh, . .	655	4,485	429	2,623	305	7,842
Banff, . . .	70	492	65	274	35	866
Buckie, . . .	90	658	49	345	39	1,091
Findhorn, . .	55	318	24	175	26	543
Cromarty, . .	23	140	6	76	6	228
Helmsdale, . .	84	466	45	294	4	809
Lybster, . . .	90	580	43	345	72	1,040
Wick, . . .	448	2,896	253	1,629	171	4,949
Orkney, . . .	168	1,048	76	530	24	1,678
Shetland, . .	840	5,195	380	2,545	104	8,224
Stornoway, . .	1,129	7,179	343	3,007	210	10,739
Loch Broom, . .	100	500	7	200	9	716
Loch Carron and Skye,	410	1,530	38	258	22	1,848
Fort William, . .	50	150	9	57	8	224
Campbeltown, . .	432	1,296	25	93	64	1,478
Inveraray, .	236	870	4	...	49	923
Rothesay, . .	284	852	9	39	15	915
Greenock, . .	56	192	33	57	97	379
Ballantrae, . .	292	1,168	38	78	118	1,402

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX C.

FISH SOLD FRESH.—STATEMENT, by Districts, of the Total Quantity and Value of the different kinds of White and Shell Fish returned as landed in SCOTLAND, but excluding those Herring, Cod, and Ling accounted for *as Cured* in Appendices A and B, in the Year 1886, compared with 1885

DISTRICTS.	Herring.		Sprat.		Mackerel.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coal Fish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole.)		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total Value of White Fish.	Oysters.		Mussels.		Clams.		Lobsters.		Crabs.		Other kinds of Shell Fish.		Total Value of Shell Fish.	Gross Total Value.
	Crans.	Value.	Crans.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Cwts.	Value.	Value.	Hundreds.	Value.	Cwts.	Value.	Cwts.	Value.	Hundreds.	Value.	Hundreds.	Value.	Cwts.	Value.		
EAST COAST.		£		£		£		£		£		£		£		£		£		£		£		£		£		£		£		£	£		£		£		£		£		£		£	£	£
Eyemouth,	5,687	2,859	”	”	”	”	3,522	1,426	164	105	”	”	135	17	38,426	25,179	2,782	1,389	5	22	17	50	38	38	172	111	”	”	50	18	125	33	31,247	”	”	”	”	”	”	20½	90	2,281	1,700	1,450	109	1,899	33,146
Leith,	6,767	6,810	1,782	176	3	5	30,875	17,583	3,626	2,689	3	1	2,660	803	169,251	95,080	25,225	10,670	600	1,815	1,069	2,433	1,742	2,125	18,083	11,751	89	43	4,203	2,130	31,411	10,818	164,932	511	325	19,045	1,348	9,100	1,256	47	189	6,173	3,736	1,990	305	7,159	172,091
Anstruther,	27,070	14,398	982	91	”	”	18,979	10,151	2,591	1,455	”	”	531	96	43,592	18,816	4,670	1,593	128	227	998	1,699	1	1	1,281	625	”	”	3,093	716	919	701	50,569	”	”	28,566	2,000	”	”	61¼	285	4,022½	1,749	4,600	480	4,514	55,083
Montrose,	2,439	1,848	293	50	”	”	8,676	3,597	785	327	6	2	542	84	94,166	44,643	9,936	3,067	341	856	203	286	924	857	7,370	3,896	219	165	1,247	310	6,692	1,927	61,915	”	”	99,223	6,256	”	”	62¾	240	3,693½	2,204	613	143	8,843	70,758
Stonehaven,	5,021	4,029	”	”	”	”	5,636	1,829	763	280	”	”	269	8	16,800	7,661	3,761	1,003	33	51	138	178	”	”	54	27	”	”	634	91	66	40	15,197	”	”	”	”	”	”	16¼	58	1,108	730	284	42	830	16,027
Aberdeen,	1,206	2,861	”	”	”	”	15,191	6,720	4,014	1,810	41	6	1,116	290	73,089	34,027	11,718	3,530	968	3,854	1,809	2,667	3,811	4,790	27,466	18,959	”	”	5,614	821	4,340	882	81,217	”	”	”	”	”	”	5	15	145¾	138	”	”	153	81,370
Peterhead,	10,156	6,468	”	”	5	1	8,604	2,817	2,910	1,045	86	20	1,847	277	22,031	9,979	2,540	591	25	43	765	997	15	6	812	199	149	52	2,259	451	503	128	23,074	”	”	2,555	209	”	”	6¾	36	49¼	26	51	13	284	23,358
Fraserburgh,	4,405	1,487	”	”	4	1	4,322	1,786	1,528	795	148	87	1,529	221	23,959	11,332	808	259	526	1,638	1,356	2,054	642	997	3,187	2,132	”	”	1,818	575	3,231	937	24,301	”	”	”	”	”	”	76	357	1,704	854	530	85	1,296	25,597
Banff,	2,354	1,306	”	”	4	2	4,812	1,724	2,511	1,256	”	”	1,227	229	49,709	23,308	2,899	731	7	13	291	337	”	”	919	455	”	”	1,409	292	1,199	430	30,083	”	”	”	”	”	”	85½	382	685	578	40	6	966	31,049
Buckie,	709	532	”	”	”	”	24,791	9,470	6,309	1,764	32	6	1,194	143	45,828	18,533	575	122	56	59	629	677	”	”	6	2	39	14	3,862	407	6,086	1,374	33,103	”	”	”	”	”	”	6¾	34	3	1	290	31	66	33,169
Findhorn,	6,470	2,000	4,221	3,375	”	”	13,553	4,254	1,762	637	12	4	334	79	31,383	13,737	2,163	806	1	2	305	307	10	8	5,188	2,655	”	”	1,234	356	239	70	28,300	”	”	4,930	368	”	”	11¼	55	82	83	85	14	520	28,820
Cromarty,	2,982	1,295	21	8	”	”	2,480	767	43	9	”	”	3	1	12,945	7,979	59	25	”	”	4	4	50	45	2.265	1,148	”	”	24	6	2,558	1,385	12,672	”	”	9,340	642	”	”	28	95	147	94	740	119	950	13,622
Helmsdale,	1,567	816	”	”	”	”	2,322	817	65	26	”	”	88	23	4,211	1,646	76	18	”	”	26	24	”	”	998	383	”	”	40	20	2,000	423	4,196	”	”	4,479	448	”	”	31	310	103	104	729	71	933	5,129
Lybster,	828	482	”	”	”	”	3,028	801	17	4	”	”	322	35	954	356	240	50	1	1	21	17	”	”	5	2	”	”	”	”	35	8	1,756	”	”	”	”	”	”	6¼	31	13	5	”	”	36	1,792
Wick,	11,081	3,795	”	”	”	”	21,026	8,827	6,538	3,039	159	50	7,532	1,533	8,627	2,980	167	43	43	75	1,040	1,450	6	8	2,057	805	711	422	3,657	1,078	4,172	1,410	25,515	”	”	344	37	”	”	772	4,198	983	425	4,151	700	5,360	30,875
East Coast Totals carried down,	88,742	50,986	7,299	3,700	16	9	167,817	72,569	33,626	15,241	487	176	19,329	3,839	634,971	315,256	67,619	23,897	2,734	8,656	8,671	13,180	7,239	8,875	69,863	43,150	1,207	696	29,144	7,281	63,576	20,566	588,077	511	325	168,482	11,308	9,100	1,256	1,236¼	6,375	21,193	12,427	15,553	2,118	33,809	621,886
Orkney and Shetland.																																															
Orkney,	1,820	1,220	”	”	”	”	10,396	2,643	632	186	154	44	23,004	1,369	3,620	993	75	15	47	23	4,873	2,729	”	”	1,105	434	”	”	4,770	654	211	85	10,395	35½	17	”	”	”	”	1,077½	5,488	95	30	8,670	1,673	7,208	17,603
Shetland,	11,053	4,807	”	”	24	6	925	240	160	40	160	40	200	30	21,017	5,569	”	”	”	”	10,721	3,696	”	”	10	3	101	32	1,486	143	3,236	339	14,945	20	5	5,420	478	”	”	”	”	”	”	4,775	548	1,031	15,976
Orkney and Shetland Totals carried down	12,873	6,027	”	”	24	6	11,321	2,883	792	226	314	84	23,204	1,399	24,637	6,562	75	15	47	23	15,594	6,425	”	”	1,115	437	101	32	6,256	797	3,447	424	25,340	55½	22	5,420	478	”	”	1,077½	5,488	95	30	13,445	2,221	8,239	33,579
WEST COAST.																																															
Stornoway,	7,251	5,058	11	4	233	56	5,273	1,491	2,460	883	51	17	5,341	874	6,888	2,535	488	121	581	396	5,302	2,302	”	”	2,188	656	”	”	12,345	1,485	3,718	851	16,729	145	40	2,174	162	”	”	2,175¾	6,996	1,021	446	11,573	1,622	9,266	25,995
Loch Broom,	784	592	”	”	47	7	4,293	1,500	926	358	36	15	7,480	1,497	1,775	573	1,109	339	168	91	164	99	”	”	176	62	”	”	1,349	274	793	207	5,614	”	”	262	26	”	”	820	2,139	185	24	1,675	211	2,400	8,014
Loch Carron and Skye,	4,230	2,419	”	”	18	3	189	58	108	42	”	”	1,585	172	335	149	142	48	112	67	113	68	28	20	280	138	”	”	418	77	1,994	672	3,933	”	”	”	”	”	”	352¼	1,501	406¼	148	5,366	872	2,521	6,454
Fort William,	575	831	13	10	6	5	793	625	291	237	”	”	1,761	743	35	34	312	394	”	”	1	1	8	4	197	134	”	”	260	108	399	462	3,588	”	”	172	29	”	”	622½	2,592	20	6	4,200	994	3,621	7,209
Campbeltown,	5,650	4,265	”	”	110	77	435	264	324	179	”	”	1,209	313	266	254	443	436	20	49	28	48	61	85	390	430	”	”	309	73	325	191	6,664	25	11	55	6	”	”	828½	3,866	88¾	88	1,349	288	4,259	10,923
Inveraray,	683	1,025	”	”	1,507	1,119	1,020	701	”	”	”	”	2,895	774	260	226	207	173	”	”	”	”	”	”	”	”	”	”	156	32	698	415	4,465	40	15	1,686	91	”	”	73	290	98	66	4,122	843	1,305	5,770
Rothesay,	4,859	6,700	”	”	167	78	926	743	140	89	”	”	418	194	434	370	1,034	1,075	1	2	”	”	103	118	583	567	”	”	164	48	53	22	10,006	”	”	4,140	207	”	”	46	190	16	12	576	135	544	10,550
Greenock,	907	1,893	”	”	122	76	495	485	4	5	”	”	236	98	187	192	506	516	3	7	”	”	32	37	1,962	1,567	”	”	105	41	305	162	5,079	”	”	77,005	2,434	”	”	108¼	441	12½	5	607	99	2,979	8,058
Ballantrae,	2,582	3,621	”	”	675	457	5,531	3,274	1,037	664	”	”	1,010	407	1,528	872	2,998	1,940	216	483	12	13	102	233	4,410	3,057	”	”	1,540	303	1,579	1,154	16,478	2,180	882	1,866	123	”	”	153½	627	711	292	4,765	2,420	4,344	20,822
West Coast Totals carried down,	27,521	26,404	24	14	2,885	1,878	18,955	9,141	5,290	2,457	87	32	21,935	5,072	11,708	5,205	7,239	5,042	1,101	1,095	5,620	2,531	334	497	10,186	6,611	”	”	16,646	2,441	9,864	4,136	72,556	2,390	948	87,360	3,078	”	”	5,179¾	18,642	2,558½	1,087	34,233	7,484	31,239	103,795
Totals brought down.																																															
East Coast—Totals	88,742	50,986	7,299	3,700	16	9	167,817	72,569	33,626	15,241	487	176	19,329	3,839	634,971	315,256	67,619	23,897	2,734	8,656	8,671	13,180	7,239	8,875	69,863	43,150	1,207	696	29,144	7,281	63,576	20,566	588,077	511	325	168,482	11,308	9,100	1,256	1,236¼	6,375	21,193	12,427	15,553	2,118	33,809	621,886
Orkney and Shetland—Totals,	12,873	6,027	”	”	24	6	11,321	2,883	792	226	314	84	23,204	1,399	24,637	6,562	75	15	47	23	15,594	6,425	”	”	1,115	437	101	32	6,256	797	3,447	424	25,340	55½	22	5,420	478	”	”	1,077½	5,488	95	30	13,445	2,221	8,239	33,579
West Coast—Totals,	27,521	26,404	24	14	2,885	1,878	18,955	9,141	5,290	2,457	87	32	21,935	5,072	11,708	5,205	7,239	5,042	1,101	1,095	5,620	2,531	334	497	10,186	6,611	”	”	16,646	2,441	9,864	4,136	72,556	2,390	948	87,360	3,078	”	”	5,179¾	18,642	2,558½	1,087	34,233	7,484	31,239	103,795
Grand Totals in Year 1886.	129,136	83,417	7,323	3,714	2,925	1,893	198,093	84,593	39,708	17,924	888	292	64,468	10,310	671,316	327,023	74,933	28,954	3,882	9,774	29,885	22,136	7,573	9,372	81,164	50,198	1,308	728	52,046	10,519	76,887	25,126	685,973	2,956½	1,295	261,262	14,864	9,100	1,256	7,493½	30.505	23,846½	13,544	63,231	11,823	73,287	759,260
Grand Totals in Year 1885.	139,875	122,034	22,426	4,190	12,369	3,995	201,108	93,456	49,090	27,219	531	181	47,096	10,406	522,464	304,612	99,638	38,551	7,350	13,535	28,427	20,053	5,898	7,486	83,810	52,865	”	”	106,552	15,765	74,223	23,476	737,824	2,202	809	244,262	15,367	”	”	9,563	35,081	32,499	23,740	54,196	14,196	89,193	827,017
Increases in Year 1886,	”	”	”	”	”	”	”	”	”	”	357	111	17,372	”	148,852	22,411	”	”	”	”	1,458	2,083	1,675	1,886	”	”	1,308	728	”	”	2,664	1,650	”	754½	486	17,000	”	9,100	1,256	”	”	”	”	9,035	”	”	”
Decreases in Year 1886,	10,739	38,617	15,103	476	9,444	2,102	3,015	8,863	9,382	9,295	”	”	”	96	”	”	24,705	9,597	3,468	3,761	”	”	”	”	2,646	2,667	”	”	54,506	5,246	”	”	51,851	”	”	”	503	”	”	2,069½	4,576	8,652½	10,196	”	2,373	15,906	67,757

Fishery Board for Scotland,
Edinburgh 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE II.

FISHERY STATISTICS.—RETURN of the Number and Tonnage of Boats, Decked and Undecked, and Beam Trawl Vessels, employed in the Herring and other Sea Fisheries of SCOTLAND, in the year 1886, with the Districts to which they belong; the Number of Fishermen and Boys by whom manned; the Number of Fish-Curers, Coopers, and other Persons employed; with the estimated Value of Boats, Beam Trawl Vessels, and Fishing Material.

DISTRICTS.	FISHING BOATS.						Beam Trawl Vessels.		Total.		Fisher-men and Boys.	Fish-Curers.	Coopers.	Other Persons (*Estimated*).	Total Persons employed.	Value (*Estimated*) of—			
	First Class, 30 feet keel and upwards.		Second Class, from 18 to 30 feet keel.		Third Class, under 18 feet keel.											Boats and Bm. Trawl Vessels.	Nets.	Lines.	Total.
	Number.	*Tons.*	*Number.*	*Tons.*	*Number.*	*Tons.*	*Number.*	*Tons.*	*Number.*	*Tons.*	*Number.*	*Number.*	*Number.*	*Number.*	*Number.*	£	£	£	£
Eyemouth, .	272	4,556	198	1,118	92	184	1	101	563	6,029	1,488	60	150	2,614	4,312	39,609	35,088	6,663	81,360
Leith, . .	230	5,199	312	1,597	44	91	17	697	603	7,584	1,986	20	58	2,376	4,440	109,953	45,290	7,064	162,307
Anstruther, .	607	11,500	240	1,008	116	232	2	136	965	12,876	3,897	56	73	2,081	6,107	90,364	99,514	14,202	204,080
Montrose, .	216	4,885	214	993	199	295	3	330	632	6,503	1,368	16	79	2,139	3,602	51,703	28,259	9,066	89,028
Stonehaven, .	106	1,555	36	144	65	130	...	...	207	1,829	545	30	47	685	1,307	13,240	9,817	3,750	26,807
Aberdeen, .	112	1,792	122	732	40	80	11	1,045	285	3,649	854	44	143	3,604	4,645	42,836	16,510	3,771	63,117
Peterhead .	314	5,919	162	879	82	240	...	...	558	7,038	1,873	94	411	3,213	5,591	57,237	39,960	6,238	103,435
Fraserburgh, .	337	6,740	84	504	268	804	...	...	689	8,048	2,136	84	431	3,917	6,568	51,508	55,110	7,125	113,743
Banff, .	248	4,960	60	360	207	621	...	...	515	5,941	1,209	35	65	815	2,124	26,876	20,495	4,760	52,131
Buckie, . .	640	11,520	24	120	135	405	...	...	799	12,045	3,420	30	90	3,294	6,834	104,500	102,410	17,551	224,461
Findhorn, .	320	5,958	103	544	26	73	...	...	449	6,575	2,238	26	69	1,934	4,267	59,278	47,996	5,142	112,416
Cromarty, .	135	2,041	112	523	65	138	...	...	312	2,702	1,003	6	14	1,334	2,357	12,200	25,450	2,600	40,230
Helmsdale, .	111	1,473	62	319	33	86	...	...	206	1,878	767	18	46	413	1,244	6,738	11,900	1,352	19 990
Lybster, .	141	2,260	14	77	32	64	...	...	187	2,401	796	12	43	477	1,328	7,527	11,506	485	19,518
Wick, . .	399	7,608	62	452	373	1,111	...	...	834	9.171	3,054	72	258	3,393	6,777	56,930	46,986	3,976	107,892
Orkney, .	181	2,856	26	181	428	947	...	...	635	3,984	2,544	34	76	823	3,477	19,424	11,487	2,233	33,134
Shetland, .	362	5,537	110	220	323	323	...	...	795	6,080	3,244	101	391	3,237	6,973	44,665	29,210	6,009	79,884
Stornoway, .	191	3,056	440	2,810	794	2,382	...	...	1,425	8,248	5,395	45	79	2,576	8,095	36,019	25,027	9,927	70,973
Loch Broom .	71	1,070	58	415	458	1,374	...	...	587	2,859	1,909	24	7	897	2,837	7,815	13,290	2,002	23,107
Loch Carron and Skye, . .	30	572	293	1,211	663	1,343	...	...	986	3,126	2,944	46	38	654	3,682	8,314	23,098	3,074	34,486
Fort William, .	36	392	128	547	424	901	...	...	588	1,840	1,170	34	9	790	2,003	4.264	3.349	654	8,267
Campbeltown, .	74	1,245	432	2,110	169	338	7	84	682	3,777	1,776	55	31	657	2,519	24,757	18,438	897	44,092
Inveraray, .	10	168	395	2,233	214	428	...	...	619	2,829	1,278	26	5	365	1.674	17,454	14,129	1,792	33,375
Rothesay, .	26	390	198	963	118	260	8	80	350	1,693	560	23	9	284	876	8,995	10,847	390	20,232
Greenock, .	2	24	173	670	116	116	14	127	305	937	435	31	33	916	1,415	4,588	4,438	593	9,619
Ballantrae, .	4	51	260	1,052	258	321	46	314	568	1,738	1,030	51	42	718	1,841	9,223	6,995	1,055	17,273
Total,	5,175	93,327	4,318	21,852	5,742	13,287	109	2,914	15,344	131,380	48,919	1,073	2,697	44,206	96,895	916,017	756,579	122,361	1,794,957

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE III.

FISHERY STATISTICS.—RETURN of the Tonnage of Shipping, and of the Number of Seamen engaged in the Trade of the Herring and Cod and Ling Fisheries of SCOTLAND, in the year 1886; distinguishing those employed in Importing Stave Wood, Hoops, and Salt; in Carrying Herrings or Cod Fish coastwise; or Exporting them abroad; and distinguishing British from Foreign Tonnage and Men.

DISTRICTS.	TONNAGE AND MEN.																			
	Importing Stave Wood and Hoops for the Fisheries.				Importing Salt for the Fisheries.				Carrying Herrings or Cod Fish Coastwise.				Exporting Herrings or Cod Fish.				Total.			
	British.		Foreign.		British.		Foreign.		British.		Foreign.		British.		Foreign.		British.		Foreign.	
	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.	Tons.	Men.
Eyemouth,	57	5	78	5	709	51	...	...	707	49	...	...	1,433	94	806	52	2,906	199	884	57
Leith,	160	7	455	22	175	13	...	...	640	46	...	...	6,498	460	147	11	7,473	526	602	33
Anstruther,	238	16	77	4	326	20	...	...	179	9	...	...	...	...	270	13	743	45	347	17
Montrose,	50	4	65	4	1,008	44	...	...	59	5	...	...	1,614	65	1,059	57	2,731	118	1,124	61
Stonehaven,	...	...	...	...	343	20	...	...	87	15	...	...	284	15	652	33	714	50	652	33
Aberdeen,	5,812	348	360	21	2,112	126	110	6	1,250	80	...	...	7,047	291	2,881	141	16,221	845	3,351	168
Peterhead,	560	29	2,001	111	5,444	303	752	39	565	37	...	...	10,452	486	10,387	457	17,021	855	13,140	607
Fraserburgh,	333	20	1,762	95	6,215	329	75	4	237	18	...	...	10,107	532	8,498	421	16,892	899	10,335	520
Banff,	...	...	60	4	960	58	...	...	160	36	...	...	891	50	307	16	2,011	144	367	20
Buckie,	103	8	...	...	730	41	...	...	...	...	...	...	533	29	725	41	1,366	78	725	41
Findhorn,	...	...	65	4	332	21	...	...	...	...	...	...	553	29	172	10	885	50	237	14
Cromarty,	120	33	...	...	160	15	...	...	520	104	...	...	90	5	166	9	890	157	166	9
Helmsdale,	...	...	265	16	715	46	...	...	...	...	...	...	759	42	455	25	1,474	88	720	41
Lybster,	...	...	74	4	500	32	...	...	...	...	...	...	752	53	552	31	1,252	85	626	35
Wick,	467	41	2,645	188	3,442	172	693	37	2,017	137	...	...	2,299	143	4,784	250	8,225	493	8,122	475
Orkney,	...	...	208	12	3,680	183	...	...	1,260	76	...	...	1,546	95	493	27	6,486	354	701	39
Shetland,	215	18	420	21	10,170	552	260	12	7,300	365	...	...	8,016	455	9,392	483	25,701	1,390	10,072	516
Stornoway,	290	21	152	12	4,350	273	300	19	14,265	1,241	...	...	3,685	212	293	11	22,590	1,747	745	42
Loch Broom,	45	15	...	...	420	39	...	...	745	138	...	...	...	...	...	...	1,210	192	...	...
Loch Carron and Skye,	...	...	...	...	620	52	...	...	944	94	..	...	...	...	...	...	1,564	146	...	...
Fort William,	...	...	...	...	728	57	...	...	740	63	...	...	...	...	...	...	1,468	120	...	...
Campbeltown,	...	...	...	...	252	20	...	...	5,762	270	...	...	48	12	...	...	6,062	302	...	...
Inveraray,	...	...	...	...	340	12	...	...	1,160	115	...	...	...	...	...	...	1,500	127	...	...
Rothesay,	...	...	...	...	220	15	...	...	560	51	...	...	...	...	...	...	780	66	...	...
Greenock,	60	5	...	...	1,030	55	...	...	900	45	...	...	1,803	100	...	...	3,793	205	...	...
Ballantrae,	...	...	...	...	160	13	...	...	...	...	...	...	...	...	...	...	160	13	...	...
Total,	8,510	570	8,687	523	45,141	2,562	2,190	117	40,057	2,994	...	...	58,410	3,168	42,039	2,088	152,118	9,294	52,916	2,728

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE IV.

FISHERY STATISTICS.—ABSTRACT RETURNS, showing the Tonnage of Vessels and Number of Men, the Tonnage of Boats and Number of Fishermen and Boys, and the Number of other Persons employed in the Herring, Cod and Ling, and other Sea Fisheries of SCOTLAND, in the Year 1886.

ABSTRACT.	Tonnage of Vessels and Number of Men.				Tonnage of Boats, and Number of Fishermen and Boys.		Number of other Persons.	Total Tonnage and Persons Employed.			
	British.		Foreign.					British.		Foreign.	
	Tons.	Men.	Tons.	Men.	Tons.	Fishermen and Boys.		Tons.	Persons.	Tons.	Persons.
Total of Herring Fishery Account, Appendix A—Table I., . .	1,327	230	...	...	...	...	...	1,327	230	...	...
Total of Cod and Ling Fishery Account, Appendix B—Table I.	2,541	487	...	...	...	...	...	2,541	487	...	...
Total of Fishery Statistics Account, Appendix D—Table II., . .	...	...	...	...	131,380	48,919	47,976	131,380	96,895 97,612	...	...
Total of Fishery Statistics Account, Appendix D—Table III., . .	152,118	9,294	52,916	2,728	...	...	...	152,118	9,294	52,916	2,728
Total,	155,986	10,011	52,916	2,728	131,380	48,919	47,976	287,366	106,906	52,916	2,728

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE V.

FISHERY STATISTICS.—RETURN of the Number of Lives lost in connection with the Sea Fisheries of Scotland; the Number of Boats totally wrecked, and Value thereof; the Number of Boats damaged, and Amount of Damage; and the Loss on Nets and other Fishing Material lost or damaged, in the Year 1886.

DISTRICTS.	Lives Lost.	Boats totally Wrecked, and Value thereof.		Boats Damaged, and Amount of Damage.		Gross Loss on Boats totally Wrecked or Damaged.	Loss on Nets and other Fishing Material Lost or Damaged.	Gross Total Loss on Boats, Nets, &c., Lost or Damaged.
	Number.	*Number.*	£	*Number.*	£	£	£	£
Eyemouth,	2	1	1,400	9	201	1,601	2,131	3,732
Leith,	6	3	3,218	8	267	3,485	4,480	7,965
Anstruther,	13	5	501	10	130	631	1,033	1,664
Montrose,	7	3	3,016	4	11	3,027	2,980	6,007
Stonehaven,	...	...	...	4	16	16	793	809
Aberdeen,	2	1	50	7	13	63	5,056	5,119
Peterhead,	2	2	172	8	280	452	3,178	3,630
Fraserburgh,	1	...	...	8	216	216	4,505	4,721
Banff,	...	...	...	4	80	80	760	840
Buckie,	4	4	414	9	110	524	1,172	1,696
Findhorn,	2	4	1,075	10	84	1,159	1,447	2,606
Cromarty,	...	...	...	...	...	...	287	287
Helmsdale,	...	...	...	2	2	2	1,285	1,287
Lybster,	...	1	30	1	10	40	2,073	2,113
Wick,	2	...	...	3	28	28	3,320	3,348
Orkney,	1	1	180	4	142	322	777	1,099
Shetland,	3	3	340	2	75	415	1,527	1,942
Stornoway,	10	6	275	9	109	384	509	893
Loch Broom,	3	1	6	1	4	10	16	26
Loch Carron and Skye,	6	1	30	4	13	43	237	280
Fort William,	3	2	22	13	48	70	118	188
Campbeltown,	...	...	...	8	35	35	50	85
Inveraray,	...	...	...	3	22	22	414	436
Rothesay,	...	...	...	1	3	3	178	181
Greenock,	2	1	10	...	...	10	95	105
Ballantrae,	1	1	12	...	...	12	130	142
TOTAL,	70	40	£10,751	132	£1,899	£12,650	£38,551	£51,201

Fishery Board for Scotland,
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DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE VI.

REGISTRATION OF FISHING BOATS.—ABSTRACT RETURNS of Proceedings in SCOTLAND in the Year 1886, under Sea Fisheries Acts of 1868 and 1883, and Sea Fisheries (Scotland) Amendment Act of 1885.

DISTRICTS.	FISHING BOATS.															
	Applications to Register.				Registers Issued.				Registers Examined and Endorsed.				Boats Detained.			
	First Class.	Second Class.	Third Class.	Total.	First Class.	Second Class.	Third Class.	Total.	First Class.	Second Class.	Third Class.	Total.	First Class.	Second Class.	Third Class.	Total.
Eyemouth,	...	...	...	...	...	...	...	...	...	...	...	...	85	4	...	89
Leith,	10	8	...	18	10	8	...	18	53	128	...	181	...	4	...	4
Anstruther,	18	14	...	32	18	14	...	32	275	171	...	446	9	...	...	9
Montrose,	...	...	...	...	...	...	...	...	...	...	...	...	15	32	...	47
Stonehaven,	...	...	...	...	...	...	...	...	...	...	...	...	6	10	...	16
Aberdeen,	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	2
Peterhead,	30	29	13	72	30	29	13	72	280	163	72	515	...	...	...	...
Fraserburgh,	27	18	27	72	27	18	27	72	280	59	236	575	6	2	...	8
Banff,	4	32	...	36	4	32	...	36	214	194	...	408	8	6	...	14
Buckie,	32	22	...	54	32	22	...	54	447	110	...	557	...	...	...	...
Findhorn,	2	1	...	3	2	2	...	4	10	4	5	19	6	...	...	6
Cromarty,	4	4	...	8	4	4	...	8	14	26	37	77	...	...	...	...
Helmsdale,	4	6	...	10	4	6	...	10	44	34	...	78	...	...	...	...
Lybster,	6	23	...	29	6	25	...	31	77	66	1	144	1	2	...	3
Wick,	5	1	7	13	5	1	7	13	287	120	...	407	...	...	...	...
Orkney,	8	12	...	20	8	12	...	20	61	99	...	160	...	2	...	2
Shetland,	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Stornoway,	1	5	...	6	1	5	...	6	1	9	...	10	...	12	1	13
Loch Broom,	10	13	...	23	10	13	1	24	37	86	68	191	...	...	...	...
Loch Carron & Skye	3	56	22	81	3	56	22	81	12	214	355	581	...	3	6	9
Fort-William,	...	8	4	12	...	8	4	12	4	29	60	93	...	...	...	...
Campbeltown,	2	21	...	23	2	21	...	23	46	315	...	361	...	29	...	29
Inveraray,	1	36	...	37	1	36	...	37	7	350	...	357	1	14	...	15
Rothesay,	1	21	...	22	1	21	...	22	4	194	27	225	...	2	1	3
Greenock,	...	...	...	...	...	...	...	...	...	11	1	12	...	...	...	...
Ballantrae,	...	28	...	28	...	28	...	28	...	203	...	203	...	...	...	...
'Vigilant' Cruiser,	...	...	...	...	...	...	...	...	...	..	...	...	275	115	...	390
H.M.S. 'Jackal,'	...	...	...	...	...	...	...	...	...	...	...	...	7	17	...	24
Fishery Superintendents,	...	...	...	...	...	...	...	...	...	...	...	...	10	5	...	15
TOTAL,	168	358	73	599	168	361	74	603	2,153	2,585	862	5,600	431	259	8	698

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX D.—TABLE VII.

FISHERY STATISTICS.—RETURN, by Fishing Villages or Creeks, for the Coasts of Scotland, of the Number of Boats, Beam Trawl Vessels, and Resident Fishermen and Boys, in the Year 1886.

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Eyemouth District.						
Amble, - - - - -	7	2	3	...	12	21
Alnmouth, - - - -	1	10	5	...	16	24
Boulmer, - - - - -	9	24	4	...	37	56
Craster, - - - - -	20	30	6	...	56	69
Newton, - - - - -	16	14	2	...	32	53
Beadnell, - - - - -	17	17	3	...	37	49
North Sunderland, - -	25	20	6	...	51	84
Holy Island, - - -	18	19	9	...	46	83
Spittal, - - - - -	8	18	2	...	28	92
Berwick, - - - - -	24	24	4	1	53	116
Burnmouth, - - - -	24	4	20	...	48	108
Eyemouth, - - - -	80	8	12	...	100	281
Coldingham, - - - -	23	8	16	...	47	85
Total, - -	272	198	92	1	563	1121
Leith District.						
Cove, - - - - -	...	12	...	...	12	18
Dunbar, - - - - -	9	44	...	...	53	145
North Berwick, - - -	12	20	...	...	32	80
Port Seton and Cockenzie, -	72	38	...	...	110	400
Prestonpans, - - -	17	7	...	...	24	90
Fisherrow, - - - - -	38	9	...	...	47	265
Leith, - - - - -	19	...	...	6	25	75
Newhaven, - - - -	30	132	...	...	162	400
Granton, - - - - -	10	...	...	11	21	100
Queensferry, - - - -	...	12	...	...	12	32
Bo'ness, - - - - -	...	1	1	...	2	4
Alloa, - - - - -	19	...	...	...	19	60
Kincardine, - - - -	2	1	...	...	3	8
Limekilns, - - - - -	...	4	2	...	6	18
Inverkeithing, - - - -	...	7	...	...	7	20
Aberdour, - - - - -	...	3	...	...	3	7
Burntisland, - - - -	2	12	4	...	18	25
Kinghorn, - - - - -	...	6	12	...	18	20
Kirkcaldy, - - - - -	...	...	22	...	22	25
Dysart, - - - - -	...	4	3	...	7	15
Total, - -	230	312	44	17	603	1807
Anstruther District.						
Buckhaven, - - - -	124	75	3	...	202	400
Methil and Leven, - -	...	1	3	...	4	13
Largo, - - - - -	15	12	7	...	34	86
Elie and Earlsferry, - -	...	6	8	...	14	20
St Monance, - - - -	114	31	5	...	150	415
Pittenweem, - - - -	75	15	3	...	93	293
Anstruther and Cellardyke, -	197	21	7	...	225	650
Crail, - - - - -	1	17	21	...	39	70
Kingsbarns and Boarhills, -	...	3	6	...	9	21
St Andrews, - - - -	39	17	6	2	64	200
Tayport, - - - - -	1	42	6	...	49	126
Newburgh, - - - -	41	...	41	...	82	123
Total, - -	607	240	116	2	965	2417

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Montrose District.						
Broughty-Ferry,	29	18	60	...	107	190
Westhaven,	...	5	8	...	13	29
Easthaven,	...	4	5	...	9	21
Arbroath,	44	35	9	...	88	182
Auchmithie,	12	25	4	...	41	68
Thornhaven,	...	...	1	...	1	3
Usan,	2	6	4	...	12	28
Ferryden,	55	50	55	...	160	400
Montrose,	...	...	10	3	13	30
Milton,	...	...	4	...	4	7
Johnshaven,	18	24	23	...	65	120
Gourdon,	56	47	16	...	119	240
Total,	216	214	199	3	632	1318
Stonehaven District.						
Shieldhill,	...	4	2	...	6	7
Caterline,	7	7	17	...	31	40
Crawton,	1	3	8	...	12	16
Stonehaven,	75	10	22	...	107	301
Cowie,	6	6	4	...	16	40
Stranathra,	1	1	1	...	3	6
Skateraw,	16	5	11	...	32	70
Total,	106	36	65	...	207	480
Aberdeen District.						
Downies,	4	5	6	...	15	46
Portlethen,	14	13	11	...	38	95
Findon,	5	5	3	...	13	35
Cove,	8	13	6	...	27	90
Burnbank,	3	2	1	...	6	12
Torry,	37	50	8	...	95	215
Aberdeen,	41	34	5	11	91	225
Total,	112	122	40	11	285	718
Peterhead District.						
Newburgh,	...	2	4	...	6	18
Collieston,	18	32	2	...	52	104
Old Castle,	4	11	1	...	16	26
Whinnyfold,	9	9	4	...	22	36
Port Errol,	23	17	8	...	48	90
Bullers of Buchan,	3	5	3	...	11	36
Boddam,	88	27	7	...	122	198
Burnhaven,	9	7	9	...	25	36
Peterhead,	114	29	30	...	173	350
Buchanhaven,	46	23	14	...	83	138
Total,	314	162	82	...	558	1032

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Fraserburgh District.						
St Combs,	48	5	60	...	113	164
Charlestown,	5	1	8	...	14	20
Inverallochy,	60	10	62	...	132	218
Cairnbulg,	37	6	40	...	83	133
Fraserburgh,	104	28	40	...	172	381
Pitullie,	21	7	18	...	46	81
Rosehearty,	42	18	28	...	88	171
Pennan,	20	9	12	...	41	78
Total,	337	84	268	...	689	1246
Banff District.						
Crovie,	24	5	21	...	50	98
Gardenstown,	48	9	37	...	94	164
Macduff,	60	14	54	...	128	205
Banff,	38	2	18	...	58	132
Whitehills,	36	21	30	...	87	172
Portsoy,	30	5	21	...	56	120
Sandend,	12	4	26	...	42	74
Total,	248	60	207	...	515	965
Buckie District.						
Cullen,	75	...	13	...	88	240
Portknockie,	84	1	33	...	118	290
Findochty,	78	3	35	...	116	250
Portessie,	99	2	26	...	127	300
Buckie,	236	11	21	...	268	745
Portgordon,	68	7	7	...	82	245
Total,	640	24	135	...	799	2070
Findhorn District.						
Lossiemouth,	150	18	2	...	170	462
Hopeman,	73	17	3	...	93	290
Burghead,	45	7	8	...	60	182
Findhorn,	4	6	1	...	11	35
Nairn,	38	38	2	...	78	225
Campbeltown,	8	7	3	...	18	50
Petty,	2	3	2	...	7	20
Inverness and Clachnaharry,	...	7	5	...	12	36
Total,	320	103	26	...	449	1300
Cromarty District.						
Craigton and Kilmuir,	...	6	...	...	6	30
Avoch,	36	39	4	...	79	200
Fortrose and Rosemarkie,	...	...	4	...	4	16
Cromarty,	18	20	22	...	60	160
Invergordon, &c.,	...	...	6	...	6	24
Balintrad,	...	...	2	...	2	8
Nigg,	2	...	8	...	10	32
Shandwick,	13	6	...	...	19	60
Balintore,	13	10	2	...	25	65
Hilton,	11	9	9	...	29	80
Rockfield,	9	9	...	...	18	54
Portmahomack,	18	5	4	...	27	100
Inver,	15	8	4	...	27	84
Total,	135	112	65	...	312	913

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Helmsdale District.						
Embo, - - - - -	23	13	6	...	42	85
Golspie, - - - - -	13	11	3	...	27	60
Brora, - - - - -	22	13	4	...	39	96
Portgower, - - - - -	9	5	2	...	16	26
Helmsdale, - - -	14	10	4	...	28	46
Navidale, - - - - -	...	...	3	...	3	12
Berridale, - - - - -	...	...	3	...	3	12
Dunbeath, - - - - -	30	10	8	...	48	100
Total, - -	111	62	33	...	206	437
Lybster District.						
Latheronwheel, - - -	17	3	12	...	32	61
Forse, - - - - -	21	6	4	...	31	54
Lybster, - - - - -	96	3	10	...	109	215
Clyth, - - - - -	7	2	6	...	15	40
Total, - -	141	14	32	...	187	370
Wick District.						
Whaligoe, - - - - -	10	3	5	...	18	62
Sarclet, - - - - -	8	1	3	...	12	50
Wick and Pulteney, - -	252	17	33	...	302	800
Boathaven, Papigoe, &c., -	8	2	8	...	18	40
Staxigoe, - - - - -	7	3	7	...	17	35
Ackergill, - - - - -	4	3	5	...	12	20
Keiss, - - - - -	26	5	20	...	51	110
Nybster and Auckingill, -	7	...	12	...	19	40
Freswick, - - - - -	7	...	16	...	23	69
Duncansby and Huna, -	7	...	25	...	32	82
Stroma, - - - - -	12	3	46	...	61	120
Gills and May, - - -	7	...	20	...	27	84
Scarfskerry and Ham, - -	...	...	13	...	13	35
Brough and Dunnet, - -	...	...	14	...	14	52
Murkle and Castlehill, -	...	...	13	...	13	44
Thurso and Scrabster, - -	9	10	14	...	33	75
Crosskirk and Brims, - -	3	...	9	...	12	28
Sandside, - - - - -	...	2	3	...	5	12
Portskerry, - - - -	11	6	9	...	26	118
Strathyhead, - - - -	1	...	5	...	6	28
Armadale, - - - - -	5	2	4	...	11	31
Kirtomy and Farr, - -	6	4	10	...	20	78
Skerray, Island Roan, &c., -	3	1	24	...	28	98
Coldibacky and Scullomy, -	...	...	6	...	6	20
Talmine and Portvasgo, -	3	...	15	...	18	88
Erriboll, Rispond, and Smoo,	3	...	34	...	37	74
Total, - -	399	62	373	...	834	2293

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Orkney District.						
Burwick,	3	2	10	...	15	60
Grimness,	17	...	14	...	31	140
St Margaret's Hope,	21	2	16	...	39	170
Herston,	4	1	3	...	8	37
Swinna,	2	...	4	...	6	10
Walls,	9	1	13	...	23	97
Flotta,	7	1	12	...	20	82
Fara, South,	1	...	2	...	3	12
Cava,	...	...	2	...	2	10
Hoy,	5	...	8	...	13	54
Gramesay,	...	...	5	...	5	20
Stromness,	4	3	13	...	20	80
Orphir,	1	1	8	...	10	38
Scapa,	2	3	6	...	11	42
Holm,	14	...	6	...	20	74
Burray,	22	...	14	...	36	102
Deerness,	6	...	8	...	14	60
Tankerness,	2	...	3	...	5	22
Kirkwall,	11	1	22	...	34	150
Evie,	4	...	6	...	10	48
Birsay,	...	1	9	...	10	40
Rousay,	3	...	10	...	13	60
Weir,	1	...	7	...	8	22
Egilshay,	1	...	7	...	8	33
Shapinshay,	5	1	18	...	24	100
Stronsay,	13	...	20	...	33	135
Eday,	6	...	20	...	26	96
Fara, North,	...	...	3	...	3	12
Westray and Papa,	8	9	133	...	150	480
Sanday,	3	...	16	...	19	68
North Ronaldshay,	6	...	10	...	16	66
Total,	181	26	428	...	635	2420
Shetland District.						
Dunrossness,	2	7	38	...	47	186
Levenwick,	4	8	8	...	20	64
Hoswick,	6	5	7	...	18	66
Sandsair,	16	7	4	...	27	138
Aithsvoe,	25	3	2	...	30	168
Bressay,	6	...	6	...	12	40
Lerwick,	67	1	14	...	82	410
Nesting,	9	...	...	...	9	56
Whalsay,	24	3	20	...	47	159
Skerries,	3	2	...	...	5	35
Vidlin,	12	3	...	...	15	86
Dalesvoe,	7	...	4	...	11	46
Mossbank,	5	...	4	...	9	30
Burravoe,	5	...	3	...	8	30
Middyell,	13	...	20	...	33	78
Fetler,	1	3	4	...	8	24
Uyasound,	12	...	4	...	16	72
Baltasound,	3	...	...	...	3	18
Haroldswick,	...	5	...	...	5	30
Norwick,	...	6	...	...	6	36
Carry forward,	220	53	138	...	411	1772

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Brought forward, -	220	53	138	...	411	1772
Shetland District—continued.						
Burrafirth, - - - -	...	6	...	...	6	36
Cullivoe, - - - -	5	3	...	...	8	45
Westsandwick, - - -	11	...	7	...	18	66
Fethaland, - - - -	...	12	...	...	12	72
Sandvoe, - - - -	...	4	...	...	4	24
Ronasvoe, - - - -	4	7	...	...	11	66
Stennes, - - - -	...	15	...	...	15	90
Hillswick, - - - -	7	...	4	...	11	42
Papa Stour, - - -	7	2	20	...	29	54
Sandness, - - - -	10	4	...	...	14	84
Vaila Sound, - - -	13	...	...	...	13	78
Skeld, - - - -	2	...	4	...	6	18
Reawick, - - - -	13	...	3	...	16	78
Sand, - - - - -	12	...	3	...	15	84
Whitness, - - - -	15	...	14	...	29	115
Burwick, - - - -	3	...	4	...	7	25
Scalloway, - - - -	14	...	68	...	82	130
Oxna, - - - -	2	...	4	...	6	18
Trondera, - - - -	4	...	4	...	8	27
Burra Isle, - - - -	14	...	10	...	24	84
Havera, - - - -	...	...	6	...	6	36
Maywick, - - - -	...	...	10	...	10	40
Spiggie, - - - -	4	...	4	...	8	42
Queendale, - - - -	...	...	7	...	7	40
Foula Isle, - - - -	2	...	...	...	6	36
Fair Isle, - - - -	...	4	13	...	13	42
Total, - -	362	110	323	...	795	3244
Stornoway District.						
Europia, - - - -	...	4	3	...	7	40
Stow, - - - -	...	7	3	...	10	40
Portness, - - - -	...	30	6	...	36	250
Skegersta, - - - -	1	6	4	...	11	35
Tolsta, - - - -	5	9	3	...	17	60
Glen, - - - - -	1	1	1	...	3	14
Coll, - - - - -	...	8	6	...	14	120
Back, - - - -	6	8	2	...	16	130
Vatisker, - - - -	5	10	4	...	19	150
Tong, - - - -	8	8	5	...	21	95
Stenish, - - - -	...	...	4	...	4	10
Melbost, - - - -	2	3	5	...	10	60
Garrabost, - - - -	8	6	10	...	24	95
Shader, - - - -	7	4	3	...	14	60
Portnagurin, - - -	11	10	6	...	27	170
Port Voller, - - -	4	5	6	...	15	85
Sheshader, - - - -	6	6	2	...	14	70
Bayble, - - - -	23	24	16	...	63	260
Knock, - - - -	4	6	4	...	14	45
Swordale, - - - -	5	6	4	...	15	50
Holm, - - - -	...	...	4	...	4	10
Sandwick, - - - -	...	2	6	...	8	20
Stornoway, - - -	...	...	15	...	15	25
Grimshader, - - -	2	4	2	...	8	40
Ranish, - - - -	5	8	4	...	17	55
Carry forward, -	98	167	124	...	389	1934

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
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Brought forward, –	98	167	124	...	389	1934
Stornoway District—continued.						
Crossbost, – – – –	9	10	6	...	25	60
Leurbost, – – – –	8	9	7	...	24	70
Koese, – – – –	3	...	4	...	7	20
Laxay, – – – –	2	...	3	...	5	20
Ballallan, – – – –	1	...	4	...	5	50
Habost, – – – –	1	...	6	...	7	15
Kershader, – – – –	1	...	2	...	3	12
Garavard, – – – –	...	...	5	...	5	18
Cromore, – – – –	3	8	6	...	17	50
Marwick, – – – –	6	6	8	...	20	70
Calbost, – – – –	6	6	3	...	15	50
Graver, – – – –	7	9	8	...	24	55
Leumeriva, – – –	7	7	7	...	21	60
Loch Seaforth, – – –	...	...	5	...	5	40
Elennenibe, – – –	...	...	2	...	2	12
Quilis, – – – –	1	2	5	...	8	10
Scalpay Island, – – –	8	10	40	...	58	160
Plockerpool, – – –	...	13	6	...	19	50
Orrigo, – – – –	...	2	5	...	7	16
Derriclate, – – – –	...	...	3	...	3	12
Maevig, – – – –	1	2	4	...	7	20
Drimishader, – – –	1	...	5	...	6	20
Scadabay, – – – –	1	3	7	...	11	60
Grozabay, – – – –	...	2	4	...	6	20
Cleur, – – – –	...	...	4	...	4	20
Stocknish, – – – –	1	9	6	...	16	50
Lachalee, – – – –	...	...	6	...	6	30
Grocrass, – – – –	...	2	6	...	8	25
Mannish, – – – –	...	...	4	...	4	20
Flodavay, – – – –	...	...	5	...	5	25
Quitnish, – – – –	...	...	4	...	4	20
Finisbay, – – – –	...	11	8	...	19	70
Strond, – – – –	1	6	25	...	32	90
Tarrinsay, – – – –	...	2	6	...	8	30
Airdhasaig, – – –	...	...	7	...	7	24
Scarp Island – – –	...	...	6	...	6	30
Borve, – – – –	...	2	2	...	4	40
Shader, – – – –	...	...	2	...	2	11
Barvas, – – – –	...	4	4	...	8	50
Bragor, – – – –	...	2	5	...	7	80
Shabost, – – – –	...	3	5	...	8	60
Carloway, – – – –	8	10	6	...	24	150
Tolstachulish, – – –	...	9	6	...	15	50
Tobison, – – – –	...	8	6	...	14	60
Eneclate, – – – –	...	...	4	...	4	20
Breasclate, – – – –	...	4	10	...	14	80
Geshader, – – – –	...	...	4	...	4	15
Carrishader, – – –	...	...	5	...	5	20
Crulivig, – – – –	...	...	3	...	3	20
Valtos, – – – –	...	12	8	...	20	120
Kneep, – – – –	...	5	4	...	9	30
Airduig, – – – –	..	4	3	...	7	30
Croulista, – – – –	2	8	6	...	16	60
Mangersta, – – – –	...	...	3	...	3	10
Islivig, – – – –	...	4	6	...	10	25
Carry forward, –	181	369	462	...	1012	4324

APPENDIX D.—TABLE VII.—*Continued.*

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Brought forward,	181	369	462	...	1012	4324
Stornoway District—continued.						
Brenish,	.	4	6	...	10	25
Valley, North Uist,	...	...	3	...	3	15
Lochmaddy,	...	8	50	...	58	110
Locheport,	...	4	27	...	31	78
Graemsay Island,	...	3	9	...	12	40
Heisker Island,	...	...	9	...	9	10
Benbucla Island,	...	...	72	...	72	78
Loch Skipport,	...	...	7	...	7	50
Loch Boisdale,	...	19	75	...	94	150
Eriskay Island,	...	9	12	...	21	150
Brurnish, Barra,	...	6	5	...	11	46
Bualnabodach,	...	...	8	...	8	30
Earsary,	...	2	9	...	11	30
Brevig,	2	4	6	...	12	38
Castlebay,	8	7	21	...	36	160
Pabbay,	...	...	2	...	2	5
Menglay,	...	5	6	...	11	40
Barrahead,	...	...	1	...	1	4
Borve,	...	...	4	...	4	12
Total,	191	440	794	...	1425	5395
Loch Broom District.						
Foulin,	1	...	6	...	7	24
Oldshore-beg and Oldshore-more,	3	1	18	...	22	76
Kinlochbervie,	1	...	7	...	8	25
Badcal (Inchard),	...	...	2	...	2	6
Auchriskill,	2	...	7	...	9	31
Achlighness,	...	...	2	...	2	6
Tanagmore,	1	...	3	...	4	6
Findlemore,	...	...	7	...	7	21
Ardmore and Portlovorchaidh,	...	...	5	...	5	15
Tarbet, Scourie,	2	...	14	...	16	34
Badcall, Scourie,	...	1	7	...	8	17
Glendhu and Unapool,	...	...	7	...	7	21
Ardvar and Nedd,	1	...	5	...	6	19
Drumbeg,	...	...	6	...	6	18
Culkein,	1	...	9	...	10	28
Clashnessie,	2	...	5	...	7	21
Achnacairn,	...	...	5	...	5	16
Culkein (Stoer),	...	...	7	...	7	22
Raffin,	...	...	2	...	2	6
Ballacladich,	3	...	2	...	5	23
Clachtoll,	3	...	8	...	11	24
Achmelvich,	2	...	4	...	6	23
Lochinver,	...	...	3	...	3	9
Strathau,	...	...	2	...	2	6
Badnaban,	1	...	4	...	5	20
Inverkirkaig,	1	...	5	...	6	20
Achnahaird,	1	2	9	...	12	39
Altandhu,	2	3	10	...	15	40
Polbain and Tarrera,	4	10	14	...	28	70
Achiltibuie and Badenscally,	...	2	21	...	23	84
Polglass,	2	3	6	...	11	30
Carry forward,	33	22	212	...	267	800

APPENDIX D.—TABLE VII.—*Continued.*

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Brought forward, –	33	22	212	...	267	800
Loch Broom District—continued.						
Culnacraig and Achduart, –	...	...	4	...	4	16
Isle-Martin, – – –	...	...	4	...	4	8
Ardmair, – – – – –	1	...	4	...	5	12
Rhu and Morefield, – –	2	...	13	...	15	34
Ullapool, – – – – –	2	...	32	...	34	102
Leckmelm and Ardcharnich,	...	...	6	...	6	18
Letters, Ardindrean, and Rheroy, – – – – –	7	...	25	...	32	96
Auchmore, – – – – –	...	...	4	...	4	13
Scorring and Lotts of Scorring,	2	1	8	...	11	44
Carnoch and Rhurevoch, –	...	1	7	...	8	24
Badralloch, – – –	1	1	6	...	8	26
Ardessie and Badcaul, – –	...	...	9	...	9	27
Durnmuck and Badlurach, –	...	...	21	...	21	76
First and Second Coast, –	...	...	7	...	7	28
Sand and Laid, – – –	2	...	10	...	12	59
Achgarvl and Mellow-Udrigle,	3	...	6	...	9	40
Opbinin and Mellow-Charles,	1	...	9	...	10	39
Ormiscraig and Balnaluib, –	1	...	9	...	10	41
Tenafelin and Aultbea, –	1	...	6	...	7	39
Poolewe and Nast, – –	...	...	9	...	9	36
Invesasdale, – – –	2	5	10	...	17	50
Cove, – – – – – –	...	...	8	...	8	24
Melvaig, – – – – –	2	...	2	...	4	11
North Erradale, – – –	1	1	2	...	4	20
Sand (Gairloch), – – –	...	4	7	...	11	44
Strath, – – – – –	1	9	4	...	14	56
Badachro, – – – –	4	8	4	...	16	48
Port Anderson, – – –	3	4	4	...	11	44
South Erradale, – – –	1	1	2	...	4	16
Charlestown, – – –	1	1	1	...	3	9
Red Point, – – – –	...	...	3	...	3	9
Total, – –	71	58	458	...	587	1909
Loch Carron and Skye District.						
Dibeig to Ardglass, – –	1	1	8	...	10	30
Loch Torridon, – – –	2	4	10	...	16	48
Loch Shieldaig, – – –	...	3	24	...	27	81
Ardheslaig to Kenmore, –	1	6	8	...	15	45
Arinachrinachd to Lonebain,	...	2	9	...	11	33
Applecross to Ugas, – –	3	10	16	...	29	79
Kishorn to Kenistin, – –	...	3	23	...	26	78
Aird to Strome, – – –	1	6	23	...	30	90
Loch Carron, – – –	2	8	39	...	49	147
Plockton to Balmacara, –	3	14	24	...	41	130
Lochs Duich and Long, –	...	5	55	...	60	160
Loch Hourn and Glenelg, –	...	3	38	...	41	113
Troternish, – – – –	...	16	2	...	18	50
Portree, – – – –	4	7	29	...	40	120
Balmeanoch, – – –	...	6	50	...	56	160
Sconser, – – – –	...	2	34	...	36	108
Luib to Dunan, – – –	1	10	41	...	52	156
Strolomus, – – – –	...	2	5	...	7	21
Broadford to Lussay, – –	1	19	42	...	62	186
Carry forward, –	19	137	480	...	620	1835

APPENDIX D.—TABLE VII.—*Continued.*

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Brought forward, –	19	137	480	...	620	1835
Loch Carron and Skye District —continued.						
Kyleakin, – – – – –	2	13	9	...	24	72
Sleat, – – – –	2	30	54	...	86	258
Uig, – – – – –	3	23	4	...	30	85
Snizort, – – – –	...	8	9	...	17	50
Lyndale, – – – –	...	14	10	...	24	72
Waternish, – – – –	...	13	...	...	13	50
Stein, – – – –	...	9	...	...	9	36
Dunvegan, – – – –	2	18	10	...	30	78
Glendale, – – – –	...	18	...	...	18	70
Lochs Bracadale and Brittle,	1	8	12	...	21	63
Strathaird, – – – –	...	3	13	...	16	50
Lochs Slapin and Eyshort, –	...	1	27	...	28	84
Rona, Raasay, and Scalpa, –	1	6	28	...	35	105
Croulin and Soay, – –	...	2	7	...	9	36
Total, – –	30	293	663	...	986	2944
Fort William District.						
Lochs Nevis and Morar, –	8	10	60	...	78	130
Arisaig, Loch-na-magh, and Laylert, – – – –	1	4	15	...	20	40
Eilan, Shoner Sunsary, and Glenuig, – – – –	3	6	34	...	43	60
Loch Moidart and Ardnamurchan, – – – –	8	10	30	...	48	80
Loch Sunart and Loch Aline,	...	3	16	...	19	40
Fort William to head of Loch Eil, – – – –	...	3	30	...	33	70
Fort William, – – –	...	4	12	...	16	40
Fort William to Corran, –	...	2	10	...	12	20
Bunrie to Carron Ferry, –	...	2	12	...	14	29
Loch Levan, – – –	...	4	20	...	24	40
N. side Loch Creran and Port Appin, – – –	...	2	10	...	12	20
Keil, Coul, and Kintallen, –	...	4	12	...	16	50
N. Connal Ferry, S. side Loch Creran, – – –	...	2	6	...	8	20
Loch Etive, – – –	...	3	10	...	13	24
Dunstaffnage and S. Connal Ferry, – – – –	...	2	3	...	5	10
Oban, – – – –	6	12	12	...	30	51
Lismore, – – – –	2	6	9	...	17	30
Tobermory and Salen, Mull,	2	8	10	...	20	30
Loch Buy, Loch Spelvie, Crogan, and Loch Don, –	...	3	10	...	13	50
Carsaig, Port Uskin, and Keutra, – – – –	...	2	10	...	12	20
Loch Larch and Loch Scriddan,	1	6	14	...	21	60
Loch-na-Keiel, Ulva, and Loch Tuah, – – –	...	6	12	...	18	30
Iona, – – – – –	...	2	4	...	6	18
Tiree, – – – –	5	18	50	...	73	150
Coll, – – – – –	...	2	3	...	5	18
Muck, Eigg, Rum, and Canna,	...	2	10	...	12	40
Total, – –	36	128	424	...	588	1170

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vessels.	Total Number of Boats and Beam Trawl Vessels.	Resident Fishermen and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Campbeltown District.						
Skipness and Clonuig,	2	24	10	...	36	67
Cour and Grogport,	1	22	11	...	34	100
Carradale and Torrisdale,	2	70	8	...	80	127
Campbeltown,	56	228	21	7	312	509
South end of Kintyre,	...	5	2	...	7	17
Sanda Island,	...	5	2	...	7	9
Machrihamish,	...	3	3	...	6	19
Ballochantee and Muasdale,	...	7	5	...	12	20
Gigha Island,	2	26	11	...	39	91
Jura Island,	...	...	2	...	2	10
Colonsay Island,	...	4	2	...	6	30
Portnahaven, Islay,	8	17	33	...	58	128
Portwemyss, Islay,	3	9	19	...	31	63
Bowriord and Port Charlotte, Islay,	...	7	12	...	19	46
Portillon & Portaskaig, Islay,	...	5	24	...	29	48
Lochgrunard, Islay,	...	...	4	...	4	6
Total,	74	432	169	7	682	1290
Inveraray District.						
Loch Feochan,	...	4	21	...	25	42
Luing,	...	4	29	...	33	66
Loch Melfort,	...	3	10	...	13	19
Loch Craignish,	...	3	9	...	12	18
Crinin,	...	4	8	...	12	12
Loch-na-Keal,	...	2	7	...	9	14
Loch Sweyn,	...	3	8	...	11	18
Loch Kylesport.	..	2	10	...	13	16
Tarbert,	8	108	24	...	140	350
Ardrishaig,	...	88	22	...	110	212
Lochgilphead,	2	48	6	...	56	106
Castleton,	...	18	8	...	26	66
Lochgair,	...	16	6	...	22	56
Minard to Crarae,	...	20	7	...	27	72
Sandhole to Furnace,	...	12	8	...	20	44
Kenmore to Douglas,	...	4	3	...	7	12
Inveraray,	...	3	10	...	13	10
Dunderaw to Leachk,	...	12	6	...	18	41
Newton to Otter,	...	16	4	...	20	46
Kilfinnan to Ardlamont,	...	24	8	...	32	58
Total,	10	395	214	...	619	1278
Rothesay District.						
Rothesay,	1	13	9	8	31	40
Port Bannatyne,	4	12	5	...	21	30
Kyles of Bute,	2	60	24	...	86	95
St Ninians and west side of Bute,	10	22	5	...	37	30
Kilchattan and Schoolac,	...	2	11	...	13	20
Boseneath to Toward,	1	27	40	...	68	102
Loch Ranza,	6	21	4	...	31	60
Loch Ranza to Blackwater,	2	30	6	...	38	70
Blackwater to Whiting Bay,	...	4	5	...	9	14
Whiting Bay to Lamlash,	...	4	6	...	10	15
Brodick and Corrie,	...	3	3	...	6	9
Total,	26	198	118	8	350	485

APPENDIX D.—TABLE VII.—*Continued.*

CREEKS.	Number of Boats in Classes.			Number of Beam Trawl Vesssls.	Total Number of Boats and Beam Trawl Vessels.	Resident Fisher-men and Boys.
	1st Class, 30 ft. Keel and upwards.	2nd Class, 18 ft. to 30 ft. Keel.	3rd Class, under 18 ft. Keel.			
Greenock District.						
Gareloch,	...	6	9	...	15	29
Helensburgh,	...	5	5	...	10	11
Dumbarton,	...	3	8	...	11	11
Glasgow and Paisley,	...	...	2	...	2	6
Port-Glasgow,	...	17	9	1	27	20
Greenock,	...	7	6	9	22	48
Gourock,	. .	2	6	2	10	16
Inverkip,	...	...	4	...	4	8
Largs,	1	3	25	2	31	66
Fairlie,	...	1	3	...	4	8
Cumbraes,	...	5	10	...	15	21
Portincross,	...	5	7	...	12	18
Ardrossan,	...	...	2	...	2	4
Saltcoats,	...	51	9	...	60	92
Irvine,	1	36	4	...	41	56
Troon,	...	32	7	...	39	21
Total,	2	173	116	14	305	435
Ballantrae District.						
Annan,	...	...	10	44	54	84
Powfoot,	...	...	1	...	1	25
Carsethorn,	...	...	5	...	5	12
Kirkcudbright,	...	2	10	...	12	20
Garliston,	...	4	10	...	14	20
Whitehorn Isle,	...	2	20	...	22	40
Port William,	...	...	36	...	36	36
Glenluce,	...	3	9	...	12	24
Sandhead,	...	1	20	...	21	25
Drumore,	1	8	2	...	11	50
Portlogan,	...	...	9	...	9	15
Portpatrick,	...	4	24	...	28	70
Stewarton,	...	1	13	...	14	25
Stranraer,	...	14	16	2	32	50
Cairnryan,	...	2	5	...	7	20
Ballantrae,	1	37	10	...	48	90
Carleton,	1	20	5	...	26	55
Girvan,	1	87	10	...	98	180
Maidens,	...	18	16	...	34	54
Dunure,	...	42	12	...	54	70
Ayr,	...	15	15	..	30	65
Total,	4	260	258	46	568	1030

DUGALD GRAHAM, *Secretary.*

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

APPENDIX E.

HARBOUR ACCOUNTS.—ACCOUNT of RECEIPT and EXPENDITURE by the Fishery Board for Scotland for Building and Repairing PIERS and HARBOURS, and for TELEGRAPHIC EXTENSION to Remote Fishery Districts (5 George IV. cap. 64, and *ex* Herring Brand Fees), in the Year 1886.

Dr.

1885.				
Dec. 31.	To Balance at this date,			£3392 19 6
1886.	PARLIAMENTARY GRANTS.			
Mar. 31.	To Parliamentary Grant for Piers or Quays (5 Geo. IV. cap. 64), year ending this date,		£3000 0 0	
„ „	„ Parliamentary Grant for Piers or Quays and Telegraphic Extension (*ex* Herring Brand Fees, 1884):—			
	For Piers or Quays,	£4200 0 0		
	„ Telegraphic Extension,	1000 0 0		
			5200 0 0	
				8200 0 0
	BANK INTEREST.			
April 30.	To Bank Interest on Pier or Quay Deposit Account at Exchequer, year ended 31st March 1886,			40 12 6

Cr.

	PIERS AND HARBOURS.	
1886.	*Harbours for Island of Lewis.*	
Jan. 15.	By Engineers' fee for preliminary inspection and report on proposed harbours for Lewis,	£30 0 0
	Engineers' Travelling Expenses.	
April 30.	„ Engineers' travelling expenses, year ended 31st March 1886,	18 1 2
	Ness Harbour, Island of Lewis.	
Dec. 31.	„ Payments for repairs at Ness Harbour during the year ending this date, viz.:— Works,	54 1 6
	Rosehearty Harbour, Aberdeenshire.	
„ 31.	„ Payments for the harbour works at Rosehearty during the year ending this date, viz.:— Works,	69 2 6
		£171 5 2

TELEGRAPHIC EXTENSION.

St Mary's (Holm), Burray, and St Margaret's Hope, Orkney.

Sept. 10.	To guarantee received from Mr John Laughton, Blanster, St Margaret's Hope, to meet his proportion of the deficit in receipts from inland messages forwarded during the year ended 3rd August 1886, from the telegraph offices established at St Mary's, Burray, and St Margaret's Hope, ... £70 15 0				
1886.	*Castlebay, Barra.*				
Nov. 12.	,, Transference from 'Grant in aid of Telegraphic Extension' of proportion chargeable against that grant of deficit in receipts from inland messages forwarded during the year ended 30th September 1886, from the telegraph office established at Castlebay, . . . £122 5 8				
,, 18.	,, Guarantee received from Lady Gordon Cathcart to meet her proportion of the above deficit,	114 14 5	237 0 1	307 15 1	
					£11,941 7 1

TELEGRAPHIC EXTENSION.

1886.	*St Mary's (Holm), Burray, and St Margaret's Hope, Orkney.*			
Sept. 2.	By Guarantee paid to H.M. Postmaster General to meet the deficit in receipts from inland messages forwarded during the year ended 3rd August 1886, from the telegraph offices established at St Mary's, Burray, and St Margaret's Hope, . . . £212 4 11			
	Castlebay, Barra.			
Nov. 12.	,, Guarantee paid to H.M. Postmaster General to meet the deficit in receipts from inland messages forwarded during the year ended 30th September 1886, from the telegraph office established at Castlebay .	633 13 5		
	Walls and Reawick, Shetland.			
Oct. 5.	,, Guarantee paid to H.M. Postmaster General to meet the deficit in receipts from inland messages forwarded during the year ended 9th September 1886, from the telegraph offices established at Walls and Reawick,	165 1 5	1,010 19 9	
Dec. 31.	,, Balance at this date, ...		10,759 2 2	
			£11,941 7 1	

Fishery Board for Scotland,
Edinburgh, 2nd May 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX F.—No. I.

REPORT ON THE TRAWLING EXPERIMENTS ON THE EAST COAST. PART I.—PRELIMINARY. By J. C. Ewart, M.D., and Sir J. Ramsay-Gibson-Maitland, Bart.

With Plates I., II., and III.

Introduction.

The Commissioners appointed in 1883 to inquire and report on the influence of trawling in the territorial waters of the United Kingdom made the following amongst other recommendations:*—'That in the mean- ' time powers be given to the Scotch Fishery Board similar to those of ' the Irish Board, enabling them to make bye-laws for the regulation or ' suspension of beam trawling, or of any other mode of fishing within ' territorial waters, and that a sum of money be granted annually by the ' Treasury for the purposes mentioned in the last paragraph.

'That statutory powers and means be given to the Fishery authorities ' to enable them to collect adequate statistics.

'That the cruisers serving under the Scotch Fishery Board, whether ' employed for police or scientific purposes, be replaced by efficient steam ' vessels.'*

These recommendations were made apparently because the Commissioners satisfied themselves that—1. In the territorial waters, from the Moray Firth to Grimsby, there was (*a*) 'a falling off of flat fish,' and (*b*) 'a decrease of haddocks in certain places;' 2. 'The number of fish on ' particular grounds, especially in narrow waters, may be sensibly dimin- ' ished by the use of the beam trawl;' and 3. 'In the absence of a proper ' system of fishery statistics and scientific observations, it is impossible to ' discover the causes or measure the fluctuations of the fisheries.'

As the direct result of these recommendations, the Sea Fisheries (Scotland) Amendment Act, 1885 (48 and 49 Vict. c. 70), was passed, empowering the Fishery Board, when satisfied that any mode of fishing in any part of the sea adjoining Scotland, and within the exclusive fishery limits of the British Islands, is injurious to any kind of sea fishing within that part, or where it appears to the Fishery Board desirable to make experiments or observations with the view of ascertaining whether any particular mode of fishing is injurious, or for the purposes of fish culture or experiments in fish culture, to make bye-laws for restricting or prohibiting, either entirely or subject to such regulations as may be provided by the bye-law, any method of fishing for sea fish within the said part, during such time or times as they may think fit, and may from time to time make bye-laws for altering or revoking any such bye-laws.

After the necessary preliminary inquiries had been made and the statutory regulations complied with, the following bye-law was made by the Board and duly confirmed by the Secretary for Scotland, (The Right Honourable the Earl of Dalhousie, K.C.B.):—

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* Report of the Commissioners on Trawl, Net, and Beam Trawl Fishing, presented to Parliament, March 1885.

'I. This bye-law shall extend and apply to (1) the Firth of Forth 'inside or to the west of a straight line drawn from Tantallon Castle on 'the south shore of the Firth to the Lighthouse on the Isle of May, and 'thence to Fifeness; (2) St Andrews Bay and the Firth of Tay, sofar 'as they lie inside or to the west of a straight line drawn from Fifeness 'to the Fairway buoy at the mouth of the Tay, and thence to the land; '(3) that part of the sea off the coast of Aberdeenshire and Kincardine-'shire, which lies inside or to the west of a straight line drawn from the 'Cruden Scars Rocks to a point one and a half miles east (magnetic) 'of Girdleness Lighthouse.

'II. Within the foresaid limits, no person, unless in the service of the 'Fishery Board for Scotland, shall at any time, from the date when this 'bye-law comes into force, use any beam trawl for taking sea fish, and 'the master, or the person actually in command, of any vessel acting in 'contravention of this bye-law shall, on conviction, be liable to a fine not 'exceeding £100, and failing immediate payment of the fine, to imprison-'ment for a period not exceeding sixty days, without prejudice to dili-'gence by poinding or imprisonment, if no imprisonment has followed on 'the conviction—all in terms of the said Act.'

This bye-law came into force on Monday, the 5th of April 1886.

The bye-law having been passed and confirmed, it was necessary to make arrangements to discover, if possible, what influence the prohibition of trawling would have in leading to an increase of fish in the protected waters. At the outset it was evident that it would be necessary to make systematic observations on the various areas by trawling along the same lines, and as nearly as possible under the same conditions, as the ordinary steam trawlers; and further, that it would be equally necessary to obtain as far as possible a record of the fish captured day by day from the various grounds in the Firth of Forth, St Andrews and Aberdeen Bays.

Accordingly representations were made pointing out that a small steam vessel, provided with trawling gear and other appliances, was indispensable.

An application for a sum of money to purchase and maintain a trawling vessel was made by the Board to the Secretary for Scotland (His Grace the Duke of Richmond and Gordon, K.T.), and after full explanations were made by one of us (Professor Ewart) the sum of £3000 was placed on the estimates for the purpose. After due inquiries had been made, the steam fishing yacht 'Garland' was purchased from Mr Woodall, of Scarborough, for the sum of £2500. To save time as far as possible, the above negotiations were begun soon after the bye-law was made, and a few days after the bye-law was confirmed the 'Garland' reached Granton, in order to be fitted out for the trawling experiments contemplated.

The 'Garland' is an iron fishing yacht with accessory steam power. She was built in 1880 at Dumbarton; her length over all is 92 feet, breadth 15 feet 10 inches, depth 8½ feet, and she is rigged as a fore-and-aft schooner.

Before beginning the trawling and other work it was necessary to provide the vessel with a steam winch, trawling gear, dredges, &c., and later it was found desirable to add a small bridge to admit of a better 'look-out' being kept when at work during the night in the vicinity of small fishing boats, often imperfectly protected by lights. The beam of the trawl provided is 25 feet in length, *i.e.*, about half the length of those used by the ordinary steam trawlers. This size was selected partly to suit the weight of the ship, and partly to cause as little disturbance as possible to the fishing grounds when under periodical inspection.

Arrangements for carrying on the Work.

As it was necessary that the trawling operations should be carried out in a thorough and systematic manner, and that all the areas should be studied in relation to each other as well as separately, it was thought desirable to place a naturalist on board the 'Garland.' Mr Calderwood, who had already gained considerable experience in dredging and trawling work in the Moray Firth and in Loch Fyne, was selected for this post.

After the winch and other fittings had been completed, and several preliminary trials made, the 'Garland' was reported on the 15th June as ready to begin the regular trawling and other operations. While the 'Garland' was being adapted for her unique mission, we had under consideration how the work should be carried on. This was a difficult problem owing to the areas selected differing greatly from each other. The Forth, *e.g.*, consists partly of water undergoing constant variations, and partly of water in which the conditions from top to bottom remain almost unchanged. In St Andrews Bay, on the other hand, there is no true estuary at the mouth of the Tay, no piece of water corresponds to that which in the Forth lies between Inchkeith and the sea; and Aberdeen Bay differs from both, for there is attempt at an estuary, the fresh water running directly into the salt without altering appreciably the bottom salinity. Further, while Aberdeen and St Andrews Bays are almost entirely floored with sand, which gradually approaches the surface towards the shore, the bottom in the Forth consists of a series of banks, and depression of a most irregular character (see sections, Plate II.) some of them composed of mud and sand, others chiefly of shells and gravel.

After gaining all the information available from fishermen and others, we came to the conclusion that, for our experiments, the 'Garland' should periodically trawl over nine separate fishing banks or stations (see chart, Plate I.), in or near the Firth of Forth.

In St Andrews Bay we ascertained that it mattered little which lines were selected for trawling, there being no special fishing banks where the same vertebrate and invertebrate forms are invariably found. The same applies to Aberdeen Bay, hence in laying down lines we considered chiefly how the various portions of the bays might be most effectively tested. The lines (stations) in St Andrews Bay are indicated in the chart, Plate I. In Aberdeen Bay six stations were selected which have a similar disposition to those in St Andrews Bay.

Mr Calderwood, on joining the 'Garland,' was instructed to superintend the trawling and dredging operations, the collection of surface forms, preservation of specimens, taking of temperatures, and especially to note carefully and accurately the number and size of all the fish captured by the trawl from the various stations which had been selected for observation.

Special forms were prepared to admit of a complete record being kept of the fish taken by the trawl, dredge, and tow net, and of the temperature, state of the weather, &c. The 'Garland' was supplied with charts, showing the extent and direction in which the trawl was to be carried in working over the various trawling stations, and with several books of reference, bottles, tanks, &c., for the preservation of spawn, young fish, crustacea, and other objects which required to be afterwards examined or identified. Recently a complete set of thermometers and other instruments for making physical observations have been provided, and the necessary instructions given for their use.

The 'Garland' having been equipped and manned [the crew, consisting of a master, two fishermen (one an experienced trawler), an engineer and stoker, an ordinary seaman, a steward, and a boy], began the regular trawling work, on the 16th of June. The station I. (Plate I.) which lies to the N.E. of Inchkeith, generally known as the Roost, was first examined. The trawl was let down about a mile east of Inchkeith, and carried along the bottom for a distance of six and a half miles. When the trawl was hauled in, after being four hours at work, it was found to contain over a hundred haddocks, about 60 flat fish (plaice and dabs), 3 small cod, 40 whiting, 12 gurnards, and a single skate, and in addition a number of sea urchins, starfish, mussels, scallops, crabs, and other invertebrates. With the tow net the water over Station I. was found to contain medusæ (jelly fish), copepods (small crustacea), and other pelagic forms. Later in the same evening Station II. was examined. This station (Plate I.) lies 2 miles off shore in the north bay, between West Wemyss and Leven, and extends in an easterly direction for about four and a half miles. The bottom consists of mud and stones, but towards the east end there is fine sand. After trawling for two and a half hours, only 18 fish in all were captured—10 flat fish and 8 round. In addition to the fish there were, as before, sea urchins, starfish, mussels, crabs, and also whelks, anemones, and ascidians.

On the following day Stations III. and VII. were examined in the same manner, and on the 22nd June all the nine stations in the Forth had been investigated for the first time. The 'Garland' proceeded next to St Andrews Bay, and after trawling over the five stations indicated in the chart (Plate I.), steamed north to Aberdeen, and began the examination of the Bay on the 6th of July. Having trawled over the six stations in Aberdeen Bay, she returned to Granton, and on the 19th July was again at work, examining for the second time the Forth Stations. In the meantime it had been arranged only to visit Stations I. and IV. in the Forth at long intervals—once perhaps in every three months—so as to give the fish every possible chance to increase in numbers and in size; hence, during the second visit of the 'Garland' to the Forth, these two stations were left undisturbed, as were also, for other reasons, Stations V., VIII., and IX. After visiting St Andrews Bay, the 'Garland' proceeded to Aberdeen, and made arrangements for making a short cruise in the Moray Firth, in order to ascertain as far as possible whether it might be desirable at a future time to extend the trawling experiments by closing certain portions of the territorial waters in that Firth. During this cruise we were able to arrange for a series of physical observations being made under the direction of Mr Hugh R. Mill, D.Sc., but the Board has not included in the Appendix the valuable paper dealing with these observations. After returning from the Moray Firth the 'Garland' was only able to examine the various stations in the three closed areas twice before we were compelled, for want of funds, to suspend the trawling portion of the work until the beginning of another financial year. On the 25th of April, the trawling operations were again resumed, and it is hoped it may be possible, with the larger sum now voted for the maintenance of the 'Garland,' to continue the work without interruption throughout the greater part of the year. While the trawling operations were in progress, one or both of us visited at intervals the various restricted areas, and Professor M'Intosh frequently joined the 'Garland' when at work in St Andrews Bay.

The 'Garland' having been fitted out, we next directed our attention to the collection of statistics showing the daily take of fish within and in the vicinity of the closed areas. This proved an extremely difficult matter to arrange, as, to render the statistics of any real value, it was necessary to learn as nearly as possible where the fish were captured, the size of the boats, the kind of bait, the nature of the weather, and also the size and condition of the fish. It was obvious that this work could not be overtaken by the District Fishery Officers, hence at the outset it was necessary to appoint a 'correspondent' at the various stations from which boats fished in the closed waters.

With the assistance of the Fishery Officers of the districts, we at last succeeded in completing the arrangements for the Firth of Forth and St Andrews Bay, from which we are now receiving daily returns, showing the number of the fish captured, size of boats, &c.

While it was possible to obtain the desired returns from the Forth and St Andrews Bay, it was practically impossible, owing to the narrowness of the water from which trawling is prohibited, to get reliable statistics of the fish caught in Aberdeen Bay. The boats are at one time fishing inside, at another outside the boundary; and the fishermen can seldom, if ever, say how many fish were taken in the closed waters and how many beyond.

In instituting this enquiry, it was necessary to consider carefully the three partially protected areas from every point of view, and to ascertain as far as possible which fish are in the habit of visiting them either in search of food, shelter, or spawning grounds at the present day. Although there are a considerable number of food-fishes in our waters, it is only necessary to direct special attention in an enquiry of this kind to those which are largely used as food either in a fresh or in a preserved state. Chief amongst food fishes in Scotland is the herring; then in order of importance we have the haddock, cod (along with which the ling and hake may be included); whiting; halibut and turbot; flounders, dabs, plaice and brill, and lastly, the skate and coalfish. The value of these during 1885 in round numbers was as follows:—(1) Herring and sprats (cured and fresh), £1,700,000, (2) haddock, £300,000; (3) cod, ling and hake, cured and fresh, £250,000; (4) halibut and turbot, £30,000; (5) flounders, dabs, plaice, and brill, £6,000; (6) skate, £15,000; (7) coalfish, £10,000. Our waters yield comparatively few shellfish. In 1885 the lobsters and crabs were valued at £58,000; the mussels at £15,000; while the oysters only yielded £800.

If we consider the Forth either as a feeding ground or nursery for these fish, we find that it is extremely well adapted to play the part of both for most of them, and we are more and more impressed with this fact, if we enquire as to its yield some twenty or thirty years ago.

Unfortunately, we have no statistics to trust to, but all the old fishermen allege that haddocks, flounders, cod, and other white fish were once far more abundant than they are at the present day. Dense shoals of herring and sprats still visit the Firth of Forth, but it seems, a generation ago, herring were still more abundant. In former years herring used often to spawn above Inchkeith, and in Kirkcaldy Bay, but now the chief spawning grounds are at or near the Fluke Hole (off Pittenweem) and in the vicinity of the May. The autumn brood seems to enter the Firth in October and to work its way (sometimes along with the sprat shoals, sometimes separately) up towards Inchkeith, and later into the brackish water between Queensferry and Alloa. As the young herring increase in size they leave the upper reaches for the deeper waters of the Firth, and gradually approach the May previous to entering the North Sea to feed on the shoals of crustacea, etc., it contains during the summer and autumn. But the Forth is also visited during the winter by shoals of large herring, apparently like the fry, in search of food, and even the large fish are sometimes captured in almost fresh water in the vicinity of Alloa. The herring are always followed by haddock and cod; large haddock seldom advance far up the Firth, but they often congregate in immense numbers in the vicinity of the herring spawning grounds to feed on the herring spawn. Small haddocks, on the other hand, make the Firth their head quarters during the spring and summer. The haddock spawns in the open sea in the early spring. Where the young haddocks spend the first weeks of their existence we cannot tell, but in course of time, when a few inches in length, thousands seek the shelter of the Forth. The favourite feeding grounds of the young haddocks lie between Elie, Ness, and Burntisland, where there is abundance of small echinoderms and other favourite food. The haddock shoals are usually composed of two broods, the members of one probably being over a year old, while the members of the other are only a few months old. As the weeks pass, the haddocks grow rapidly, varying from three to six or seven inches in April; they are somewhat larger in July, and in August they measure from seven to ten or twelve inches. After they reach a certain size they seek deeper water, and finally leave the Firth for the open sea. For some reason or other even the small haddocks begin to leave their summer quarters in August, and during September very few either large or small are left in the Firth. That all the young haddocks are not allowed to return to the sea will be at once evident by a glance at Table D (page 130), which shows the number of haddock captured from 1884 to 1886 by the Buckhaven fishermen. This Table shows that from April to August of last year over 700,000 small haddocks and whitings were landed at Buckhaven.

But the Forth serves as a nursery for the whiting and the cod as well as the haddock. About these we have, however, not yet obtained any definite information, but we have ascertained that large cod enter the Firth often in immense numbers in the wake of the herring; hence, as Table D also indicates, cod are more abundant in the Firth during the winter than during the summer months. When the cod come in from the deep sea they are unable at first to bear the brackish water, and hence they move upwards along the deeper parts of the Firth, but after a time they get accustomed to the lower specific gravity of the water, and often follow the herring a considerable distance above Queensferry. When returning to the sea, which they do in March and April, they at first avoid the deep and more salt water by swimming near the surface, and they often rest for a time in the vicinity of Inchkeith before returning to the bracing waters beyond the May. After once reaching the open sea their movements appear to be uncertain, chiefly because the spawning season is about to set in. For example, during the present season large takes of cod were obtained off the May daily for some weeks, but all at once they disappeared, the females apparently leading the way, for one of the last trawls, while it contained over fifty males, had only a single female.

It has often been alleged that turbot were once abundant in the Forth, but of this we have failed to obtain any trustworthy evidence.

Turbot and halibut are now, as in former years, taken east of the May, but seldom west of Inchkeith, and this seems to have been the case in years gone by. On the other hand, flounders are said by nearly all the old fishermen to have been extremely plentiful twenty to thirty years ago on nearly all the sandbanks in the Forth, more especially along the south shore; and what is true of the flounders holds for dabs and most of the other flat fish. At the present day, judging from the takes of the 'Garland,' it must be confessed that flounders and other flat fish are relatively few in number and of small size, and this is largely true of the 'Fluke hole' which at one time seems to have been literally floored with flat fish. But the Forth seems equally well adapted by nature for certain kinds of shell fish as it is for round and flat fish. We have often heard of the rich oyster beds of former days. That oysters were once plentiful enough can scarcely be doubted. It seems that about 1830, the fishermen not satisfied with taking the large oysters for the home market began to export young oysters to Holland, Belgium and England. This seems to have gone on for over thirty years without any attempt at oyster culture as now understood or even any steps being taken to preserve a stock for breeding purposes. However, about 1869 or 1870 it was found many of the beds had been destroyed with the result, that at the present day the Forth only yields oysters to the value of a few hundred pounds annually.

Mussels and clams are however still fairly abundant more especially along the south shore from the vicinity of Gullane Sands as far as Mickry Island. Hence, although the fishermen can no longer enrich themselves with oysters, they can still obtain a goodly supply of bait.

We may conclude therefore that the Forth is naturally well adaped for most kinds of fish and shellfish and that in former years it was better stocked than it is at the present day. As a matter of fact, there is not, as far as we are aware on the east coast of England or anywhere else on the coast of Scotland, a stretch of water with so many natural advantages from the fishermen's point of view as the Firth of Forth. The fresh water carries with it food for mussels and other shellfish. The sea brings in food for herring and other round fish. The water varies considerably in depth and salinity and the bottom at one part consists of sand or mud at another of gravel or shingle and at another of rocks, sometimes bare, sometimes covered with sea-weed and the temperature throughout the year is fairly constant, there never being great heat in summer or very great cold in winter.

It may here be mentioned that as an indication that the firths and bays and territorial waters generally have yielded large supplies of fish, the fishing boats until comparatively recently were with few exceptions small and undecked, and although the boats are now much larger than they were, none of the great fishing stations can yet boast of a fleet of schooners, similar to those at Grimsby or other English fishing centres, or at Gloucester and Boston in the United States. Scotland is certainly largely interested in the fisheries, yet her fishermen are practically unable to compete with the English great fleet on the fishing banks of the North Sea. The English and American fishing schooners are sufficiently large to make a cruise of several weeks duration to the great fishing banks, but our fishermen are at the best, owing to the size of their boats, only able to glean in a hurried fashion the banks from which the English vessels reap an abundant harvest. As a result of this, the amount of fish landed in Scotland except during the great summer herring fishing, differs strikingly from the amount landed in England, *e.g.*, the fish landed on the coasts of Scotland during April (1887) was valued at £62,161, while the fish landed at the English fishing stations during the same months was valued at £328,806,—this is exclusive of shell fish, the estimated value of which is £19,855. The boats are increasing in size year by year, and probably in another generation we shall have a fleet of well-found schooners able to stay at sea for months at a time, and to fish thoroughly the offshore banks, and it may be to take part in the Iceland cod and halibut fisheries and the great Lofoden fisheries, which in 1886 yielded to the Norwegians over 31,000,000 cod.

Having referred at some length to the natural advantages of the Firth of Forth as a fishing centre, we shall without discussing St Andrews and

Aberdeen bays in the same manner, next describe shortly the work that has been accomplished since the passing of the Bye-law.

Sufficient time has not yet elapsed since the passing of the bye-law to admit of definite conclusions being arrived at. In the present Report it would therefore be premature to discuss at length the results likely to follow the prohibition of trawling in the territorial waters. As the experiments will require to extend over several years, the public interest will be best served if in the meantime we indicate generally the physical and biological conditions of the Forth and St Andrews Bay, as far as they have been ascertained, and append the statistics collected, which are likely to assist in throwing light on the influence of trawling and other modes of fishing in diminishing the number of fish in the territorial waters.

Physical Conditions of the Firth of Forth.

From the investigations recently made by Mr Hugh R. Mill,* 'it seems ' the Firth of Forth may be described as extending from Alloa to the Isle ' of May. From Grangemouth to near Queensferry it averages 1½ miles in ' breadth, with a depth of less than 10 fathoms ; at Queensferry it contracts ' to 1 mile, and the depth increases to over 40 fathoms, but diminishes afterwards. From Queensferry the breadth increases to 5 miles at Leith ' and 16 at Musselburgh, contracts to 8 miles at North Berwick, and again ' widens, measuring 18 miles across where it merges with the North Sea ' at the Isle of May. The deep water at Queensferry is confined to a ' very small area, and the 10 fathom stream, broken by a few deeper ' patches, runs along the northern shore to near Kirkcaldy, where it widens ' out in a funnel shape (see chart, Plate XX.). A short tack of over 10 ' fathoms, known as the Narrow Deep, lies to the south of Inchkeith, and ' a few miles to the east of that island the 20 fathom area begins as a ' narrow stream, tending north-eastwards, and spreading out off Largo ' towards both shores. The Isle of May is connected to the mainland of ' Fife by a submarine plateau rising to less than 20 fathoms from the ' surface, and a few miles to the eastward of it depths of over 30 fathoms ' commence. The mean depth of the whole Firth is 14 fathoms, the greatest ' extent of shallow water being the range from Leith to North Berwick ' along the south shore across Aberlady Bay.'

In considering firths into which a large river enters at the one end while the other is in free communication with the open sea, the saltness of the water is of great importance in influencing the movements of the fish and their food, and also the development of both ova and young fish. From the observations made it seems that the salinity of the surface water increases rapidly from the river to Queensferry, while from Queensferry to Inchkeith the rate of increase is more gradual and the tidal difference less. From Inchkeith to the Isle of May the rate of increase in salinity is very slight, and the tidal variation almost imperceptible.

Inquiries as to bottom salinity show that tidal change extends only from the river to a point off Blackness, and the rate of change is everywhere similar to that for surface salinity, but more uniform. As far as Inchkeith ' surface salinity is always less than that at the bottom, but gradually ' approaches it, and seaward of Inchkeith the surface water is scarcely at all ' fresher than that beneath, until some little distance beyond the mouth of ' the Firth, where the freshening action of the Tay appears superficially, but ' is not felt at a depth greater than about 5 fathoms. Between Inchkeith

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* The Physical Conditions of the Firth of Forth, by Hugh R. Mill, D.Sc., page 349.

‘ and Alloa the difference in salinity between bottom and surface water is ‘ about equal to that at the same level between stations from 4 to 6 miles ‘ apart. For instance, bottom water at Grangemouth is about as salt as ‘ surface water at Blackness, and bottom water at Blackness as salt as ‘ surface water midway between Queensferry and the Oxcar Rock. Seaward ‘ of Inchkeith the difference between bottom and surface water is very slight ‘ indeed.’

The influence of the tide on the salinity of the Firth of Forth may be described as follows :—

‘From the mouth of the Firth to Inchkeith the result is simply a ‘ to-and-fro movement of the water without any very apparent consequences, ‘ as the salinity differs little from point to point. Above Inchkeith the ‘ to-and-fro motion gradually changes into one of shearing. The tidal ‘ water, from its superior specific gravity, tends to pass under the lighter ‘ brackish water of the estuary, and to push its way below the downward ’ moving stream of the river. After some time the river current slackens, ‘ then stops, and finally turns, mixture with the salt water becoming more ‘ complete.’

Although, when selecting the trawling stations, we considered chiefly which portion of the Firth would show best the results of limited protection, they all happen to lie in water having practically the same salinity, with the exception of No. IV. (Plate I.), over which the water has an average salinity of 3·300 per cent., while at the other stations the salinity does not vary more than 0·050 from 3·400 per cent.

However sensitive ordinary fish may be to changes in salinity, they are apparently still more sensitive to changes of temperature. The temperature of the Forth varies considerably. The southern margin is very much warmer than the northern in summer, and very much colder in winter. This variation of temperature is more marked at Station IV. than any of the others, the cold being more intense in winter and the heat greater in summer. During spring the temperature of both the river and firth from side to side and from surface to bottom is nearly the same, varying in the years already noted from 40° to 43° F. As the season advances the water gets rapidly warmer, ‘the surface heating more rapidly than the lower strata, ‘ and the river more rapidly than the sea. Consequently, a typical summer ‘ distribution is arrived at, in which there is a continuous gradient of ‘ temperature from river to sea, and from surface to bottom. The tempera- ‘ ture at Alloa in August may be about 60°, that at the Isle of May 55°, ‘ and the bottom water from 3° to 2° colder. After the autumnal equinox ‘ cooling sets in, and this is most rapid in the landward reaches and on the ‘ surface, slowest at sea and on the bottom. As a result, a state of ‘ uniformity is reached in October or November, with a temperature about ‘ 50° from river to sea and from surface to bottom; then, as cooling goes on, ‘ the river becomes coldest, and in January or February the minimum is ‘ reached, and there is a uniform rise of temperature from river to sea and ‘ from surface to bottom. As spring advances heating ensues, and once ‘ again a uniform temperature is attained.’

‘Considerations of salinity and also of temperature lead to a distinction ‘ being drawn between various parts of the Firth. Between Inchkeith and ‘ the sea there is a constancy of salinity and of temperature from point to ‘ point, and from surface to bottom, and from high to low tide, that stands ‘ sharply in contrast with the region between Inchkeith and the river, ‘ where there is rapid change in all conditions from many causes.’ These two very different parts of the Forth Dr Mill proposes to call the *Firth proper* and the *Estuary*. Inchkeith may be taken as the boundary between estuary and firth, while the line dividing firth from sea lies somewhere about the Isle of May. Sufficient progress has not yet been made with the examination of the St Andrews Bay to admit of its being considered in the present report.

Description of the Trawling Stations.

As already stated, we selected for special observation nine of the more important fishing grounds in the Firth of Forth, seven within and two beyond, the boundary given in the bye-law. The position of the various stations will be best understood by referring to the chart, Plate I.

Station I., known as the Roost among the fishermen, begins one mile to the east of Inchkeith, and extends in an easterly direction for six and a half miles.

The bottom in this area is almost entirely composed of mud, but in the vicinity of Inchkeith there are stones and shells. The depth varies from 10 to 18 fathoms.

All the common food fishes are caught here in tolerable abundance, the common dab, haddock, and plaice being the most plentiful.

The mud of the bottom is rich in lob-worms, and the hard ground near Inchkeith is peopled with mussels, clams, starfish, crustacea (including several species of crabs), and other invertebrates. The water over this station at certain seasons teems with pelagic forms, such as Sagitta and Tomopteris—both of which enter largely into the food of the herring. medusæ, copepods, and ostracods are also often found in great abundance.

Fishing boats come to this station from all the fishing villages in the vicinity, but especially from Newhaven, Kirkcaldy, and Buckhaven.

By a reference to Table B, page 80, it will be seen that the 'Garland,' when trawling on the Roost, captured chiefly common dabs, haddocks, plaice, lemon dabs, whiting, cod, long rough dabs, gurnards, skate, and ling.

Station II. (Plate I.), is situated in the North Bay of the Forth, 2 miles off the shore, between West Wemyss and Leven. The bottom for the most part consists of mud and stones, but sand is abundant towards the N.E. end. The depth varies from 9 to 12 fathoms.

Flat fish preponderate in this station, but haddocks are also often caught in large numbers. This is partly accounted for by the nature of the bottom fauna. There are, especially at the N.E. end, numerous brittle stars, and in addition to ordinary star fish, sea urchins, and crustacea, there are mussels, scallops, whelks, a few oysters, and at times, loligo and other 'cuttle fish.' At or near the surface, Sagitta, Appendicularia, small medusæ, copepods, and other crustacea are often abundant.

This bank is chiefly fished by the Buckhaven and Kirkcaldy fishermen.

The fish taken in the order of their abundance are—Haddocks, common dabs, plaice, lemon dabs, whiting, long rough dabs, gurnards, and young cod.

Station III. extends eastwards from Inchkeith in a similar manner to Station I. It lies south of that station, and runs to a point 2 miles off Gullane Ness, on the south shore of the Firth.

The bottom is composed chiefly of mud, but there is an admixture of shells and stones, more or less covered with weeds. In depth it varies from 8 to 10 fathoms. As in Station II., flat fish are more common than round fish.

The bottom is rich in crustacea, including Nephrops (the Norway lobster), edible and other crabs. There are also mussels, clams, whelks, oysters, 'cuttle fish,' Aphrodite (the sea mouse), starfish, sea urchins, and anemones. The 'cuttle fish' are especially sought after by (and they are excellent bait for) the cod. In the mid and surface waters medusæ, Tomopteris, Sagitta, and copepods flourish, and at certain seasons larvæ of crabs and crustacea are abundant.

The fish taken by the 'Garland,' when trawling over this station (Table B, page 80), were chiefly haddocks, plaice, lemon dabs, long rough dabs, cod, common dabs, whiting, gurnards, skate and turbot.

Station IV. extends round the South Bay, following the outline of the coast for 8 miles. The depth varies from 5 to 7 fathoms. The bottom is chiefly composed of sand, intermixed with an immense number of shells and small stones. At some parts sea weeds are plentiful.

The fish in this station agree very closely with those in Station III. (Table B, page 80), and the same holds true for both the bottom and surface fauna. The fishermen from the adjacent villages often set long lines in Stations III. and IV., and in addition to yielding fish, these stations produce large supplies of bait.

Station V. is situated in the eastern section of the Firth, about halfway between the north and south shores. It runs west from the May Island for 6 miles. The bottom is composed of mud, and the depth is on an average 20 fathoms. The bottom fauna includes worms (Polychætæ), Nephrops, and other crustacea, starfish, whelks, cuttle fish, and other molluscs. Feeding on these are fish of various kinds but chiefly dabs, plaice and flounders, with at certain seasons haddocks, cod, whiting, skate and gurnards. In the waters over this fishing ground there are often medusæ, copepods, ascidians, and young fish.

Station VI. is the smallest of all the stations. It is represented by an oval patch of sand and gravel a mile and a half long, situated between St Monance and Pittenweem. It, in fact, consists of a stretch of sand, gravel and broken shells which extends into a considerable area of rocky ground. The depth varies from 13 to 14 fathoms.

This small patch of sand has long been known as the 'Fluke Hole.' It has yielded, year after year, enormous quantities of fish to the Pittenweem and other fishermen, and in some respects it resembles the famous 'Silver Pit' which lies off the English coast. The sand probably forms a convenient resting place to the 'flukes' and other flat fish, while the surrounding rocks yield a sufficient supply of food throughout the greater part of the year, and a rich banquet, when during the winter and autumn they are visited by immense shoals of spawning herring. During all seasons, starfish, sea urchins, and other echinoderms, abound; also crustacea and molluscs and 'cuttlefish' are often plentiful. The waters over the station teem often with crustacea—adult and larval forms,—Sagittæ, young echinoderms, fish, and molluscs, and also pteropods and medusæ.

From this fishing bank the 'Garland' obtained chiefly plaice, common, lemon, and long rough dabs, haddocks and gurnards, but young cod, whiting, turbot and other fish were also captured. At certain seasons the Fluke Hole is visited by large shoals of haddock which apparently come to feed on the herring spawn.

Station VII. extends from the Bass Rock to Fiddra, at a distance of about a mile and a quarter from the land. The bottom consists of sand, mud and stones, and lies at a depth of from 11 to 14 fathoms.

Living on this station are again numerous echinoderms including many Luidia and other starfish, also crustacea and molluscs. In the waters over it, copepods, medusæ and Sagittæ have been specially observed. As would be expected from the nature of the fauna the fish here are chiefly haddocks (at certain seasons), dabs and plaice, but whiting, skate, gurnards, cod and saith are also captured, and the fishermen from North Berwick secure a considerable number of crabs and lobsters.

Stations VIII. and IX. being very similar may be taken together. They both lie to the east of the Bass Rock, and are about four and a half miles long. No. VIII. runs E.N.E., while No. IX. runs in a more southerly direction, or E. by S. Both stations have an average depth of from 18 to 20 fathoms, and the bottom consists chiefly of mud and stones.

The bottom fauna consists chiefly of Echinoderms, crustacea and molluscs similar to those in the other stations. Station VIII. yields dabs, gurnards, skate and ling, and at times numerous haddocks, while Station IX. in addition, yielded a few cod and whiting when examined by the 'Garland.'

Stations VIII. and IX. are very often visited by trawlers, the bottom in the vicinity of these stations consists chiefly of sand and mud and is fairly level. Further, these stations lie in the route to the trawling banks situated from 15 to 30 miles E. and S.E. of the May, from which large quantities of fish are annually captured.

In St Andrews Bay as already mentioned there are five trawling stations. Four of these as the chart (Plate 1) shows radiate from a point near St Andrews towards the line (C, D), which indicates the outer boundary of the restricted area, and the fifth runs parallel to, but some distance beyond, the boundary line.

The bottom of St Andrews Bay with the exception of the south shore which is rocky, consists almost entirely of sand; it slopes gently from the beach in an easterly direction, until at the boundary line a depth of from 10 to 12 fathoms is reached. Outside the boundary the depth in the vicinity of Station V. is from 12 to 14 fathoms. Into St Andrews Bay a large volume of fresh water is constantly flowing from the Tay, but there is no firth or estuary formed as in the Forth. When the Tay is in flood the brownish coloured fresh water can be seen extending along the surface towards Fifeness the point of which it often doubles to be carried by the tide some distance into the Firth of Forth. Near the mouth of the Tay where the fresh and salt water meet, there are large sand banks with often irregular channels between them. These irregular banks extend towards the mouth of the Eden, but from the Eden to St Andrews the bottom beyond low water mark is nearly uniform. Beyond St Andrews the shore consists chiefly of rocks which extend without any large break to form an irregular belt from St Andrews to Fifeness, and thence along the south shore of the Fifeshire coast as far as Elie Ness.

The physical conditions of St Andrews Bay are thus entirely unlike those of the Forth, and this being the case we naturally expect the fauna to differ considerably. A complete account of the fauna of St Andrews Bay during the different months of the year we have not had time to prepare, but we trust with the help of Professor M'Intosh that a first list will be ready for the next report. We, however, know already that the rocky ground on the south shore is rich in molluscs, crustacea, marine worms, cœlenterates, &c., and that starfish and other echinoderms, edible, swimmimg, and hermit crabs and other crustacea are scattered in abundance over the sandy bottom of the bay and especially that mussels abound near the mouth of the Eden. Further swimming or pelagic forms (including at certain seasons of the year schools of young fish, crustacea, and molluscs) teem in the surface and deeper waters.

As is to be expected from the nature of the bottom, flat fish far outnumber round fish all over the bay. The flat fish are chiefly represented by several kinds of dabs, by plaice, flounders, skate and brill, and at times turbot, and in addition the bay is visited by haddock, whiting, cod, and other round fish.

The first station (I.) extends for five miles S.E. by E. from St Andrews, and has a depth of from 6 to 12 fathoms. Lines from small boats are often set in the vicinity of this station.

Station II. begins at a point about two miles from St Andrews and extends E. by S. to the boundary line—a distance of four miles. The water at first 7, gradually deepens to 14 fathoms. In these two stations the 'Garland' captured (Table B) in addition to flat fish (plaice, dabs, flounders and turbot), a number of round fish, including gurnards, haddocks and dragonets, and Station II. also yielded a number of skate.

Station III. begins about two miles from the pier, and extends for a distance of four miles E. by N. towards the boundary line. The depth increases from 8 to 12 fathoms. From this station brill and small cod were taken along with the fish common to all the stations.

Station IV. begins at a point about a mile and a half from the harbour and describes a curve around the N.W. part of the bay, the depth being at no point greater than 8 fathoms. From Station IV. gurnard, saith, and skate were taken along with the flat fish.

The last Station V. in St Andrews Bay as already said lies beyond the restricted area. It begins about two miles from the Tay buoy, runs parallel to the boundary line and ends east half south of Barbert Ness. The fish taken in this, were similar to those at the other stations (TableB , page 80). From the conformation and position of St Andrews Bay it will be readily understood that during easterly and north-easterly gales its waters are extremely unsettled, heavy swells roll in to break on the beach or on the rocks along the south shore. Sometimes the waters are so troubled for days, that even the least migratory of the flat fish seek shelter in deep water, hence occasionally when trawling at St Andrews the fish captured were very few in number. It might be supposed that the take was small, owing to the heavy sea preventing the trawl keeping the bottom, rather than the absence of fish; but this is unlikely, as the line fishermen have had the same experience; when the Bay is unsettled they require to seek the fish in deeper water.

The N.W. portion of St Andrews Bay seems to form a nursery for young flatfish, especially dabs and plaice, probably because it is less exposed than the other portions of the bay, or perhaps food is more abundant in the vicinity of the mouth of the Tay.

In order to give St Andrews Bay every possible chance of becoming as productive as by common report it was some twenty years ago, we have suggested that the present restricted area should be extended so as to enclose the territorial waters that lie off the coast of Forfarshire, as far north as Red Head.

If this is done we trust the increased protection may admit of a freer passage being secured between the bay and the north sea, on which for new supplies it must chiefly depend. Unfortunately, the St Andrews fishermen fail to realize that it is possible to overfish the inshore ground by lines as well as by trawls. We understand that they are setting long lines in the bay, so as to catch as many fish as they possibly can. Should this continue, it may be necessary to prevent for a time all kinds of fishing in St Andrews Bay.

Aberdeen Bay corresponds in some respects with St Andrews Bay, but the closed area includes not the Bay proper, so much as a narrow portion of the territorial waters (some eighteen miles in length), which extends from Girdle Ness to the Cruden Scars. This area, very narrow at certain points, never reaches a width of three miles. The Dee, Don, and Ythan flow into the bay, but the fresh water flows over the salt without mingling with it as in the Forth to form a true estuary. The bottom consists chiefly of sand, but towards the north and south sand gives place to rock. The fauna resembles that found at St Andrews, but although flatfish are relatively plentiful, whiting are far more abundant. As at St Andrews the water is often for days in great commotion owing to easterly gales; while the gales last, the fish seem here, as elsewhere, to seek shelter in deep water, hence on several occasions the trawl in Aberdeen Bay only succeeded in capturing a few small fish. As already mentioned, owing to the impossibility of collecting valuable statistics of the fish caught in this area, and to the uncertain results obtained by the 'Garland,' we recommended that in the meantime experiments in Aberdeen Bay should be suspended.

The Garland when at work trawled over six stations, four of them within, and one without the closed waters.

The first Station I. extends from a point one and a half miles off the mouth of the Don to a point the same distance S.E. of Hare's Cairn, the greatest depth is twelve fathoms. Stations II. and III. extend from Hare's Cairn in a similar direction towards the boundary line, the greatest depth is 16 fathoms. Station IV. runs from a point off Belhelvie Coastguard Station towards Heachley Head; the greatest depth is eleven fathoms. Station V. extends from near the mouth of the Ythan to end at the boundary line opposite Old Slains Castle; it has a uniform depth of eight fathoms. Station VI. runs for a distance of three miles parallel to, but beyond the boundary line; the greatest depth is eighteen fathoms. By referring to Table B, page 81, the nature of the takes of the 'Garland' at the above stations will be at once understood. They will be seen to differ from the takes in St Andrews Bay in the large number of whitings and gurnards. The flatfish include plaice, dabs, flounders and turbot, the round fish include whiting, gurnards; haddock, cod (chiefly young), hake, and ling.

Statistics.

Statistics, it is often said, can be made to prove anything. If there is a difficulty in collecting reliable statistics of ordinary imports and exports, still more difficult is it to collect trustworthy statistics of the fish landed at the various fishing stations around the coast. This difficulty all nations are familiar with, and certainly no country has hitherto succeeded so well as Scotland in collecting fishery statistics; but unfortunately until recently we were contented with recording the quantities of fish cured, no attention having been paid to the fish used fresh.

While the total quantity of fish captured around the coast throughout the year has a certain national interest (in as far as it enables us to estimate in a general way the value of our fisheries), it has no scientific value. Statistics, to be of any real use now or in the future, must show, not only the quantity of fish caught at any given time, but also, as accurately as possible, the place where they were captured, the number of boats fishing, the bait used, the size of the boats, state of the weather, condition of the fish, &c. Hitherto, we are not aware of any attempt having been made on a large scale to collect statistics on the above lines. In order to obtain complete and accurate statistics it would be necessary for each boat around the coast to keep a day book, indicating not only the fish captured, but also the ground fished over, the state of the weather, value of the fish, &c. An experiment in this direction we have recently made. Some forty fishermen were good enough to consent to fill up books provided for the purpose, and return them once each month to be checked and copied. The takes of several boats fishing on the same ground year after year might be extremely valuable, and there is no reason why each boat should not keep a careful record of her takes; were this done, many questions of great interest would in a few years be finally settled, and our knowledge of the movements of fish would be considerably increased.

The sea is ever changing, and its inhabitants, especially the shallow water and surface forms, are more or less influenced by these changes. Further, fish seem naturally to move to and fro, some wandering over wide areas, while others are limited in their migrations. It may be taken for granted that fish are less capricious and less migratory than has been generally supposed—that, in fact, led by instinct or by experience, they only change from one place to another when some good to the individual or the species is likely to be gained. Hitherto the fishing boats when in search of shoals have, like the fish, been steered more by instinct than reason. Nevertheless, the experienced fishermen know most of the resorts of fish at the different seasons, but their information requires to be tabulated and tested.

Taking for granted fish are abundant on a certain bank, many things may prevent their being captured. In the first place, the fishermen may fail to discover the particular bank. It was only in 1842 that the Silver Pit was discovered,—the 'pit' where the sole and other flat fish congregate in immense numbers in winter;—yet this sheltered spot has probably served as the winter quarters of the sole for centuries. Again the bottom feeders may be engaged spawning near the surface, or the surface forms may be spawning at the bottom. The other day, *e.g.*, of 56 cod taken in a trawl off the May, there was only one female, the other females of the shoal having either left for the off-shore spawning banks or taken to swimming nearer the surface preparatory to shedding their ova. Again, the take may be small owing to the bait used, the size of the nets, the state of the tide, or the condition of the weather or sea.

Apparently, both in St Andrews and Aberdeen Bays, the flat fish often find the inshore ground so unpleasant during storms that they with common consent move seawards. If the trawl is carried along a given line one day when the sea is still, hundreds of flat fish may be readily captured; but the same trawl, taken over the same ground some days later when the sea is rough, may fail to secure a single fish.

Having indicated some of the difficulties that must be taken into account in collecting statistics of fish, we shall now direct attention to the statistical tables given below. These tables show—(1) The takes of the 'Garland' in the three closed areas; (2) The takes of the boats which have been at work in the closed areas since December last; (3) The takes of a number of boats which kept a daily record of the fish captured; and (4) The takes of trawled as distinguished from net and line fish landed at the fishing stations between Leith and Aberdeen.

Although it is unnecessary in the meantime to examine critically these tables, some of their more striking features may be referred to. By turning to Table B. which gives a summary of the 'Garland' takes, it will be first noticed that fish are apparently more abundant in the territorial waters during the summer months than during October and November. In the Firth of Forth the average number of fish taken during June, July, and September amounts to 246, while the average for October and November is only 118, or a little less than a half. In St Andrews Bay and Aberdeen Bay the decrease in the average is still more remarkable; in the former the number falling from 239 to 82, or nearly one-third, in the latter from 465 to 85, or somewhat more than one-fifth. Within the period mentioned there is, however, considerable variation in the number of fish captured, although on the whole it is wonderfully equal. The largest takes appear to have been made in the months of June and July, the quantity of fish for the months previous showing a tendency to increase, while that of the succeeding months gradually decreased till September, after which there is a sudden and very noticeable falling off. Thus in the Firth of Forth the average number of fish per catch was 473 for July, 285 for September, 109 for November; in St Andrews 270 for June, 247 for September, and 70 for November; in Aberdeen Bay, 578 for July, 473 for September, and 37 for November.

With regard to the relative abundance of the fish, it is found that haddock are by far the most plentiful of those captured in the Firth of Forth; they, in fact, form more than one-third of the entire catch, while in St Andrews Bay the proportion of the number of haddock to the number of fish taken is only one-fifteenth, in Aberdeen Bay, a little over one-seventh. The largest takes of haddock in the Forth were made during the months of June and July, but they remain the predominant fish even in other months.

Whiting are not nearly so numerous as the haddock, the relative proportions being about as 1 to 9; they were caught in largest numbers in June and July, although good takes were also got in September and November. The number of cod captured is somewhat less than that of whiting, but those taken are with one or two exceptions recorded as being small; there is no special month when they are plentiful, as good catches being made in September as in June.

Flat fish constitute more than one-half of the entire number of fish taken by the 'Garland;' common dabs, brill, and plaice being especially abundant, lemon dabs being fairly numerous, while skate, flounders, halibut, and turbot are poorly represented. Plentiful takes do not appear to be confined to any particular month.

Gurnard are largely present in the catches; they were taken in greatest abundance in April, June and July. One or two good takes were, however, made in September, but in November very few are recorded.

In St Andrews Bay, flat fish specially abound, making up more than two-thirds of the entire take. Among these, common dabs occur in largest numbers, brill plaice come next, while lemon dabs, halibut, and turbot are also represented. Flounders are more numerous than in the Forth, there being on an average 5 for each haul in St Andrews Bay, as compared with 1 in the Firth of Forth. The fishermen report that flounders are more abundant than previously, and that last summer they had better takes of flounders than they have had for several years. Good catches of flat fish are not limited to any special month; in November, however, in all cases but one, the number captured was very low. Gurnard also are much more abundant than in the Forth, 11 being the average per take for the Forth, while in St Andrews Bay it amounts to 41. The largest takes were made in May and June, but in November very few gurnard were captured.

Haddock are not so plentiful, being only one-fifteenth of the number of fish taken; this gives an average of 11 as the result of each trawl, compared with 60 in the Firth of Forth. The months of May and June are found to be the season of greatest catches. The number of whiting caught is very small, averaging less than 2 for each haul, while only fifteen cod were taken in twenty-three trawls. The whiting were almost entirely confined to Station V. which is outside the boundary, and it is noticeable that all the cod but one were taken in November. The fishermen report that while flounders are more plentiful than formerly, there is a great decrease in the number of haddock; they further state that there is not one-third of the fish in the Bay it contained twenty years ago.

In Aberdeen Bay, gurnards were by far the most plentiful, the average catch being nearly 112, the proportion to the whole quantity captured being slightly over one-third. They were obtained in largest numbers in the month of July, upwards of 500 being sometimes taken at one haul. In three hauls made in September, only eight gurnards were captured, while they were entirely absent from the November takes.

Whiting come next in numerical importance, forming somewhat less than a quarter of the number of fish obtained. The average catch was 68, as compared with 7 in the Firth of Forth and about 1⅗ in St Andrews Bay. They were most abundant in the month of September; in July as a rule the takes were small, only two moderate ones being recorded, and in November, with but two meagre exceptions, they contained no whiting. It is worthy of remark, that while in the Firth of Forth the largest catches of whiting were made in June or July, September is the month in which they were obtained in greatest abundance in Aberdeen Bay. Haddock are well represented, although they are not so plentiful as whiting, the proportion to the whole catch being about one-seventh. Here again it is to be noticed that the largest takes occurred in September, all the July catches proving very meagre. In November one good catch is recorded, while the others contained few or no haddocks. Cod were not numerous; but though fewer than in the Forth, they were more abundant than in St Andrews Bay.

Flat fish occur also very plentifully, among these, brill, plaice, and dabs are to be noted as the prevalent forms. Lemon dabs and skate show a deficiency, and flounders have only one representative in the hauls. The best catches of flat fish were made in July and September.

By comparing now the prominent features of the three districts investigated, it is to be observed that the Firth of Forth is characterised by an abundance of haddock, St Andrews Bay by the predominance of flat fish, and Aberdeen Bay by the great number of gurnards and whitings. Further, while the Firth of Forth and Aberdeen Bay contain a fair average number of the different kinds of fish, there is a deficiency of haddock, whiting, and cod in St Andrews Bay. Flat fish are well represented in all the three regions, but among these flounders abound most in St Andrews Bay. The lemon dab is largely present in the Firth of Forth, but in St Andrews and Aberdeen Bays it is poorly represented in the takes. Once more it is to be remarked, that, while in the Firth of Forth and St Andrews Bay haddock and whiting are caught in greatest numbers during June and July, in Aberdeen Bay they were taken most abundantly in the month of September.

It will be further noticed in this table that the takes in May 1887 in St Andrews Bay are at two of the stations larger than they were during the previous summer, *e.g.*, the total take of Station II. on May 3rd was 463, 36 more than the total take for June, July, September and November; and the total take at Station V. on May 5th, 1887 is 546 against 296 for June 30th, 1886. But at Stations III. and IV. the take for April was very considerably below the average for the other months recorded.

As to Table C. (which indicates as accurately as possible not only the quantities of the various kinds of fish captured, but also where and under what conditions they were captured), it is, for want of previous statistics, impossible to do more than call attention to the difference in the takes at the various fishing stations during the several months of the year. Special attention should, however, be paid to Table D. (page 130), which shows the takes of haddock, cod and whiting by the Buckhaven fishermen from April 1884 to April 1887. This table, in addition to showing that cod are most abundant in the Forth in winter, while haddock and whiting are most numerous in summer, indicates that either because trawling was prohibited in the Forth or for some other reason, small haddocks were more plentiful in 1886 than they were in either 1884 or 1885. The difference between 1884 and 1886 is most marked. During April, May, June and July of 1884, with practically the same number of boats fishing, 2423 shots yielded 137,984 small haddocks, while during the same months of 1886, 2991 shots (*i.e.* 568 shots more than in 1884) yielded 614,784 haddocks, more than four times the number taken in 1884. It will be extremely interesting to note the takes during the present summer, to see if the improvement of 1886 will be maintained during 1887.

Table E. gives the total amount of fish taken in the Forth and St Andrews Bay and landed in the Anstruther District. It will be interesting to compare the take during the present year.

The Table (F.) showing the number of fish taken by certain east coast fishing boats need not be considered until additional statistics of a similar nature have been obtained for comparison.

Table G. shows not only the quantities of fish landed at the east coast fishing stations but also admits of a comparison being made between the quantities of fish caught by the line and net fishermen and the beam trawlers during the months of December 1886, and January, February, and March 1887.

Table H. shows that a larger quantity of fish has been landed in the Leith district since trawling was prohibited in the Firth of Forth. In the next Report, it may be stated, it will not be necessary to give the statistics in so great detail.

In concluding this, our preliminary report, it is only necessary to add, that although only a year has elapsed since the bye-law was passed providing for a limited form of protection for the waters referred to, there is already some signs of improvement both in the number and size of the less migratory flat fish, and in the number of young round fish which visit the territorial waters for long or short periods.

The fishermen of the Forth and St Andrews Bay state they are already obtaining better takes of flat fish and that they believe in a few years the in-shore grounds will have recovered to a considerable extent their former richness. Mr Mair, the fishery officer who takes charge of St Andrews Bay, in a letter dated the 29th March, 1887, reports that ‘in the month of ‘January last year 89 cwts. (of flat fish) were caught, but none in February, ‘while during January and February of the present year (1887) 1368 cwts. ‘were landed, the largest take during these two months that has been ‘recorded for ten or twelve years.

TABLE A.—FISH TAKEN BY 'GARLAND.'

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
I. FIRTH OF FORTH, 16th June. 1886.	4 hours.	Gray skate, . .	1	m.	Dull.
		Plaice, . . .	25	m.	Sea tolerably smooth.
		,, . . .	1	l.	Station gone over twice
		Common dab, .	10	v. s.	
		Lemon dab, . .	8	m.	
		Long rough dab, .	13	m.	
		Haddock, . .	128	m.	
		Cod, . . .	3	s.	
		Whiting, . .	40	m.	
		Gurnard, . .	12	m.	
II. FIRTH OF FORTH, 16th June.	2½ hours.	Plaice, . . .	3	m.	Dull.
		Flounder (*P. flesus*),	7	v. s.	Sea tolerably smooth.
		Haddock, . .	6	m.	
		Whiting, . .	1	m.	
		Gurnard, . .	1	s.	
III. FIRTH OF FORTH, 17th June.	4 hours.	Plaice, . . .	88	s.	Dull.
		Common dab, .	27	v. s.	Swell coming in from the E.
		Lemon dab, . .	19	m.	
		Long rough dab, .	25	m.	
		Haddock, . .	282	m.	
		Cod, . . .	13	s.	
		Whiting, . .	6	m.	
		Gurnard, . .	17	m.	
IV. FIRTH OF FORTH, 22nd June.	4 hours.	Gray skate, . .	4	l.	Dull.
		Plaice, . . .	100	m.	Sea tolerably smooth, but rough outside.
		Common dab, .	36	v. s.	
		Lemon dab, . .	9	m.	
		Haddock, . .	89	m.	
		Cod, . . .	11	s.	
		Whiting, . .	4	m.	
		Hake, . . .	1	s.	
		Herring, . .	9	v. s.	
		Gurnard, . .	11	m.	
V. FIRTH OF FORTH, 18th June.	3½ hours.	Plaice, . . .	4	s.	Heavy swell on the sea.
		Common dab, .	8	v. s.	Gear not having a fair chance to remain on bottom.
		Long rough dab, .	1	m.	
		Haddock, . .	80	m.	
		Cod, . . .	1	s.	
		Whiting, . .	5	m.	
		Gurnard, . .	2	m.	
VI. FIRTH OF FORTH, 22nd June.	3 hours.	Plaice, . . .	30	m.	Dull.
		,, . . .	1	l.	Sea rough.
		Common dab, .	31	m.	Station gone over twice.
		Lemon dab, . .	18	m.	
		Turbot, . .	1	m.	
		Haddock, . .	29	m.	
		Cod, . . .	8	s.	
		Whiting, . .	4	m.	
		Gurnard, . .	40	s.	
		,, . .	11	m.	
		Fishing frog, .	5	l.	
		,, ,, . .	2	m.	
		Sand eel, . .	1	m.	
VII. FIRTH OF FORTH, 17th June.	3½ hours.	Long rough dab, .	4	m.	Dull.
		Haddock, . .	15	m.	Swell coming in from the E.

m. = medium ; l. = large ; v. l. = very large ; s. = small ; v. s. = very small.

TABLE A.—Fish taken by 'Garland'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
IX. Firth of Forth, 22nd June.	3½ hours.	Haddocks	2	m.	Heavy Sea running. The trawl-net not heavy enough to stop on bottom.
II. Firth of Forth, 19th July.	3 hours.	Plaice,	88	s.	Weather fine. Clear; good breeze from W.S.W. The Gurnards were ready for spawning. This Station takes 1½ hours to go over. In this case it was gone over twice.
		Common dab,	73	v. s.	
		Lemon dab,	36	m.	
		Long rough dab,	34	m.	
		Haddock,	70	l.	
		,,	200	m.	
		,,	60	s.	
		Cod,	10	s.	
		Whiting,	66	m.	
		Gurnard,	14	l.	
III. Firth of Forth, 19th July.	3 hours.	Flapper skate,	1	l.	Weather fine. Light breeze from W.S.W.; cirro-stratus clouds. Station was gone over twice. With the exception of the common dabs, all fish in good condition.
		Plaice,	90	m.	
		Common dab,	19	v. s.	
		Lemon dab,	29	m.	
		Long rough dab,	34	m.	
		Haddock,	357	m.	
		Cod,	3	l.	
		,,	37	s.	
		Whiting,	23	m.	
		Bib (*G. luscus*),	1	m.	
VI. Firth of Forth, 20th July.	3 hours.	Plaice,	15	l.	Weather close and sultry. Sea calm. This is a small station, and was gone over 3½ times.
		,,	29	m.	
		Common dab,	63	v. s.	
		Lemon dab,	29	m.	
		Long rough dab,	3	m.	
		Turbot,	1	s.	
		Haddock,	100	m.	
		,,	21	l.	
		Cod,	20	s.	
		Whiting,	21	m.	
		Gurnard,	52	m.	
		Fishing frog,	7	m.	
		,,	1	l.	
		Dragonet,	2	m.	
VII. Firth of Forth, 20th July.	3 hours.	Gray skate,	1	m.	Cloudy; a light breeze from the east. Station gone over twice
		Flapper skate,	1	m.	
		Plaice	25	m.	
		Common dab,	149	s.	
		Lemon dab,	4	m.	
		Long rough dab,	14	m.	
		Haddock,	382	m.	
		Cod,	4	s.	
		Coal fish,	1	l.	
		Whiting,	19	m.	
		Gurnard,	12	s.	
		Fishing frog,	2	s.	
I. Firth of Forth, 17th September.	2 hours.	Plaice,	70	m.	Wind E.; force 2. Clear. Sea tolerably smooth. There were two dead fish in this trawl, one a long rough dab, the other a common dab.
		Common dab,	28	s.	
		Lemon dab,	30	m.	
		,, ,,	10	s.	
		Long rough dab,	7	m.	
		Haddock,	3	m.	
		Cod,	28	s.	
		Whiting,	4	m.	
		Ling,	1	m.	
		Dragonet,	1	m.	

m. = medium; l. = large: v. l. = very large; s = small; v. s. = very small.

TABLE A.—FISH TAKEN BY 'GARLAND'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
II. FIRTH OF FORTH, 15th September.	1½ hours.	Gray skate, . .	3	m.	Wind E. by S.; force 3. Clear. Sea, tolerably smooth water in Largo Bay.
		Plaice, . . .	52	m.	
		Common dab, .	70	v. s.	
		,, ,, .	33	s.	
		Lemon dab, . .	63	m.	
		Haddock, . .	8	m.	
		Whiting, . .	4	m.	
		Gurnard, . .	14	m.	
		Fishing frog, .	5	m.	
		Dragonet, . .	3	m.	
III. FIRTH OF FORTH, 23rd September.	2½ hours.	Plaice, . . .	161	m.	Wind easterly. Moderate. Sea tolerably smooth. A great quantity of mud brought up in the net, altogether spoiling the appearance of the fish, even after washing.
		Common dab, .	36	m.	
		Lemon dab, . .	71	m.	
		Long rough dab, .	44	m.	
		Haddock, . .	44	m.	
		Cod, . . .	1	l.	
		,, . . .	34	s.	
		Whiting, . .	26	m.	
		Gurnard, . .	81	m.	
IV. FIRTH OF FORTH, 23rd September.	2½ hours.	Gray skate, . .	14	s.	
		Plaice, . . .	76	m.	
		,, . . .	1	l.	
		Common dab, -	32	s.	
		Lemon dab, . .	4	m.	
		Long rough dab, .	1	m.	
		Sole, . . .	1	l.	
		Cod, . . .	4	s.	
		Gurnard, . .	1	s.	
V. FIRTH OF FORTH, 21st October.	2½	Flapper skate, .	1	s.	Dull and foggy. Slight airs from the the S. A heavy swell coming in from the eastward, the remains of a recent gale.
		Plaice, . . .	32	m.	
		,, . . .	1	l.	
		Common dab, .	31	v. s.	
		Lemon dab, . .	2	m.	
		Long rough dab, .	46	m.	
		,, ,, .	1	l.	
		Haddock, . .	108	m.	
		,, . . .	1	l.	
		Cod, . . .	16	m.	
		Fishing frog, .	2	m.	
		,, . . .	2	l.	
VI. FIRTH OF FORTH, 15th September.	½ hour.	Plaice, . . .	43	m.	Wind N.N.E.; force 2. Clear; cirro-stratus clouds. Heavy swell.
		Common dab, .	14	s.	
		Lemon dab, . .	14	m.	
		Long rough dab, .	5	m.	
		Sail fluke, . . (*A. megastoma*)	1	m.	
		Haddock, .	12	m.	
		Cod, . . .	8	s.	
		Gurnard, . .	4	m.	
		Dragonet, . .	1	m.	
VII. FIRTH OF FORTH, 21st October.	2 hours.	Gray skate, . .	4	m.	Dull and foggy. Slight airs from the S. A heavy swell.
		Flapper skate, .	5	m.	
		Starry ray, . .	2	s.	
		Plaice, . . .	5	m.	
		Common dab, .	19	s.	
		Haddock, . .	14	m.	
		Cod, . . .	2	s.	
		Whiting, . .	1	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—FISH TAKEN BY 'GARLAND'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
VIII. FIRTH OF FORTH, 22nd October.	2 hours.	Common dab,	38	v. s.	Dull. No wind. A considerable swell.
		,, ,,	20	s.	
		Lemon dab,	2	m.	
		Long rough dab,	62	m.	
		Haddock,	35	s.	
		,,	52	m.	
		Cod,	3	s.	
		Ling,	1	l.	
		Gurnard,	7	m.	
		Fishing frog,	5	m.	
IX. FIRTH OF FORTH, 22nd October.	2 hours.	Gray skate,	3	m.	Dull. No wind. A considerable swell coming in from the E.
		Flapper skate,	2	m.	
		Plaice,	2	m.	
		Common dab,	8	s.	
		Lemon dab,	6	s.	
		Long rough dab,	20	s.	
		,, ,,	8	m.	
		Haddock,	6	m.	
		Fishing frog,	1	s.	
III. FIRTH OF FORTH. 17th November.	2 hours.	Gray skate,	1	s.	Wind Westerly. Fine. Net so full of scallop shells that the "Cod End" had to be lifted aboard by steam.
		Flapper skate,	1	s.	
		Plaice,	1	s.	
		Common dab,	3	s.	
		Lemon dab,	50	s.	
		,, ,,	48	m.	
		Long rough dab,	6	m.	
		Cod,	15	s.	
		Monk,	1	m.	
		Pogge, (*Agonus cataphractus*).	1	m.	
V. FIRTH OF FORTH, 19th November.	2½ hours.	Gray skate,	2	m.	Wind westerly. Fine.
		Flapper skate,	1	m.	
		Plaice,	3	m.	
		Common dab,	13	s.	
		Long rough dab,	20	m.	
		Haddock,	99	m.	
		Cod,	10	s.	
		Whiting,	14	m.	
		Fishing frog,	1	m.	
VI. FIRTH OF FORTH, 19th November.	½ hour.	Plaice,	100	l.	Wind westerly. Fine.
		,,	9	m.	
		Common dab,	2	m.	
		,, ,,	4	s.	
		Lemon dab,	3	m.	
		Long rough dab,	3	m.	
		Turbot,	1	s.	
		Haddock,	10	m.	
		Cod,	6	s.	
		Whiting,	3	m.	
VII. FIRTH OF FORTH, 17th November.	2 hours.	Gray skate,	1	m.	Wind westerly. Fine.
		Flapper skate,	1	m.	
		Common dab,	14	s.	
		Long rough dab,	50	m.	
		Haddock,	31	m.	
		Cod,	1	s.	
		Whiting,	1	m.	
		Fishing frog,	2	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—FISH TAKEN BY 'GARLAND'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.	Size of Fish.	Wind and Weather and Other Observations.
VIII. FIRTH OF FORTH, 20th November.	2 hours.	Gray skate, . . 1	m.	Strong breeze from the West. Fine.
		Long rough dab, . 1	m.	
		Cod, . . . 1	s.	
IX. FIRTH OF FORTH, 20th November.	2 hours.	Gray skate, . . 1	m.	Strong breeze from the W. Fine. The large skate measured 4 ft. 6 in. × 3 ft.
		Flapper skate, . 5	m.	
		" " . 1	v. l.	
		Starry ray, . . 1	m.	
		Plaice, . . . 2	m.	
		Common dab, . 10	s.	
		Long rough dab, . 17	s.	
		Haddock, . . 29	m.	
		Cod, . . . 2	s.	
		Whiting, . . 11	s.	
I. ST ANDREWS BAY, 29th June.	3 hours.	Gray skate, . . 3	s.	Weather fine. Wind easterly. All fish in excellent condition. Common dab largest come upon.
		Plaice, . . . 111	m.	
		Common dab, . 100	m.	
		" " . 16	l.	
		Lemon dab, . . 2	m.	
		Long rough dab, . 9	m.	
		Flounder (*P. flesus*), 2	s.	
		Turbot, . . 1	s.	
		Haddock, . . 10	m.	
		Whiting, . . 1	m.	
		Gurnard, . . 66	m.	
II. ST ANDREWS BAY, 29th June.	2½ hours.	Plaice, . . . 6	s.	Weather fine. Wind easterly; fair. All fish in excellent condition.
		" . . . 50	m.	
		Common dab, . 13	s.	
		" " . 20	m.	
		Flounder (*P. flesus*), 2	m.	
		Haddock, . . 49	m.	
		Gurnard, . . 25	m.	
		Fishing frog, . 2	m.	
III. ST ANDREWS BAY, 29th June.	3 hours.	Gray skate, . . 1	s.	Weather fine.
		Plaice, . . . 65	s.	
		" . . . 50	m.	
		Common dab, . 37	s.	
		Long rough dab, . 5	m.	
		Flounder (*P. flesus*), 2	s.	
		Haddock, . . 47	m.	
		Gurnard, . . 23	s.	
IV. ST ANDREWS BAY, 30th June.	2 hours.	Plaice, . . . 105	m.	Weather fine. A large number of the plaice were marked in a very similar manner to the common dabs. Could be recognised chiefly by their shape.
		Common dab, . 120	v. s.	
		" " . 25	m.	
		Flounder (*P. flesus*), 9	s.	
		Gurnard, . . 19	m.	
V. ST ANDREWS BAY, 30th June.	3 hours.	Gray skate, . . 2	m.	Weather fine. Fish in splendid condition.
		Plaice, . . . 130	m.	
		" . . . 4	l.	
		Common dab, . 26	s.	
		Lemon dab, . . 15	m.	
		Long rough dab, . 3	m.	
		Flounder (*P. flesus*), 5	s.	
		Haddock, . . 12	m.	
		Whiting, . . 2	m.	
		" . . . 2	l.	
		Gurnard, . . 95	m.	
		Dragonet, . . 1	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Fish taken by 'Garland'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
I. St Andrews Bay, 23rd July.	¼ hour.	Plaice, . . .	24	s.	Weather fine. Slight wind and swell from the E. Only the most westerly portion of the station trawled over. The whole gone over a day later.
		Common dab, .	19	s.	
		Lemon dab, . .	1	m.	
		Long rough dab, .	1	m.	
		Whiting, . .	1	s.	
		Gurnard, . .	1	s.	
I. St Andrews Bay, 28th July.	3½ hours.	Gray skate, . .	2	s.	Weather fine. This haul did not have sufficient justice. A large triangular tow-net was out at the same time, necessitating a much slower speed than usual. The immense white tow-net would also probably frighten away fish.
		Plaice, . . .	34	m.	
		Common dab, .	8	m.	
		,, ,, .	1	l.	
		Lemon dab, . .	1	m.	
		,, ,, . .	1	l.	
		Long rough dab, .	1	v. s.	
		Flounder (*P. flesus*),	1	m.	
		Dragonet, . .	1	m.	
I. St Andrews Bay, 14th September.		Plaice, . . .	171	m.	Weather fine; clear. The large Haddock measured 22½ in.
		Common dab, .	131	s.	
		Long rough dab, .	16	s.	
		Haddock, . .	4	s.	
		,, . .	1	v. l.	
		Gurnard, . .	45	m.	
		Dragonet, . .	1	m.	
II. St Andrews Bay, 14th September.	1½ hours.	Plaice, . . .	7	s.	Weather fine.
		,, . . .	1	l.	
		Common dab, .	22	v. s.	
		Turbot, . .	1	m.	
		Gurnard, . .	8	m.	
III. St Andrews Bay, 16th September.	2 hours.	Plaice, . . .	120	m.	Wind S.S.W.; force 2. Clear and fine. The tide unusually strong, on account of a freshet in the Tay. Ship set somewhat to S. of proper course.
		Common dab, .	200	v. s.	
		,, ,, .	47	s.	
		Lemon dab, . .	1	s.	
		Long rough dab, .	5	s.	
		Brill, . . .	1	m.	
		Haddock, . .	4	m.	
		Gurnard, . .	21	s.	
		Fishing frog, .	2	s.	
IV. St Andrews Bay, 14th September.	2 hours.	Gray skate, . .	4	m.	Dull; clearing to westward.
		Plaice, . . .	129	s.	
		Common dab, .	69	s.	
		Flounder (*P. flesus*),	1	m.	
		Gurnard, . .	38	m.	
V. St Andrews Bay, 16th September.	2½ hours.	Plaice, . . .	43	m.	Wind S.S.W.; force 2. Clear. Sea tolerably smooth.
		Common dab, .	36	s.	
		Lemon dab, . .	1	m.	
		Long rough dab, .	1	m.	
		Haddock, . .	10	m.	
		Whiting, . .	1	m.	
		Gurnard, . .	45	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Fish taken by 'Garland'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
I. St Andrews Bay, 13th November.	2 hours.	Gray skate,	2	s.	Wind light from East. A considerable swell, result of late gale.
		Starry ray,	6	s.	
		Plaice,	7	m.	
		,,	1	l.	
		Common dab,	7	m.	
		Haddock,	1	m.	
		Cod,	1	s.	
		Whiting,	1	m.	
		Sprat,	1	m.	
		Gurnard,	7	m.	
II. St Andrews Bay, 13th November.	2 hours.	Starry ray,	1	s.	Wind light from East. A considerable swell coming in from same direction, the result of a recent gale. River Tay in spate. Brown water could be traced across the Bay to the North Carr beacon at Fife-Ness.
		Plaice,	1	s.	
		Common dab,	8	s.	
		Lemon dab,	1	s.	
		Gurnard,	6	m.	
		Father lasher, (*C. scorpius.*)	1	m.	
III. St Andrews Bay, 13th November.	1½ hours.	Gray skate,	1	s.	Wind N., variable, cold. Showers and bursts of sunlight. Sea smooth on surface, but considerable swell coming in from E.
		Flapper skate,	1	s.	
		Common dab,	1	v. s.	
		Long rough dab,	1	m.	
		Cod,	8	s.	
IV. St Andrews Bay, 15th November.	2½ hours.	Plaice,	45	s.	Wind off the land. Sea tolerably smooth.
		,,	100	m.	
		Common dab,	46	s.	
		,, ,,	80	m.	
		Coal fish,	1	m.	
		Gurnard,	1	m.	
V. St Andrews Bay, 15th November.	1½ hours.	Gray skate,	1	m.	Wind westerly. Sun shining, but cold.
		Sandy ray,	1	m.	
		Common dab,	6	s.	
		Lemon dab,	1	l.	
		Long rough dab,	21	m.	
		Haddock,	15	m.	
		,,	6	s.	
		Cod,	2	l.	
		,,	3	s.	
		Whiting,	5	m.	
		Gurnard,	11	m.	
I. Aberdeen Bay, 6th July.	4 hours.	Gray skate,	1	m.	Weather very fine.
		Plaice,	286	s.	
		,,	3	m.	
		Common dab,	141	s.	
		Lemon dab,	1	s.	
		Long rough dab,	8	s.	
		Haddock,	17	m.	
		Cod,	1	s.	
		Whiting,	25	s.	
		Gurnard,	520	v. s.	
		Fishing frog,	8	m.	

m. = medium ; l. = large ; v. l. = very large ; s. = small ; v. s. = very small.

TABLE A.—FISH TAKEN BY 'GARLAND'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
II. ABERDEEN BAY, 7th July.	2 hours.	Plaice, . . .	50	s.	Bright sun. Fine.
		,, . . .	67	m.	
		Common dab, .	101	s.	
		Lemon dab, . .	1	m.	
		Long rough dab, .	6	m.	
		Haddock, . .	5	s.	
		,, . .	6	m.	
		Cod, . . .	3	s.	
		Whiting, . .	17	s.	
		,, . .	15	m.	
		Gurnard, . .	282	s.	
		Fishing frog, .	3	m.	
III. ABERDEEN BAY, 8th July.	1½ hours.	Plaice, . . .	41	m.	Weather very fine.
		Common dab, .	34	s.	
		Lemon dab, . .	1	m.	
		Long rough dab, .	11	m.	
		Haddock, . .	35	m.	
		Cod, . . .	3	s.	
		Whiting, . .	100	s.	
		,, . .	25	m.	
		Hake, . . .	1	m.	
		Ling, . . .	1	m.	
		Gurnard, . .	80	s.	
IV. ABERDEEN BAY, 7th July.	1½ hours.	Gray skate, . .	1	s.	Weather very fine.
		Plaice, . . .	87	m.	
		Common dab, .	49	v. s.	
		Long rough dab, .	4	m.	
		Haddock, . .	6	m.	
		Cod, . . .	1	s.	
		Whiting, . .	70	m.	
		,, . .	21	s.	
		Hake, . . .	2	m.	
		Gurnard, . .	122	v. s.	
		Fishing frog, .	2	m.	
V. ABERDEEN BAY, 8th July.	2 hours.	Gray skate, . .	1	s.	Wind south-westerly. Fine. The Gurnards were the smallest come upon, some not exceeding 4 inches.
		Plaice, . .	100	m.	
		,, . . .	25	s.	
		Common dab, .	36	v. s.	
		Long rough dab, .	1	m.	
		Haddock, . .	11	m.	
		Whiting, . .	10	m.	
		Gurnard, . .	489	v. s.	
I. ABERDEEN BAY, 2nd September.	1½ hours.	Plaice, . . .	201	s.	Weather very fine. Sea quite calm. No wind. The last named was so mutilated by the net that the genus only could be made out.
		Common dab, .	171	m.	
		Long rough dab, .	54	m.	
		Sail fluke, . . (*A. megastoma*).	1	m.	
		Haddock, . .	167	m.	
		,, . .	2	l.	
		Cod, . . .	21	s.	
		Whiting, . .	322	m.	
		,, . .	5	l.	
		Hake, . . .	7	m.	
		Herring or sprat, .	1	v. s.	

m. = medium ; l. = large ; v. l. = very large ; s. = small ; v. s. = very small.

TABLE A.——Fish taken by 'Garland'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
II. Aberdeen Bay, 3rd September.	¾ hour.	Plaice, . . .	26	s.	Fine. Wind S.S.W. Moderate. Sea tolerably smooth.
		Common dab, .	9	s.	
		Lemon dab, . .	1	m.	
		Long rough dab, .	10	m.	
		Haddock, . .	57	s.	
		Cod, . . .	10	s.	
		Whiting, . .	140	m.	
		,, . .	2	l.	
		Hake, . . .	4	m.	
		Gurnard, . .	4	m.	
III. Aberdeen Bay, 3rd September.	1¼ hour.	Plaice, . . .	49	s.	Clear and fine. Wind S.S.W. Moderate. Sea tolerably smooth.
		Common dab, .	9	s.	
		Long rough dab, .	11	m.	
		Haddock, . .	7	s.	
		,, . .	1	l.	
		Cod, . . .	3	s.	
		Whiting, . .	100	s.	
		,, . .	60	m.	
		,, . .	3	l.	
		Hake, . . .	3	m.	
		Gurnard, . .	2	m.	
IV. Aberdeen Bay, 3rd September.	1½ hours.	Plaice, . .	56	s.	Fine. Wind E.S.E. Pretty fresh. Sea rising.
		Common dab, .	24	s.	
		Long rough dab, .	3	m.	
		Flounder (*P. flesus*),	1	s.	
		Turbot, . .	1	m.	
		Haddock, . .	134	s.	
		Cod, . . .	1	s.	
		Whiting, . .	156	s.	
		Hake, . . .	2	m.	
		Gurnard, . .	2	m.	
I. Aberdeen Bay, 1st November.	1½ hours.	Flapper skate, .	2	s.	Blowing from the eastward. Sea rather rough for working in.
		Starry ray, . .	3	s.	
		Plaice, . . .	7	m.	
		Common dab, .	3	s.	
		Long rough dab, .	1	m.	
		Haddock, . .	104	m.	
		,, . .	2	l.	
		Cod, . . .	1	s.	
		,, . . .	1	l.	
		Whiting, . .	7	m.	
II. Aberdeen Bay, 5th November.	1 hour.	Plaice, . . .	3	m.	Wind easterly. Moderate. Sea very rough on account of recent gale. Few fish in the Bay, for same reason.
		Common dab, .	1	s.	
		Long rough dab, .	3	s.	
		Haddock, . .	1	v. s.	
III. Aberdeen Bay, 5th November.	2 hours.	Gray skate, . .	1	m.	Wind easterly. Moderate. Sea rough from recent gale. Scarcely any fish were caught in the Bay at this time on account of the heavy swell. Trawlers got good takes in deep water.
		Plaice. . . .	3	m.	
		Common dab, .	7	s.	
		Long rough dab, .	4	m.	
		Turbot, . .	1	s.	
		Whiting, . .	2	m.	
		Fishing frog, .	1	s.	

m.=medium; l.=large; v. l.=very large; s.=small; v. s.=very small.

TABLE A.—Fish taken by 'Garland'—*continued.*

Station and Date.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
IV. Aberdeen Bay, 5th November.	2 hours.	Starry ray,	1	m.	Sun warm. Light airs from S.W., N., and E. Very variable. At sundown wind blew a gale from E. with a falling glass. Sea rose rapidly. A whole gale all next day.
		Long rough dab,	10	m.	
		Turbot,	1	m.	
		"	1	s.	
		Haddock,	4	v. s.	
V. Aberdeen Bay. 9th November.	2 hours.	Flapper skate,	1	s.	Wind squally and variable. Sea rough.
		Haddock,	30	m.	
		Cod,	2	s.	
VI. Aberdeen Bay, 9th July.	2 hours.	Plaice,	46	m.	Fine. An enormous quantity of gray Gurnards.
		Common dab,	7	v. s.	
		Long rough dab,	4	s.	
		Turbot,	1	m.	
		Haddock,	10	m.	
		Whiting,	6	m.	
		Gurnard,	200	v. s.	
		"	84	s.	
VI. Aberdeen Bay, 11th November.	2 hours.	Plaice,	2	m.	Wind very slight from East. Sea tolerably smooth. Foggy in evening. All the fish in good condition.
		Common dab,	2	m.	
		Lemon dab,	2	m.	
		Haddock,	6	m.	
		Cod,	5	s.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—*continued.*—RECORD OF OBSERVATIONS MADE ON BOARD THE 'GARLAND.'

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
I. FIRTH OF FORTH, 25th April 1887.	46·8	43·0	42·6	Appendicularia.	2 hours.	Gray skate, . . .	1	m.	Wind W. by S.; force 2.
				Hyperia galba.		Starry ray, . . .	2	m.	Showery.
				Copepods.		Plaice, . . .	10	s.	
				Minute Medusæ.		,, . . .	63	m.	
						Common dab, . .	51	s.	
						Lemon dab, . .	1	l.	
						,, ,, . .	6	m.	
						,, ,, . .	55	s.	
						Long rough dab, . .	1	l.	
						,, ,, . .	1	m.	
						,, ,, . .	7	s.	
						Flounder, . . .	1	m.	
						Haddock, . . .	10	s.	
						,, . . .	4	m.	
						Cod, . . .	15	s.	
						,, . . .	1	l.	
						Whiting, . . .	6	m.	
						Gurnard, . . .	11	m.	
						Fishing frog, . .	2	m.	
						Cat fish, . . .	1	l.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—RECORD OF OBSERVATIONS MADE ON BOARD THE 'GARLAND'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
II. FIRTH OF FORTH, 25th April 1887.	45·0	43·0	42·6	Appendicularia. Copepods. Minute Medusæ.	1½ hours.	Starry ray,	2	m.	Wind W. by S.; force 2. Clear; fine.
						Plaice,	7	s.	
						"	44	m.	
						Common dab,	34	s.	
						Lemon dab,	30	s.	
						" "	3	m.	
						Long rough dab,	14	s.	
						Flounder,	6	m.	
						Haddock,	2	m.	
						"	53	s.	
						Cod,	9	s.	
						Whiting,	2	s.	
						Gurnard,	26	m.	
III. FIRTH OF FORTH, 26th April 1887.	43·2	43·3	42·6	Copepods and small Medusæ.	2 hours.	Gray skate,	1	v. s.	Wind S.W.; very gusty. Sea rough.
						Starry ray,	2	s.	
						Plaice,	8	s.	
						"	34	m.	
						Common dab,	58	s.	
						" "	1	l.	
						Lemon dab,	29	s.	
						" "	53	m.	
						Long rough dab,	36	s.	
						Flounder,	5	m.	
						Haddock,	7	m.	
						Cod,	1	m.	
						Gurnard,	12	m.	
						Fishing frog,	1	s.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Record of Observations made on board the 'Garland'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
III. Firth of Forth, 2nd May 1887.	48·5	44·1	42·7	Copepods. Medusæ.	2 hours.	Flapper skate, . .	1	v. s.	Wind E. by N.; force 1. Bright; fine.
						Starry ray, . . .	1	v. s.	
						Plaice, . . .	66	m.	
						Common dab, . .	66	m.	
						Lemon dab, . .	25	s.	
						,, ,, . .	60	m.	
						Long rough dab, . .	34	s.	
						,, ,, . .	1	l.	
						Flounder, . . .	10	s.	
						Brill, . . .	1	m.	
						Haddock, . . .	2	s.	
						,, . . .	4	m.	
						Cod, . . .	8	m.	
						Whiting, . . .	2	s.	
						,, . . .	4	m.	
						Herring, . . .	1	s.	
						Gurnard, . . .	31	s.	
						,, . . .	3	m.	
						Fishing frog, . .	3	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—RECORD OF OBSERVATIONS MADE ON BOARD THE 'GARLAND'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
IV. FIRTH OF FORTH, 27th April 1887.	42·8	43·8	43·9	Copepods.	3 hours.	Gray skate, . . .	4	s.	Wind W.S.W.; force 3. Rather hazy.
						Flapper skate, . .	1	v. l.	
						Plaice, . . .	24	s.	
						,, . . .	185	m.	
						Common dab, . .	50	s.	
						,, ,, . .	57	m.	
						Lemon dab, . .	11	s.	
						Flounder, . . .	2	m.	
						Turbot, . . .	1	s.	
						Cod, . . .	2	s.	
						Gurnard, . . .	18	s.	
						,, . . .	21	m.	
						Fishing frog, . .	1	s.	
						Lumpsucker, . .	1	m.	
V. FIRTH OF FORTH, 28th April 1887.	46·3	43·0	42·4	Minute Medusæ. Appendicularia. Copepods	1½ hours.	Starry ray, . . .	1	s.	Wind W. by N.; force 2. Fine; clear.
						Common dab, . .	6	s.	
						Lemon dab, . .	1	s.	
						,, ,, . .	9	m.	
						Long rough dab, . .	12	s.	
						Long flounder, . .	5	l.	
						Haddock, . . .	8	v. s.	
						,, . . .	13	m.	
						Cod, . . .	5	m.	
						Whiting, . . .	13	m.	
						Gurnard, . . .	23	m.	

m. = medium l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Record of Observations made on board the Garland'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
VI. Firth of Forth, 28th April 1887.	46·0	43·1	42·4	Small Medusæ.	¾ of hour.	Plaice, . . .	6	s.	Wind W. by S.; force 1.
				Appendicularia.		,, . . .	94	m.	Fine, but cloudy.
				Copepods.		,, . . .	2	l.	Sea tolerably smooth.
						Common dab, . .	11	s.	This Station has been largely worked over lately by the line boats, catching haddocks.
						Lemon dab, . .	18	m.	
						Flounder, . . .	1	m.	
						Gurnard, . . .	17	m.	
VII. Firth of Forth, 27th April 1887.	45·6	43·3	42·9	Copepods.	2 hours.	Starry ray, . . .	3	m.	Wind W.N.W.; force 2.
				Appendicularia.		Plaice, . . .	2	m.	Bright and clear.
				Sagittæ.		,, . . .	1	l.	
						Common dab, . .	20	s.	
						Lemon dab, . .	3	s.	
						,, ,, . .	18	m.	
						Long rough dab, . .	13	s.	
						,, ,, . .	51	m.	
						Long flounder, . .	1	l.	
						Flounder, . . .	4	m.	
						Haddock, . . .	9	s.	
						,, . . .	13	m.	
						Whiting, . . .	2	s.	
						Gurnard, . . .	52	s.	
						,, . . .	34	m.	
						Fishing frog, . .	1	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—RECORD OF OBSERVATIONS MADE ON BOARD THE 'GARLAND'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
VIII. FIRTH OF FORTH, 29th April 1887.	43·0	43·0	42·7	Copepods.	1½ hours.	Gray skate,	1	s.	Wind N.E. by E.; force 2. Sea roughish.
						Flapper skate,	1	s.	
						Common dab,	18	s.	
						Lemon dab,	10	m.	
						Long rough dab,	18	s.	
						,, ,,	20	m.	
						Long flounder,	3	l.	
						Flounder,	2	m.	
						Turbot,	1	s.	
						Haddock,	6	s.	
						,,	7	m.	
						Cod,	1	l.	
						Whiting,	9	m.	
						Gurnard,	45	m.	
						Dragonet,	1	m.	
IX. FIRTH OF FORTH, 29th April 1887.	43·3	43·3	42·7	Copepods.	1 hour.	Plaice,	1	s.	Wind N.E.; force 3. Sea rough.
						Common dab,	13	m.	
						Lemon dab,	10	m.	
						Long rough dab,	13	m.	
						Long flounder,	6	l.	
						Flounder,	1	m.	
						Haddock,	6	s.	
						,,	4	m.	
						Cod,	1	s.	
						Whiting,	3	m.	
						Gurnard,	15	m.	
						Cat fish,	1	s.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Record of Observations made on board the 'Garland'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
I. St Andrews Bay, 3rd May 1887.	44·8	44·1	43·6	Copepods (several species).	2 hours.	Gray skate, . . .	3	m.	Wind N.E.; force 1. Dull. Sea with a heavy swell.
						Plaice, . . .	36	s.	
						,, . . .	50	m.	
						Common dab, . .	43	s.	
						,, ,, . .	99	m.	
						Long rough dab, . .	5	m.	
						Flounder, . . .	11	s.	
						Haddock, . . .	3	m.	
						Cod, . . .	1	s.	
						Gurnard, . . .	29	s.	
						,, . . .	25	m.	
II. St Andrews Bay, 3rd May 1887.	45·8	44·8	43·0	Copepods (several species).	2 hours.	Gray skate, . . .	1	s.	Wind S.E. by E.; force 1. Cloudy. Sea with a heavy swell.
						Flapper skate, . .	1	s.	
						Plaice, . . .	23	s.	
						,, . . .	55	m.	
						Common dab, . .	73	s.	
						,, ,, . .	167	m.	
						Long rough dab, . .	6	s.	
						Flounder, . . .	33	m.	
						Haddock, . . .	7	s.	
						,, . . .	34	m.	
						Gurnard, . . .	49	s.	
						,, . . .	14	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—Record of Observations made on board the 'Garland'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
III. St Andrews Bay, 4th May 1887.	45·8	45·6	43·5	Copepods.	2 hours.	Flapper skate,	1	s.	Wind S.S.E.; force 2.
				Sagittæ.		Starry ray,	3	s.	Bright; clear.
				Appendicularia.		Plaice,	3	s.	A "cross" sea.
						,,	6	m.	
						,,	1	l.	
						Common dab,	5	s.	
						,, ,,	39	m.	
						Flounder,	1	m.	
						Haddock,	3	m.	
						Gurnard,	3	s.	
						,,	1	m.	
IV. St Andrews Bay, 4th May 1887.	47·2	46·0	45·7	Copepods (several species).	2¾ hours.	Gray skate,	1	m.	Wind N.E. by E.; force 1.
						Plaice,	24	m.	Bright and clear.
						Common dab,	1	s.	Sea with a heavy swell.
						,, ,,	4	m.	
						Flounder,	1	s.	
						Brill,	1	s.	
						Gurnard,	2	m.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE A.—RECORD OF OBSERVATIONS MADE ON BOARD THE 'GARLAND'—*continued.*

Station and Date.	Temperature.			Surface Fauna.	Time Trawl down.	Description of Take.		Size of Fish.	Wind and Weather and Other Observations.
	Air.	Water.							
	Dry Bulb.	Surface.	Bottom.						
V. ST ANDREWS BAY, 5th May 1887.	47·8	45·3	43·0	Copepods. Small Medusæ (*Thaumatius*). 1 Larval fish (dab). 1 *Hyperia galba.* Sagittæ.	2½ hours.	Gray skate, . . .	2	s.	Wind S.E.; force 3. Bright; clear. Sea rough.
						Starry ray, . . .	2	s.	
						Plaice, . . .	18	m.	
						,, . . .	1	l.	
						Common dab, . .	28	s.	
						,, ,, . .	14	m.	
						Lemon dab, . .	2	s.	
						,, ,, . .	2	m.	
						,, ,, . .	1	l.	
						Long rough dab, . .	3	s.	
						Flounder, . . .	47	m.	
						Haddock, . . .	4	s.	
						,, . . .	29	m.	
						Whiting, . . .	24	m.	
						Gurnard, . . .	334	s.	
						,, . . .	32	m.	
						Fishing frog, . .	2	s.	

m. = medium; l. = large; v. l. = very large; s. = small; v. s. = very small.

TABLE B.—SHOWING SUMMARY OF FISH TAKEN BY 'GARLAND.'

Station and Date.	Cod.	Ling.	Haddock.	Whiting.	Halibut and Turbot.	Brill and Plaice.	Lemon Dab.	Dabs.	Flounders.	Skate.	Hake.	Gurnard.	Other kinds of Fish.	Total.
FIRTH OF FORTH—														
Station I.														
June 16, 1886,	3	.	128	40	.	26 p	8	23	.	1	.	12	.	241
Sept. 17, ,,	28	1	3	4	.	70 p	40	35	.	.	.	.	1	182
April 25, 1887,	16	.	14	6	.	73 p	62	69	1	3	.	11	3	249
Station II.														
June 16, 1886,	.	.	6	1	.	3 p	.	.	7	.	.	1	.	18
July 19, ,,	10	.	342	66	.	88 p	36	107	.	.	.	14	.	663
Sept. 15, ,,	.	.	8	4	.	52	63	103	.	3	.	14	8	255
April 25, 1887,	9	.	55	2	.	51 p	33	48	6	2	.	26	1	232
Station III.														
June 17, 1886,	13	.	282	6	.	88	19	52	.	.	.	17	.	477
July 19, ,,	40	.	357	23	1	90	29	53	.	1	.	.	2	594
Sept. 23, ,,	35	.	44	26	.	161	71	80	.	.	.	21	.	498
Nov. 17, ,,	15	.	.	.	.	1	98	9	.	2	.	.	1	127
April 26, 1887,	1	.	7	.	.	42 p	82	95	5	3	.	12	1	248
Station IV.														
June 22, 1886,	11	.	89	4	.	100	9	36	.	4	1	11	9	274
Sept. 23, ,,	4	.	.	.	.	77	4	33	.	14	.	1	1	134
April 27, 1887,	2	.	.	.	1 t	209 p	11	107	2	5	.	39	2	377
Station V.														
June 18, 1886,	1	.	80	5	.	4	.	9	.	.	.	2	.	103
Oct. 21, ,,	16	.	109	.	.	33	2	78	.	1	.	.	4	243
Nov. 19, ,,	10	.	99	14	.	3	.	33	.	3	.	.	2	163
April 28, 1887,	5	.	21	13	.	.	10	18	5	1	.	23	.	96
Station VI.														
June 22, 1886,	8	.	29	4	1	31	18	31	.	.	.	51	8	181
July 20, ,,	20	.	120	21	1	44	29	66	.	.	.	52	10	863
Sept. 15, ,,	8	.	12	.	.	43	14	19	.	.	.	4	2	102
Nov. 19, ,,	6	.	10	3	1	109	3	9	.	.	.	.	.	141
April 28, 1887,	.	.	.	.	.	102 p	18	11	1	.	.	17	.	149
Station VII.														
June 17, 1886,	.	.	15	.	.	.	.	4	.	.	.	.	.	19
July 20, ,,	4	.	382	19	.	25	4	163	.	2	.	12	3	614
Oct. 21, ,,	2	.	14	1	.	5	.	19	.	11	.	.	.	52
Nov. 17, ,,	.	.	31	2	.	.	.	64	.	2	.	.	2	101
April 27, 1887,	.	.	22	2	.	3 p	21	84	5	3	.	86	.	204
Station VIII.														
June 22, 1886,	.	.	2	.	.	.	.	.	.	.	.	.	.	2
Oct. 22, ,,	3	1	87	.	.	.	2	120	.	.	.	7	6	226
Nov. 20, ,,	1	.	.	.	.	.	.	1	.	1	.	.	.	3
April 29, 1887,	1	.	13	9	1 t	.	10	56	5	2	.	45	1	143
Station IX.														
Oct. 22, 1886,	.	.	6	.	.	2	6	36	.	5	.	.	1	56
Nov. 20, ,,	2	.	29	11	.	2	.	27	.	8	.	.	.	79
April 21, 1887,	1	.	10	3	.	1 p	10	26	7	.	.	15	1	14

TABLE B.—SHOWING SUMMARY OF FISH TAKEN BY 'GARLAND'—*continued.*

Station and Date.	Cod.	Ling.	Haddock.	Whiting.	Halibut and Turbot.	Brill and Plaice.	Lemon Dab.	Dabs.	Flounders.	Skate.	Hake.	Gurnard.	Other kinds of Fish.	Total.
ST ANDREWS—														
Station I.														
June 29, 1886, .	.	.	10	1	1	111	2	125	2	3	.	66	.	361
July 23, ,, .	.	.	.	1	.	24	1	20	.	.	.	1	.	47
July 28, ,, .	.	.	.	.	.	34	2	10	1	2	.	.	1	50
Sept. 14, ,, .	.	.	5	.	.	171	.	147	.	.	.	45	1	419
Nov. 13, ,, .	1	.	1	1	.	8	.	7	.	8	.	7	1	34
May 3, 1887, .	1	.	3	.	.	86 p	.	147	11	3	.	54	.	305
Station II.														
June 29, 1886, .	.	.	49	.	.	56	.	39	2	.	.	25	2	173
July 29, ,, .	.	.	6	1	.	77	2	77	1	2	.	27	4	197
Sept. 14, ,, .	.	.	.	.	1	8	.	22	.	.	.	8	.	39
Nov. 13, ,, .	.	.	.	.	.	1	1	8	.	1	.	6	1	181
May 3, 1887, .	.	.	41	.	.	78 p	.	246	33	2	.	63	.	463
Station III.														
June 29, 1886, .	.	.	47	.	.	125	.	42	2	1	.	23	1	241
Sept. 16, ,, .	.	.	4	.	1 t	120	1	252	.	.	.	21	2	401
Nov. 13, ,, .	8	.	.	.	.	.	.	2	.	2	.	.	.	12
May 4, 1887, .	.	.	3	.	.	10 p	.	44	1	4	.	4	.	66
Station IV.														
June 30, 1886, .	.	.	.	.	.	105	.	145	9	.	.	19	.	278
Sept. 14, ,, .	.	.	.	.	.	129	.	69	1	4	.	38	.	241
Nov. 15, ,, .	.	.	.	.	.	145	.	126	.	.	.	.	2	273
May 4, 1887, .	.	.	.	.	.	25	.	5	1	1	.	2	.	34
Station V.														
June 30, 1886, .	.	.	12	4	.	134	15	29	5	2	.	95	.	296
Sept. 16, ,, .	.	.	10	1	.	43	1	37	.	.	.	45	.	137
Nov. 15, ,, .	5	.	24	5	.	.	1	27	.	2	.	.	11	75
May 5, 1887, .	.	.	33	24	.	19	5	45	47	4	.	366	2	546
ABERDEEN BAY—														
Station I.														
July 6, 1886, .	1	.	17	25	.	289	1	149	.	1	.	520	.	963
Sept. 2, ,, .	21	.	169	327	.	201	.	225	.	.	7	.	5	955
Nov. 1, ,, .	2	.	106	7	.	7	.	4	.	5	.	.	.	131
Station II.														
July 7, 1887, .	3	.	11	32	.	127	1	107	.	.	.	282	.	563
Sept. 3, ,, .	10	.	57	142	.	26	1	19	.	.	4	4		263
Nov. 5, ,, .	.	.	1	.	.	3	.	4	.	.	.	.	.	8
Station III.														
July 8, 1886, .	3	1	35	125	.	41	1	45	.	.	1	80	.	332
Sept. 3, ,, .	3	.	72	164	.	49	.	20	.	.	3	2	.	313
Nov. 5, ,, .	.	.	.	2	1	3	.	11	.	1	.	.	1	19
Station IV.														
July 7, 1886, .	1	.	6	91	.	87	.	53	.	1	2	122	2	365
Sept. 3, ,, .	1	.	134	156	1	56	.	27	1	.	2	2	.	360
Nov. 5, ,, .	.	.	4	.	2	.	.	10	.	1	.	.	.	17
Station V.														
July 8, 1886, .	.	.	11	10	.	125	.	37	.	1	.	489	.	573
Nov. 9, ,, .	2	.	30	.	.	.	.	.	.	1	.	.	.	32
Station VI.														
July 9, 1886, .	.	.	10	6	1	46	.	11	.	.	.	284	.	368
Nov. 11, ,, .	5	.	6	.	.	2	2	2	.	.	.	.	.	17

TABLE C.—SHOWING THE TAKE OF LINE AND NET BOATS FROM INSHORE GROUNDS, IN THE LEITH, ANSTRUTHER, AND MONTROSE DISTRICTS.

LEITH DISTRICT.

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Jan. 3	North Berwick,	...	...	3	...	...	...	...	4	Yawls.	...	...	...	...	On the 6th, 9th, and 11th, boats could not go out.
” 4	”	...	...	4	...	...	...	...	...	...	...	...	...	...	
” 5	”	...	...	10	...	...	...	...	6	”	...	...	...	...	
” 7	”	...	...	2	...	...	...	...	5	”	...	...	...	...	Stormy.
” 8	”	...	4½	4½	...	...	...	...	...	”	1	Large.	...	...	
” 10	”	...	...	10	...	...	...	...	4	”	...	...	...	...	
” 12	”	...	...	16	...	...	...	...	6	”	...	...	...	...	
” 13	”	...	...	14	...	...	...	...	6	”	...	...	...	...	
” 14	”	...	...	20	...	...	...	...	6	”	...	...	...	...	
” 17	”	...	...	9	...	...	...	...	4	Yawls.	...	...	Medium.	Clams and Mussels.	Fine.
” 18	”	...	...	8	...	...	...	...	5	”	...	...	...	”	”
” 20	”	...	...	10	...	...	...	...	6	”	...	...	...	”	”
” 21	”	...	10	20	...	...	...	...	...	”	1	Large.	Large.	”	”
” 24	”	...	...	9	...	...	...	...	4	”	...	...	...	”	”
” 25	”	2	2	6	...	...	...	...	...	”	3	Large.	...	”	”
” 26	”	...	6	15	...	...	..	...	6	”	1	...	...	”	”

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate, and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Jan. 27	North Berwick,	...	...	5	...	...	...	...	5	„	...	...	Large.	Clams and Mussels.	Fine.
„ 29	„	...	...	10	...	...	...	...	6	„	...	...	...	„	„
„ 31	„	...	...	15	...	...	...	...	6	„	...	...	...	„	„
Totals for January.	...	2	22½	190½	...	...	...	...	79	...	6	...	...	...	...
Feb. 1	North Berwick,	...	...	9	...	...	...	...	5	„	...	...	Medium.	Clams.	Fine.
„ 2	„	...	...	7	...	...	...	...	4	„	...	...	„	„	Wind N.W.; heavy sea.
„ 4	„	...	...	9	...	...	...	...	5	„	...	...	„	„	Moderate weather.
„ 5	„	...	...	4	...	...	...	...	4	„	1	Large.	„	„	Fine.
„ 7	„	...	...	14	...	...	...	...	5	„	...	..	„	„	„
„ 8	„	...	...	20	...	...	..	...	5	„	...	...	„	„	„
„ 9	„	...	...	17	...	...	...	...	5	„	...	...	„	„	„
„ 10	„	10	10	17	...	...	...	...	6	„	1	Large.	„	„	„
„ 11	„	...	...	24	...	...	...	...	4	„	1	„	„	„	„
„ 12	„	10	...	11	...	...	...	...	4	„	1	„	„	„	„
„ 14	„	...	7	10	...	...	...	...	3	„	1	„	„	„	„
„ 15	„	...	..	12	...	...	...	...	4	„	...	„	„	„	„
„ 16	„	...	8	30	...	...	...	...	5	„	1	Large.	„	„	Generally fine.
„ 17	„	29	...	20	...	...	...	...	4	Yawls.	2	Large.	„	„	„
„ 18	„	...	...	10	...	...	...	...	5	„	...	...	„	„	„

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate, and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 19	North Berwick,	...	7	10	...	...	...	...	4	,,	1	Large.	Medium.	Clams.	Moderate.
,, 21	,,	...	...	9	...	...	...	...	4	,,	...	...	,,	,,	,,
,, 22	,,	...	...	5	...	...	...	...	3	,,	...	...	,,	,,	,,
,, 25	,,	...	...	5	...	...	...	...	4	,,	...	...	,,	,,	,,
,, 26	,,	...	...	6	...	...	...	...	5	,,	...	...	,,	,,	,,
,, 28	,,	...	...	10	...	...	...	...	5	,,	...	...	,,	,,	,,
Totals for February.	...	49	32	259	...	...	...	.	79	...	6	...	...	...	...
Mar. 1	North Berwick,	...	10	13	...	...	...	...	4	,,	1	Large.	Medium.	Clams.	Fine.
,, 2	,,	...	...	8	...	...	...	...	4	,,	...	,,	,,	,,	,,
,, 3	,,	...	...	7	...	...	...	...	3	,,	...	,,	,,	,,	,,
,, 4	,,	...	...	10	...	...	...	...	4	,,	...	,,	,,	,,	,,
,, 5	,,	...	13	8	...	...	...	...	4	,,	1	Large.	,,	,,	,,
,, 7	,,	...	...	11	...	...	...	...	4	,,	...	...	,,	,,	,,
,, 8	,,	...	12	12	...	...	...	...	4	,,	1	Large.	,,	,,	,,
,, 9	,,	...	20	27	...	...	...	...	5	,,	4	,,	,,	,,	,,
,, 10	,,	...	...	No	boats	out.	...	...	...	...	...	...	...	...	Fresh gale from N.E.; heavy sea.
,, 11	,,														
,, 12	,,														
,, 13	,,														
,, 14	,,	...	...	8	...	...	...	...	5	Yawls.	...	...	,,	Clams & Musl.	Fine.
,, 15	,,	...	...	11	...	...	...	...	2	,,	1	Large.	,,	,, ,,	,,

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 16	North Berwick, .	...	4	4	...	...	...	...	4	Yawls.	1	Large.	Medium.	Clams & Musl.	Moderate.
„ 17	„ . .	...	5	...	...	...	...	...	4	„	...	...	„	„ „	„
„ 18	„ . .	...	4	10	...	...	...	...	...	...	...	...	„	„ „	„
„ 19	„ . .	...	5	10	...	...	...	...	4	Yawls.	1	Large.	„	„ „	„
„ 21	„ . .	...	...	9	...	...	...	...	4	„	1	„	„	„ „	„
„ 22	„ . .	...	5	...	...	...	...	...	5	„	...	...	„	„ „	„
„ 23	„ . .	...	...	4	...	...	...	...	4	„	...	...	„	„ „	„
„ 25	„ . .	...	...	6	...	...	...	...	5	„	...	...	„	„ „	„
„ 26	„ . .	...	4	10	...	...	...	...	5	„	1	Large.	„	„ „	„
„ 28	„ . .	...	...	5	...	...	...	...	4	„	...	...	„	„ „	Fine.
„ 29	„ . .	...	5	15	...	...	...	...	6	„	...	...	„	„ „	„
„ 30	„ . .	...	...	8	...	...	...	...	5	„	...	...	„	„ „	„
„ 31	„ . .	...	...	4	...	...	...	...	4	„	...	...	„	„ „	Moderate.
Totals for March.	} .	...	87	230	...	...	...	...	93	...	12	...	...	...	...
Jan. 3 to 15	Cockenzie and Port-Seton . .	...	91	879	179	...	...	...	...	Yawls.	...	Large.	...	...	...
„ 17	„ „ .	...	7	7	...	...	...	...	14	„	...	...	...	...	...
„ 18	„ „ .	...	1½	80	16	...	...	...	„	„	...	...	...	...	...

Note.—The number of fishing boats inside the restricted area is the same as on previous years, the fish not much more plentiful than formerly except Flounders, the catch of which is six times greater than in the month of March 1886. Haddocks seem to have gone away from the Firth to deeper water, and the large boats engaged at the Haddock and Cod fishing had to go out from 50 to 100 miles east of the May before they got any. The large boats consequently, in several instances, were at sea from Monday till Friday and Saturday. The prevalence of westerly winds has interfered with the catch to a great extent, the fishermen saying that if there had been more east winds the take would have been better.

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Jan. 19	Cockenzie and Port-Seton,	...	...	...	...	...	...	...	...	...	...	...	...	...	On the 19th boats were prevented fishing by gale from W.
,, 21	,, ,,	...	21	250	23	...	...	...	14	Yawls.	...	...	...	...	...
,, 22	,, ,,	...	21	...	...	...	...	...	,,	,,	24	Large.	...	...	...
,, 24	,, ,,	...	19	9	...	...	...	...	,,	,,	,,	,,	...	...	...
,, 25	,, ,,	...	...	260	28	...	...	...	,,	,,	,,	,,	...	...	...
,, 26	,, ,,	...	16	10	...	...	...	...	13	,,	,,	,,	...	...	...
,, 27	,, ,,	...	17	18	...	...	...	...	14	,,	,,	,,	...	...	...
,, 28	,, ,,	...	...	225	25	...	...	...	...	...	25	,,	Medium.	Clams.	Stormy.
,, ,,	,, ,,	...	4	10	...	...	...	...	7	Yawls.	...	...	,,	,,	...
,, 29	,, ,,	...	12	16	...	...	...	...	14	,,	...	...	,,	,,	,,
,, 31	,, ,,	...	11	10	...	...	...	...	,,	,,	...	...	,,	,,	,,
Totals for January.	...	...	220½	1774	271	...	...	...	510	...	...	...	...	...	...
Feb. 1	Cockenzie and Port-Seton,	...	12	9	...	...	...	...	,,	Yawls.	...	...	Medium.	Clams.	Threatening.
,, ,,	,, ,,	...	...	220	20	...	...	...	...	...	20	Large.	,,	,,	,,
,, 2	,, ,,	...	14	14	...	...	...	...	14	Yawls.	...	...	,,	,,	Moderate.
,, 3	,, ,,	8 crans.		...	...	...	...	...	...	...	1	Large.	,,	,,	Stormy; gale from the W., 14 Yawls not at sea.

TABLE C.—Leith District—*continued.*

Date.	Place where Landed.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts,*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 4	Cockenzie and Port-Seton,	...	...	200	10	...	...	...	...	...	21	„	Large.	Clams.	...
„ „	„ „	...	16	12	...	...	...	...	14	Yawls.	...	...	Small.	„	Fine.
„ 5	„ „	...	16	12	...	...	...	...	„	„	...	...	Large.	„	Fair.
„ „	„ „	...	...	130	26	...	...	...	...	...	26	Large.	Medium.	„	„
„ 7	„ „	...	12	30	...	...	...	...	14	Yawls.	...	...	Large.	„	Calm.
„ 8	„ „	...	12	16	...	...	...	...	„	„	...	...	Medium.	„	„
„ „	„ „	...	...	170	22	...	...	...	...	...	24	Large.	„	„	„
„ 9	„ „	...	20	22	...	...	...	...	14	Yawls.	...	...	„	„	„
„ 10	„ „	...	26	30	...	...	...	...	14	Yawls.	...	...	Large.	„	„
„ „	„ „	...	...	165	15	...	...	...	...	...	20	Large.	Medium.	„	„
„ 11	„ „	...	7½	15	...	...	...	...	9	Yawls.	...	...	„	„	„
„ 12	„ „	...	18	24	...	...	...	...	14	„	...	...	„	„	„
„ „	„ „	...	...	180	20	...	...	...	...	...	25	Large.	„	„	„
„ 14	„ „	...	15	20	...	...	...	...	14	Yawls.	...	...	„	„	„
„ 15	„ „	...	14	21	...	...	...	...	„	„	...	...	„	„	Fair.
„ „	„ „	...	...	132	12	...	...	...	...	...	24	Large.	„	„	„
„ 16	„ „	...	8	20	...	...	...	...	14	Yawls.	...	...	„	„	Good.
„ 17	„ „	...	5	16	...	...	...	...	„	„	...	...	„	„	„
„ „	„ „	...	...	140	25	...	...	...	...	...	22	Large.	„	„	„
„ 18	„ „	...	9	19	...	...	...	...	14	Yawls.	...	...	„	„	„
„ 19	„ „	...	10	25	...	...	...	...	„	„	...	...	„	„	Moderate.
„ „	„ „	...	...	170	33	...	...	...	...	...	29	Large.	Large.	„	„
„ 21	„ „	...	6	20	...	...	...	...	13	Yawls.	...	...	Medium.	„	„
„ 22	„ „	...	8	18	...	...	...	...	„		...	...	„	„	„

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 22	Cockenzie and Port-Seton, . .	...	...	132	12	...	...	...	...	...	24	Large.	Large.	Clams.	Moderate.
23	„ „ .	...	8	10	...	...	...	...	12	Yawls.	...	...	Medium.	„	Gale from west.
24	„ „ .	..	...	135	15	...	...	...	...	...	25	Large.	„	„	„ „ Yawls not at sea.
„ 25	„ „ .	...	9½	10	...	...	...	...	13	Yawls.	...	...	„	„	Moderate.
„ 26	„ „ .	...	...	75	10	...	...	...	...	...	17	Large.	„	„	„
„ 28	„ „ .	...	7½	12	...	...	...	...	13	Yawls.	...	...	„	„	Fine.
Totals for February.	...	8 crans.	265½	2218	220	...	...	...	298	...	278	...	...	...	...
Mar. 1	Cockenzie and Port-Seton . .	...	12	14	...	...	...	...	13	Yawls.	...	...	Medium.	Clams.	Breezy.
„ „	„ „ .	...	...	98	22	...	...	...	...	...	24	Large	„	„	„
„ 2	„ „ .	...	7	9¼	...	...	...	...	13	Yawls.	...	...	„	„	Light wind.
„ 3	„ „ .	...	6	20	...	...	...	...	13	„	...	...	Small.	„	„ „
„ „	„ „ .	...	...	90	10	...	...	...	...	...	25	Large.	Medium.	„	„ „
„ 4	„ „ .	...	8	11½	...	...	...	...	13	Yawls.	...	...	„	„	Fine.
„ 5	„ „ .	...	6	20	...	...	...	...	13	„	...	...	„	„	„
„ „	„ „ .	...	...	90	30	...	...	...	...	...	24	Large.	„	„	„
„ 7	„ „ .	...	9½	10	...	...	...	...	13	Yawls.	...	...	„	„	Calm.
„ 8	„ „ .	...	6	6	...	...	...	...	12	„	...	...	„	„	„
„ „	„ „ .	...	...	30	20	...	...	...	...	...	10	Large.	„	„	„
„ 9	„ „ .	...	10	14	...	...	...	...	12	Yawls.	...	...	Small.	„	„

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 10	Cockenzie and Port-Seton,	...	8	10	...	...	...	...	12	”	...	...	Small	Clam.	Showery.
” ”	” ”	...	...	100	20	...	...	...	...	...	20	Large.	Medium.	”	”
” 11	” ”	...	1	1¼	...	...	...	...	1	Yawls.	...	...	”	”	Gale from east.
” 12	” ”	...	5	...	...	...	...	...	5	”	...	...	”	”	” ”
” ”	” ”	...	...	60	15	...	...	...	...	...	25	Large.	”	”	” ”
” 14	” ”	...	8	10	...	...	...	...	12	Yawls.	...	...	”	”	Strong wind from N.
” 15	” ”	...	6	6	...	...	...	...	12	”	...	...	”	”	” ”
” ”	” ”	...	...	70	10	...	...	...	...	...	20	Large.	”	”	” ”
” 16	” ”	...	8	4	...	...	...	...	12	Yawls.	...	...	Small.	”	Moderate.
” 17	” ”	...	6	6	...	...	...	...	12	”	...	...	Medium.	”	”
” ”	” ”	...	...	80	28	...	...	...	...	...	12	Large.	Small.	”	”
” 18	” ”	...	8	10	...	...	...	...	12	Yawls.	...	...	”	”	”
” 19	” ”	...	...	75	5	...	...	...	...	...	20	Large.	”	”	”
	” ”	...	4	8	...	...	...	...	12	Yawls.	...	...	”	”	Fine.
” 21	” ”	...	9	9	...	...	...	...	12	”	...	...	”	”	Showery.
” 22	” ”	...	6	6	...	...	...	...	12	”	...	...	”	”	”
” 23	” ”	...	3	6	...	...	...	...	12	”	...	...	”	”	Light wind.
” ”	” ”	...	...	220	30	...	...	...	...	...	25	Large.	Medium.	”	” ”
” 24	” ”	...	...	...	...	...	...	...	...	...	...	...	...	”	Gale from west; no boats at sea.
” 25	” ”	...	6	6	...	...	...	...	12	Yawls.	...	...	Medium.	”	Moderate.
” 26	” ”	...	6	2	...	...	...	...	8	”	...	...	Small.	”	”
” ”	” ”	...	4	120	40	...	...	...	...	...	20	Large.	”	”	”
” 28	” ”	...	4	2	...	...	...	...	8	Yawls.	...	...	”	”	Fine.
” 29	” ”	...	4	4	...	...	...	...	8	”	...	...	”	”	”

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 30	Cockenzie and Port-Seton,	...	4	8	...	...	...	...	8	,,	...	...	Small.	Clam.	Fine.
,, 31	,, ,,	...	3	5	...	...	...	...	8	,,	...	...	,,	,,	Moderate.
,, ,,	,, ,,	...	...	130	30	...	...	...	...	...	20	Large.	Medium.	,,	,,
Totals for March.	...	...	55½	1357	260	...	..	...	270	...	245	...	...	...	...
Jan. 1	Fisherrow,	...	40	...	...	...	...	...	2	Large.	...	...	...	...	
,, 5	,,	42	5	...	...	...	...	...	3 1	Large. Yawl.	...	...	..	...	On the 3rd and 4th most of the large boats were prevented going out of harbour by the lowness of the tides not permitting of their floating.
,, 6	,,	45	15	2	1	...	...	...	3 3	Large. Yawls.	...	...	...	...	
,, 7	,,	40	15	...	...	...	...	...	3 2	Large. Yawls.	...	...	...	...	
,, 8	,,	20	10	...	...	...	...	...	4 1	Large. Yawl.	...	...	...	...	
,, 11	,,	3	8	10	...	...	...	...	2 1	Large. Yawl.	7	Large.	...	...	
,, 12	,,	6	5	...	...	...	...	...	1 1	Large. Yawl.	...	...	...	...	
,, 13	,,	12	15	2	...	...	...	...	4 2	Large. Yawls.	...	...	...	...	
,, 14	,,	2	36	...	...	...	...	...	3 1	Large. Yawl.	...	...	...	...	

TABLE C.—Leith District—*continued.*

Date.	Place where Landed.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring and Sprats.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Jan. 15	Fisherrow, . .	30	20	2	...	...	...	...	6 3	Large. Yawls.	...	...	...	...	
" 17	" . .	...	...	...	...	...	...	...	...	...	4	Large.	Large Cod, from 2 ft. 3 in. to 3 ft. long. Haddocks, " " 11 " 14 in. " " Herring, " " 9 " 10 " "	Muss. & Her'g.	Frosty.
" 18	" . .	...	...	...	...	...	...	...	...	...	1	"		Herring Bait *only* used for Cod, &c. fishing, and Mussels for the Haddocks.	Stormy; S.W. wind.
" 19	" . .	12	...	...	...	...	...	...	2 1	Large. Yawl.	...	...			Fine; fresh.
" 20	" . .	15	...	...	...	...	...	...	1 1	Large. Yawl.	...	...			Keen frost; W. wind.
" 21	" . .	9	...	4	...	...	...	...	1 2	Large. Yawls.	3	Large.			Strong wind, W.
" 22	" . .	3	5	...	...	...	...	...	1 1	Large. Yawl.	8	"			Strong W. breeze.
" 24	" . .	...	...	...	...	...	...	...	...	...	1	"			Fresh, S.W.
" 25	" . .	60	8	3	...	1	...	...	4 3	Large. Yawls.	9	"			S.W. gale.
" 26	" . .	16	...	...	...	...	...	...	1	Large.	...	...			W. strong breeze.
" 27	" . .	18	10	...	...	...	...	...	2 1	Large. Yawl.	2	Large.			S.W. "
" 28	" . .	30	15	1	1	1	...	...	4 2	Large. Yawls.	10	"			W. gale.
" 29	" . .	6	3	1	1	2	...	...	2 1	Large. Yawl.	2	"			" "
" 31	" . .			No	Fish	landed.			...	...	...	...	...	...	Westerly gale.
Totals for January.	...	369	210	25	3	4	...	...	77	...	47	...	...	...	...

Note.—The stormy weather during January has prevented the boats prosecuting the fishing so continuously inside and outside the Firth.

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 1	Fisherrow,	...	2	45	5	4		...	6 1	Large. Yawl.	3	Large.	Medium size.	Mussel.	N.W. breeze.
,, 2	,,	6	1	1	...	5	...	...	1 4	Large. Yawls.	3	,,	,,	,,	Southerly gale.
,, 3	,,	45	3	1	1	2	...	...	2 1	Large. Yawl.	11	,,	,,	,,	Westerly gale.
,, 4	,,	...	...	...	...	2	...	...	1	Yawl.	...	...	,,	,,	S.W. breeze.
,, 5	,,	21	7	6	1	22	...	...	3 5	Large. Yawls.	...	...	,,	Her'g. & Musl.	W. ,,
,, 7	,,	...	...	No	Fish	lande	d.	...	...	...	...	...	...	...	Fine; frosty.
,, 8	,,	...	...	1	1	18	...	...	3	Yawls.	...	...	Medium size.	Mussel.	Calm; frosty.
,, 9	,,	9	...	1	1	12	...	...	1 3	Large. Yawls.	12	Large.	,,	,,	,, ,,
,, 10	,,	7	2	1	4	20	...	...	2 4	Large. Yawls.	8	,,	Large & Med.	Her'g. & Musl.	,, ,,
,, 11	,,	18	3	2	2	15	...	...	2 3	Large. Yawls.	5	,,	,, ,,	,, ,,	,, ,,
,, 12	,,	120	2	5	5	40	...	...	7 4	Large. Yawls.	8	,,	,, ,,	,, ,,	Calm; fresh.
,, 14	,,	15	...	...	...	...	...	...	1	Large.	3	,,	...	...	N.E. breeze.
,, 15	,,	...	...	...	3	25	...	...	4	Yawls.	5	,,	Medium.	Herring used only for Cod, and Mussels for Haddock fishing used here.	Calm; frosty.
,, 16	,,	5	2	20	2	...	...	...	2 1	Large. Yawl.	9	,,	,,		,, ,,
,, 17	,,	15	...	...	3	30	...	...	1 5	Large. Yawls.	3	,,	,,		Calm; foggy.

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 18	Fisherrow,	12	...	...	2	4	...	...	1 1	Large. Yawl.	9	Large.	Medium.		Fine; light breeze.
,, 19	,,	120	...	2	5	30	...	...	3 5	Large. Yawls.	11	,,	,,		Fine; frosty.
,, 21	,,	15	5	...	...	...	...	...	2	Large.	...	...	,,	Herring bait only for Cod, and Mussels for Haddock fishing used here.	,, light breeze.
,, 22	,,	...	...	...	2	30	...	...	6	Yawls.	9	Large.	,,		W., strong.
,, 23	,,	54	3	...	...	2	...	...	2 1	Large. Yawl.	1	,,	,,		W. gale.
,, 24	,,	...	...	...	...	1	...	...	1	,,	2	,,	,,		S.W. gale.
,, 25	,,	...	...	...	...	...	...	...	...	...	...	...	,,		W. gale.
,, 26	,,	3	3	...	3	70	...	...	7	Yawl.	3	Large.	,,		S. breeze.
,, 28	,,	...	...	...	...	...	...	...	...	...	1	,,	,,		Calm; frosty.
Totals for February.	...	465	35	85	40	332	...	...	96	...	106	...	...	...	...
Mar. 1	Fisherrow,	...	2	...	3	70	...	...	3 7	Large. Yawls.	3	Large.	Medium.	Musl. & Her'g.	Dull; westerly breeze.
,, 2	,,	...	...	...	2	15	...	...	2	,,	5	,,	,,	,, ,,	,, ,,
,, 3	,,	...	...	...	5	30	...	...	5	,,	7	,,	,,	,, ,,	Dull; S.W. light.
,, 4	,,	...	...	...	...	6	...	...	1	,,	7	,,	,,	,, ,,	Fine; calm.
,, 5	,,	...	...	...	...	12	...	...	3	,,	10	,,	,,	,, ,,	Still; frosty.
,, 7	,,	...	...	...	...	...	...	...	...	...	1	,,	...	...	Fine; light E. wind.

Note.—There have been few Haddocks got inside the Firth this last fortnight, but Flounders have been plentiful about Largo and Aberlady Bays, and prices have been good. The boats have been prevented going off to the fishing grounds a few days on account of the stormy weather.

TABLE C.—Leith District—*continued.*

Date.	Place where Landed.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish, principally Codlings.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 8	Fisherrow,	...	...	...	2	18	...	...	5	Yawls.	1	Large.	Medium.	Musl. & Her'g.	Calm; foggy.
,, 9	,,	...	...	...	...	2	...	...	1		3	,,	,,	,, ,,	,, ,,
,, 10	,,	...	...	...	3	20	...	...	5		10	,,	,,	,, ,,	E. wind; snow.
,, 11	,,	...	...	...	...	2	...	...	1		8	,,	,,	,, ,,	N.E. gale; snow.
,, 12	,,	...	...	...	...	...	...	...	...	...	2	,,	,,	,, ,,	E. wind; frosty.
,, 14	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	N. wind; frosty.
,, 15	,,	...	...	...	4	20	...	...	5	Yawls.	7	Large.	Medium.	Musl. & Her'g.	,, ,,
,, 16	,,	...	No	Fish	lande	d.	...	...	...	...	...	...	Medium and large for Haddocks; Cod large; Herring very medium sized and poor in quality.	Mussels and Herring only.	Frosty; light E. wind.
,, 17	,,	...	...	...	2	20	...	...	5	Yawls.	2	Large.			,, light W. wind.
,, 18	,,	...	...	...	1	15	...	...	4	,,	6	,,			Foggy; no wind.
,, 19	,,	...	...	...	2	20	...	...	5	,,	11	,,			,, light W. wind.
,, 21	,,	...	...	...	...	...	...	...	...	...	2	,,			,, calm.
,, 22	,,	...	...	...	2	16	...	...	4	Yawls.	...	...			Snowy; fresh.
,, 23	,,	...	...	1	1	2	...	...	1	,,	8	Large.			N.W., light breeze.
,, 24	,,	...	...	...	...	25	...	...	5	,,	...	.			W. strong breeze.
,, 25	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	Fine; light W. wind.
,, 26	,,	...	...	3	3	38	...	...	7	Yawls.	10	Large.	Flounders were in many cases of large size, with a few small.	...	,, ,,
,, 28	,,	...	...	...	...	...	...	...	...	...	1	,,			,, light N.W. wind.
,, 29	,,	...	...	...	...	20	...	...	5	Yawls.	1	,,			Calm; clear.
,, 30	,,	...	...	...	...	6	...	...	1	,,	...	,,			Light W. wind.
,, 31	,,	...	...	...	...	15	...	...	5	,,	9	,,			,, ,,
Totals for March.	...	...	2	4	30	372	...	...	80	...	114	...	...	...	...

Note.—The stormy weather of the last few days has prevented some of the boats prosecuting the fishing as successfully as they would otherwise have done. The take of large fish is better than last month, but Haddocks taken outside the boundary have fallen off in quantity. The principal fish caught within the limits just now are Flounders with a few Whiting.

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.*	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish, Principally Codlings.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Jan. 3	Leith,	...	11	10	...	...	...	...	14	Yawls.	...	...	...	...	
,, 4	,,	...	5	16	...	...	...	...	,,	,,	...	...	...	...	
,, 5	,,	...	4	10	...	...	...	...	,,	,,	...	...	...	...	
,, 12	,,	...	15	6	...	...	...	...	,,	,,	...	...	...	...	
,, 13	,,	...	10	4	...	...	...	...	,,	,,	...	...	...	...	On the 11th a strong S.W. wind blew, preventing fishing.
,, 14	,,	...	7½	10	...	...	...	...	,,	,,	...	...	...	...	
,, 15	,,	...	10	11	...	...	...	...	,,	,,	...	...	...	...	
Totals for January.	} ...	224	62½	67	...	...	...	...	98	...	...	...	...	...	...
Jan. 1	Newhaven,	120	...	...	...	...	½	1	60	Yawl.	...	...	Medium.	Mussel & Clam, or Mussel, Clam & Sand-worm for Haddocks, Whitings & other small Fish.	Fresh breeze.
,, 3	,,	210	...	3	¼	...	...	2	,,	,,	5	Big-Decked Boats.	,,		
,, 4	,,	185	...	...	...	2	...	1	,,	,,	2	,,	Good.		
,, 5	,,	420	...	1	⅛	...	...	...	,,	,,	4	,,	,,		
,, 6	,,	480	...	1½	⅛	...	...	4	,,	,,	1	,,	,,		
,, 7	,,	480	...	1	...	...	...	3½	,,	,,	2	,,	,,		
,, 8	,,	90	...	4	¼	...	...	2	,,	,,	5	,,	,,		

* There were also about 1200 Crans of Sprats landed here in January.

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Jan. 10	Newhaven, . . .	180	...	2	$\frac{1}{8}$	...	...	$4\frac{1}{4}$	,,	,,	4	,,	Very Good.	Herring or Squids, or Ink Fish and both combined alternately put on the hooks for Cod, Ling, Skate, and Halibut, the Squid being the most deadly bait, £3 per cwt. box having been given for them when scarce.	
,, 11	,, . . .	150	...	$2\frac{1}{2}$	$\frac{1}{8}$	...	...	2	,,	,,	...	...	,,		
,, 12	,, . . .	60	...	7	$1\frac{1}{4}$	...	$\frac{1}{2}$	...	,,	,,	4	,,	,,		
,, 13	,, . . .	45	...	1	...	...	...	...	,,	,,	...	...	,,		
,, 14	,, . . .	120	...	9	2	$1\frac{1}{2}$	...	...	30	,,	3	,,	,,		
,, 15	,, . . .	240	...	3	$\frac{1}{8}$	...	...	1	,,	,,	2	,,	Good.		
,, 18	,, . . .	60	...	6	$1\frac{1}{4}$	...	...	...	,,	,,	5	,,	Haddocks, Cod, Flounders & Skate, very good quality and size; Herrings becoming more mixed with small, and Whitings very small.		
,, 19	,, . . .	90	...	6	1	...	$2\frac{1}{4}$	1	,,	,,	...	...			
,, 20	,, . . .	90	...	...	...	...	...	...	,,	,,	3	,,			
,, 21	,, . . .	60	...	2	...	...	...	$\frac{1}{2}$	,,	,,	2	,,			
,, 22	,, . . .	45	...	1	...	...	...	...	,,	,,	3	,,			
,, 24	,, . . .	21	...	$2\frac{1}{2}$	$\frac{1}{4}$	4	...	1	,,	,,	4	,,			
,, 25	,, . . .	30	...	2	$\frac{1}{8}$	...	$1\frac{3}{4}$	$1\frac{1}{2}$	,,	,,	...	,,			
,, 26	,, . . .	30	...	2	$\frac{1}{6}$	...	...	$2\frac{3}{4}$	,,	,,	3	,,			
,, 27	,, . . .	27	...	$2\frac{1}{2}$	$\frac{1}{8}$	...	1	$3\frac{1}{3}$	,,	,,	2	,,			
,, 28	,, . . .	90	...	$1\frac{1}{2}$	...	...	...	$2\frac{1}{2}$	,,	,,	...	,,			
,, 29	,, . . .	15	...	1	...	...	...	$1\frac{3}{4}$	,,	,,	5	,,			
,, 31	,, . . .	16	...	...	...	...	...	1	22	Yawls.	6	Large Decked Boats.	Medium and Small.	Mussel, Clam, Herring and Squid.	Stormy.
Totals for January.	...	3354	...	$61\frac{1}{2}$	$7\frac{1}{7}$	$7\frac{1}{2}$	$5\frac{1}{2}$	$34\frac{1}{3}$	1072	...	65	...	...	...	...

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 1	Newhaven,	39	1½ cwt. during the Fortnight.	About ½ cwt. for the whole Fortnight.	...	About 2 cwt.	...	...	25	Yawls.	6	Large Decked Boats.	Medium and Small.	Mussel, Clam, Herring and Squid.	Stormy.
„ 2	„	60						2½	65	„	„	„	„	„	Fresh breeze.
„ 3	„	39						1	48	„	„	„	„	„	„
„ 4	„	39						1½	21	„	„	„	„	„	Fine.
„ 5	„	34						2	46	„	„	„	„	„	„
„ 7	„	4						1½	51	„	„	„	„	„	„
„ 8	„	33						1½	64	„	5	„	„	„	„
„ 9	„	12						1	54	„	„	„	„	„	„
„ 10	„	8						2	16	„	„	„	„	„	„
„ 11	„	5						1	27	„	6	„	„	„	„
„ 12	„	3						1½	39	„	„	„	„	„	„
„ 15	„	30	...	...	...	...	...	1	20	„	7	„	„	„	Moderate
„ 16	„	10	...	...	16	...	...	5	20	„	...	...	...	„	Rough.
„ 17	„	20	...	...	...	...	...	3	17	„	...	...	...	„	Gale.
„ 18	„	10	...	...	12	...	...	1½	15	„	...	...	...	„	Severe gale.
„ 19	„	12	...	...	...	...	...	4	15	„	...	...	...	„	„
„ 22	„	6	...	...	...	...	...	5	10	„	...	...	...	„	Moderate.
„ 23	„	7	...	...	...	...	...	1	12	„	...	...	...	Herrings, Mussels, and Clams.	„
„ 25	„	10	...	...	...	...	...	1½	10	„	...	...	...		Light.
„ 26	„	11	...	...	...	...	...	4	5	„	...	...	...		Very light and foggy.
Totals for February.	...	392	1½	½	28	about 2	...	41½	580	...	76	...	...	...	...

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught withinthe Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 1	Newhaven,	Although there was 130 crans of Herring landed during the month, they were caught outside the limits, with the exception of about 15 crans.	During the month about 13 cwts. altogether; but cannot say so much as 1 cwt. on any one day, the most being 5 or 6 fish.	Very few each landing; cannot state it in daily quantities; about 27 cwts. altogether.	About 13 cwts.	6	...	...	18	Yawls.	16	Large Decked Boats.	Haddocks, Small and Medium. Whitings, ” Cod, Good and Large outside Area, and reverse inside. All Fish inside Area are Small and very Small.	Principally Herrings and Clams with Mussel, and occasionally Ink Fish.	Fine; cloudy.
,, 2	”					2	...	...							”
,, 3	”					5	...	...							”
,, 4	”					15	...	...							”
,, 5	”					1	...	...							”
,, 8	”					...	...	...							Cloudy and overcast.
,, 9	”					...	...	...							
,, 10	”					5	...	...							
,, 11	”					9	...	...							
,, 12	”					4	...	...							Fine.
,, 15	”					1	...	...							
,, 16	”					3	...	...							
,, 17	”					9	...	...							
,, 18	”					17	...	...							Very fresh breeze.
,, 19	”					...	...	...							
,, 22	”					...	...	...							
,, 23	”					1	...	...							
,, 24	”					...	...	...							Breezy.
,, 25	”					3	...	...							
,, 26	”					...	...	...							
,, 29	”					...	...	...							
,, 30	”					...	...	...							Strong gale.
,, 31	”					...	...	...							Very strong gale, N.N.W.
Totals for March.	...	15 crans.	13 cwt.	27 cwt.	13 cwt.	81	...	...	414	...	368	...	...	...	...

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Jan. 4 to 15	Granton, . .	...	174	...	...	...	...	...	...	...	...	...	...	...	...
„ 17	„ . .	...	22	...	...	...	...	...	1	Large.	...	...	Full sized.	Ink Fish.	Moderate.
„ 18	„ . .	...	28	...	...	...	...	...	1	„	...	...	„	„	„
„ 19	„ . .	...	34	...	...	...	...	...	2	„	...	...	„	„	High wind from S.W.
„ 20	„ . .	...	4	...	..	...	...	...	1	„	...	...	„	„	„ „
„ 21	„ . .	...	4	...	...	...	...	...	2	„	...	...	„	„	S.W. gale.
„ ...	„ . .	80	...	...	...	...	...	...	1	Small.	...	...	Mixed.	Caught with Cir. Trawl or Devil's Net.	„
„ 24	„ . .	73	...	...	...	...	...	...	1	„	...	...	„	„ „	Moderate.
„ 26	„ . .	...	8	...	...	...	...	...	...	...	2	Large.	Full sized.	Ink Fish.	Strong breeze, S.S.W.
„ 27	„ . .	71	...	...	...	...	...	...	1	Small.	...	...	Mixed.	Circle Trawl.	„ „
„ ...	„ . .	...	16	...	...	...	...	...	..	...	2	Large.	Full sized.	Ink Fish.	S.S.W.; strong gale.
Totals for January.	...	224	266	...	...	...	...	...	23	...	...	...	...	...	...
Feb. 1	Granton, . .	91	...	...	...	...	...	...	1	Small.	...	...	...	...	Good.
„ 2	„ . .	68	5*	...	...	...	...	...	1	„	2	Large.	*Large.	Ink Fish and Whelk.	„
„ 3	„ . .	...	12*	...	...	...	...	...	...	...	1	„	* „	„ „	Strong S.W. gale.
„ 5	„ . .	103	...	...	...	...	...	...	1	Small.	...	...	...	...	Good.
„ 8	„ . .	161	...	...	...	...	...	...	1	„	...	...	...	...	„
„ 9	„ . .	...	17*	...	...	...	...	...	...	...	2	Large.	*Large.	„ „	„

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 10	Granton, . .	113	20*	...	...	...	...	...	1	Small.	2	Large.	* Large.	Ink Fish ank Whelk.	Good.
,, 11	,, . .	...	13*	...	...	...	...	...	...	...	2	,,	* ,,		Good, but foggy.
,, 12	,, . .	...	8*	...	...	...	...	...	...	...	1	,,	* ,,	,, ,,	Good.
,, 14	,, . .	180	...	...	...	...	...	...	1	Small.	...	...	...	...	
,, 15	,, . .	109	...	...	...	...	...	...	1	,,	...	...	...	...	
,, 14	,, . .	111	...	...	...	...	...	...	2	,,	...	...	...	...	
,, 15	,, . .	109	...	...	...	...	...	...	2	,,	...	...	...	...	
,, 16	,, . .	...	17	...	...	...	...	...	...	...	2	Large.	Large.	Ink Fish.	West to S.-Westerly gales both weeks.
,, ...	,, . .	353	...	...	...	...	...	...	3	Small.	...	...	...	...	
,, 17	,, . .	...	20	...	...	...	...	...	...	...	2	Large.	Large.	Ink Fish.	West to S. Westerly gales both weeks.
,, 18	,, . .	...	8	...	...	...	...	...	...	...	2	,,	,,	,,	
,, ...	,, . .	194	...	...	...	...	...	...	2	Small.	...	...	...	...	
,, 19	,, . .	180	...	...	...	...	...	...	3	,,	...	...	...	...	
,, ...	,, . .	...	6	...	...	...	...	...	...	...	2	Large.	Large.	Ink Fish.	
,, 21	,, . .	258	...	...	...	...	...	...	3	Small.	...	...	...	...	
,, 22	,, . .	259	...	...	...	...	...	...	3	,,	...	...	...	...	
,, ...	,, . .	...	1	5	...	...	...	...	...	...	2	Large.	Cod, Large; Hads., Large & Medium.	Herring and Mussel.	
,, 23	,, . .	...	4	5	...	...	...	...	...	...	2	,,	,, ,,	,, ,,	
,, 24	,, . .	...	...	6	...	...	...	...	...	...	2	,,	Hadks., Large & Medium.	Mussel.	
,, 26	,, . .	...	...	12	...	...	...	...	...	...	2	,,	,, ,,	,,	
Totals for February.	...	2329	131	28	...	...	...	...	25	...	26	...	...	...	...

TABLE C.—LEITH DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 3	Granton, . .	...	...	5	...	...	...	...	...	...	1	"	Medium.	Musl. & Clam.	Fine all week.
" 4	" . .	...	...	6	...	...	...	...	...	...	1	"	Large & Med.	" "	(The smallness of the catch accounted for by the strike among the fishermen, by which two days fishing was lost.)
" 5	" . .	...	5	9	...	...	...	..	...	...	2	"	Medium.	Musl. & Her'g.	
" 8	" . .	...	...	5	...	...	...	...	...	...	1	Large.	Large & Med.	Musl. & Clam.	Fine.
" 9	" . .	...	3	6	...	...	...	...	...	...	2	"	" "	Musl. & Her'g.	"
" 10	" . .	...	23	...	...	...	...	...	...	...	1	"	Large.	Herring.	Easterly gale & snow.
" 11	" . .	...	...	3	...	...	...	...	...	...	1	"	Large & Med.	Musl. & Clam.	N.E. gale and snow.
" 12	" . .	...	9	...	...	...	...	...	...	...	1	"	Large.	Herring.	Mod. breeze, N.E.; frosty.
" 15	" . .	...	8	7	...	...	...	...	...	...	2	"	Large & Med.	Her'g. & Musl.	N.E.; fresh; frosty.
Totals for March.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT.

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 1	Largo, . . .	...	1	10	...	...	...	...	9	18 to 24 ft.	...	...	Medium.	Mussels.	Fine.
„ 2	„ . . .	...	1	4	...	...	...	...	5	...	...	...	...	...	Stormy.
„ 3	„ . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	„
„ 4	„ . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	
„ 5	„ . . .	...	...	...	...	4	...	...	2	...	...	...	...	Sand Worms and Mussels.	
„ 7	„ . . .	...	...	5	1	10	...	...	9	...	...	...	...	...	Fine.
„ 8	„ . . .	...	...	2	...	18	...	...	9	...	...	...	...	...	
„ 9	„ . . .	...	...	...	...	22	...	...	8	...	...	...	...	...	
„ 10	„ . . .	...	2	...	...	18	...	...	9	...	...	...	...	...	
„ 11	„ . . .	...	2	...	...	20	...	...	9	...	...	...	...	...	
„ 12	„ . . .	...	3	...	...	16	...	...	9	...	...	...	...	...	
„ 14	„ . . .	...	2	3	1	12	...	...	9	...	...	...	...	...	
„ 15	„ . . .	...	2	3	1	10	...	...	9	...	...	...	...	...	
„ 16	„ . . .	...	...	...	...	8	...	...	7	...	...	...	...	...	Strong Breeze.
„ 17	„ . . .	...	1	1	...	6	...	...	9	...	...	...	...	...	Fine.
„ 18	„ . . .	...	1	4	...	6	...	...	9	...	...	...	...	...	
„ 19	„ . . .	...	1	5	...	5	...	...	9	...	...	...	...	...	
„ 21	„ . . .	...	2	5	...	2	...	...	8	...	...	...	...	...	
„ 22	„ . . .	...	1	6	...	2	...	...	9	...	...	...	...	...	
„ 23	„ . . .	...	...	...	...	2	...	...	1	...	...	...	...	...	Stormy.
„ 24	„ . . .	...	...	...	...	...	...	...	...	...	...	...	...	...	
„ 25	„ . . .	...	...	5	...	7	...	...	9	...	...	...	...	...	Strong Wind.
„ 26	„ . . .	...	...	4	...	6	...	...	9	...	...	...	...	...	Fine.
„ 28	„ . . .	...	2	4	...	5	...	...	9	...	...	...	...	...	
Totals for February.	...	...	21	61	3	179	...	...	168	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 1	Largo,	...	½	1	...	3	...	...	...	18 to 24 ft.	...	...	Medium.	Mussels and Lobworms.	Stormy.
,, ,,	,,	...	1	4	...	3	...	...	9	,,	...	...	,,	,,	Fine.
,, 2	,,	...	2	3	...	4	...	...	,,	,,	...	...	,,	,,	,,
,, 3	,,	...	1	4	...	2	...	...	,,	,,	...	...	,,	,,	,,
,, 4	,,	...	1	3	...	3	...	...	9	,,	...	...	,,	,,	Fine.
,, 5	,,	...	2	3	...	3	...	...	,,	,,	...	...	,,	,,	,
,, 7	,,	...	3	2	...	2	...	...	,,	,,	...	...	,,	,,	,,
,, 8	,,	...	...	3	...	3	...	...	,,	,,	...	...	,,	,,	,,
,, 9	,,	...	...	2	...	4	...	...	,,	,,	...	...	,,	,,	,,
,, 10	,,	...	1	2	...	5	...	...	,,	,,	...	...	,,	,,	Stormy.
,, 11	,,	...	...	...	...	2	...	...	2	,,	...	...	,,	,,	,,
,, 12	,,	...	...	...	...	5	...	...	3	,,	...	...	,,	,,	,,
,, 14	,,	...	2	2	...	8	...	...	,,	,,	...	...	,,	,,	Fine.
,, 15	,,	...	2	1	...	10	...	...	,,	,,	...	...	,,	,,	,,
,, 16	,,	...	1	3	...	9	...	...	,,	,,	...	...	,,	,,	,,
,, 17	,,	...	1	1	...	4	...	...	,,	,,	...	...	,,	,,	,,
,, 18	,,	...	1	2	...	2	...	...	,,	,,	...	...	,,	,,	,,
,, 19	,,	...	1	2	...	2	...	...	,,	,,	...	...	,,	,,	,,
,, 21	,,	...	3	2	...	3	...	...	,,	,,	...	...	,,	,,	,,
,, 22	,,	...	3	2	...	4	...	...	7	,,	...	...	,,	,,	Strong wind.
,, 23	,,	...	2	3	...	3	...	...	8	,,	...	...	,,	,,	Fine.
,, 24	,,	...	...	...	...	...	...	...	...	...	...	...	...	...	Stormy.
,, 25	,,	...	4	2	...	3	...	...	8	18 to 24 ft.	...	...	Medium.	Mussels and Lobworms.	Fine.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 26	Largo,	...	3	3	...	4	...	...	8	18 to 24 ft.	...	...	Medium.	Mussels and Lobworms.	Fine.
,, 28	,,	...	2	2	...	2	...	...	,,	,,	...	...	,,		,,
,, 29	,,	...	3	6	...	1	...	...	,,	,,	...	...	,,	,,	,,
,, 30	,,	...	2	4	...	1	...	...	,,	,,	...	...	,,	,,	,,
,, 31	,,	...	2	3	...	1	...	...	,,	,,	...	...	,,	,,	Stormy.
Totals for March.	...	...	43½	65	...	96	...	...	179	...	...	...	...	...	...
Feb. 1	Elie and Earlsferry,	...	3	4½	...	...	...	...	3	2nd Class.	...	...	Medium.	Mussels, Limpets, and Lobworms.	S.W. ; strong breezes and cloudy.
,, 2	,, ,,	...	...	3	...	...	...	...	3	,,	...	...	,,	,,	,, ,,
,, 3	,, ,,	...	...	...	...	...	...	...	...	...	...	...	No Boats out.	...	S.W. ; gale.
,, 4	,, ,,	...	...	...	...	...	...	...	...	...	...	...	,,	,,	,, ,,
,, 5	,, ,,	...	...	¾	...	...	...	...	1	,,	...	...	Medium.	,,	W. ; fresh breezes.
,, 7	,, ,,	...	2	3	...	...	...	...	5	,,	...	...	,,	,,	S.W. ; light breezes.
,, 8	,, ,,	...	...	4	...	1	...	...	5	,,	...	...	,,	,,	S. ; light and hazy.
,, 9	,, ,,	...	2	3	...	1	...	...	5	,,	...	...	,,	,,	N.W. ; light & hazy.
,, 10	,, ,,	...	...	2½	...	2	...	...	5	,,	...	...	,,	,,	S.W. ; light and hazy.
,, 11	,, ,,	...	...	2	...	2	...	...	5	,,	...	...	,,	,,	Calm and hazy.
,, 12	,, ,,	...	2¼	1½	...	2	...	...	5	,,	...	...	,,	,,	E. ; light and cloudy.
,, 14	,, ,,	...	...	2½	...	2¼	...	...	5	,,	...	...	,,	,,	N.E. ; light & cloudy.
,, 15	,, ,,	...	...	2	...	4½	...	...	5	,,	...	...	,,	,,	S.E. ; light & cloudy.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 16	Elie and Earlsferry,	...	½	1½	...	3	...	...	5	2nd Class.	...	...	Medium.	Mussels, Limpets, and Lobworms.	S.W.; fresh & cloudy.
„ 17	„ „	...	½	1¾	...	1¼	...	...	5	„	...	...	„		S.W.; light & cloudy.
„ 18	„ „	...	½	1¼	...	2	...	...	5	„	...	...	„		N.W.; moderate and cloudy.
„ 19	„ „	...	...	1½	...	1	...	...	5	„	...	...	„	„	S.W.; light & cloudy.
„ 21	„ „	...	1	2	...	2	...	...	5	„	...	...	„	„	S.W.; moderate and cloudy.
„ 22	„ „	...	...	½	...	...	...	...	1	„	...	...	„	„	S.W.; strong & cloudy.
„ 23	„ „	...	...	...	...	...	...	...	...	..	...	...	No Boats out.	...	S.W.; gale and cloudy.
„ 24	„ „	...	...	...	...	...	...	...	...	...	...	...	„	...	„ „
„ 25	„ „	...	...	½	...	...	...	...	1	2nd Class.	...	...	Medium.	Mussels, Limpets, and Lobworms.	W.; strong breezes and cloudy.
„ 26	„ „	...	¼	1¾	...	4	...	...	5	„	...	...	„	„	„ „
„ 28	„ „	...	...	2¾	...	2	...	...	5	„	...	...	„	„	N.W.; fresh & hazy.
Totals for February.	...	...	11½	42¼	...	30	...	...	84	...	...	...	...	...	...
Mar. 1	Elie and Earlsferry,	...	...	2	...	2	...	...	5	2nd Class.	...	...	Medium.	Lobworm and Mussel.	Fine.
„ 2	„ „	...	...	1¾	...	2	...	...	„	„	...	...	„	„	„
„ 3	„ „	...	...	2	...	2	...	...	4	„	...	...	„	„	„
„ 4	„ „	...	...	2	...	2	...	...	5	„	...	...	„	„	„

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 5	Elie and Earlsferry .	...	...	2	...	2	...	...	„	„	...	...	Medium	Lobworms and Mussel	Fine.
„ 7	„ „ .	...	...	2½	...	2	...	...	„	„	...	...	„		„
„ 8	„ „ .	...	...	2½	...	2	...	...	2	2nd Class.	...	...	„	„	„
„ 9														„	
„ 10	„ „ .	...	...	2½	...	2	...	...	„	„	...	...	„	„	„
„ 11	„ „ .	...	...	3	...	2	...	...	„	„	...	...	„	„	„
„ 12	„ „ .	...	...	1¼	...	1	...	...	3	„	...	...	„	„	Squally.
„ 14	„ „ .	...	...	2	...	1	...	...	4	„	...	...	„	„	„
„ 15	„ „ .	...	...	1	...	1	...	...	3	„	...	...	„	„	„
„ 16	„ „ .	...	...	1	...	3	...	...	5	„	...	...	„	„	Moderate.
„ 17	„ „ .	...	...	1	...	3	...	...	4	„	...	...	„	„	„
„ 18	„ „ .	...	...	1½	...	2½	...	...	4	„	...	...	„	„	„
„ 19	„ „ .	...	...	1	...	2	...	...	5	„	...	...	„	„	„
„ 21	„ „ .	...	½	1½	...	2½	...	...	„	„	...	...	„	„	„
„ 22	„ „ .	...	½	1½	...	3½	...	...	„	„	...	...	„	„	„
„ 23	„ „ .	...	...	1	...	1½	...	...	3	„	...	...	„	„	Squally.
„ 24	„ „ .	...	½	1	...	3	...	...	5	„	...	...	„	„	Moderate.
„ 25	„ „ .	...	...	...	...	... ½	...	...	„	„	...	...	„	„	Stormy.
„ 26	„ „ .	...	1	½	...	2	...	...	„	„	...	...	„	„	Moderate.
„ 28	„ „ .	...	1½	1½	...	2½	...	...	„	„	...	...	„	„	„
„ 29	„ „ .	...	2	2	...	2	...	...	„	„	...	...	„	„	„
„ 30	„ „ .	...	1½	3	...	2	...	...	„	„	...	...	„	„	„
„ 31	„ „ .	...	1½	2	...	2	...	...	„	„	...	...	„	„	Squally.
Totals for March. }	...	...	9	43	...	53	...	...	112	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 5	St Monance,	...	...	83	15	...	...	...	9	30 feet.	5	30 feet.	10 to 15 inch.	Herring and Clams.	Stormy & Threatening.
„ 12	„	...	...	149	35	...	...	...	10	„	4	„	„ „	„	„ „
„ 19	„	...	...	57	23	...	...	...	9	„	5	„	„ „	„	„ „
„ 26	„	...	...	47	13	...	...	...	14	„	...	...	„ „	„	„ „
Totals for February.	...	...	...	336	86	...	...	...	42	...	14	...	...	...	...
Mar. 1	St Monance,	150	...	18	2	2	...	...	10	28 to 30 ft.	25	50 to 55 ft.	...	Clams & Her'g.	...
„ 2	„	180	4	19	2	3	...	...	14	50 to 55 ft.	12	„	...	„	...
„ „	„	...	...	...	...	...	...	...	9	28 to 30 ft.	5	28 to 30 ft.	...	„	...
„ 3	„	60	3	20	4	2	...	...	12 1	50 to 55 ft. 28 to 30 ft.	13	50 to 55 ft.	...	„	...
„ 4	„	200	6	18	2	3	...	...	20 1	50 to 55 ft. 28 to 30 ft.	13	28 to 30 ft.	...	„	...
„ 5	„	450	4	15	2	1	...	...	30 1	50 to 55 ft. 28 to 30 ft.	13	„	...	„	...
„ 7	„	...	...	19	5	2	...	...	1	„	13	„	...	„	...
„ 8	„	...	...	16	3	3	...	...	1	„	13	„	...	„	...
„ 9	„	286	6	20	4	1	...	...	18 13	50 to 55 ft. 28 to 30 ft.	1	„	...	„	...
„ 10	„	...	...	18	2	2	...	...	13	„	1	„	...	„	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 11	St Monance, . .	...	...	...	...	...	...	...	...	...	...	...	...	Clams & Her'g.	Stormy; no boats or yawls out.
" 12	" . .	...	...	...	...	...	...	...	...	...	...	...	...	"	
" 14	" . .	...	...	16	2	...	...	...	...	...	...	...	...	"	...
" 15	" . .	44	...	17	3	...	...	...	10 11	50 to 55 ft. 28 to 30 ft.	30 3	50 to 55 ft. 28 to 30 ft.	...	"	...
" 16	" . .	68	...	16	2	...	...	...	6 9	50 to 55 ft. 28 to 30 ft.	34 5	50 to 55 ft. 28 to 30 ft.	...	"	...
" 17	" . .	23	...	19	3	...	...	...	4 10	50 to 55 ft. 28 to 30 ft.	36 4	50 to 55 ft. 28 to 30 ft.	...	"	...
" 18	" . .	19	...	20	4	...	...	...	5 8	50 to 55 ft. 28 to 30 ft.	35 7	50 to 55 ft. 28 to 30 ft.	...	"	...
" 19	" . .	57	...	...	...	...	...	...	5	50 to 55 ft.	35	50 to 55 ft.	...	"	No yawls out.
" 21	" . .	...	...	21	2	...	...	...	12	28 to 30 ft.	2	28 to 30 ft.	...	"	...
" 22	" . .	93	...	19	2	...	...	...	10	50 to 55 ft.	30 3	50 to 55 ft. 28 to 30 ft.	...	"	...
" 23	" . .	...	...	18	1	...	...	...	1	"	39	50 to 55 ft.	...	"	...
" 24	" . .	8	...	...	...	...	...	...	...	...	...	...	...	"	Stormy.
" 25	" . .	...	...	17	3	...	...	...	9	28 to 30 ft.	5	28 to 30 ft.	...	"	...
" 26	" . .	...	...	...	...	...	...	...	...	...	...	...	...	"	No yawls out.
" 28	" . .	...	...	20	4	...	...	...	14	28 to 30 ft.	...	...	...	"	...
" 29	" . .	...	...	19	3	...	...	...	14	"	...	...	...	"	...
" 30	" . .	...	...	17	2	...	...	...	14	"	...	...	...	"	...
" 31	" . .	...	...	18	2	...	...	...	14	"	...	...	...	"	...
Totals for March.	...	1638	23	400	59	19	...	...	300	...	107	...	...	..	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate, and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 1	Pittenweem,			No	Boats	out.		...	...	...	...	...	...	...	Stormy wind, W.S.W.
„ 2	„	27	...	6	...	...	...	...	6	Small.	2	Large.	...	Mussels.	„ „
„ 3	„	100½	...	...	...	...	...	...	...	...	7	„	...	...	Strong wind, W.S.W.
„ 4	„			No	Boats	out.	...	...	...	...	...	...	...	...	Stormy; W.S.W.
„ 5	„	271½	...	4	2	...	...	...	5	„	26	„	...	Mussels and Herrings.	Fine, W.S.W.
„ 7	„	...	...	15	3	...	...	...	8	„	...	„	...	„	„ S.S.W.
„ 8	„	33	...	8	2	...	...	...	5	„	6	...	...	„	Calm; W.
„ 9	„	90	..	11	3	...	...	...	8	„	14	...	...	„	Very Mild; W.
„ 10	„	144	...	14	3	...	...	...	8	„	13	...	...	„	„ „
„ 11	„	171	...	9	4	...	...	...	7	„	11	...	...	„	„ „
„ 12	„	144	4	3	...	...	...	20 Ling.	1	„	4	...	...	„	„ „
„ 14	„	...	...	11	6	...	...	...	7	„	...	...	...	Mussels.	„ „
„ 15	„	15	...	12	3	...	...	...	8	„	3	...	...	„	Light wind, E.S.E.
„ 16	„	30	...	5	2	...	...	...	4	„	2	...	...	Herring and Mussels.	„ „
„ 17	„	93	7½	6	2	...	...	20 Ling.	8	Small.	5	...	...	„	Calm.
„ 18	„	165	5	8	2	...	...	10 „	6	„	8	...	...	„	Light wind, S.S.W.
„ 19	„	78	17½	8	2	...	Skt. 4	20 „	4	„	23	...	...	Clams.	„ „
„ 21	„	...	...	14	2	...	...	...	8	„	...	...	...	Mussels.	„ „
„ 22	„	63	...	...	...	...	...	...	...	„	...	...	...	...	Stormy; wind W.S.W.
„ 23	„	27	12½	...	...	...	1 cwt. 6 ston.	...	...	„	2	...	...	...	„ „
„ 24	„			No	Boats	in.		...	...	...	...	...	...	...	Stormy.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 25	Pittenweem, .			No	Boats	in.		...	...	...	...	...	...	...	Stormy ; S.S.W.
„ 26	„ . .	315	2½	6	2	...	...	...	7	„	26	...	...	Mussels.	Fine ; W.S.W.
„ 28	„ . .	...	...	11	3	...	...	...	7	„	...	...	...	Clams.	Fine ; W.N.W.
Totals for February.	...	1767	49	151	41	...	4 Skt. 6 ston. 1 cwt.	70 Ling.	107	...	...	...	...	...	...
Mar. 1	Pittenweem, . .	...	...	7	2	...	...	...	5	Yawls.	...	...	...	Mussels.	Fine ; wind W.S.W.
„ 2	„ . .	...	...	9	4	...	...	...	7	„	10	Large.	...	„	„
„ 3	„ . .	...	...	10	2	...	...	...	7	„	...	...	...	Musl. & Clams.	„
„ 4	„ . .	12	...	12	3	...	...	...	7 6	„ Large.	...	...	...	Musl. & Her'g.	„
„ 5	„ . .	27	...	2	...	...	...	...	2 5	Yawls. Large.	...	...	...	Mussels.	Foggy ; W.S.W.
„ 7	„ . .	...	...	6	2	...	...	...	7	Yawls.	...	...	...	„	Dull, „
„ 8	„ . .	...	...	8	2	...	...	...	7	„	8	Large.	...	„	„ „
„ 9	„ . .	55	...	11	3	...	...	...	6 6	„ Large.	...	...	...	Herrings.	Changeable.
„ 10	„ . .	...	...	4	1	...	...	...	5	Yawls.	7	Large.	...	...	Wind E.N.E.; snow.
„ 11	„ . .	...	...	...	...	...	...	...	6	Large.	12	„	...	...	„ N.N.E.
„ 12	„ . .	...	...	...	...	...	...	...	...	...	...	...	..	Mussels.	„
„ 14	„ . .	...	...	4	3	...	...	...	7	Yawls.	...	...	...	„	Frosty ; wind N.N.W.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 15	Pittenweem, . .	4	...	3	3	...	...	...	7 6	Yawls. Large.	7	Large.	...	”	”
” 16	” . .	8	...	4	3	...	...	...	6 4	Yawls. Large.	9	”	...	”	Mild; wind W.N.W.
” 17	” . .	7	...	8	4	...	...	...	7 3	Yawls. Large.	...	...	...	”	Wind W.S.W.; light.
” 18	” . .	1	...	6	2	...	...	...	5 1	Yawls. Large.	..	...	...	”	”
” 19	” . .	11	...	3	1	...	...	...	2 3	Yawls. Large.	12	Large.	...	”	”
” 21	” . .	...	...	7	2	...	...	...	3	Yawls.	...	...	...	...	Changeable; P.M. sleet.
” 22	” . .	6	...	...	...	...	...	...	4	Large.	...	...	...	...	Wind S.S.W.; rain.
” 23	” . .	...	...	...	...	...	...	...	...	...	7	Large.	...	...	Stormy; wind W.S.W.
” 24	” . .	2	...	...	...	...	...	...	1	Large.	...	...	...	...	Wind W.S.W.
” 25	” . .	...	...	14	3	...	...	...	7	Yawls.	6	Large.	...	Mussels.	”
” 26	” . .	...	...	4	2	...	...	...	4	Yawls.	...	...	...	Mussels.	Fine.
” 28	” . .	...	...	18	5	...	...	...	7	”	...	...	...	”	Wind W.S.W.
” 29	” . .	...	...	19	6	...	...	...	7	”	7	Large.	...	”	Fine.
” 30	” . .	...	...	16	4	...	...	...	7	”	...	...	...	”	Changeable.
” 31	” . .	...	...	5	...	...	...	...	4	”	...	...	...	”	Wind N.N.E.
Totals for March.	...	133	...	118	40	...	...	...	139	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1886. Dec. 1 to ,, 31	Anstruther, . .	4274	836	2080	160	18	29	87	84 170	24 to 30 ft. 26 to 54 ft.	29	30 to 55 ft.	...	...	Stormy and Unsettled.
1887. Jan. 1 to ,, 31	Anstruther, . .	2400	200	1500	84	225	...	100	First two weeks of Month.				Haddocks, large, near the May Island, in the medium-sized & small.	Mussels principally, also Herrings & Clams.	E. to N.E. winds till 11th Jan., after that W. and S.W., strong breezes and unsettled all the month. 6 to 8 days kept on shore at the different places.
									65 80	24 to 30 ft. 30 to 58 ft.	110	30 to 58 ft.			
									Two last weeks of Month.						
									65	24 to 30 ft.	190	30 to 58 ft.			
Feb. 1	Anstruther, . .	...	...	7	...	...	...	...	4	24 to 28 ft.	36	30 to 55 ft.	½ Large, ½ Med.	Mussels.	Rough ; wind W.
,, 2	,, . .	...	...	4	...	...	...	...	2	,, ,,	140	,, ,,	,, ,,	,,	Rough ; wind S.W.
,, 3	,, . .	...	...	2	...	...	...	...	1	,, ,,	7	45 to 55 ft.	,, ,,	,,	Stormy ; wind S.W.
,, 4	,, . .	...	...	...	...	...	...	...	...	...	4	,, ,,	,, ,,	,,	Stormy ; wind W.
,, 5	,, . .	...	...	...	...	...	...	...	...	...	110	,, ,,	,, ,,	,,	Rough ; wind W.
,, 7	,, . .	...	...	9	...	...	...	...	4	24 to 28 ft.	42	,, ,,	,, ,,	,,	Fine ; wind W.
,, 8	,, . .	1800	80	7½	...	...	...	...	4 40	,, ,, 30 to 55 ft.	82	,, ,,	,, ,,	,,	,, ,,
,, 9	,, . .	600	70	12	...	...	...	...	4 70	,, ,,	65	,, ,,	,, ,,	,,	,, ,,

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwt .*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 10	Anstruther, . .	3600	200	7½	...	...	...	...	4 120	30 to 55 ft.	25	45 to 55 ft.	½ Large, ½ Med.	Mussels.	Fine ; wind W.
,, 11	,, . .	3000	220	3	...	...	...	...	2 125	,, ,,	30	,, ,,	Herrings spawning.	,,	Calm.
,, 12	,, . .	4050	85	...	...	...	...	...	88	30 to 55 ft.	...	...	,, ,,	,,	,, ,,
,, 14	,, . .	60	...	9	...	...	...	...	4 14	24 to 28 ft. 30 to 55 ft.	...	...	Haddocks—⅔ Large, ⅓ Small.	,,	Fine ; wind N.E.
,, 15	,, . .	1200	120	5¼	...	...	...	...	3 90	24 to 28 ft. 30 to 90 ft.	35	,, ,,	,,	,,	Fine ; wind S.
,, 16	,, . .	2100	210	4	...	...	...	...	4 100	24 to 28 ft. 30 to 55 ft.	10	,, ,,	,,	,,	Moderate ; wind W.
,, 17	,, . .	3600	300	2¼	...	...	...	...	2 110	24 to 28 ft. 30 to 55 ft.	25	,, ,,	,,	,,	Fine ; wind S.W.
,, 18	,, . .	1500	130	3¾	...	...	...	...	4 100	24 to 28 ft. 30 to 55 ft.	30	,, ,,	,,	,,	,, ,,
,, 19	,, . .	1200	40	...	...	...	...	...	101	30 to 55 ft.	15	,, ,,	,,	,,	Dull ; wind N.W.
,, 21	,, . .	300	12	3	...	...	...	...	4 20	24 to 28 ft. 30 to 55 ft.	41	,, ,,	,,	,,	Moderate.
,, 22	,, . .	450	10	...	...	...	...	...	24	30 to 55 ft.	100	,, ,,	Herrings moving outside May, after spawning.	,,	Rough ; wind W.
,, 23	,, . .	...	...	...	...	...	...	...	...	...	7	,, ,,	,,	,,	Rough ; wind W.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 24	Anstruther,	...	...	...	...	...	...	...	...	...	72	45 to 55 ft.	Herrings moving outside May, after spawning.	Mussels.	Stormy ; wind W.
,, 25	,,	...	...	...	...	...	...	...	...	...	4	,, ,,		,,	,, ,,
,, 26	,,	...	...	3	...	...	...	...	4	24 to 28 ft.	118	,, ,,		,,	Fine wind ; W.
,, 28	,,	...	...	2¼	...	...	...	...	3	,, ,,	17	,, ,,		,,	,, ,,
Totals for February.	...	23,460	1477	84½	...	...	...	...	1057	...	...	...	...	...	...
Mar. 1	Anstruther,	...	...	3	...	...	...	...	4	24 to 28 ft.	146	45 to 55 ft.	Herrings moving outside May, after spawning.	Mussels.	Wind west ; fine.
,, 2	,,	...	...	2½	...	...	...	...	3	,,	87	,,			,,
,, 3	,,	180	10	3½	...	...	...	...	4 24	,, 45 to 55 ft.	57	,,		,,	,,
,, 4	,,	200	7	2	...	...	...	...	3 33	Yawls. Large.	35	,,	,,	,,	,,
,, 5	,,	100	4	3	...	...	...	...	3 25	Yawls. Large.	54	,,	,,	,,	,,
,, 7	,,	...	...	3½	...	...	...	...	4	Yawls.	26	,,	,,	,,	N.E. wind, light.
,, 8	,,	...	...	2	...	...	...	...	3	,,	35	,,	,,	,,	W. ,, fine.
,, 9	,,	...	...	1½	...	...	...	...	2	,,	55	,,	,,	,,	S.W. ,, ,,
,, 10	,,	...	...	...	...	...	...	...	...	...	60	,,	,,	,,	N.E. breeze; cold, snow.
,, 11 ,, 12	,,	...	...	...	...	...	...	...	...	...	8	,,	...	,,	Stormy ; N.E.; frost and snow.
,, 14	,,	6	...	2	...	...	...	...	3 6	Yawls. Large.	...	...	,,	,,	N.E. light wind; frost.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 15	Anstruther, . .	280	25	...	...	...	...	...	80	Large.	...	...	...	Mussels.	N.E. light wind; frost.
„ 16	„ . .	275	15	1	...	...	...	...	1 92	Yawl. Large.	4	„	„	„	N. light wind; frost.
„ 17	„ . . .	108	20	1½	...	...	...	...	1 75	Yawl. Large.	48	45 to 55 ft.	Large and Med.	„	West wind; rain.
„ 18	„ . .	120	12	2	...	...	...	...	2 40	Yawls. Large.	15	„	„	„	West; fine, mild.
„ 19	„ . .	130	8	...	...	...	...	...	30	„	61	„	„	„	S.W. „
„ 21	„ . .	...	...	½	...	...	...	...	1	Yawl.	...	...	„	„	Breezy.
„ 22	„ . .	60	...	1	...	...	...	...	1 80	„ Large.	1	45 to 55 ft.	„	„	S.E., strong breeze.
„ 23	„ . .	10	2	...	...	...	...	...	31	„	11	„	„	„	W. „
„ 24	„ . .	...	...	1½	...	...	...	...	2	Yawls.	4	„	„	„	W., fresh breeze.
„ 25	„ . .	10	1	...	...	...	...	...	1 12	„ Large.	6	„	„	„	W., fine.
„ 26	„ . .	5	...	...	...	...	...	...	60	„	17	„	„	„	„
„ 28	„ . .	...	...	...	...	...	...	...	...	...	4	„	„	„	„
„ 29	„ . .	8	...	...	...	...	...	...	75	Large.	1	„	„	„	„
„ 30	„ . .	5	...	...	...	...	...	...	60	„	5	„	„	„	„
„ 31	„ . .	10	...	...	...	...	...	...	43	„	40	„	„	„	W., strong breeze, showery, increased to gale from N.W. to N.
Totals for March.	...	1507	104	30½	...	...	...	...	804	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 1	Crail, . . .	24	3¾	16½	...	...	...	18	4	36 to 40 ft.	...	...	...	Herring for Cod Mussels for Haddock and Codlings.	Stormy.
,, 2	,, . . .	87	5	...	...	...	...	...	8	,, ,,	...	...	...	,,	Stormy.
,, 3	,, . . .	51	3¾	...	...	...	...	...	4	,, ,,	...	...	...	,,	Strong Gale.
,, 4	,, . . .	...	...	...	...	...	...	...	...	...	...	...	...	,,	,, ,,
,, 5	,, . . .	144	5	...	...	...	...	...	5	,, ,,	...	...	...	,,	Strong Breezes.
,, 7	,, . . .	...	5	...	...	...	...	...	1	,, ,,	...	...	...	,,	Strong Gale.
,, 8	,, . . .	...	3¾	22½	...	...	...	24	11	28 feet.	...	...	...	,,	Light Breeze; Clear.
,, 9	,, . . .	48	6¼	22½	...	...	...	27	10	,,	...	...	...	,,	Thick Foggy Weather.
,, 10	,, . . .	27	8	21	...	...	...	30	10	,,	...	...	...	,,	Light Air; Foggy.
,, 11	,, . . .	48	3¾	22½	...	...	...	28½	11	,,	...	...	...	,,	,, ,,
,, 14	,, . . .	18	3¾	22½	...	...	...	28½	11	,,	...	...	...	,,	Fresh Breeze; Clear.
,, 15	,, . . .	18	2½	28½	...	...	...	27	10	,,	...	...	...	,,	Light Air; Foggy.
,, 16	,, . . .	105	5	24	...	...	...	22½	10	,,	...	...	...	,,	Fresh Breeze; Clear.
,, 17	,, . . .	105	5	27¾	...	...	...	30	11	,,	...	...	...	,,	Fresh Breeze; Hazy.
,, 18	,, . . .	18	2½	12¾	...	...	...	15	11	,,	...	...	...	,,	Calm; Foggy.
,, 19	,, . . .	78	2½	...	...	...	...	...	5	,,	...	...	...	,,	Fresh Breeze; Clear.
,, 21	,, . . .	18	5	15	...	...	...	19½	11	,,	...	...	...	,,	Fresh Breeze; Cloudy.
,, 22	,, . . .	30	...	4½	...	...	...	10½	4	,,	...	...	...	,,	Strong Breeze; Overcast.
,, 25	,, . . .	...	...	6¾	...	...	...	4½	4	,,	...	...	...	,,	Strong Gale from West.
,, 26	,, . . .	60	...	7½	...	...	...	10½	11	,,	...	...	...	,,	,, ,,
,, 28	,, . . .	27	2½	7½	...	...	...	9¾	7	,,	...	...	...	,,	Fresh Breeze; Clear.
Totals for February.	...	898	73	261	...	...	...	305¼	159	...	...	...	...	...	...

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 1	Crail, . .	9	9	5	...	...	...	...	15	24 to 38 ft.	1	28 to 38 ft.	Had'ks. mostly large, Codlings large.	Mussels.	Fine.
,, 2	,, . .	5	9	7	...	...	...	...	16	,,	...	...	,,	,,	,,
,, 3	,, . .	4½	9½	7	...	...	...	...	16	,,	...	...	,,	,,	,,
,, 4	,, . .	9	12	7	...	...	...	...	14	,,	2	28 to 38 ft.	,,	,,	Fresh breeze.
,, 5	,, . .	3	26	3	...	...	...	...	9	,,	7	,,	,,	,,	Light air ; fog.
,, 7	,, . .	7	9	8	...	...	...	...	8	,,	5	,,	,,	,,	Fresh breeze.
,, 8	,, . .	1	11	12	...	...	...	...	11	,,	3	,,	,,	,,	,,
,, 9	,, . .	...	...	...	...	...	...	...	...	...	3	,,	,,	,,	Light breeze.
,, 10	,, . .	...	14	13	...	...	...	...	11	,,	5	,,	,,	,,	Strong breeze.
,, 11	,, . .	...	...	...	...	...	...	...	...	...	...	...	,,	,,	Stormy ; snow.
,, 12	,, . .	...	...	...	...	...	...	...	...	...	...	...	,,	,,	,,
,, 14	,, . .	1	7	11	...	...	...	...	10	,,	...	...	,,	,,	Moderate.
,, 15	,, . .	3	2	1	...	...	...	...	20	15 to 24 ft.	...	...	,,	,,	,,
,, 16	,, . .	2½	9	7	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 17	,, . .	...	5	13	...	...	...	...	20	,,	...	...	,,	,,	,, hazy.
,, 18	,, . .	...	5	7	...	...	...	...	20	,,	...	...	,,	,,	Fine ; mild.
,, 19	,, . .	...	3	2½	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 21	,, . .	...	5	3	...	...	...	...	20	,,	...	...	,,	,,	Breezy.
,, 22	,, . .	...	2	2	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 23	,, . .	...	3	2	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 24	,, . .	...	5	2	...	...	...	...	20	,,	...	...	,,	,,	Fresh breeze.
,, 25	,, . .	...	3	1	...	...	...	...	20	,,	...	...	,,	,,	Light air.
,, 26	,, . .	...	3	1	...	...	...	...	20	,,	...	...	,,	,,	Fine.

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Mar. 28	Crail,	...	...	1	...	...	...	...	20	,,	...	...	Large and Med.	Mussels.	Fine.
,, 29	,,	...	...	1	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 30	,,	...	...	...	...	...	...	...	20	,,	...	...	,,	,,	,,
,, 31	,,	...	...	...	...	...	...	...	20	,,	...	...	,,	,,	Strong breeze, increased to gale.
													,,	,,	
Totals for March.	...	45	151½	116½	...	...	...	...	410	...	...	...	...	...	...
Feb. 1	St Andrews,	...	...	...	...	96	...	...	12	25 to 45 ft.	10	35 to 45 ft.	Larger.	Mussels.	Moderate.
,, 2	,,	...	...	...	...	48	...	...	6	,,	...	...	Medium.	,,	,,
,, 3	,,	...	...	...	...	24	...	...	3	about 44 ft.	...	...	,,	,,	Stormy.
,, 4	,,	..	...	...	...	144	...	...	24	25 to 45 ft.	...	...	,,	,,	Strong winds.
,, 5	,,	...	...	...	...	150	...	...	25	,,	...	...	,,	,,	Moderate.
,, 7	,,	...	...	...	...	96	...	...	16	,,	...	...	,,	,,	Fresh wind.
,, 8	,,	...	...	...	...	36	...	...	6	25 to 35 ft.	...	...	,,	,,	Moderate.
,, 9	,,	...	...	...	...	48	...	...	8	,,	...	...	,,	,,	,,
,, 10	,,	...	...	...	...	48	...	...	8	,,	...	...	,,	,,	Fine.
,, 11	,,	...	...	...	...	40	...	...	8	,,	...	...	,,	,,	,,
,, 12	,,	...	...	...	...	40	...	...	8	,,	...	...	,,	,,	,,
,, 14	,,	...	...	...	...	40	...	...	8	Yawls.	...	...	,,	,,	,,
,, 15	,,	...	...	...	...	16	...	...	4	,,	...	...	,,	,,	Moderate.
,, 16	,,	...	...	...	...	10	...	...	2	,,	...	...	,,	,,	,,
,, 17	,,	...	...	...	...	38	...	...	8	25 to 40 ft.	...	...	,,	,,	,,

TABLE C.—ANSTRUTHER DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 18	St Andrews, . .	...	...	...	...	115	...	...	22	25 to 45 ft.	...	...	Medium.	Mussels.	„
„ 19	„ . .	...	...	...	...	72	...	...	16	„	...	...	„	„	„
„ 21	„ . .	...	...	...	...	30	...	...	8	Yawls.	...	...	„	„	„
„ 22	„ . .	...	...	...	...	20	...	...	5	„	...	...	„	„	„
„ 23	„ . .	...	...	...	...	12	...	...	3	„	...	...	„	„	Stormy.
„ 24	„ .	...	...	...	...	...	...	...	...	...	...	...	...	...	„
„ 25	„ . .	...	...	...	...	42	...	...	14	25 to 45 ft.	...	...	„	„	Fresh wind.
„ 26	„ . .	...	...	13	...	...	...	...	3	30 to 45 ft.	...	...	„	...	„
„ 28	„ . .	...	...	...	...	14	...	...	6	Yawls.	...	...	„	„	Fine.
Totals for February.	...	...	...	13	...	1179	...	...	123	...	...	...	...	...	...
Mar. 1	St Andrews, .	...	...	...	...	20	...	...	8	20 to 30 ft.	...	...	Medium.	Mussels.	Fine.
„ 2	„ . .	...	...	...	...	14	...	...	6	„	...	...	„	„	„
„ 3	„ . .	...	...	...	...	7	...	...	6	„	...	...	„	„	„
„ 4	„ . .	...	...	...	...	12	...	...	8	„	...	...	„	„	„
„ 5	„ . .	...	...	...	...	3	...	...	1	25 ft.	...	...	„	„	„
„ 8	„ . .	...	...	...	...	5	...	...	5	20 to 30 ft.	...	...	„	„	„
„ 9	„ . .	...	...	...	...	5	...	...	5	„	...	...	„	„	„
„ 10 } „ 11 }	„ . .	...	...	No	boats	out.	...	...	...	...	...	...	...	...	Stormy.
„ 14	„ . .	...	...	...	...	3	...	...	3	15 to 20 ft.	...	...	Medium.	Mussels.	Calm.
„ 15	„ . .	...	...	No	boats	out.	...	...	...	...	...	...	...	...	Moderate.

TABLE C.—ANSTRUTHER DISTRICT—*continued*.

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 16	St Andrews,	...	...	...	...	6	...	...	6	15 to 25 ft.	...	...	Medium.	Mussel.	Fine.
,, 17	,	...	...	...	...	8	...	...	8	15 to 30 ft.	...	...	,,	,,	,,
,, 18	,,	...	...	...	...	3	...	...	2	20 to 25 ft.	...	...	,,	,,	,,
,, 19	,,	...	...	...	...	2	...	...	1	25 ft.	...	...	,,	,,	,,
,, 22	,,	...	...	No	boats	out.	...	...	...	...	...	...	...	...	Stormy.
,, 23	,,	...	...	...	...	3	...	...	2	20 to 25 ft.	...	...	Medium.	Mussel.	Fine.
,, 24	,,	...	...	...	...	8	...	...	4	,,	...	...	,,	,,	,,
,, 25	,,	...	...	...	...	16	...	...	8	15 to 30 ft.	...	...	,,	,,	,,
,, 28	,,	...	...	...	...	10	...	...	8	,,	...	..	,,	,,	,,
,, 29	,,	...	...	...	...	8	...	...	6	,,	...	...	,,	,,	,,
,, 30	,,	...	...	...	...	6	...	...	6	,,	...	...	,,	,,	,,
,, 31	,,	...	...	...	...	8	...	...	6	,,	...	...	,,	,,	Stormy.
Totals for March.	...	...	...	...	...	135	...	...	99	...	...	...	...	...	...

MONTROSE DISTRICT.

Date.	Place where Landed.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	Cwts.	No.	Size.	No.	Size.			
1886. Dec. 1 to „ 20	Broughty Ferry,	42	1¾	85	...	11	...	...	5 7	29 to 36 ft. 42 to 50 ft.	27	35 to 53 ft.	...	Herring Bait.	Strong gale, E.N.E.; heavy sea.
„ 21 to „ 31	„	12	1¼	39	...	4	...	...	3 2	29 to 30 ft. 30 to 38 ft.	29	30 to 53 ft.	...	...	Weather moderate.
Totals for December.	...	54	3	124	...	15	...	...	...	...	...	...	...	...	...
1887. Jan. 1 to „ 20	Broughty Ferry,	...	½	12	2	2½	...	...	2	19 to 22 ft.	31	24 to 53 ft.	...	...	Weather rough; gales from S.E., and heavy seas.
„ 21 to „ 31	„	...	¾	12	3	4½	...	...	2	22 to 26 ft.	30	26 to 52 ft.	...	...	Gales from W.S.W.
Totals for January.	...	...	1¼	24	5	7	...	...	...	...	...	...	...	...	...
Feb. 1 to „ 10	Broughty Ferry,	...	...	...	...	30	...	...	2	26 to 33 ft.	30	33 to 53 ft.	...	Ling Bait.	Strong gale, S.S.E.

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 11 to „ 20	Broughty Ferry, .	...	...	...	...	60	...	...	6	18 to 38 ft.	30	30 to 53 ft.	...	...	Strong gale, S.S.E.
„ 21 to „ 28	„ .	...	...	...	...	95	...	...	7	18 to 36 ft.	28	36 to 53 ft.	...	...	Strong wind, blowing from S.W. to N.W.
Totals for February.	..	...	...	...	...	135	...	...	...	...	...	...	...	...	...
Mar. 1 to „ 10	Broughty Ferry, .	...	...	12	...	130	...	...	5	„ „	...	...	...	...	Fine.
„ 11 to „ 20	„ „ .	...	6 fish.	15	...	40	...	...	5	„ „	...	...	...	...	Boats prevented from fishing for 4 or 5 days; strong gale from N. and N.E.
„ 21 to „ 31	Broughty Ferry, .	...	10 fish	15	...	32	...	...	5	18 to 30 ft.	27	30 to 53 ft.	...	...	Boats prevented fishing for 3 days; gale from N.N.W.
Totals for March.	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddocks.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1886. Dec. 1 to „ 20	Arbroath, . .	750	20	35	2	..	...	20	23	20 to 40 ft.	17	20 to 40 ft.	...	...	Strong wind, E; heavy sea.
„ 21 to „ 31	„ . .	90	3	10	...	...	...	5	6	20 to 40 ft.	30	20 to 40 ft.	...	...	„ „
Totals for December.	..	840	23	45	2	...	...	25	...	...	...	...	...	...	...
1887. Jan. 1 to „ 10	Arbroath, . .	21	4	2	1	...	...	2	6	20 to 34 ft.	10	20 to 40 ft.	...	...	Strong wind, E.S.E.; heavy swell.
„ 11 to „ 20	„ . .	12	5	20	...	...	...	6	6	20 to 34 ft.	34	20 to 40 ft.	...	...	Strong wind, S.E.
„ 21 to , 31	„ . .	15	1	2	...	...	...	5	2	16 to 30 ft.	36	20 to 40 ft.	.	...	Strong wind, W. to S.W.
Totals for January.	..	48	10	24	1	...	...	13	...	...	...	.	.		...

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddocks.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 1 to „ 10	Arbroath,	60	...	...	...	...	...	10	4	18 to 20 ft.	36	20 to 40 ft.	...	...	Light weather; no wind.
„ 11 to „ 20	„	...	...	...	...	...	...	5	3	18 to 30 ft.	36	20 to 40 ft.	...	...	Strong wind; adverse tides for line fishing.
„ 21 to „ 28	„	...	...	...	...	...	...	10	2	18 to 20 ft.	36	20 to 40 ft.	...	...	Strong wind from S.W.
Totals for February.	...	60	...	...	...	...	...	25	...	...	...	...	...	...	...
Mar. 1 to „ 10	Arbroath,	...	10	...	...	...	...	...	4	18 to 30 ft.	36	20 to 40 ft.	...	...	Fine.
„ 11 to „ 20	„	...	3	...	...	...	...	...	4	„ „	31	30 to 50 ft.	...	...	Boats prevented from fishing for 2 days by gale from N.E.; for 4 days a strong wind blew from westward, prevented fishing.
„ 21 to „ 31	„	...	2	...	...	...	...	2	2	„ „	33	30 to 40 ft.	...	...	
Totals for March.	...	...	15	...	...	...	...	2	...	...	...	...	...	...	...

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1886. Dec. 1 to „ 20	Auchmithie, . .	...	20	400	40	10	10	5	10 3	28 ft. 20 ft.	...	...	...	...	Strong weather; heavy surf.
„ 21 to „ 31	„ . .	...	...	...	...	...	...	...	...	...	3 10	18 ft. 28 ft.	...	...	Stormy weather.
Totals for December.	...	...	20	400	40	10	10	5	...	...	...	...	...	...	...
1887. Jan. 1 to „ 10	Auchmithie, . .	...	...	...	...	...	...	...	...	...	...	...	...	...	New Year Holidays; stormy weather.
„ 11 to „ 20	„ . .	...	...	...	...	...	...	...	...	...	9 4	28 ft. 19 ft.	...	...	Stormy weather.
„ 21 to „ 31	„ . .	...	...	...	...	...	...	...	...	...	10 3	28 ft. 18 ft.	...	...	„ „
Feb. 1 to „ 10	„ . .	...	...	...	...	...	...	...	...	...	10 3	28 ft. 18 ft.	...	...	Stormy weather.

TABLE C.—Montrose District—*continued.*

Date.	Place where Landed.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Feb. 11 to „ 20	„	...	...	...	...	...	...	...	...	...	10 3	28 ft. 18 ft.	...	...	Stormy weather.
„ 21 to „ 28	„	...	...	...	...	...	...	...	...	...	10 3	28 ft. 18 ft.	...	...	Bad tides.
Mar. 1 to „ 10	Auchmithie,	...	5	20	...	...	...	60	13	18 to 28 ft.	...	...	...	...	Boats not at sea for 5 days, as recent takes had been so poor.
„ 11 to „ 20	„	...	54	30	...	...	...	...	13	„ „	...	...	...	...	Weather stormy; boats prevented fishing for 4 days.
Totals for March.	...	...	59	50	...	...	...	60	...	...	...	...	...	...	...
1886. Dec. 1 to „ 10	Montrose and Ferryden Stations,	...	36	472	118	...	...	...	20 to 40	18 to 30 ft.	50 to 58	18 to 56 feet.	...	...	Strong gales; heavy seas, S. to S.E. with rain & snow showers.

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1886. Dec. 11 to „ 20	Montrose and Ferryden Stations,	210	40	120	30	6	...	40	20 to 30	18 to 50 ft.	20 to 30	20 to 56 feet.	...	...	Strong wind N.N.E. two days; heavy land surf other three days.
„ 21 to „ 31	„ „	255	10	130	20	6	...	60	10 to 20	18 to 56 ft.	38 to 48	20 to 56 feet.	...	...	Weather stormy; wind strong, S.E.
Totals for December.	...	465	86	722	168	12	...	100	...	...	...	...	...	...	...
1887. Jan. 1 to „ 10	Montrose and Ferryden Stations,	18	...	8	2	...	...	8	3 6 to 8	50 to 53 ft. 18 to 25 ft.	30 to 35	20 to 40 feet.	...	...	Weatherstormy; heavy sea; wind S.S.E to N.E.
„ 11 to „ 20	„ „	60	10	110	2	...	...	40	10 to 12	18 to 56 ft.	40 to 46	25 to 56 feet.	...	...	Strong wind; snowy and heavy sea; wind S.S.E. to S.W.
„ 21 to „ 31	„ „	12	20	310	17	...	...	155	1 20 to 25	50 ft. 18 to 30 ft.	35 to 45	25 to 56 feet.	...	...	Weather rough; wind strong, S. to S.W.
Totals for January.	...	80	30	428	21	...	...	203	...	...	...	...	...	...	...

TABLE C.—MONTROSE DISTRICT—*continued.*

Date	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
1887.		*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
Feb. 1 to „ 10	Montrose and Ferryden Stations, .	27	17	130	12	80	...	...	1 10 to 12	50 ft. 18 to 25 ft.	40 to 50	25 to 56 feet.	...	...	Wind strong and heavy sea S.S.W.
„ 11 to „ 20	„ „ .	...	11	124	15	16	...	74	8 to 20	18 to 25 ft.	40 to 50	25 to 56 feet.	...	...	Calm weather for two days.
„ 21 to „ 28	„ „ .	...	10	80	10	15	...	20	5 to 10	18 to 25 ft.	40 to 50	20 to 53 feet.	...	...	Weather stormy; wind S.E. to S.S.W.
Totals for February.	...	27	38	334	37	111	...	...	...	...	...	...	...	...	...
Mar. 1 to „ 10	Montrose and Ferryden Stations, .	...	10	19	5	55	...	...	4 to 6	18 to 20 ft.	40 to 50	20 to 54 ft.	...	...	No wind; boats could get out.
„ 11 to „ 20	„ . .	...	28	26	3	12	...	...	6 to 10	18 to 25 ft.	...	...	...	...	Boats prevented from fishing for 4 days.
„ 21 to „ 31	„ . .	...	24	30	5	10	...	...	8 to 10	„ „	40 to 50	20 to 54 ft.	...	...	Stormy for 5 days; sea stormy; wind from W.N.W., N. N.E.
Totals for March.	...		62	75	13	77	...	...	...	...	...	...	...	...	...

TABLE C.—MONTROSE DISTRICT—*continued.*

Date.	PLACE WHERE LANDED.	Quantity of Net and Line Fish caught within the Area restricted from Trawling.							Number and Size of Boats Fishing.				Average Size of Fish.	Kind of Bait used.	Weather.
		Herring.	Cod.	Haddock.	Whiting.	Soles, Dabs, and Flounders.	Skate and Turbot.	Other White Fish.	Inside the Area.		Outside the Area.				
		Cwts.	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*Cwts.*	*No.*	*Size.*	*No.*	*Size.*			
1887. Mar. 1 to „ 10	Johnshaven, . .	...	136	36	...	...	...	...	21	18 to 33 ft.	...	...	...	...	No fishing for 2 days, owing to stormy weather.
„ 11 to „ 20	„ . .	...	100	58	...	...	...	...	15	18 to 30 ft.	4	42 to 50 ft.	...	...	Do. for 3 days.
„ 21 to „ 31	„ . .	...	30	40	...	...	...	...	12	18 to 24 ft.	6	38 to 50 ft.	...	...	Do. for 4 days.
Totals for March.	...	...	266	134	...	...	...	...	...	...	...	...	...	...	...
Mar. 1 to „ 10	Gourdon, . .	...	91	517	...	...	...	2	32	18 to 36 ft.	20	28 to 36 ft.	...	...	Gale from N.N.E.; boats prevented from fishing.
„ 11 to „ 20	„ . .	...	44	236	8	...	...	2	34	„ „	26	18 to 36 ft.	...	...	Do. for 1 day.
„ 21 to „ 31	„ . .	...	70	213	18	...	...	1	36	17 to 24 ft.	24	24 to 36 ft.	...	...	Do. for 4 days.
Totals for March.	...	...	205	966	26	...	...	...		...	...	...	...	...	...

TABLE D.—ANSTRUTHER DISTRICT—BUCKHAVEN HADDOCK LINE FISHING—YEARS 1884, 1885, 1886, 1887.

MONTHS.	1884.					1885.					1886.					1887.				
	Number of Days Boats were out per Month.	Total Number of Shots per Month.	Haddocks and Whiting.		Number of Cod.	Number of Days Boats were out per Month.	Total Number of Shots per Month.	Haddocks and Whiting.		Number of Cod.	Number of Days Boats were out per Month.	Total Number of Shots per Month.	Haddocks and Whiting.		Number of Cod.	Number of Days Boats were out per Month.	Total Number of Shots per Month.	Haddocks and Whiting.		Number of Cod.
			Large, 100's.	Small, 100's.				Large, 100's.	Small, 100's.				Large, 100's.	Small, 100's.				Large, 100's.	Small, 100's.	
January, . .	...	...	19¾	585	63	26	157	51¼	16¼	321	20	226	10¼	464	602	17	148	40¾	58	348
February, . .	...	...	23½	548	48	19	116	29¼	28	114	24	269	7½	302½	544	18	144	23½	39½	143
March, . . .	...	...	24	396½	104	23	271	38½	34½	76	18	378	70½	346	153	24	373	73¼	74	152
April, . . .	24	1154	132	461½	168	22	279	108¾	42½	104	22	1124	239½	1199	140	...	...	...	...	...
May, . . .	24	598	92	268¼	143	26	269	123¼	108½	102	23	979	56½	1194	94	...	...	...	...	...
June, . . .	25	348	65¼	202½	162	26	254	85	295	57	26	509	23½	1306	74	...	...	...	...	...
July, . . .	24	323	64	145½	118	27	243	70¾	657½	39	27	379	72½	1104	91	...	...	...	...	...
August, . .	26	321	97½	100½	106	25	238	64	804	51	25	350	178	812	73	...	...	...	...	...
September, .	26	325	67	52	49	24	278	50	990	48	25	471	172½	390	78	...	...	...	...	...
October, . .	23	704	113½	61	101	24	1017	131	1904	88	25	1297	484	598	116	...	...	...	...	...
November, .	24	628	108	47	132	21	827	22	1750	495	24	1379	492½	539	250	...	...	...	...	...
December, .	24	123	44½	25½	573	24	593	58	1231	809	24	508	153½	170	344	...	...	...	...	...

Note.—The above comprises all the line fishing at Buckhaven for the several years, and all fish are caught within the enclosed area. 'Large' Fish are Haddocks only; Whiting and 'Small' Haddocks are counted together. One hundred fish is 32 warp, or 128 Fish. The total number of shots per month is ascertained by adding together the number of boats out each day. There is no record of the number of boats for the first three months of 1884.

TABLE E.—ESTIMATED QUANTITY OF FISH CAUGHT WITHIN THE AREA RESTRICTED FROM TRAWLING IN THE ANSTRUTHER DISTRICT.

I. *From 5th April to 30th November* 1886.

Kind of Fish.	Quantity.	Remarks.
	Cwt.	
Herrings,	140	
Sprat,	935	Caught October and November; Newburgh.
Sparling,	91	Do. August to November, do.
Cod,	1,316	Cod and Codlings.
Haddock,	14,316	Best month's fishing in November.
Whiting,	1,320	
Flounder,	1,005	Chiefly caught, St Andrews Bay, also Largo Bay and Newburgh.
Eel,	69	Nearly all caught at Newburgh.
Skate,	26	
Other White Fish,	10	
Mussels,	22,247	From River Eden, Tayport, and Buckhaven, Leith.
Clams,	1,916	Fished off Cockenzie, &c.; landed Buckhaven.
	100s.	
Lobsters,	59	
Crabs,	4,020	Chiefly caught off Crail.
	cwt.	
Other Shell Fish,	1,297	Whelks gathered along the shore.

II. *From 1st December 1886 to 31st March 1887.*

	Cwt.	
Herring,	18,000	Difficult to estimate; see note below.
Sprat,	7,730	Landed at Newburgh; best fishing February—all for manure.
Sparling,	74	Landed Newburgh; half of quantity fished March.
Cod,	1,800	Principally caught on hand-lines by herring crews.
Saith,	175	Principally caught on hand-lines by herring crews.
Haddock,	5,880	Caught over the Firth generally.
Whiting,	387	Do. do.
Flounder,	1,988	Fully ¾'s caught at St Andrews Bay; balance Largo Bay; best fishing February.
Eel,	15	
Other White Fish,	...	
Mussels,	6,577	River Eden and Tayport; part from Leith to Buckhaven.
Clams,	235	Fished off Cockenzie; landed at Buckhaven.
	100s.	
Lobsters,	4¾	Fished near Fifeness over the four months.
Crabs,	206½	All caught in March from Cellardyke round to Kingsbarns.
	cwt.	
Other Shell Fish,	303	Whelks gathered along the shore.

Note.—About two-thirds of the whole district catch of herrings each winter is caught between the May Island, Fifeness, and the Carr, on or immediately outside the trawling limits.

Nearly all the Cod and Saith entered above were caught on hand-lines while herring fishing, and with so much fishing near the limits of trawling, are difficult to estimate, but I believe the whole is a very near estimate of the actual quantities.

TABLE F.—SHOWING "TAKES" OF FISH BY FORTY-THREE EAST COAST FISHING BOATS.

Note.—The positions appended to the monthly totals may not correspond with daily positions; they indicate only the distance from the nearest part of coast.

Heavy type indicates that the fish were taken within the area restricted by the Board's Bye-Law from Trawling operations.

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.	Cwt.	Cran.	
ABERDEEN DISTRICT. *Burnbanks Station.* Boat No. 1. 32 feet Keel. 6 Men.	Jan. 10	...	1	...	...	...	...	1
	,, 14	...	1	...	...	...	1 herring.	”
	,, 15	...	5	1	...	...	...	8–9
	,, 18	...	5	...	...	...	...	1
	,, 20	...	9	...	...	...	...	8–9
	,, 21	...	8	...	...	...	...	”
	,, 22	...	4	...	...	...	...	1
	,, 25	...	3	...	...	...	...	”
	,, 26	...	4	...	...	...	...	”
	,, 27	...	9	1	...	...	...	8–9
	,, 28	...	4	...	...	...	...	1
	,, 29	...	5	...	...	...	...	”
	,, 30	...	4	...	...	...	...	3
	Total for Month.	...	27	...	...	...	1	Under 2
		...	4	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	31	2	...	...	...	Over 6
	Feb. 1	...	2½	...	...	...	...	1
	,, 4	...	4 l.	...	...	...	¾ herrings.	”
	,, 5	...	4 l.	...	...	...	...	”
	,, 7	...	3 l.	...	...	...	...	”
	,, 8	...	...	...	...	...	3¼ herrings.	”
	,, 10	...	4	2	...	...	...	8
	,, 11	...	6	1	...	...	...	”
	,, 12	...	4	...	...	...	...	”
	,, 14	...	6	½	...	...	...	9
	,, 15	...	4½	...	...	...	...	8
	,, 17	...	4	1	...	...	...	”
	,, 19	...	2	...	...	...	...	”
	,, 23	...	2 l.	...	...	...	...	2–3
	,, 24	...	2 l.	...	...	...	...	”
	,, 25	...	1	...	...	...	...	5
	,, 28	...	2½	...	...	...	...	2–3
	Total for Month.	...	13½	...	...	...	4	Under 2
		...	6½	...	...	...	...	2–3
		...	1	...	...	...	...	3-6
		...	30½	4½	...	...	...	Over 6
	Mar. 1	...	1 l.	...	...	...	...	1
	,, 2	...	1½l.	...	...	...	...	3
	,, 3	...	½l.	...	...	...	...	1
	,, 7	...	½l.	...	...	...	...	”
	,, 8	...	4 s.	...	...	...	...	8–9
	,, 15	...	4½l.	...	...	...	...	4–6
	,, 16	...	4 l.	...	...	...	...	3
	,, 17	...	2 l.	...	...	...	...	1
	,, 19	...	3 l.	...	...	...	...	3
	,, 21	...	1½l.	...	...	...	...	”
	,, 23	...	1 l.	...	...	...	...	”
	,, 25	...	2½l.	...	...	...	...	4–6
	,, 28	...	2 l.	...	...	...	...	3
	,, 30	...	2½l.	...	...	...	...	4–6
	,, 31	...	2½l.	...	...	...	...	3
	Total for Month.	...	4	...	...	...	...	Under 2
		...	15½	...	...	...	...	2–3
		...	9½	...	...	...	...	3–6
		...	4	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.		
ABERDEEN DISTRICT—*cont.* *Cove Station.* Boat No. 2.	Jan. 10	...	3 l.	...	...	...	...	1–1½
	,, 12	...	3 l.	...	...	...	...	2–3
	,, 14	...	2 l.	...	...	...	...	,,
	,, 15	...	3 l.	...	...	...	...	1–1½
	,, 20	1	3	...	...	...	...	2–3
	,, 21	...	3 l.	...	...	...	...	,,
	,, 22	...	3	...	...	...	...	,,
	,, 25	...	2 l.	...	...	...	...	,,
	,, 26	...	3	...	...	...	...	,,
	,, 27	1	3 l.	...	...	...	...	,,
	,, 28	...	2	...	...	...	...	,,
	,, 29	...	3 l.	1	...	...	...	,,
	,, 31	...	4 l.	...	...	...	...	,,
	Total for Month.	...	6	...	...	...	...	Under 2
		2	31	1	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	2	...	...	...	...	2–3
	,, 4	...	3	...	...	...	...	,,
	,, 5	...	2½	...	...	...	...	,,
	,, 7	...	4 l.	...	...	...	...	,,
	,, 8	...	2	...	...	...	...	,,
	,, 9	...	5	1	...	...	...	8
	,, 10	...	4	...	...	...	...	9–10
	,, 11	...	3	...	...	...	...	8
	,, 15	...	5	½	...	...	...	9–10
	,, 17	...	4	1	...	...	...	,,
	,, 24	...	2½ l.	1½	...	...	...	2–3
		1	...	...	...	...	...	8
		...	...	...	...	1 l.	...	10
	,, 25	...	3	...	...	...	...	5
	,, 28	...	2	...	...	...	...	2–3
	Total for Month.	...	...	...	...	...	...	Under 2
		...	18	1½	...	...	...	2–3
		...	3	...	...	...	...	3–6
		1	21	2½	...	1	...	Over 6
	Mar. 1	...	1	...	...	...	...	2–3
	,, 2	...	2½	...	...	...	...	4–6
	,, 3	...	½	...	1	...	...	,,
	,, 4	1	5	3	...	...	...	8–10
	,, 7	...	2	1	...	...	...	,,
	,, 8	1	3	2	...	...	...	,,
	,, 9	...	...	...	...	1	...	2 3
	,, 15	...	3½	...	...	...	...	,,
	,. 17	1	2	...	...	...	...	,,
	,, 18	...	1	...	...	...	...	,,
	,, 19	...	2	...	...	...	...	4–6
	,, 21	...	1	...	...	...	...	2–3
	,, 23	...	1	1	...	...	...	4–6
	,, 26	...	1	...	...	...	...	,,
	,, 29	...	2½	...	...	...	...	2–3
	,, 30	...	2	...	...	...	...	,,
	,, 31	...	3	...	...	...	...	4–6
	Total for Month.	...	...	...	...	...	...	Under 2
		1	13	...	...	1	...	2–3
		...	10	1	1	...	...	3–6
		2	10	6	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Score.	Score.				
ABERDEEN DISTRICT—*cont.* *Findon Station.* Boat No. 3. 30 feet Keel, 6 Men.	Dec. 3	...	18 s.	...	...	...	...	12 S.E.
	„ 7	...	5 s.	18 s.	...	...	...	1–1½ E.S.E.
	„ 10	...	7 s.	6 s.	...	...	...	„
	„ 11	...	12 s.	...	...	...	...	6 E.
	„ 13	...	8	14	...	...	...	1 E.S.E.
	„ 14	...	4½	6	...	...	...	„
	„ 24	...	4½ l. 16 s.	10 s.	...	...	...	„
	„ 25	...	5 l. 14 s.	10 s.	...	...	...	„
	„ 27	...	2 l. 12 s.	2½	...	...	...	„
	„ 28	...	1 l. 11 s.	6 s.	...	...	...	„
	„ 29	...	2½ l. 43	10 s.	...	...	...	8 E.S.E.
	„ 30	...	2 l. 41	7 s.	...	...	...	„
	Total for Month.	...	90	72½	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	12	...	...	...	...	3–6
		...	106½	17	...	...	...	Over 6
	1887. Jan. 10	...	2 l. 8	...	...	...	...	1–1½
	„ 12	...	3 l. 8	...	...	...	...	„
	„ 14	...	4 l. 38	2	...	...	...	7–10
	„ 15	...	5 l. 56	6	...	...	...	Over 10
	„ 20	...	4½ l. 14	...	...	...	...	1–1½
	„ 21	...	2 l. 6	...	...	...	...	„
	„ 22	...	5 l. 16	...	...	...	...	„
	„ 24	...	6 l. 16	...	...	...	...	„
	„ 25	...	4 l. 11	...	...	...	...	„
	„ 27	...	1 l. 15	4	...	...	...	4–6
	„ 28	...	1 l. 6	2	...	...	...	7–10
	„ 31	...	6 l. 19	...	...	...	...	1–1½
	Total for Month.	...	130½	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	16	4	...	...	...	3–6
		...	110	10	...	...	...	Over 6
	Feb. 1	...	3½ l. 10	...	...	...	...	1 S.E.
	„ 4	...	4 l. 11	...	...	...	...	„
	„ 5	...	2 l. 16	...	...	...	...	„
	„ 7	...	3 l. 39 6 s.	2 l. 12 s.	...	...	...	8 E.S.E.
	„ 8	...	4 l. 40 4 s.	9	...	...	...	8 E.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Score.	Score.				
ABERDEEN DISTRICT—*cont.* *Findon Station.* Boat No. 3.	Feb. 9	...	1 l. 5	...	...	...	...	1 E.S.E.
	,, 10	...	3½ l. 15	...	...	...	...	6 ,,
	,, 11	...	5 l. 36	...	...	...	...	8 ,,
	,, 14	...	3 l. 30 4 s.	5	...	...	...	15 ,,
	,, 18	...	2 l. 12 35	...	...	...	...	8 ,,
	,, 21	...	12 3 s.	5	...	...	...	,, ,,
	,, 25	...	3 l. 14	...	...	...	...	3 ,,
	,, 28	...	2 l. 10	...	...	...	...	1 S.E.
	Total for Month.	... ...	64½ ... 35½ 206	 33	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Mar. 1	...	1	...	...	...	...	1–1½
	,, 2	...	8	...	...	...	...	,,
	,, 3	...	8 4 s.	...	...	...	...	7–10
	,, 4	...	12 3 s.	4	...	...	...	Over 10
	,, 7	...	3 3 s.	...	...	...	...	4–6
	,, 8	...	2 l. 20 3 s.	2 13 s.	...	...	...	Over 10
	,, 10	...	11 8 s.	10	...	...	...	7–10
	,, 15	...	1 l. 7 3 s.	...	...	...	...	1–1½
	,, 16	...	1 l. 7 4 s.	...	...	...	...	,,
	,, 17	...	6 5	...	...	...	...	,,
	,, 18	...	6 3	...	...	...	...	,,
	,, 19	...	10 5	...	...	...	...	4–6
	,, 21	...	3 3	...	...	...	...	1–1½
	,, 24	...	2 3	...	...	...	...	,,
	,, 26	...	4 5	...	...	...	...	7–10
	,, 29	...	4 3	...	...	...	...	1–1½
	,, 30	...	1 l. 5 5 s.	...	...	...	...	,,
	,, 31	...	1 l. 3 4 s.	...	...	...	...	4–6
	Total for Month.	... ...	81 ... 29 80	 29	... ...	... ...	... ...	Under 2 2–3 2–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	No.	Score.	Score.	Score.		Crans.	
ABERDEEN DISTRICT.—*cont.* *Portlethen Station.* Boat No. 4. 33 feet Keel, 6 Men.	Dec. 3	…	9	6 s.	…	…	…	6 S.E.
	,, 6	4	9	18 s.	…	…	…	2 S.
	,, 7	…	6	15 s.	…	…	…	,,
	,, 10	4	4	6 s.	…	…	…	,, E.
	,, 11	…	7	4 s.	…	…	…	4 ,,
	,, 13	…	7	11 s.	…	…	…	2–3
	,, 15	…	…	…	…	…	7¾ her'ngs.	inshore.
	,, 17	…	…	…	…	…	4½ ,,	,,
	,, 18	…	…	…	…	…	2¼ ,,	,,
	,, 24	…	13	12 s.	…	…	…	2–3 S. E.
	,, 25	…	2 l. 12 s.	10 s.	…	…	…	,,
	,, 27	…	6 s.	4 s.	…	…	…	4 E.
	,, 28	…	2 l. 6½ s	6 s.	1	…	…	,,
	,, 29	3	3 l. 12 s.	18 s.	1	…	…	3 S. E.
	,, 30	…	3 l. 69	7 s.	…	…	…	10 E.
	Total for Month.	… 11 … …	… 68 30½ 72	… 90 20 7	… 1 1 …	… … … …	14½ … … …	Under 2 2–3 3–6 Over 6
	1887.							
	Jan. 1	…	6	7 s.	…	…	…	2–3
	,, 10	…	8 l.	…	…	…	…	,,
	,, 12	… …	4 l. 26	7 s. …	…	…	…	10
	,, 13	…	5	…	1	…	…	2–3
	,, 15	…	6 l. 62	19 s.	…	…	…	18
	,, 18	…	12 s. 2 l. 12	1 s.	…	…	…	5
	,, 20	…	6 s. 2 l. 14	…	…	…	…	2–3
	,, 21	…	7 l. 28	1 s.	…	…	…	,,
	,, 22	…	2 s. 5 l. 15	…	1	…	…	,,
	,, 26	…	2 s. 10 l.	…	…	…	…	,,
	,, 27	…	2 s. 9 l. 15½	4½ s.	…	…	…	,,
	,, 28	…	6 s. 9 l. 2	2 s.	…	…	…	,,
	,, 29	…	2 s. 5 l. 5	1 s.	1	…	…	2–3
	,, 31	…	5 s. 6 l. 6 s.	1½ s.	…	…	…	,,
	Total for Month.	… … … …	… 176½ 20 110	… 17 1 26	… 3 … …	… … … …	… … … …	Under 2 2–3 3–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Score.	Score.	Score.			
ABERDEEN DISTRICT—*cont.* *Portlethen Station.* Boat No. 4.	Feb. 1	...	6 l. 4	...	...	...	...	2 S.E.
	,, 5	...	10 l. 5 s. 19	...	...	...	...	,,
	,, 7	...	9 l. 6 s. 18	1 s.	1 s.	...	...	,,
	,, 8	...	3 l. 2 s. 8½	1 s.	1 s.	...	...	3 E.
	,, 9	...	2 l. 28½ s 18	11 s.	...	...	...	22 E.S.E.
	,, 10	...	3 l. 6 s. 14½	1 s.	1 s.	...	...	4 S.E.
	,, 11	...	1½ l. 12	...	1 s.	...	...	,,
	,, 14	...	4 l. 3 s. 27½	4 s.	...	...	...	11 E.S.E.
	,, 15	...	2 l. 10	...	...	...	...	3 S.E.
	,, 17	...	2 l. 6 s. 23	1 s.	...	...	...	10–12
	,, 19	...	2 l. 5 s. 32	1 s.	...	...	...	,,
	,, 21	...	1 l. 2 s. 21	1 s.	...	...	...	,,
	,, 25	...	1½ l. 6 1 s.	...	...	...	...	4
	Total for Month.	...	...	...	...	...	...	Under 2
		...	102½	2	2	...	...	2–3
		...	48½	1	2	...	...	3–6
		...	174	18	...	...	...	Over 6
	Mar. 1	...	6	...	...	...	...	2–3
	,, 2	...	21	...	...	...	...	4–6
	,, 3	...	30 9 s.	...	...	...	...	14–21
	,, 5	...	12½	...	...	...	...	10
	,, 7	...	12	1 s.	...	...	...	4–6
	,, 8	...	24	26 s.	...	...	...	14–21
	,, 15	...	2 l. 11½ 1 s.	...	1	...	...	2–3
	,, 16	...	12 3 s.	...	...	...	...	,,
	,, 17	...	10½ 2 s.	...	...	...	...	4–6
	,, 18	...	5 3 s.	...	...	...	...	2–3
	,, 19	...	8 2 s.	...	...	...	...	4–6
	,, 21	...	2 6 s.	...	...	...	...	2–3
	,, 24	...	4½ s.	...	...	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ABERDEEN DISTRICT—*cont.*	1887.	No.	Score.	Score.	Score.			
Portlethen Station.	Mar. 26	...	16½ 4 s.	1 s.	1	...	...	14–21
Boat No. 4.	,, 28	...	7½ s.	...	...	...	...	2–3
	,, 29	...	7 s.	3½ s.	...	...	...	4–6
	,, 31	...	10 s.	...	...	...	...	"
	Total for Month.	...	...	...	...	...	...	Under 2
		...	63½	...	1	...	...	2–3
		...	72½	4½	...	...	...	3–6
		...	96	27	1	...	...	Over 6
Boat No. 5. 29 feet Keel. 6 Men.	1886.						Crans.	
	Dec. 3	...	10	6 s.	...	...	...	6 S.E.
	,, 6	1	4	30	...	...	...	2–3 "
	,, 7	...	6	15 s.	...	...	...	"
	,, 10	1	3	10 s.	...	...	...	"
	,, 11	...	8	5 s.	...	...	...	4 E.
	,, 13	...	8	6 s.	...	...	...	2–3 S.E.
	,, 15	...	...	...	...	...	6¾ her'ngs.	inshore.
	,, 17	...	...	...	...	...	5¾ "	"
	,, 18	...	...	...	...	...	1½ "	"
	,, 20	...	...	...	...	...	2 "	"
	,, 21	...	14	9	...	...	...	2 S.E.
	,, 25	...	21	18	...	...	...	4 E.
	,, 27	...	5	30 s.	...	...	...	3 "
	,, 28	...	7 s. 2 l. 8	7 s.	1	...	...	4 "
	,, 29	...	2 l. 7	10 s.	...	...	...	2–3 S.E.
	,, 30	...	6 l. 42	12 s.	...	...	...	12 E.
	Total for Month.	...	...	...	...	...	16	Under 2
		2	56	110	...	...	...	2–3
		...	49	36	1	...	...	3–6
		...	48	12	...	...	...	Over 6
	1887.							
	Jan. 1	...	10	12 s.	...	...	...	2–3
	,, 10	...	9	...	...	...	...	"
	,, 12	...	6 l. 47	7 s.	...	...	...	10 S.E.
	,, 13	...	1½	...	1	...	...	2–3
	,, 15	...	12 l. 70	13 s.	...	...	...	18 S.E.
	,, 18	...	12 s. 3 l. 17	...	...	...	...	2–3
	,, 20	...	4 l. 34	...	...	...	...	"
	,, 27	...	12 l. 16½	8 s.	...	...	...	"
	,, 29	...	5 s. 7 l. 11	2½ s.	...	...	...	"
	,, 31	...	6 s. 6 l. 8½	6 s.	...	...	...	"
	Total for Month.	...	...	...	...	...	...	Under 2
		...	150½	28½	1	...	...	2–3
		...	...	...	...	...	...	3–6
		...	147	20	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Score.	Score.	Score.		Cwt.	
ABERDEEN DISTRICT—*cont.* *Portlethen Station.* Boat No. 5.	Feb. 1	...	6 l. 1 s. 7	...	...	...	...	2-3 S.
	,, 4	...	3 l. 6 5 s.	...	...	...	...	”
	,, 5	...	12 l. 6 s. 22	...	...	...	3 her'ngs.	inshore.
	,, 7	...	13½	...	...	...	10 ,,	4 S. ,,
	,, 8	...	...	...	...	...	10 ,,	”
	,, 9	...	6 l. 36 16½ s.	30 s.	...	...	...	20 E.S.E.
	,, 10	4	4 l. 6 s. 13½	1	1	...	...	4 E.
	,, 11	...	2 l. 2 s. 9½	...	...	...	...	5
	,, 14	...	5 l. 3½s. 24	7	...	...	...	10 E.
	,, 15	...	2 l. 10	...	...	...	...	”
	,, 17	...	4 l. 5 s. 32	1	...	...	...	”
	,, 19	...	2 l. 7 s. 29	2	...	...	...	11–12 S.E.
	,, 21	...	2 l. 1 s. 18	...	...	...	...	”
	,, 25	...	1 l. 2 s. 6	...	...	...	...	4 S.E.
	Total for Month.	... ... 4 ...	... 68 59½ 191	... ... 1 40	... ... 1 ...	... ...	23	Under 2 2–3 3–6 Over 6
	Mar. 1	...	8½	...	...	...	...	2–3
	,, 2	...	18	...	...	...	...	4–5
	,, 3	...	12	...	...	...	...	12–21
	,, 5	...	19	4 s.	...	...	...	”
	,, 7	...	10½	...	...	...	...	4–5
	,, 8	...	30½	23 s.	...	...	...	12–21
	,, 15	...	1 l. 11½ 2 s.	...	...	...	...	2–3
	,, 16	...	10 2½ s.	...	...	...	...	”
	,, 17	...	8 2 s.	...	...	...	...	”
	,, 18	...	6 3½ s.	...	...	...	...	”
	,, 19	...	10½ 2 s.	...	...	...	...	4–5
	,, 21	...	3½	...	...	...	...	2–3
	,, 24	...	5½	...	...	...	...	”
	,, 26	...	10	...	...	...	...	10
	,, 28	...	5	...	...	...	...	2–3
	,, 29	...	9	5½ s.	...	...	...	4–5
	,, 31	...	6½ s.	...	...	...	...	2–3
	Total for Month.	... ...	... 75½ 50 71½	... ... 5½ 27	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Score.	Score.	Score.			
ABERDEEN DISTRICT. *Downies Station.* Boat No. 6. 32 feet Keel, 6 Men.	Dec. 3	...	9	6 s.	...	...	...	10
	,, 6	...	5	10 s.	...	...	...	1
	,, 7	...	13	6 s.	...	...	...	2–3
	,, 11	...	9	15 s.	...	...	...	,,
	,, 25	...	27	18 s.	2	...	...	,,
	,, 27	...	19	...	...	...	...	,,
	,, 28	...	...	24 s.	...	...	...	,,
	,, 29	...	13	18 s.	...	...	...	,,
	,, 30	...	66 s.	18 s.	...	...	...	10
	Total for Month.	...	5	10	...	...	...	Under 2
		...	81	81	2	...	...	2–3
		...	...	...	...	...	...	3–6
		...	75	24	...	...	...	Over 6
	1887.							
	Jan. 10	...	15	...	...	...	...	2–3
	,, 14	...	50	...	...	...	...	12
		...	3 s.					
	,, 15	...	30	...	...	...	...	6
	,, 20	...	18	...	...	...	...	2–3
	,, 27	...	26 l.	3 s.	...	...	...	,,
	,, 28	...	18	...	...	...	...	,,
	,, 31	...	17	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	94	3	...	...	...	2–3
		...	30	...	...	...	...	3–6
		...	53	...	...	...	...	Over 6
							Crans.	
	Feb. 1	...	12 l.	...	...	...	...	2-3 S.E.
	,, 4	...	24	...	...	...	...	,,
	,, 5	...	...	...	...	...	7	inshore.
	,, 7	...	...	...	...	...	5	,,
	,, 9	...	66	12 s.	...	...	...	10–14 E.S.E.
	,, 10	...	20	...	...	...	...	4 S.E.
	,, 11	...	24	...	...	...	...	8 E.S.E.
	,, 14	...	48	...	...	...	...	12 ,,
	,, 15	...	12 l.	...	...	...	...	2–3 S.E.
	,, 17	...	33 s.	...	...	...	...	10–14 E.S.E.
	,, 19	...	36 s.	...	...	...	...	,,
	,, 25	...	14	...	...	...	...	2–3 S.E.
	,, 28	...	14 l.	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	12	Under 2
		...	76	...	...	...	...	2–3
		...	20	...	...	...	...	3–6
		...	207	12	...	...	...	Over 6
	Mar. 1	...	14	...	...	...	...	2–3
	,, 2	...	12	...	...	...	...	,,
	,, 3	...	15 s.	...	...	...	...	4–6
	,, 4	...	14 s.	...	...	...	...	2–3
	,, 7	...	21	...	...	...	...	10–12
	,, 10	...	30	2 s.	...	...	...	,,
	,, 15	...	30	...	...	...	...	2–3
	,, 16	...	15	...	...	...	...	,,
	,, 17	...	14	...	...	...	...	4–6
	,, 21	...	11	...	...	...	...	2–3
	,, 24	...	4	...	...	...	...	,,
	,, 26	...	8	...	...	...	...	10–12

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Score.	Score.	Score.			
ABERDEEN DISTRICT—*cont.*	Mar. 29	...	10	...	...	...	...	2–3
Downies Station.	,, 30	...	14	...	...	...	...	,,
	,, 31	...	14	...	...	...	...	,,
Boat No. 6.	Total for Month.	... ...	... 138 29 59	 2	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
STONEHAVEN DISTRICT.	1886.	No.	hunds.*					
Skateraw Station.	Nov. 2	...	⅓ 3	...	...	...	...	Under 3
Boat No. 7. 32 feet Keel, 6 Men.	,, 5	...	2½ l. 3¼ s.	...	...	...	...	Over 10
	,, 8	...	4 l. 1 s.	...	...	...	...	,,
	,, 9	...	1 l. 1¼	...	...	...	...	7–10
	,, 11	...	1 ½	...	...	...	...	4–6
	,, 12	...	2¼ l. 1¼ s.	...	...	...	...	Over 10
	,, 13	...	3½ l. 1 s.	...	...	...	...	,,
	,, 16	...	½ l. 3	...	...	...	...	Under 3
	,, 17	...	1½ l. 1	...	...	...	...	,,
	,, 20	...	1 l. 1¼	...	...	...	...	4–6
	,, 22	...	5⅓ l. 1¼ s.	...	...	...	...	Over 10
	,, 23	...	5½ l. 2¼ s.	...	...	...	...	,,
	,, 24	...	4¼ l. 1½ s.	...	...	...	...	,,
	,, 25	...	1 l. 1	...	...	...	...	Under 3
	,, 26	...	2 l. 1	...	...	...	...	Over 10
	,, 27	...	2½ l. 1¼	...	...	...	...	,,
	,,1–30	10	...	...	...	...	...	...
	Total for Month.	 10	... 11⅓ 3¾ 48	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Dec. 1	...	½l. 1½s.	...	...	...	Crans.	2–3
	,, 3	...	½l. 2¼s.	...	...	...	...	4 S.E.
	,, 6	...	½l. 2¼s.	...	...	...	...	,,
	,, 11	...	...	...	...	...	1⅛ her'ngs	Under 2
	,, 14	...	...	...	...	...	5 ,,	,,
	,, 15	...	...	...	...	...	17 ,	,,
	,, 16	...	...	...	...	...	9½ ,,	,,
	,, 18	...	...	...	...	...	1¾ ,,	,,
	,, 21	...	...	...	...	...	1¾ ,,	,,
	,, 27	...	1¼ 1 s.	...	...	...	1¼ ,,	,,

* Includes Haddocks and Whitings measured by hundreds of 135 fish.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	No.	hunds.				Crans.	
STONEHAVEN DISTRICT—*cont.* *Skateraw Station.* Boat No. 7. 32 feet Keel. 6 Men.	Dec. 28	...	1¾ ¾s.	...	...	...	...	3 S.E.
	„ 29	...	1¾ 1 s.	...	...	...	...	2 E.
	„ 30	...	1 l. 1 s.	...	...	...	...	3 N.E.
	„ 31	...	1 l. 5 s.	...	...	...	...	4 S.E.
	Total for Month.	... ...	... 36⅛ 13¾* ...	... ...	... ...	... ...	9¼*	Under 2 2–3 3–6 Over 6.
	1887.							
	Jan. 12	...	1 l.	...	...	...	...	2–3
	„ 14	...	1⅓ l. 1	...	...	...	...	„
	„ 16	...	6½ l. 7	...	...	...	...	Over 10
	„ 20	...	3 l. ¼	...	...	...	...	4–6
	„ 21	...	1⅓ l. ⅛	...	...	...	...	2 3
	„ 24	...	1¼ l. ¼	...	...	...	...	4–6
	„ 27	...	3 l. ¼	...	...	...	...	„
	„ 28	...	5½ l. 1/7	...	...	...	...	2–3
	„ 29	...	4¼ l. 1/7	...	...	...	...	„
	„ 31	...	4 l. ¼	...	...	...	...	„
	„ 1–31	4	...	...	...	...	...	...
	Total for Month.	... ... 4 ...	... 19⅛* 8 * 13½*	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	3⅔l. ⅙s.	...	...	...	...	3–6
	„ 4	...	3⅔l. ⅑s.	...	...	...	...	„
	„ 5	...	2 l.	...	...	...	...	„
	„ 7	...	1 l.	...	...	...	...	2–3
	„ 9	...	7⅓l. 4⅔s.	...	...	...	...	3 S.S.E.
	„ 10	...	1 l.	...	...	...	...	2-3
	„ 11	...	2¼l. 1 s.	...	...	...	...	Over 3-6
	„ 12	...	3 l. 1 s.	...	...	...	...	3–6
	„ 14	...	3¼l. 2 s.	...	...	...	...	15 E.S.E.
	„ 15	...	⅛l. 1/16s.	...	...	...	...	8 S.E.
	„ 17	...	¾l. ¼s.	...	...	...	...	3–6
	„ 19	...	2 l. 1 s.	...	...	...	...	10 E.S.E.
	„ 21	...	2⅙l. 1⅔s.	...	...	...	...	11 „

* Includes Whitings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Skateraw Station.* Boat No. 7. 32 feet Keel. 6 Men.	1887. Feb. 25	No. ...	hunds. 1 l. 1¼s.	...	...	...	..	3–4 E.S.E.
	,, 26	...	2 l. ⅕s.	...	...	...	...	4 ,,
	Total for Month.	... ...	... 4½ 16⅓ 27½	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
	Mar. 1	...	1 l. ⅐	...	...	...	...	4–6
	,, 2	...	1¼ l. ½	...	...	...	...	7–10
	,, 3	...	1¼ l. 1	...	...	...	...	Over 10
	,, 4	...	1 l. 1	...	...	...	...	7–10
	,, 5	...	1 l. ¾	...	...	...	...	,,
	,, 8	...	3 l. 1	...	...	...	...	Over 10
	,, 14	...	2⅛ l. 1¼	...	...	...	...	2–3
	,, 15	...	2 l. 1½	...	...	...	...	4–6
	,, 16	...	1¼ l. 1	...	...	...	...	,,
	,, 17	...	1¼ l. 1⅙	...	...	...	...	7–10
	,, 19	...	1½ l. 1	...	...	...	...	,,
	,, 21	...	1 l. ½	...	...	...	...	4–6
	,, 24	...	½ l. ¼	...	...	...	...	2–3
	,, 29	...	1¼ l. 1	...	...	...	...	7–10
	,, 30	...	1 l. 1	...	...	...	...	4–6
	,, 31	...	1 1⅛ l.	...	...	...	...	,,
	,,1–31	6	...	...	...	...	...	...
	Total for Month.	... ... 6 ...	... 4⅛* 12½* 18⅞*	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
Stranathra Station. Boat No. 8. 30 feet Keel. 5 Men.	1886. Nov. 5	...	3¾ l. 2½ s.	...	...	...	...	3–4 S.E.
	,, 8	...	4 l. 2 s.	...	...	...	...	10–12
	,, 12	...	3 l. 2 s.	...	...	...	...	3–4
	,, 13	...	2 l. 1½ s.	...	...	...	...	10–12
	,, 15	...	1 l. ½ s.	...	...	...	...	3–4
	,, 18	...	1 l. ½ s.	...	...	...	...	2
	,, 20	...	2 l. 1½ s.	...	...	...	...	3–4
	,, 22	...	5½ l. 2 s.	...	...	...	...	10–12

* Includes Whitings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stranathra Station.*	1886. Nov. 23	...	hunds. 5 l. 3 s.	...	...	...	...	10–12
	„ 25	...	1 l. ½ s.	...	...	...	...	3–4
Boat No. 8. 30 feet Keel. 5 Men.	Total for Month.	... ...	... 1½ 17¾ 25	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Dec. 1	...	3 l. 2 s.	...	...	...	...	4 S.
	„ 3	...	1 l. ½s.	...	...	...	...	4 S.
	„ 6	...	2 l. 1 s.	...	...	...	...	5 „
	„ 7	...	1½l. ½s.	...	...	...	...	3 „
	„ 9	...	2½l. 1 s.	...	...	...	...	4 „
	„ 27	...	2 l. 2 s.	...	...	...	...	3 „
	„ 28	...	2 l. 2 s.	...	...	...	...	5 „
	„ 29	...	2½l. 1½s.	...	...	...	...	4 „
	„ 30	...	2 l. 1 s.	...	...	...	...	6 „
	„ 31	...	3 l. 2 s.	...	...	...	...	4 „
	Total for Month.	... ...	... 7 30 ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1887. Jan. 14	...	7 l. 1 s.	...	...	...	...	10–12
	, 15	...	6 l. 2 s.	...	...	...	...	„
	„ 20	...	7 l. 2 s.	...	...	...	...	2
	„ 21	...	6½l.	...	...	...	...	3–4
	„ 22	...	7½l. 2 s.	...	...	...	...	2
	, 24	...	5 l.	...	...	...	...	„
	„ 28	...	4 l. 1 s.	...	...	...	...	3–4
	„ 31	...	8 l. 3 s.	...	...	...	...	„
	Total for Month.	... ...	... 23½ 22½ 16	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	4 l. 2 s.	...	...	...	...	3 S.
	„ 4	...	9 l. 3 s.	...	...	...	...	4 „
	„ 5	...	4 l. 2 s.	...	...	...	...	3 S.E.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stranathra Station.* Boat No. 8. 30 feet Keel. 5 Men.	1887. Feb. 7	...	Cwt. 2 l. 1 s.	...	...	...	...	2–3 S.
	„ 9	...	3 l. 1 s.	...	...	...	...	„
	„ 10	...	2 l. 1 s.	...	...	...	...	„
	„ 11	...	1 l. ½ s.	...	...	...	...	„
	„ 14	...	3 l.	...	...	...	...	„
	„ 15	...	1½l.	...	...	...	...	4 S.
	„ 17	...	1 l.	...	...	...	...	2–3 „
	„ 19	...	1½l.	...	...	...	...	2–3 „
	„ 21	...	2½l.	...	...	...	...	4 „
	„ 22	...	3 l. 1 s.	...	...	...	...	3 „
	„ 24	...	2 l. ½s.	...	...	...	...	4 „
	Total for Month.	...	...	...	...	...	...	Under 2
		...	33	...	...	...	...	2–3
		...	18½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	2 l. 1 s.	...	...	...	...	3–4
	„ 2	...	2 l. ½s.	...	...	...	...	„
	„ 3	...	2 s.	...	...	...	...	2
	„ 10	...	1¼ l.	...	...	...	...	„
	„ 11	...	1½ l.	...	...	...	...	„
	„ 12	...	1½ l.	...	...	...	...	„
	Total for Month.	...	...	...	...	...	...	Under 2
		...	6¼	...	...	...	...	2–3
		...	5½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
Cowie Station. Boat No. 9. 25 feet Keel. 5 Men.	1886. Nov. 2	...	½ l. 1¾ s.*	...	...	...	...	1–2
	„ 4	...	¾ l. 1⅓ s.	...	...	...	...	„
	„ 5	...	1 s.	...	...	...	...	„
	„ 8	...	2¼ s.*	...	...	...	...	„
	„ 9	...	1½ l. 1¾ s.*	...	...	...	...	„
	„ 10	...	1⅓ l. ¾ s.	...	...	...	...	„
	„ 11	...	¼ l. 1 s.	...	...	...	...	„
	„ 13	...	¾ l. 1¼ s.*	...	...	...	...	„
	„ 16	...	¾ l. 1 s.	..	...	...	...	„
	„ 17	...	⅓ l. 1 s.	...	...	...	...	„
	„ 18	...	⅓ l. ⅓ s.	...	...	...	...	„
	„ 20	...	¼ l. 1½ s.	...	...	...	...	„
	„ 22	...	½ l. ¾ s.	...	...	...	...	„
	„ 23	...	1 l. ¾ s.	...	...	...	...	6

* Whitings, small Haddocks, and Codlings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	No.	Cwt.					
STONEHAVEN DISTRICT—*cont.* *Cowie Station.* Boat No. 9. 25 feet Keel. 5 Men.	Nov. 24	...	⅓ l. 1⅓ s.	...	...	...	...	1–2
	,, 25	...	1 l. 1 s.	...	...	...	...	4–5
	,, 27	...	1 l. ⅓ s.	...	...	...	...	,,
	,, 30	...	⅓ l. ¾ s.	...	...	...	...	1–2
	Total for Month.	...	25⅔	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	5	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 3	...	⅓ l. 1 s.	...	...	...	...	2–3
	6	...	⅓ l. 1 s.	...	...	...	...	1
	,, 7	...	⅓ l. ¾ s.	...	...	...	...	2–3
	,, 11	...	½ l. 1 s.	...	...	...	...	1
	17	...	¼ l. ⅓ s.	...	...	...	...	2–3
	,, 20	...	¾ l. 1½ s.	...	...	...	...	,,
	21	...	½ l. 1⅝ s.	...	...	...	...	,,
	24	...	1¼ l. 1½ s.	...	...	...	...	,,
	,, 27	...	⅔ l. 1⅛ s.	...	...	...	...	,,
	,, 28	...	1⅚ l. ¾ s.	...	...	...	...	,,
	, 29	...	1½ l. 1 s.	...	...	...	...	4
	,, 30	...	1⅓ l. 1 s.	...	...	...	...	5
	Total for Month.	...	2⅚	...	...	...	...	Under 2
		...	15½	...	...	...	...	2–3
		...	4⅚	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887. Jan. 12	...	1⅓ l. ⅓ s.	...	...	...	...	2
	,, 14	...	1¼ l. ⅓ s.	...	...	...	...	3–4
	, 15	...	1⅓ l. 1⅓ s.	...	...	...	...	2
	, 19	...	1 l. ½ s.	...	...	...	...	3–4
	, 20	...	1¾ l. ¾ s.	...	...	...	...	2
	,, 21	...	1½ l. ⅓ s.	...	...	...	...	,,
	,, 27	...	2 l. ⅓ s.	...	...	...	...	,,
	,, 28	...	1½ l. ⅓ s.	...	...	...	...	3–4
	,, 31	...	1½ l. ½ s.	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	11	...	...	...	...	2–3
		...	10	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles
STONEHAVEN DISTRICT—*cont.* *Cowie Station.* Boat No. 9. 25 feet Keel. 5 Men.	1887.		Cwt.	Cwt.				
	Feb. 1	...	3 l. ½ s.	...	...	...	...	2–3
	,, 3	...	1 l. ¼ s.	...	...	...	...	4
	,, 5	...	2 l. ⅓ s.	...	...	...	...	2–3
	,, 7	...	1¼ l.	...	...	...	...	,,
	8	...	1⅕ l. ¾ s.	...	...	...	...	,,
	,, 9	...	1¾ l. ⅓ s.	...	...	...	...	5
	,, 10	...	1¼ l. ⅚ s.	...	...	...	...	4
	,, 12	...	2⅕ l. 1⅓ s.	...	...	...	...	7
	14	...	2⅓ l. ¾ s.	...	...	...	...	6
	,, 18	...	1 l. ½ s.	...	...	...	...	5
	,, 19	...	1⅓ l. ½ s.	...	...	...	...	6
	Total for Month.	... ...	... 8⅘ 13⅓ 3½	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Mar. 2	...	¾ l. ⅓ s.	...	...	...	...	5
	,, 3	...	¾ l. ½ s.	...	...	...	...	,,
	,, 7	...	¾ l. ⅓ s.	...	...	...	...	,,
	,, 16	...	1 l. ¾ s.	...	...	...	...	,,
	,, 17	...	1 l. ½ s.	...	...	...	...	8
	,, 19	...	1 l. ½ s.	...	...	...	...	5
	,, 29	...	1¾ l. ¾ s.	...	...	...	...	,,
	,, 30	...	1¼ l. ¾ s.	...	...	...	...	,,
	,, 31	...	1 l. ⅓ s.	...	...	...	...	
	Total for Month.	... ...	... ... 12½ 1½	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1886.							
Stonehaven Stn. Boat No. 10. 34 feet Keel. 6 Men.	Nov. 2	...	4	...	...	...	...	5–10
	,, 4	...	1½	...	...	...	...	,,
	,, 5	...	4	...	...	...	...	,,
	,, 8	...	4½	...	...	...	...	,,
	,, 9	...	3¼	...	...	...	...	,,
	,, 11	...	1¼	...	...	...	...	,, 3
	,, 12	...	1½	...	...	...	...	,,
	,, 13	...	3½	...	...	...	...	5–10
	,, 16	...	1½	...	...	...	...	,,
	,, 17	...	1¾	...	...	...	...	,,
	,, 18	...	1¼	...	...	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stonehaven Stn.*	1886.		Cwt.		Cwt.		No.	
	Nov. 19	...	1¼	...	...	...	...	5–10
	,, 22	...	1¼	...	...	...	...	,,
	,, 23	...	4	...	...	...	...	,,
Boat No 10. 34 feet Keel. 6 Men.	,, 24	50*	...	...	...	...	...	,,
	Total for Month.	 50	... 2¾ ... 31¾	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Dec. 3	6	...	...	...	...	...	6 S.
	6	9	...	...	...	...	2 ling 4 congers	3 S.E.
	, 11	8	...	...	...	...	5 skate 1 ling 3 congers	4 E.S.E.
	,, 23	7	...	...	...	...	2 ling 1 conger	6 S.
	,, 24	...	...	...	...	...	2 saith 2 ling 4 skate 3 congers	7 E.
	Total for Month.	... 22 8 ...	... ...	... ...	... ...	... ...	... 9 9 11	Under 2 2–3 3–6 Over 6.
	1887.							
	Jan. 2	...	½	...	...	...	...	2–3
	,, 13	20	...	...	...	...	3 congers 1 skate 1 ling	4–7
	, 14	...	2	...	...	...	...	2–3
	,, 15	40	...	...	15	...	...	4–7
	,, 18	12	...	...	...	...	...	,,
	,, 20	...	1¾ l. ½ s.	...	...	...	...	2–3
	,, 24	...	4¾	...	...	...	...	4–7
	,, 26	...	1¼ l. ¼ s.	...	...	...	...	,,
	,, 27	...	5¼ 1¼ s.	...	...	...	...	,,
	,, 28	...	2 1 s.	...	...	...	...	,,
	,, 31	...	3¼ 1 s.	...	...	...	...	2–3
	Total for Month.	... ... 72 ...	... 9 15¾ ...	... ...	... ... 15 ...	... ...	... ... 5 ...	Under 2 2–3 3–6 Over 6.
	Feb. 1	...	2 s.	...	...	...	...	3 S.
	,, 4	...	3½ l.	...	...	...	...	4 E.
	,, 5	...	22¼	...	...	...	...	,, S.
	,, 7	...	2¾	...	...	...	...	,,
	,, 8	...	2¾	...	...	...	...	6 S.E.
	,, 9	...	3½ l. 1⅛ s.	...	...	...	...	10 S.E.
	,, 10	...	2½ l. ¾ s.	...	...	...	...	8 ,,

* Includes Conger Eels.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.				
STONEHAVEN DISTRICT—*cont.* *Stonehaven Stn.*	Feb. 11	...	1¼ l.	...	...	...	...	3 S.
	„ 12	...	2½ l.	...	...	...	...	4 S.E.
	„ 25	...	1¼ l.	...	...	...	...	„
Boat No. 10. 34 feet Keel. 6 Men.	Total for Month.	... ...	8¼ ... 10 7⅞	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
	1886.							
Boat No. 11. 18 feet Keel. 4 Men.	Nov. 1–6	...	3 l. 2⅛ s.	...	...	...	...	1–5
	„ 7–13	...	4 l. 10 s.	...	...	...	...	„
	„ 14–20	...	2 l. 11½ s.	...	...	...	...	„
	„ 21–27	...	3¼ l. 5½ s.	...	...	...	...	„
	Total for Month.	... ...	... 41⅜*	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
	Dec. 2	...	...	2½	...	...	...	1–1½ S.E.
	„ 3	...	2 s. ½ l.	...	...	...	...	„
	„ 4	...	2½ s. ½ l.	...	...	...	...	„
	„ 6	...	2 s.	...	...	...	...	„
	„ 7	...	2 3⁄6 s. ¼ l.	...	...	...	...	E.
	„ 10	...	1 s. ¼ l.	...	...	...	...	1–1½ S.E.
	„ 11	...	1½ s. ⅝ l.	...	...	...	...	2½ E.N.E.
	„ 15	...	1½	...	...	...	...	½–1½ E.
	„ 17	...	2 s. ⅜ l.	...	...	...	...	1–1½ S.E.
	„ 18	...	1 s. 1 l.	...	...	...	...	„
	„ 20	...	3½ s. 1 l.	...	...	...	...	2 E.S.E.
	„ 21	...	½ s. 2½ l.	...	...	...	...	1 E.
	„ 23	...	2 s. ¾ l.	...	...	...	...	1 E.S.E.
	„ 24	...	1 s. 4 l.	...	...	...	...	2 S.E.
	„ 25	...	1 s. 1½ l.	...	...	...	...	„
	„ 27	...	1 s. 1 l.	...	...	...	...	1½ S.E.
	„ 28	...	1 s. 1¾ l.	...	...	...	...	2 S.S.E.
	„ 29	...	1 l. 2 s.	...	...	...	...	6 E.S.E.
	„ 30	...	½ s. 1 l.	...	...	...	...	4 E.S.E.
	„ 31	...	1 s. ½ l.	...	...	...	...	1 S.E.
	Total for Month.	... ...	43⅜† ... 1½ 3 †	2½	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.

* Includes Whitings and Codlings. † Includes Whitings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.				
STONEHAVEN DISTRICT.—*cont.* *Stonehaven Stn.*	Jan. 14	...	1½ l. ¼ s.*	...	...	...	...	4–6 S.E.
	,, 15	...	1 l. ½ s.†	...	...	...	...	„
Boat No. 11. 18 feet Keel. 4 Men.	,, 18	...	½ l. ¼ s.†	...	...	...	...	1½
	,, 20	...	½ l.	...	...	...	...	„
	,, 21	...	1¼ l. ¼ s.	...	...	...	...	2–3
	,, 22	...	2 l.	...	...	...	...	„
	,, 24	...	2¼ l.	...	...	...	...	„
	,, 25	...	3¾ l.	...	...	...	...	„
	,, 27	...	3½ l. ½ s.	...	...	...	...	„
	,, 28	...	2¼ l. ¼ s.	...	...	...	...	„
	,, 31	...	4¾	...	...	...	...	4–6
	Total for Month.	... ...	1¼ 16 8 ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
	Feb. 1	...	2 l.	...	...	...	...	3 S.E.
	,, 2	...	1 l.	...	...	...	...	2½ N.E.
	,, 4	...	3 l.	...	...	...	...	2 S.E.
	,, 5	...	2½l.	...	...	...	...	4 E.S.E.
	,, 7	...	2 l.	...	...	...	...	2½ „
	,, 8	...	3 l.	...	...	...	...	6 „
	,, 9	...	1½l. ½s.	...	...	...	...	„
	,, 10	...	1½l. ½s.	...	...	...	...	8 „
	,, 11	...	2 l. 1 s.	...	...	...	...	7 „
	,, 12	...	2½l. 1 s.	...	...	...	...	8 „
	,, 14	...	2 l. ½s.	...	...	...	...	6 „
	,, 17	...	1 l.	...	...	...	...	4 „
	,, 18	...	1 l.	...	...	...	...	„
	,, 19	...	2 l.	...	...	...	...	6 E.
	,, 21	...	1½l.	...	...	...	...	4 S.E.
	,, 25	...	1¼l. ½s.	...	...	...	...	5 „
	,, 26	...	½l. ½s.	...	...	...	...	2½ E.
	Total for Month.	... ...	4 8 14¼ 8½	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6.
	Mar. 2	...	½ ¼ s.	...	...	...	...	4–6
	,, 3	...	½	...	...	...	...	„
	,, 4	...	¾ ¼ s.	...	...	...	...	„
	,, 8	...	1 ¼ s.	...	...	...	...	„
	,, 9	...	½ ¼ s.	...	...	...	...	„
	,, 16	...	½ ½ s.	...	...	...	...	2–3

* Includes Whitings. † Includes Codlings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.			
STONEHAVEN DISTRICT—*cont.* *Stonehaven Stn.*	Mar. 17	...	¾ ¼ s.	...	...	...	...	”
	” 18	...	1	...	...	...	...	4–6
Boat No. 11. 18 feet Keel. 4 Men.	” 19	...	1 ¼ s.	...	...	...	...	”
	” 24	...	¼	...	...	...	...	2–3
	” 25	...	½ ¼ s.	...	...	...	...	”
	” 26	...	1 ¾ s.	...	...	...	...	4–6
	” 29	...	¾ ¼ s.	...	...	...	...	”
	” 30	...	1½ ¾ s.	...	...	...	...	”
	” 31	...	1 ¼ s.	...	...	...	...	2–3
	Total for Month.	... ...	... 4¼ 11½ ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1886.							
Boat No. 12. 15 feet Keel. 4 Men.	Nov. 2	...	½	2	...	...	...	2-3 S.E.
	” 4	...	¾	2	...	...	...	4 ”
	” 5	...	¾	2½	...	...	...	2-3
	” 8	...	¾	2¼	...	...	...	”
	” 9	...	½	1	...	...	...	1½
	” 10	...	½	1½	...	...	...	2-3
	” 11	...	½	1	...	...	...	3-4 N.E.
	” 12	...	½	1½	...	...	...	3
	” 13	...	1¼	1¼	...	...	...	3-4 N.E.
	” 15	...	1½	1	...	...	...	” ”
	” 17	...	¼	2	...	...	...	2-3
	” 19	...	¼	2	...	...	...	”
	” 20	...	¼	1½	...	...	...	”
	” 22	...	½	1½	...	...	...	”
	” 23	...	½	2	...	...	...	”
	” 24	...	½	1½	...	...	...	3-4
	” 25	...	½	1½	...	...	...	”
	” 26	...	½	1	...	...	...	3
	” 27	...	½	2	...	...	...	2-3
	Total for Month.	... ...	½ 9 1¾ ...	1 25* 5 ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Dec. 3	...	¼	3	...	...	...	2–3 S.E.
	” 6	...	¼	1½	...	...	...	”
	” 7	...	¼	3	...	...	...	”
	” 10	...	½	½	...	...	...	” E.N.E.
	” 20	...	1	1¼	...	...	...	” E.S.E.
	” 21	...	½	2	...	...	...	”
	” 23	...	¾	1½	...	...	...	” S.
	” 24	...	3	1	...	...	...	”
	” 25	...	1½	¾	...	...	...	”
	” 27	...	1¼	½	¼	...	...	” S.E.
	” 28	...	1¼	½	½	...	...	”
	” 29	...	1½	1	½	...	...	” E.
	” 30	...	1½	1	½	...	...	” E.S.E.
	” 31	...	¾ ¾ s.	1	¼	...	...	”
	Total for Month.	... ...	... 15	... 18½	... 2	... ...	... ...	Under 2 2–3 3–6 Over 6

* Includes Codlings and small Haddocks.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.			
STONEHAVEN DISTRICT—*cont.* *Stonehaven Stn.* Boat No. 12. 15 feet Keel. 4 Men.	Jan. 4	...	½	¼	¼	...	...	2–3
	„ 12	...	1	...	¼	...	...	„
	„ 13	...	1	...	¼	...	...	„
	„ 14	...	1½	...	¼	...	..	„
	„ 15	...	1	...	¼	...	...	„
	„ 18	...	1½ ¼ s.	...	¼	...	...	„
	„ 20	...	5¼	...	¼	...	...	„
	„ 21	...	3½	...	...	...	...	„
	„ 22	...	½	...	...	...	...	1½
	„ 24	...	1¼	...	...	...	...	2–3
	„ 25	...	3¾ ¼ s.	...	...	...	...	„
	„ 27	...	2½ ¼ s.	...	...	...	...	„
	„ 31	...	1¾	...	...	...	...	„
	Total for Month.	... ...	½ 25¼	... ¼	... 1¾	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	2	...	...	...	...	2–3
	„ 4	...	2¼	...	...	...	...	„
	„ 5	...	2¼	...	...	...	...	„
	„ 7	...	1¼	...	...	...	...	„
	„ 8	...	½	..	...	...	...	1½ S.E.
	„ 9	...	1¼	...	...	...	...	5–6 S.S.E.
	„ 10	...	2¼	...	...	...	...	„
	„ 11	...	2¼	...	...	...	...	„
	„ 12	...	2¼	...	...	...	...	„
	„ 14	...	2¾	...	...	...	...	„
	„ 16	...	1¾	...	...	...	...	2–3 S.E.
	„ 19	...	1¾	...	...	...	...	„
	„ 21	...	2	...	...	...	...	„
	„ 25	...	1	...	...	...	...	„
	„ 26	...	¾	...	...	...	...	„
	Total for Month.	... ...	... 12 14¼ ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Mar. 1	...	½	...	...	...	...	2–3
	„ 3	...	½	...	...	...	...	„
	„ 7	...	½ ¼ s.	...	...	...	...	„
	„ 8	...	½ ¼ s.	...	...	...	...	„
	„ 17	...	¾ ¼ s.	...	...	...	...	„
	„ 18	...	½ ¼ s.	...	...	...	...	„
	„ 19	...	¼ ¼ s.	...	...	...	...	„
	„ 25	...	¼ ¼ s.	...	...	...	...	2 E.
	„ 26	...	½ ¼ s.	...	...	...	...	„
	„ 29	...	½ ¼ s.	...	...	...	...	„
	„ 30	...	1 ¼ s.	...	...	...	...	5 S.E.
	Total for Month.	... ...	2 4¾ 1¼ ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 9

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Cwt.					
STONEHAVEN DISTRICT—*cont.* *Stonehaven Stn.* Boat No. 13. 34 feet Keel. 6 Men.	Nov. 2	...	3 l.	...	...	...	...	10–16
	„ 4	...	2 l. 1¼ s.	...	...	...	...	4–6 S.E.
	„ 5	...	2½ l. 2¾ s.	...	...	...	...	10–16
	„ 8	...	1½ l. 1½ s.	...	...	...	...	4–6
	„ 9	...	2 1½ s.	...	...	...	...	„
	„ 11	...	⅗ l. 2¼ s.	...	...	...	...	1 S.E.
	„ 12	...	2¼ l. 2¼ s.	...	...	...	...	10 16
	„ 13	...	1¾ l. 2 s.	...	...	...	...	,
	„ 15	...	1¼ l. 1⅓ s.	...	...	...	...	10–16
	„ 16	...	2½ l. 1¾ s.	...	...	...	...	„
	„ 17	...	2 l. 1½ s.	...	...	...	...	„
	„ 19	...	½ l. 1¾ s.	...	...	...	...	1
	„ 20	...	¾ l. ¾ s.	...	...	...	...	2–3
	„ 22	...	2½ l. 2½ s.	...	...	...	...	10–16
	„ 23	...	2 l. 2 s.	...	...	...	...	„
	„ 24	...	2¼ l. 1⅛ s.	...	...	...	...	„
	„ 25	...	3 l. 1¾ s.	...	...	...	...	„
	„ 27	...	1⅛ l. 1 s.	...	...	...	...	„
	Total for Month.	... ...	5 1½ 9¾ 46	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
		No.					No.	
	Dec. 1	5	...	...	...	...	9 congers	2–3
	„ 4	5	...	...	...	...	20 „	„
	„ 6	4	...	...	...	...	13 „	„
	„ 7	13	...	...	...	...	5 ling 2 „ 12 skate	„
	„ 9	16	...	...	...	...	9 congers 6 „	„
	„ 10	...	...	...	...	...	Crans. 1 herring	Under 1.
	„ 11	...	...	...	...	...	4 „	„
	„ 14	...	...	...	...	...	8 „	„
	„ 15	...	...	...	...	...	4 „	„
	„ 16	...	...	...	...	...	6 „	„
	„ 20	...	...	...	...	...	14 „	„
	„ 21	...	...	...	...	...	2 „	„
	„ 25	...	...	...	...	...	1 „	„
	„ 26	12	...	...	...	...	...	2 E.
	„ 28	10	...	...	...	...	...	„
	Total for Month.	... 65	... ...	... ...	... ...	... ...	... 40 crans 76 No.	Under 2 2–3 3–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.* Boat No. 13. 34 feet Keel. 6 Men.	1887.	No.	Cwt.	Cwt.			Crans.	
	Jan. 11	...	...	...	...	...	1 herring	1
	,, 12	...	...	...	...	...	2 ,,	,,
		26	...	...	...	...	...	3–4
	,, 15	...	...	...	...	...	3 herrings	2
	,, 17	...	...	...	...	...	1 ,,	,,
	,, 18	...	...	...	...	...	2 ,,	,,
	,, 19	...	...	...	...	...	8 ,,	,,
	,, 22	...	...	...	...	...	13 ,,	,,
	,, 25	...	...	...	...	...	8 ,,	,,
	,, 26	...	...	...	...	...	1 ,,	2
	,, 29	...	...	...	...	...	2 ,,	,,
		...	2 l.	...	...	...	...	3–4
	,, 31	...	...	...	...	...	15 herrings	2
	Total for Month.	...	...	...	...	...	56	Under 2
		...	...	...	...	...	...	2–3
		26	2	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	...	...	...	...	13 herrings	1–2
	,, 3	...	...	...	...	...	15 ,,	,,
	,, 5	...	3 l.	...	...	...	5 ,,	,,
	,, 7	...	2	...	...	...	...	4–6
	,, 8	...	...	...	...	...	2 herrings	3
	,, 9	...	...	...	...	...	12 ,,	,,
	,, 10	...	...	...	...	...	5 ,,	4–6
	,, 11	...	...	...	...	...	2 ,,	3
	,, 12	...	...	...	...	...	2 ,,	,,
	,, 15	...	...	...	...	...	2 ,,	1
		14	...	...	...	...	...	4–6
	,, 17	...	...	...	...	...	2 herrings	3
	,, 19	...	...	...	...	...	3 ,,	2
	,, 24	8	...	...	...	...	...	4
	,, 26	12	...	...	...	...	...	3
	Total for Month.	...	3	...	...	...	35	Under 2
		12	...	...	...	...	23	2–3
		22	2	...	...	...	5	3–6
		...	...	...	...	...	...	Over 6
							No.	
	Mar. 1	16	...	...	...	...	6 congers	3
	,, 16	...	2 l.	...	...	...	...	,,
			1 s.	...	...	...	...	
	,, 17	...	1 l.	...	..	...	...	5–6
			2 s.	...	...	...	...	
	,, 18	...	2 l.	...	...	...	...	9
	,, 19	...	2 l.	...	...	...	...	5–6
	,, 24	...	1 l.	...	...	...	...	9
			2 s.	...	...	...	...	
	,, 29	...	3 l.	...	...	...	...	5 6
			1 s.	...	...	...	...	
	,, 30	...	2 l.	...	...	...	...	,,
	,, 31	...	2 l.	...	...	...	...	,,
			1 s.	...	...	...	...	
	Total for Month.	...	...	...	...	...	...	Under 2
		16	3	...	...	...	6	2–3
		...	14	...	...	...	...	3–6
		...	5	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.* Boat No. 14. 38 feet Keel. 6 Men.	1886.	No.	Cwt.	Cwt.				
	Nov. 2	...	$6\frac{1}{4}$	...	...	...	...	8–14 E.S.E.
	,, 4	...	$2\frac{3}{4}$	...	...	...	...	,,
	,, 5	...	$5\frac{1}{4}$	...	...	...	...	,,
	,, 8	...	4	...	...	...	...	,,
	,, 9	...	$3\frac{1}{2}$	...	...	...	...	,,
	,, 12	...	$4\frac{1}{2}$	...	...	...	...	,,
	,, 13	...	$3\frac{1}{2}$	...	...	...	...	,,
	,, 15	...	2	...	...	...	...	,,
	,, 16	...	$2\frac{1}{2}$	...	...	...	...	,,
	,, 17	...	6	...	...	...	...	,,
	,, 18	...	...	$3\frac{1}{2}$	...	...	...	1 E.S.E.
	,, 20	...	...	$3\frac{1}{2}$	...	...	...	,,
	,, 22	...	4	...	...	...	...	20 E.S.E.
	,, 23	...	10	...	...	...	...	8–14
	,, 24	...	2	...	...	...	...	,,
	,, 25	...	$5\frac{1}{2}$	...	...	...	...	,,
	,, 26	...	2	...	...	...	...	,,
	Total for Month.	...	...	7	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	$63\frac{3}{4}$	...	...	...	...	Over 6
							Crans,	
	Dec. 7	...	...	...	...	...	1 herring.	inshore.
	,, 8	...	...	...	...	...	$\frac{1}{4}$,,	,,
	,, 10	...	...	...	...	...	3 ,,	,,
	,, 11	...	...	...	...	...	$1\frac{1}{2}$,,	,,
	,, 15	...	...	...	...	...	$1\frac{1}{2}$,,	,,
	,, 16	...	...	...	...	...	$\frac{3}{4}$,,	,,
	,, 17	...	...	...	...	...	4 ,,	,,
							No.	
	,, 20	40	...	...	...	...	2 ling l.	2 E.
							8 saith l.	,,
							3 cong. l,	,,
							Crans.	
	,, 21	...	...	...	...	...	2 herrings	inshore.
	,, 22	...	...	...	...	...	$1\frac{1}{2}$,,	,,
	,, 25	...	...	...	...	...	$1\frac{1}{4}$,,	,,
							No.	
		23 l.	...	...	...	...	2 cong. s.	1 S.E.
							1 halibut s.	,,
	,, 29	23 l.	...	...	...	...	2 ling l.	8–10 S.S.E.
							3 congers.	
	,, 30	26 l.	...	...	...	...	10 ,, l.	,,
							6 saith.	,,
							3 congers.	
	,, 31	4 l.	...	...	...	...	1 ling l.	,,
							2 halibut s.	,,
							1 turbot s.	,,
	Total for Month.	63	...	...	...	...	$16\frac{3}{4}$ crans	Under 2
		...	...	...	...	13	3 No.	2–3
		...	...	...	...	...	...	3–6
		53	...	...	...	...	27	Over 6
	1887.						Crans.	
	Jan. 11	...	...	...	...	...	$\frac{1}{4}$ herrings	1 E.
	,, 12	...	...	...	...	...	$1\frac{1}{2}$,,	,,
	,, 13	...	...	...	...	...	$\frac{1}{2}$,,	,,
							No.	
		18	...	...	...	...	2 turbot	8–14
							1 halibut	,,
							4 ling	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.* Boat No. 14. 38 feet Keel. 6 Men.	1887. Jan. 14	No.	Cwt.	Cwt.			Crans.	
	,, 18	...	...	...	...	...	¾ herring	1
	,, 20	...	...	...	...	...	1 ,,	,,
	,, 21	...	...	...	...	...	13¼ ,,	,,
	,, 22	10	...	...	...	...	9 ,,	,,
	,, 26	...	...	...	...	...	10 ,,	,,
	,, 27	...	...	...	...	...	1 ,,	,,
	,, 28	...	...	...	...	...	1 ,,	,,
	,, 29	...	2½ l. ½ s.	...	...	...	...	,,
	,, 31	...	3½ l. ¾ s.	...	...	...	...	,,
		...	2 l. 1 s.	...	...	...	...	8
	Total for Month.	10 18	7¼ 3	... ...	... ...	... ...	38¼ Crans. ... ... 7 No.	Under 2 2–3 3–6 Over 6
	Feb. 1	...	1 l.	...	...	...	...	1 S.E.
	,, 2	...	7½ l. 1 s.	...	...	...	...	,,
	,, 4	...	6 l. ⅔ s.	...	...	...	...	,,
	,, 5	...	3½ l.	...	...	...	...	,,
	,, 7	...	3½ l. 1 s.	...	...	...	...	7 S.E.
	,, 8	...	3 l. 1 s.	...	...	...	...	10 ,,
	,, 9	...	2 l. 5 s.	...	...	...	...	17 ,,
	,, 10	...	5 l. 2⅔ s.	...	...	...	...	12 ,,
	,, 14	...	4½ l. 1½ s.	...	...	...	...	,,
	,, 17	...	2¾ l. 1½ s.	...	...	...	...	,,
	,, 18	...	3⅓ l. ⅘ s.	...	...	...	...	10 S.E.
	,, 19	...	4 l. 1 s.	...	...	...	...	,,
	,, 21	...	3 l. ⅔ s.	...	...	...	...	,,
	,, 25	...	2 l. ⅔ s.	...	...	...	...	6
	Total for Month.	... ...	19⅔ ... 2⅔ 46½	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Mar. 2	...	¾	...	...	...	...	4 S.E.
	,, 3	...	2½ ¾ s.	...	...	...	...	5–8
	,, 4	...	2½ ½ s.	...	...	...	...	,,
	,, 5	...	2¾ l. ½ s.	...	...	...	...	,,
	,, 16	...	2 l. ½ s.	...	...	...	...	

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.			No.	
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.*	Mar. 26	75	...	...	...	...	1 turbot 1 halibut	20 E. ,,
	,, 28	75	...	...	...	...	...	,,
Boat No. 14. 38 feet Keel. 6 Men.	Total for Month.	 150	... ... 12¾ ...	... ...	... ...	... ...	 2	Under 2 2–3 3–6 Over 6
	1886.							
Boat No. 15. 39 feet Keel. 6 Men.	Nov. 2	...	1¼ 2½ s.	...	...	...	...	10–16
	,, 4	...	1¼	1¼	...	...	...	6–9
	,, 5	...	2¼ 2½ s.	...	...	...	...	10–16
	,, 8	...	4	2¼	...	...	...	6–9
	,, 10	...	¾	1½	...	...	...	,,
	,, 11	...	¾	11½	...	...	...	3
	,, 12	...	2 1½ s.	...	...	...	...	10–16
	,, 13	...	1	2	...	...	...	6–9
	,, 15	...	1½ 2 s.	...	...	...	...	10–16
	,, 16	...	1½ 2½ s.	...	...	...	...	10–16
	,, 17	...	2½ 1½ s.	...	...	...	...	,,
	,, 20	...	½	1¾	...	...	...	1
	,, 22	...	3½ 2⅛ s.	...	...	...	...	,,
	,, 23	...	3¼ 2 s.	...	...	...	...	10–16
	,, 24	...	¾ ¾ s.	...	...	...	...	6–9
	,, 25	...	3⅓ 2¾ s,	...	...	...	...	10–16
	Total for Month.	... ...	6⅛ ¾ ... 43⅓	1¾ 11½ ... 7	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
							No.	
	Dec. 6	16	...	...	...	...	6 skate 6 congers	5
	,, 7	18	...	...	...	...	18 ,, 6 skate.	3
							Crans.	
							1¾ herring	inshore.
	,, 8	...	...	...	...	...	1¾ ,,	,,
	,, 10	...	...	...	...	...	7½ ,,	2
							No.	
	,, 11	14	...	...	...	...	8 skate s. 11 congers	3 ,,
							Crans.	
	,, 15	...	...	...	...	...	1¼ her'gs.	inshore.
	,, 16	...	...	...	...	...	1 ,,	,,
	,, 18	...	...	...	...	...	1¾ ,,	,,
	,, 20	...	...	...	...	...	7¾ ,,	,,
	,, 21	...	...	...	...	...	2 ,,	,,
	,, 22	...	...	...	...	...	1½ ,,	,,
	,, 23	...	...	...	...	...	¾ ,,	,,
	,, 24	...	...	...	...	...	½ ,,	,,

Statistics of Fish Caught—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.* Boat No. 15. 39 feet Keel. 6 Men.	1886.	No.	Cwt.	Cwt.	Cwt.		Crans.	
	Dec. 28	...	...	...	...	...	¾ herring.	inshore
							No.	
		13	...	...	...	...	3 skate s. 6 congers.	3
	„ 29	16	...	...	...	...	3 „ l.	7
							4 skate s.	„
	„ 30	11	...	...	...	...	3 „ 6 congers s	„
	Total for Month.	...	...	...	...	...	28¼ crans.	Under 2
		45	...	...	...	...	52 No.	2–3
		16	...	...	...	...	12 „	3–6
		27	...	...	...	...	16 „	Over 6
	1887.						Crans.	
	Jan. 12	...	...	...	...	...	1¼ her'ngs.	1
	„ 13	...	...	...	...	...	1 „	„
	„ 17	...	...	...	...	...	1 „	„
	„ 18	...	...	...	...	...	1 „	„
	„ 20	...	...	...	...	...	4 „	6–9
							No.	
		13	...	...	...	...	4 skate	10–16
							Crans.	
	„ 21	...	...	...	...	...	15 her'ngs.	3
	„ 22	...	...	...	...	...	17 „	„
	„ 24	...	...	...	...	...	¼ „	„
	„ 26	..	...	...	...	...	½ „	„
	„ 27	...	...	...	...	...	1½ „	„
	„ 28	...	...	...	...	...	1 herrings	3
		10	..	...	...	...	...	1
	„ 29	...	2 l. 1 s.	...	...	...	4½ her'ngs.	„
	„ 31	...	...	...	...	...	½ „	„
	Total for Month.	10	3	...	...	...	9¼	Under 2
		...	...	...	...	...	35¼	2–3
		...	...	...	...	...	...	3–6
		13	...	...	...	...	4 Crans. 4 No.	Over 6
							Crans.	
	Feb. 1	...	3¼ 1 s.	...	...	...	...	2–3
	„ „	...	...	...	...	...	2 herrings	4
	„ 3	...	...	...	...	...	8 „	3
	„ 4	...	...	...	...	...	1¼ „	„
	„ 5	...	2	...	...	...	...	2
	„ 7	...	3	...	...	...	...	11–12
	„ 8	...	...	...	...	...	1½ her'ngs.	1
	„ 9	...	...	...	...	...	5¼ „	„
	„ 10	...	...	...	...	...	8½ „	„
	„ 14	...	3½ 1¼ s.	...	...	...	...	17
	„ 16	...	¾	...	...	...	...	1
	„ 17	...	1½l. 1 s.	...	...	...	...	11–12
	„ 18	...	1½l. ⅔ s.	... ...	... ...	... ...	...	„
	„ 21	...	2½l.	...	...	...	...	„
	Total for Month.	...	¾	...	...	...	15¼	Under 6
		...	6¼	...	...	...	9¼	2–3
		...	...	...	...	...	2	3–6
		...	15	...	..	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.				No.	
STONEHAVEN DISTRICT—*cont.* *Stonehaven Station.* Boat No. 15. 39 feet Keel. 6 Men.	Mar. 3	...	1½ l. ½ s.	...	...	...	...	8
	,, 4	2	2⅛ 1½ s.	...	...	...	...	10-19
	,, 5	1	1½	...	...	...	...	,,
	,, 17	68	...	...	...	...	30 ling 3 halibut 1 turbot 6 skate 8 coal	,,
	,, 21	58	...	...	...	...	14 ling 1 turbot 1 halibut 8 skate	,,
	Total for Month.	 129	... ... 7⅛	... ...	... ...	... ...	 72	Under 2 2–3 3–6 Over 6
	1886.							
Crawton Station. Boat No. 16. 22 feet Keel. 5 Men.	Nov. 1	...	⅞ l.	...	1½ s.	...	...	2–3
	,, 8	...	1 l.	...	2 s.	...	...	4–6
	,, 11	...	3 l.	...	1¾	...	...	2–3
	,, 12	...	¾ l.	...	1⅜	...	...	4–6
	,, 13	...	1½ l.	...	¾	...	...	2–3
	,, 16	...	1	...	2	...	...	1
	,, 17	...	⅜ l.	...	1¼	...	...	1
	,, 20	...	⅜	...	⅞	...	...	2–3
	,, 22	...	1½ l.	...	2	...	...	4–6
	,, 23	...	1⅛ l.	...	1¾	...	...	,,
	,, 24	...	2	...	1	...	...	2–3
	,, 25	...	1⅜	...	1¾	...	...	,,
	,, 26	...	1½	...	1¾	...	...	,,
	,, 27	...	⅝	...	⅜	...	...	,,
	Total for Month.	... ...	1⅜ 11¼ 4⅜ ...	... ...	3¼ 9¾ 7⅛ ...	... ...	... ...	Under 2 2-3 3-6 Over 6
							Crans.	
	Dec. 6	...	1½ l.	...	...	...	...	3 E.
	,, 7	...	1 l.	...	...	...	...	,, S.E.
	,, 10	4	...	...	...	...	...	½ S.
	,, 11	5½	...	...	...	...	...	,,
	,, 15	...	...	...	...	...	3½ her'ngs.	,,
	,, 18	...	...	...	...	...	1 ,,	,,
	,, 20	...	...	...	...	...	2 ,,	,,
	,, 21	...	...	..	...	...	4 ,,	,,
	,, 27	5	...	...	...	...	...	,,
	,, 29	4	...	...	...	...	...	,,
	,, 30	3	...	...	...	...	...	,,
	Total for Month.	21½	... 2½	... ...	... ...	... ...	10½	Under 2 2–3 3–6 Over 6
	1887.							
	Jan. 13	...	...	...	...	..	1¼ her'ngs.	2-3
	,, 14	...	...	...	...	...	1¾ ,,	,,
	,, 15	5	...	...	...	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.	Cwt.	Cwt.		Crans.	
STONEHAVEN	Jan. 20	2¾	2½	...	...	...	...	2–3
DISTRICT—*cont.*	,, 24	...	...	...	...	...	1¼ her'ngs.	,,
Crawton Station.	,, 31	...	3 l.	...	...	...	...	,,
Boat No. 16.	Total for Month.	...	...	...	...	...	...	Under 2
22 feet Keel.		7¾	5½	...	...	...	4¼	2–3
5 Men.		...	...	...	...	...	...	3–6
		...	...	..	...	...	...	Over 6
	Feb. 1	..	3 l.	...	2½ s.	...	...	S.E.
	,, 5	...	1½ l.	...	2½	...	...	,,
	,, 7	...	1¼ l.	...	3	...	...	E.
	,, 9	...	¾	...	½	...	...	S.E.
	,, 12	...	...	...	2¼ s.	...	...	S.
	,, 14	...	1½ l.	...	1¾	...	...	S.E.
	,, 15	...	1¾ l.	...	¼	...	...	,,
	,, 17	...	1¼ l.	...	1	...	...	,,
	,, 21	...	1 l.	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	..	...	2–3
		...	12	...	13¾	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	2 s.	...	1	...	...	2–4
	,, 2	...	1 l.	...	½	...	...	,,
	,, 3	...	1½ l.	...	½	...	...	,,
	,, 4	...	1½ l.	...	1¾	...	...	,,
	,, 5	...	1¼ s.	...	½ l.	...	...	,,
	,, 7	...	2½ l.	...	1 l.	...	...	,,
	,, 8	...	1¾ s	...	...	...	...	,,
	,, 16	...	2 s.	...	¾	...	...	,,
	,, 17	...	1¼ s.	...	...	...	...	,,
	,, 18	...	3 s.	...	...	...	...	,,
	,, 19	...	1 l.	...	...	...	...	,,
	,, 25	...	1 s.	...	...	...	...	,,
	,, 29	...	1½ s.	...	...	...	...	,,
	,, 30	...	1 s.	...	...	...	...	,,
	,, 31	...	1¼ s.	...	...	...	score. 6 crabs	inshore.
	Total for Month.	...	1¼	...	...	...	6	Under 2
		...	22¼	...	6	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1886.							
Catterline Station.	Nov. 4	...	2¼ l.	...	1	...	...	3–6
	,, 5	...	3	...	1	...	...	,,
	,, 8	...	3 l.	...	1½ s.	...	...	,,
Boat No. 17.	,, 12	...	3 l.	...	1½	...	...	7 E.
26 feet Keel.	,, 13	...	1 l.	...	1	...	...	2–3
5 Men.	,, 15	...	1 l.	...	...	...	...	3–6
	,, 16	...	1½ l.	1 l.	...	...	...	,,
	,, 20	...	1½	1 l.	...	...	...	,,
	,, 22	...	3	...	...	...	...	,,
	,, 23	...	2½	...	1	...	...	,,
	,, 24	...	1¾	...	1	...	...	7 S.S.E.
	,, 25	...	1½	...	½	...	...	3–6
	,, 26	...	1	...	1	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	1	...	1	...	...	2–3
		...	20¼	2	6	...	...	3–6
		...	4¾	...	2½	...	...	Over 6.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Cwt.		Cwt.		Crans.	
STONEHAVEN DISTRICT—*cont.* *Catterline Station.* Boat No. 17. 26 feet Keel, 5 Men.	Dec. 3	...	1 l.	...	1 l.	...	...	3 S.E.
	,, 7	...	...	...	2 l.	...	...	inshore
	,, 8	...	...	...	...	...	½ herrings.	,,
	,, 10	...	...	...	...	...	2½ ,,	,,
	,, 11	...	...	...	...	...	½ ,,	,,
	,, 15	...	...	...	...	...	2 ,,	,,
	,, 17	...	...	...	...	...	4 ,,	,,
	,, 18	...	...	...	...	...	2¾ ,,	,,
	,, 20	...	...	...	...	...	1¼ ,,	,,
	,, 21	...	...	...	...	...	2½ ,,	,,
	,, 24	...	...	...	...	...	4 ,,	,,
	,, 27	...	2 l.	...	1¼	...	½ ,,	2 E.
	,, 28	...	...	...	...	...	¾ ,,	,,
			3 l.	...	1	...	...	3-4 S.E.
	,, 29	...	2½ l.	½ l.	...	...	...	,,
	,, 30	...	3 l.	...	...	...	...	,,
	,, 31	...	3 l.	...	...	...	...	,,
	Total for Month.	...	...	...	2	...	17½	Under 2
		...	3	...	2¼	...	...	2-3
		...	11½	½	1	...	...	3-6
		...	...	...	...	...	...	Over 6.
	1887.							
	Jan. 14	...	2 l.	...	...	...	...	3-4
	,, 15	...	4	...	...	...	...	4-5
			3 l.					
	,, 20	...	3 l.	...	...	...	...	,,
	,, 21	...	4	...	1½	...	...	3-4
	,, 22	...	...	...	...	...	2 herrings.	2-3
	,, 24	...	3	...	...	...	3 ,,	,,
	,, 26	...	4	...	1	...	1 ,,	,,
	,, 27	...	3	...	1	...	½ ,,	,,
	,, 29	...	4	...	...	...	...	,,
	,, 31	...	5	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	19	...	2	...	6½	2-3
		...	16	...	1½	...	...	3-6
		...	...	...	...	...	...	Over 6.
	Feb. 1	...	5½	...	...	...	10 her'ngs.	½-1½ S.
	,, 4	...	2	...	...	...	...	,,
	,, 5	...	2	...	...	...	2 herrings,	,,
	,, 7	...	...	...	...	...	4 ,,	,,
	,, 8	...	1½l.	...	...	...	1 ,,	,,
	,, 9	...	...	...	...	...	2½ ,,	,,
	,, 10	...	...	...	...	...	1 ,,	,,
		...	2½l.	...	...	...	...	5 S.E.
	,, 11	...	2½	...	...	...	..	,,
	,, 12	...	3	...	...	...	...	,,
	,, 14	...	3½	...	...	...	...	7 ,,
	,, 15	...	3½	...	...	...	...	,,
	,, 17	...	2 l.	...	...	...	...	5 ,,
	,, 18	...	2 l.	...	...	...	...	,,
	,, 19	...	3	...	...	...	...	7 ,,
	,, 21	...	2½l.	...	2 l.	...	...	,,
	,, 25	...	2 l.	...	1½l.	...	...	,,
	Total for Month.	...	11	...	...	...	20½	Under 2
		...	...	...	...	...	...	2-3
		...	12	...	...	...	...	3-6
		...	14½	...	3½	...	...	Over 6.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.	Cwt.	Cwt.		Cwt.	
STONEHAVEN DISTRICT—*cont.* *Catterline Stn.* Boat No. 17. 26 feet Keel. 5 Men.	Mar. 1	...	2	...	...	...	...	1–3
	,, 3	...	1 s.	...	...	...	...	3–4
	,, 4	...	2 s.	...	...	...	...	7 S.S.E.
	,, 5	...	2 s.	...	...	...	...	,,
	,, 7	...	2 s.	...	...	...	...	,,
	,, 8	...	2½ s.	...	...	...	...	,,
	,, 16	...	2½ s.	...	...	...	...	1–3
	,, 17	...	2 s.	...	...	...	...	4–5
	,, 19	...	2½ s.	...	...	...	...	7 S.S.E.
	,, 21	...	1 l.	...	...	...	...	1–3
	,, 26	...	...	...	2½	...	...	,,
	,, 29	...	...	...	1½	...	...	,,
	,, 30	...	1 s.	...	...	...	...	,,
	,, 31	...	1 s.	...	1 l.	...	...	,,
	Total for Month.	...	7½	...	5	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	3	...	...	...	...	3–6
		...	11	...	...	...	...	Over 6.
	1886.							
Shieldhill Station. Boat No. 18. 17 feet Keel. 3 Men.	Nov. 5	...	½	...	½	...	...	2–3
	,, 8	...	1	...	1	...	...	,,
	,, 12	...	½	...	3½	...	...	,,
	,, 13	...	...	...	2	...	...	4
	,, 16	...	...	...	1	...	...	1½
	,, 22	...	...	...	1	...	...	,,
	,, 23	...	½	...	½	...	...	2–3
	,, 24	...	¼	...	1	...	...	,,
	Total for Month.	...	...	...	2	...	...	Under 2
		...	2¾	...	6½	...	...	2–3
		...	...	...	2	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 4	...	...	...	1	...	...	1
	,, 10	...	...	...	1	...	½ con. eels.	inshore.
	,, 11	2	...	...	1	...	...	,
	,, 21	2	...	...	...	...	...	,,
	,, 25	2½	...	...	...	...	...	,,
	,, 27	1	...	...	...	...	...	,,
	,, 30	1	...	...	...	...	½ con. eels.	,,
	,, 31	...	1½	...	...	...	...	2
	Total for Month.	8½	...	...	3	...	1	Under 2
		...	1½	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 12	...	...	...	...	...	...	inshore.
	,, 14	½	...	...	2	...	...	,,
	,, 15	1½	...	...	1½	...	...	,,
	,, 20	...	...	...	½	...	...	,,
	,, 31	...	...	...	3	...	...	,,
	Total for Month.	2	...	...	7	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.		Cwt.			
STONEHAVEN DISTRICT.—*cont.*	Feb. 1	...	2 s.	...	...	...	...	2–3
Shieldhill Station.	,, 5	...	...	...	2	...	...	inshore.
	,, 9	...	...	...	1	...	...	,,
	,, 10	2	...	...	...	...	...	2–3
Boat No. 18.	,, 12	2	...	...	1	...	...	,,
17 feet Keel.	,, 14	2	...	...	...	...	...	,,
3 Men.	,, 17	...	2	...	...	...	...	,,
	,, 18	...	1	...	1	...	...	,,
	,, 19	...	...	...	1	...	...	,,
	,, 23	...	1	...	1	...	...	,,
	,, 25	...	...	...	2	...	...	,,
	Total for Month.	...	...	...	3	...	...	Under 2
		6	6	...	6	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
							Scores.	
	Mar. 1	...	...	...	1	...	...	inshore.
	,, 2	...	...	...	1½	...	...	,,
	,, 3	...	...	...	1½	...	...	,,
	,, 4	...	...	...	1	...	...	,,
	,, 5	...	...	...	2	...	...	,,
	,, 8	2	...	...	...	...	3 Crabs.	,,
	,, 9	...	...	...	...	...	5 ,,	,,
	,, 10	...	...	...	...	...	5 ,,	,,
	,, 12	...	...	...	...	...	3 ,,	,,
	,, 14	...	...	...	...	...	8 ,,	,,
	,, 16	...	...	...	...	...	11 ,,	,,
	,, 19	...	...	...	...	...	6 ,,	,,
	,, 21	...	...	...	...	...	6 ,,	,,
	,, 26	...	...	...	...	...	12 ,,	,,
	,, 29	...	...	...	...	...	6 ,,	,,
	,, 31	...	...	...	...	...	10 ,,	,,
	Total for Month.	2	...	...	7	...	75	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6.
	1886.							
Gourdon Station.	Nov. 4	...	½ s.	2½ s.	...	⅛ s.	...	2–3 S.E.
Boat No. 19.	,, 5	...	6 l.	...	1½	...	...	7–10 ,,
27 feet Keel.	,, 8	...	6½ l.	...	1½	½	...	,,
5 Tons.	,, 9	...	2 s.	2 s.	...	...	...	2–3 ,,
4 Men.	,, 10	...	¾	...	...	...	...	4-6 ,,
	,, 12	...	1½	...	1½	...	...	,,
	,, 15	...	1½	1½ s.	...	...	...	7–10
	,, 16	...	1¾	½ s.	1	⅛	...	4–6
	,, 17	...	1½	...	...	...	...	,,
	,, 19	...	1¾ s.	1 s.	...	...	...	7–10
	,, 20	...	3¼	...	3¼	...	...	4–6
	,, 22	...	1¼	...	1¼	...	...	,,
	,, 23	...	6 l.	½ s.	...	⅛	...	7–10
	,, 24	...	4 l.	...	...	...	...	4–6
	,, 30	...	1½	...	¾	...	...	2–3
	Total for Month.	...	...	...	...	...	...	Under 2
		...	4	4½	¾	⅛	...	2–3
		...	14	½	7	⅛	...	3–6
		...	21¾	3	3	⅝	...	Over 6.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT—*cont.* *Gourdon Station.* Boat No. 19. 27 feet Keel. 5 Tons. 4 Men.	1886.		Cwt.	Cwt.	Cwt.	Cwt.	Crans.	
	Dec. 1	...	2	...	...	...	...	2
	,, 3	...	5½	¾	...	⅛	...	6
	,, 4	...	1	¼	...	...	...	4
	,, 6	...	1¼	...	...	...	...	7
	,, 8	...	...	...	...	...	3 herrings.	1
	,, 9	...	...	...	...	...	¼ ,,	,,
	,, 10	35	...	...	...	...	1¼ ,,	3
	,, 11	25	...	...	...	...	14 cong. No.	1½
	,, 13	...	...	...	...	...	3½ herrings.	½
	,, 14	...	...	...	...	...	11 ,,	2–3
	,, 15	...	...	...	...	...	7¼ ,,	,,
	,, 17	...	...	...	...	...	2 ,,	inshore.
	,, 20	...	...	...	...	...	12 ,,	4
	,, 21	...	...	...	...	...	2½ ,,	inshore.
	,, 27	45	...	...	...	...	...	7
	,, 29	27	...	...	...	...	10 cong.	4
	,, 30	...	5½	...	...	...	...	8 E.S.E.
	,, 31	...	4	...	...	...	...	4
	Total for Month.	25	...	...	...	...	11¼ crans. 14 No.	Under 2
		35	2	...	...	...	19¾ crans.	2–3
		27	10½	½	...	⅛	10 No. 12 crans.	3–6
		45	6¾	...	...	...	...	Over 6.
	1887.							
	Jan. 10	20	...	...	...	...	8 congers.	7–10
	,, 12	40	...	...	...	...	...	4–6
	,, 15	...	5	...	...	...	...	2–3
	,, 20	...	2½	...	...	...	...	4–6
	,, 21	...	6	...	...	...	...	,,
	,, 24	...	2½	...	...	...	...	,,
	,, 26	...	7¾	...	...	...	...	,,
	,, 27	...	1¼	...	...	...	...	,,
	,, 28	...	5	...	...	...	...	,,
	,, 31	...	8	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	5	...	...	...	...	2–3
		40	33	...	...	...	...	3–6
		20	...	...	...	...	8	Over 6
	Feb. 1	...	6	...	...	...	...	7 E S. E.
	,, 4	...	5½	...	...	...	...	4 E.
	,, 7	...	5	½ s.	...	...	...	,, S.
	,, 9	...	2½	½ s.	...	...	...	7 S.S.W.
	,, 10	...	1	...	...	...	...	4 ,,
	,, 11	...	2¼ l.	½ s.	...	...	...	,, E.
	,, 12	...	1½ l.	...	...	...	...	5 S.
	,, 14	...	2	...	...	...	...	5 E.S.E.
	,, 15	...	2½	...	...	...	...	3 ,,
	,, 17	...	3¾	...	½ s.	...	...	6 ,,
	,, 21	...	2	...	...	...	...	4 S.S.E.
	,, 22	...	1¾	...	...	...	...	6 E.S.E.
	,, 23	...	2	...	...	...	...	,, S. S. E.
	,, 25	...	2 l.	...	...	...	...	7 E.S.E.
	,, 26	...	2½ s.	...	...	...	...	6 E.
	,, 28	...	2½ l.	...	...	...	...	3 E. S. E.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	1	...	...	...	...	2–3
		...	43¾	1½	½	...	...	3–6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.	Cwt.	Baskets.	
MONTROSE DISTRICT—*cont.* *Gourdon Station.* Boat No. 19.	Mar. 4	...	...	...	1½	...	...	1–1½
	,, 5	...	...	...	...	...	2½ crabs.	2–3
	,, 7	...	...	...	½	...	½ ,,	1–1½
	,, 8	...	...	...	1½	...	...	,,
	,, 9	...	...	...	1	...	...	,,
	,, 16	...	...	...	...	...	2½ crabs.	2–3
	,, 17	...	1 s.	...	...	...	...	4–6
	,, 19	...	...	...	...	...	2½ crabs.	2–3
	,, 21	...	...	...	1	...	...	1–1½
	,, 23	...	...	...	½	...	...	,,
							1½ crabs.	2–3
	,, 25	...	1½	...	...	...	...	4–6
	,, 28	...	1¾	...	...	...	...	2–3
	,, 31	...	2½ l.	...	...	...	...	4–6
	Total for Month.	...	...	...	6	...		Under 2
		...	1¾	...	...	...	9½	2–3
		...	5	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1886.							
Boat No. 20. 30 feet Keel. 10 Tons. 5 Men.	Nov. 4	...	2 s.	2 s.	...	⅛ s.	...	2–3 S.E.
	,, 5	...	6	1	...	...	...	7–10
	,, 8	...	5	...	1	...	...	,,
	,, 12	...	3 s.	1 s.	...	...	...	7–10
	,, 13	...	5	...	...	...	...	4–6
	,, 15	...	2 s.	½ s.	...	...	...	,,
	,, 16	...	2 s.	½ s.	...	...	...	2–3
	,, 17	...	4 s.	...	...	...	...	7–10
	,, 20	...	4½	...	...	...	...	4–6
	,, 22	...	5 l.	...	...	...	...	7–10
	,, 23	...	6	...	...	...	...	4–6
	,, 24	...	8	...	...	...	...	10–12
	,, 25	...	4	...	...	...	...	7–10
	Total for Month.	...	...	...	...	...	...	Under 2
		...	4	2½	...	⅛	...	2–3
		...	17½	½	...	...	...	3–6
		...	35	2	1	...	...	Over 6
	Dec. 3	...	2	1	...	...	...	2
	,, 4	...	2	...	...	...	...	4 E.S.E.
	,, 6	...	1	1	...	...	...	2
	,, 7	...	5½	...	...	...	...	8 S.E.
	,, 11	...	3	...	...	...	...	6 E.S.E.
	,, 21	...	5	...	1	...	...	4 S.E.
	,, 22	...	3	...	...	...	...	6 S.S.E.
	,, 24	...	4	...	...	...	...	5 S.S.E.
	,, 25	...	3	...	...	...	...	8 S.E.
	,, 27	...	2	1	...	...	...	2 ,,
	,, 28	...	2½	...	1½	...	...	3 S.S.E.
	,, 29	...	2	...	1½	...	...	2 S.E.
	,, 30	...	2½	...	1	...	...	1 ,,
	,, 31	...	2	...	1	...	...	3 E.S.E.
	Total for Month.	...	5½	...	...	...	...	Under 2
		...	8½	3	5	...	...	2–3
		...	17	...	1	...	...	3–6
		...	8½	...	...	...	...	Over 6
	1887.							
	Jan. 10	...	1	...	½	...	...	2–3
	,, 14	...	2	...	½	...	...	4–6
	,, 15	...	3½ s.	...	...	...	...	2–3

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Floundeas.	Other Fish.	Miles.
MONTROSE DISTRICT—*cont.* *Gourdon Station.* Boat No. 20.	1887.		Cwt.	Cwt.	Cwt.			
	Jan. 20	...	4	¼	¼	...	...	2–3
	,, 21	...	3	...	...	...	...	”
	,, 22	...	3 l.	...	...	...	...	”
	,, 27	...	7¼	...	...	...	...	”
	,, 28	...	5 l.	...	...	...	...	”
	,, 31	...	6 l.	...	...	...	...	”
	Total. for Month.	...	...	...	...	...	...	Under 2
		...	32¾	¼	¾	...	...	2–3
		...	2	...	½	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	7	...	...	...	...	4
	,, 4	...	5	1	...	...	...	2–3
	,, 5	...	4	1½	...	...	...	”
	,, 7	...	4½	...	...	...	...	5
	,, 9	...	3	...	...	...	...	2–3
	,, 10	...	2	...	...	...	...	”
	,, 11	...	2	...	1	...	...	”
	,, 14	...	2	...	1	...	...	4
	,, 15	..	2½	...	...	...	...	2
	,, 17	...	3	...	1	...	...	7
	,, 18	...	3	...	¾	...	...	4
	,, 19	...	3	...	...	...	...	2–3
	,, 21	...	3	...	...	...	...	”
	,, 23	...	4	...	...	...	...	1
	,, 25	...	2½	...	...	...	...	2–3
	,, 26	...	2½	...	...	...	...	”
	,, 28	...	2½	...	...	...	...	1
	Total for Month.	...	6½	...	...	...	...	Under 2
		...	29½	2½	1	...	...	2–3
		...	16½	...	1¾	...	...	3–6
		...	3	...	1	...	...	Over 6
	Mar. 1	...	3	...	...	...	...	2–3
	,, 2	...	1¼	...	...	...	...	”
	,, 3	...	2	...	...	...	...	4–6
	,, 4	...	1	...	...	...	...	”
	,, 7	...	3	...	...	...	...	”
	,, 8	...	2½	...	1	...	...	7–10
	,, 15	...	3	...	...	...	...	2–3
	,, 16	...	3	...	...	...	...	4–6
	,, 17	...	2½	...	...	...	...	4–6
	,, 19	...	2	...	...	...	...	2–3
	,, 21	...	2	...	1	...	...	4–6
	,, 25	...	3	...	...	...	...	”
	,, 26	...	2	...	...	...	...	2–3
	,, 28	...	2	...	...	...	...	4–6
	,, 31	...	2	...	...	...	...	2–3
	Total for Month.	...	...	...	...	...	...	Under 2
		...	13¼	...	...	...	...	2–3
		...	18½	...	1	...	...	3–6
		...	2½	...	1	...	...	Over 6
Johnshaven Stn.	1886.							
Boat No. 21. 34 feet Keel. 14 Tons. 5 Men.	Nov. 5	...	5 s.	...	...	...	...	16–18 S.E.
	,, 8	...	4 s.	...	...	...	...	6–8 ,,
	,, 10	...	5 s.	...	...	...	...	,, ,,
	,, 11	...	3 s.	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	No.	Cwt.	Cwt.				
MONTROSE DISTRICT—*cont.* *Johnshaven Stn.* Boat No. 21. 34 feet Keel. 14 Tons. 5 Men.	Nov. 12	3	4½ s.	...	...	...	...	3–4 S.E.
	,, 15	...	3 s.	...	...	...	...	16–18 ,,
	,, 17	...	5 s.	...	...	...	...	,, ,,
	,, 22	...	9 l.	...	...	...	...	25 ,,
	,, 23	...	7 l.	...	...	...	...	,, ,,
	,, 24	...	6 s.	...	...	...	...	6–8
	,, 25	...	7 l.	...	...	...	...	16–18
	Total for Month.	... ... 3 ...	... ... 4½ 54	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
							Crans.	
	Dec. 2	...	2½ s.	...	...	...	...	6 S.E.
	,, 3	...	3 s.	...	...	...	...	,,
	,, 11	...	...	...	...	...	1 herring	1 S.E.
	,, 13	...	...	...	...	...	2 ,,	,,
	,, 15	...	...	...	...	...	24 ,,	,,
	,, 16	...	...	...	...	...	5 ,,	,,
	,, 17	...	...	...	...	...	4 ,,	,,
	,, 20	...	...	...	...	...	7¾ ,,	,,
	,, 21	...	...	...	...	...	1 ,,	,,
	,, 23	10	...	...	...	...	...	8 E.
	,, 28	...	...	...	...	...	1 ,,	1 S.E.
	,, 29	16	...	...	...	...	...	4 E.
	,, 30	9	...	...	...	...	...	8 S.E.
	Total for Month.	... ... 16 19	... ... 5½ ...	... ...	... ...	... ...	45¾	Under 2 2–3 3–6 Over 6
	1887. Jan. 15	9	1 s.	...	...	...	...	4–6 E.
	,, 16	...	4 l.	...	...	...	...	,, S.E.
	,, 20	...	2 l. 2 s.	...	...	...	...	,, ,,
	,, 21	...	4½ l. 2 s.	...	...	...	...	,, ,,
	,, 22	...	3 l. 1½ s.	...	...	...	...	,, ,,
	,, 24	...	8 l. 2 s.	...	...	...	...	,, E.
	,, 25	...	2 l. 1 s.	...	...	...	...	,, ,,
	,, 26	...	3 l. 3 s.	...	...	...	...	4–6 E.
	,, 27	...	3 l.	...	...	...	...	,, ,,
	,, 31	...	3 l.	...	...	...	...	,, ,,
	Total for Month.	... ... 9 ...	... ... 45 ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	7 l. 2 s.	...	...	...	...	5 E.
	,, 2	...	2 l. 1 s.	...	...	...	...	6 S.E.
	,, 3	...	3 l. 3 s.	...	...	...	...	4 E.
	,, 4	...	3 l. 2 s.	...	...	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT—*cont.* *Johnshaven Station.* Boat No. 21.	1887.							
	Feb. 7	...	2 l.	...	...	...	...	6 S.E.
			1 s.					
	,, 9	...	3 l.	...	...	...	...	5 ,,
			1 s.					
	,, 14	...	2 l.	...	...	...	...	7 E.
	,, 16	...	1½ l.	...	...	...	...	,,
			1 s.					
	,, 28	...	1 l.	...	...	...	...	5 S.E.
			1 s.					
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	34½	...	...	...	...	3–6
		...	2	...	...	...	...	Over 6
							No.	
	Mar. 1	...	1 l.	...	...	...	...	8 E.
			1 s.					
	,, 3	...	15 l.	...	...	...	...	1 S.
	,, 7	...	3 l.	...	...	...	...	,,
			...	...	...	...	125 crabs	4 S.E.
	,, 9	...	...	...	...	...	94 ,,	,,
			6 l.	...	...	...	...	1 S.
	,, 11	...	8 l.	...	...	...	...	,,
	,, 12	...	...	...	...	...	154 crabs	4 S.E.
	,, 14	...	...	...	...	...	6 ,,	,,
	,, 16	...	8 l.	...	...	...	...	1 S.
	,, 17	...	...	...	...	...	200 crabs	4 S.E.
	,, 18	...	4 l.	...	...	...	...	1 S.
	,, 19	...	...	...	...	...	120 crabs	4 S.E.
	,, 22	...	...	...	...	...	139 ,,	,,
			4 l.	...	...	...	...	1 S.
	,, 24	...	4 l.	...	...	...	...	,,
			...	...	...	...	127 crabs	4 S.E.
	,, 28	...	4 l.	...	...	...	...	1 S.
	,, 29	...	7 l.	...	...	...	...	,,
			1 l.	...	...	...	...	8 E.
			...	...	...	...	76 crabs	4 S.E.
	Total for Month.	...	63	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	1041	3–6
		...	3	...	...	...	...	Over 6
	1886.							
Boat No. 22. 18 feet Keel. 3 Tons. 4 Men.	Nov. 4	1	1	...	...	...	...	2–3 S.W.
	,, 8	1½	1	...	...	...	...	,, S.E.
	,, 10	2	1½	...	...	...	...	,, ,,
	,, 11	1½	2	...	...	...	...	,, ,,
	,, 12	1½	3	...	...	...	...	4–6 S.W.
	,, 13	1½	3	...	...	...	...	2–3 ,,
	,, 16	¼	1½	...	...	...	...	4–6 S.E.
	,, 19	½	1½	...	...	...	...	,, S.W.
	,, 24	1	1½	...	...	...	...	,, S.E.
	,, 25	1½	2	...	...	...	...	2–3 ,,
	,, 26	3	2	...	...	...	...	,, S.W.
	,, 27	1½	1	...	...	...	...	4–6 ,,
	Total for Month.	5½	6	...	...	...	...	Under 2
		10	12	...	...	...	...	2–3
		1¼	3	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	Cwt.	Cwt.	Cwt.				
MONTROSE DISTRICT—*cont.* *Johnshaven Station.* Boat No. 22. 18 feet Keel. 3 Tons. 4 Men.	Dec. 1	1½	1	¾	...	...	...	3 S.S.W.
	,, 4	1	½	½	...	...	...	4 S.E.
	,, 6	...	½	...	...	...	...	2–3 S.S.E.
	,, 7	2	1	...	...	...	...	” ”
	,, 9	1½	1½	1	...	...	...	3 ”
	,, 13	6	...	...	...	...	...	” S.W.
	,, 14	5	...	...	...	...	...	” ”
	,, 15	6	....	...	...	...	...	” ”
	,, 20	3	1	...	...	...	...	” S.E.
	,, 24	4	1	...	...	...	...	” ”
	,, 28	5	2	...	...	...	...	” ”
	,, 29	3	1½	...	...	...	...	” S.S.W.
	,, 30	1	1	...	...	...	...	” S.S.E.
	,, 31	5	2	...	...	...	...	”
	Total for Month.	17	...	...	...	...	...	Under 2
		26	12½	1¾	...	...	...	2–3
		1	½	½	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 8	2	...	...	...	...	...	2–3
	,, 12	1½	2½	...	...	...	...	4–6
	,, 14	5	1½	...	...	...	...	2–3
	,, 15	3	1	...	...	...	...	4–6
	,, 20	2	1	...	...	...	...	2–3
	,, 21	3	2¾	...	...	...	...	4–6
	,, 22	...	½	...	...	...	...	”
	,, 25	1	2	...	...	...	...	”
	,, 26	2	2	...	...	...	...	”
	,, 27	...	1¾	...	...	...	...	”
	,, 28	¾	¾	...	...	...	...	”
	Total for Month.	...	...	...	...	...	...	Under 2
		9	2½	...	...	...	...	2–3
		11¼	13¼	...	...	...	...	3–6
		...	..	...	...	...	...	Over 6
	Feb. 1	1½	1	...	...	...	...	2–3 S.E.
	,, 2	1½	½	...	...	...	...	”
	,, 3	3	1	...	...	...	...	2–3 S.
	,, 4	½	2	...	...	..	...	4 S.S.W.
	,, 6	1	½	...	...	...	...	2 S.E.
	,, 7	1	...	...	...	...	...	2-3 S.E.
	,, 8	1	½	...	...	...	...	” ”
	,, 9	3	1½	...	...	...	...	” ”
	,, 10	...	1½	...	...	...	...	” S.S.W.
	,, 11	5	1½	...	...	...	...	” ”
	,, 12	3½	¾	...	...	...	...	” S.S.E.
	,, 14	4½	1	...	...	...	...	” ”
	,, 15	2½	½	...	...	...	...	” ”
	,, 16	3	¼	...	...	...	...	” ”
	,, 17	1½	¾	...	...	...	...	4 S.E.
	,, 18	¼	¼	...	...	...	...	5 ”
	,, 21	..	1½	...	...	...	...	2–3 S.S.W.
	,, 23	¼	3	...	...	...	...	” ”
	,, 25	1	½	...	...	...	...	6 ”
	Total for Month.	5¼	7½	...	...	...	...	Under 2
		27	10	...	...	...	...	2–3
		1¾	1	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station,	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	Cwt.	Cwt.	Cwt.		Cwt.		
MONTROSE DISTRICT—*cont.* *Johnshaven Station.* Boat No. 22. 18 feet Keel. 3 Tons. 4 Men.	Mar. 2	1½	...	...	...	...	...	2–3 S.W.
	” 3	1	...	...	...	¼ plaice	...	” ”
	” 4	...	...	...	...	¼ ”	...	” S.E.
	” 5	2¾	...	...	...	...	...	” ”
	” 7	1¾	...	...	...	...	...	” S.W.
	” 9	2¼	...	...	...	...	...	” ”
	” 10	2¼	...	...	..	...	...	” ”
	” 14	1¼	...	...	...	...	...	” ”
	” 17	1	...	...	...	...	...	” ”
	” 18	1	...	...	...	...	...	” ”
	” 19	1¼	...	...	...	...	...	” ”
	” 25	2	...	...	...	...	...	” ”
	Total for Month.	15¼	...	...	...	¼	...	Under 2
		2¾	...	...	...	¼	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	..	...	...	Over 6
	1886.		No.					
Ferryden Station. Boat No. 23. 20 feet Keel. 3½ Tons. 5 Men.	Nov. 5	1	1	2½	...	...	...	6–8
	” 8	1	1	1	...	...	...	”
	” 12	...	1 s.	...	...	...	...	4–5
	” 13	4	1	1½ l.	...	...	...	9–12
	” 17	...	1	1	...	...	...	4–5
	” 18	...	1	1	...	...	...	9–12
	” 19	...	1	1½	...	...	...	4–5
	” 22	...	1	2½	...	...	...	”
	” 23	...	1	1½	...	...	...	”
	” 24	...	1	2½	...	...	...	”
	” 25	4	1	1½	...	...	...	”
	” 26	...	2	...	...	...	...	”
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		4	9	10½	...	...	...	3–6
		6	4	6	...	...	...	Over 6
	Dec. 3	1	1	2 l.	...	...	...	6
	” 7	1	1	2 l.	...	...	...	7
	” 11	1	1	...	...	...	...	”
	” 21	...	2	...	...	...	...	” S.E.
	” 24	...	4	...	...	...	...	8 S.E.
	” 25	...	4 l.	...	...	...	...	”
	” 27	6	2½ l.	...	...	...	...	7 S.S.E.
	” 28	...	1	...	...	...	...	8 S.E.
	” 29	...	1 l.	...	...	...	...	6 ”
	” 31	2	4 l.	...	...	..	...	7 ”
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		11	21½	4	...	...	...	Over 6
	1887.							
	Jan. 10	1	1	...	...	...	...	9–12
	” 14	...	1	...	...	...	...	6–8
	” 15	...	1	...	...	...	...	”
	” 20	...	1½ s.	...	...	...	...	”
	” 21	3	3 l.	...	...	...	...	”
	” 22	3	3 l.	...	...	...	...	4–5
	” 24	4	2½ l.	...	...	...	...	”

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.				
MONTROSE DISTRICT—*cont.*	Jan. 25	...	2 l.	...	...	...	...	4–5
Ferryden Station.	,, 26	3	2 l.	½ s.	...	...	...	6–8
	,, 27	1	4½ l.	...	...	...	...	9–12
	,, 28	...	2	...	3	...	...	4–5
Boat No. 23.	Total for Month.	...	...	...	...	...	...	Under 2
20 feet Keel.		...	...	...	...	...	...	2–3
3½ Tons.		7	9½	...	3	...	...	3–6
5 Men.		8	14	½	...	...	...	Over 6
	Feb. 1	1	4½ l.	...	...	...	...	8 S.E.
	,, 7	...	3	...	...	...	...	,,
	,, 8	1	2 l.	1	...	...	...	,,
	,, 9	...	2	...	...	...	...	,,
	,, 10	...	2 l.	...	...	...	...	,,
	,, 11	...	2 l.	...	...	...	...	,,
	,, 14	...	2½ l.	...	...	...	...	,,
	,, 17	1	2½ l.	...	...	...	...	,,
	,, 18	...	2 l.	...	...	...	...	,,
	,, 20	...	1 l.	...	...	...	...	,,
	,, 28	...	1½ l.	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	..	...	...	...	2–3
		...	...	...	...	...	...	3–6
		3	25	...	...	...	...	Over 6
	1886.					dozen.		
Boat No. 24.	Nov. 8	...	3	...	1	...	...	8–14
27 feet Keel.	,, 10	...	1	½	1 doz.	2 s.	...	4–6
6 Tons.	,, 12	...	2	2	3 ,,	...	...	8–14
5 Men.	,, 13	...	3	¼ bskt.	½	...	...	,,
	,, 15	...	3	1 doz.	2	...	...	,,
	,, 19	...	5	...	1	...	...	,,
	,, 22	2	3	...	1	...	...	,,
	,, 23	...	3	...	¼	...	...	,,
	,, 25	2	3	...	½	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	1	½	1 doz.	2 doz.	...	3–6
		4	25	2	6¼	...	...	Over 6
			Cwt.	Cwt.	Cwt.			
	Dec. 3	...	2	¼	½	...	...	6 S.
	,, 4	...	1 l. 1	1 2	1 l.	...	...	7 S.S.E.
	,, 6	...	1		...	...	...	5 S.
	,, 20	1	1 l. 1½	...	1	...	...	6 E.S.E.
	,, 21	...	2	...	1	...	...	8 S.
	,, 22	...	1 l. ½	...	...	...	...	7 E.S.E.
	,, 24	...	2½ 2¼	...	1	...	...	8 S.E.
	,, 25	2	1 l. 2½	...	1	...	...	7 S.S.E.
	,, 27	2	1½ l. 1½	1½	1	...	...	7 S.
	,, 28	...	1 l. 2½	...	½	...	...	6 S.S.E.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT.—*cont.* *Ferryden Station.* Boat No. 24. 27 feet Keel. 6 Tons. 5 Men.	1886.	No.	Cwt.	Cwt.	Cwt.			
	Dec. 29	...	2	...	...	...	...	7 S.E.
	,, 30	2	1 l. 1	1	½	...	...	,, ,,
	,, 31	1	3½	...	½	...	...	6 S.S.E.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		3	11½	1¾	3	...	...	3–6
		5	21¾	4	5	...	...	Over 6
	1887.							
	Jan. 10	...	3	½	½	...	...	8–14 S.E.
	,, 12	...	1 l. 1 s.	...	½	...	...	4–6 ,,
	,, 14	...	2 l. 1½ s.	...	1	...	...	8–14
	,, 15	...	1 l. 1¼	...	...	...	...	4–6
	,, 20	...	1 l. 3 s.	...	...	...	...	8–14
	,, 21	1	2 l. 3	...	...	...	...	,,
	,, 22	...	2 l. 2	...	...	...	...	4–6
	,, 24	...	2½ l. 2	...	...	...	...	8–14
	,, 25	...	1 l. 1	...	...	...	...	4–6
	,, 27	...	2½ l. 3½ s.	½	...	...	...	8–14
	,, 31	...	3 l. 4	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	10¼	...	½	...	...	3-6
		1	33	1	1½	...	...	Over 6
						Doz.		
	Feb. 1	...	2 l. 2	...	...	...	...	5 S.E.
	,, 4	...	2½ l. 2	¼	¼	½	...	7 ,,
	,, 5	...	2½ l. 1	...	...	...	...	6 ,,
	,, 7	...	1	...	...	...	...	8 ,,
	,, 8	1	1½ l. 1½	½	½	...	...	6 E.S.E.
	,, 9	...	1½	...	...	...	...	7 S.E.
	,, 10	...	2 l. ½	...	...	...	...	6 E.S.E.
	,, 14	1	2 l. 1	...	...	...	..	,, ,,
	,, 16	...	1 l. ½	...	...	...	...	7 S.
	,, 17	...	1 l.	...	...	...	...	6 E.S.E.
	,, 26	...	1 l. 1	...	...	...	...	,, ,,
	,, 28	...	2	¼	...	...	...	15 E.S.E.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		2	19½	½	½	...	...	3–6
		...	10½	½	¼	½	...	Over 6.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.	Cwt.			
MONTROSE DISTRICT—*cont.*	Mar. 2	...	1½	...	...	...	...	4–6
Ferryden Station.	,, 4	...	½	...	...	...	...	,,
	,, 7	...	½	...	½	...	...	,,
	,, 16	1	2	...	...	...	...	,,
	,, 17	...	1	...	...	...	...	8–14
Boat No. 24.	,, 23	3	1	...	½	...	...	4–6
27 feet Keel.	,, 25	3	1	½	...	...	...	8–14
6 Tons.	,, 26	...	1½	...	...	...	...	4–6
5 Men.	,, 29	..	1	...	...	...	...	,,
	,, 30	1	½ l. 1	...	...	...	...	8–14
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		4	8	...	1	...	...	3–6
		4	3½	½	...	...	...	Over 6
	1886.							
Auchmithie Station.	Nov. 8	1	7½	...	...	...	...	7–10 S.E.
	,, 12	1	6½	...	...	...	...	,, ,,
Boat No. 25.	,, 13	2	4½	...	...	...	...	,, ,,
28 feet Keel.	,, 15	4	5	...	...	...	...	4–6 ,,
4 Tons.	,, 16	1	5	...	...	...	...	,, ,,
5 Men.	,, 22	1	6	...	...	...	...	7–10
	,, 23	4	6	...	...	...	...	,,
	,, 24	2	5	...	...	...	...	,,
	,, 25	3	6	...	...	...	...	,,
	,, 27	2	4	...	...	...	...	4–6
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		7	14	...	...	...	.	3–6
		14	41½	...	...	...	...	Over 6
	1887.							
	Jan. 11	2	4	...	...	...	...	4-6 S.E.
	,, 13	1	5	...	...	...	...	7–10
	,, 14	6	6	...	...	...	...	4–6
	,, 20	1	6	...	...	...	...	7–10
	,, 22	5	4	...	...	...	...	4–6
	,, 24	3	9	...	...	...	...	7–10
	,, 27	1	5	...	...	...	...	,,
	,, 31	2	6	..	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		13	14	...	...	...	...	3–6
		8	31	...	...	...	...	Over 6
	Feb. 1	2	2	...	...	...	...	7–10
	,, 6	3	2	...	...	...	...	4–5
	,, 8	1	1	...	...	...	...	,,
	,, 9	3	4	...	...	...	...	7–10
	,, 10	...	1	...	...	...	...	4–5
	,, 11	3	4	...	...	...	...	7–10
	,, 12	1	2	...	...	...	...	,,
	,, 14	1	3	...	...	...	...	,,
	,, 16	2	3	...	...	...	...	,,
	,, 17	2	4	...	...	...	...	,,
	,, 21	1	2	...	...	...	...	,,
	,, 23	2	2	...	...	...	...	4–5
	,, 26	1	1	...	...	...	...	,,
	,, 28	3	3	...	...	...	...	7–10
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		7	7	...	...	...	...	3–6
		18	27	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.	Cwt.			
MONTROSE DISTRICT—*cont.*	Mar. 1	1	2	...	...	...	...	7–10
Auchmithie Station	,, 2	2	2	...	...	...	...	,,
	,, 3	1	1	...	...	..	...	,,
	,, 4	1	...	..	3	...	...	4–6
	,, 7	...	...	...	3	...	...	,,
Boat No. 25.	,, 8	...	...	...	2	...	...	,,
28 feet Keel.	,, 9	...	...	...	4	...	...	,,
4 Tons.	,, 13	1	...	...	3	...	...	,,
5 Men.	,, 14	1	...	...	2	...	...	,,
	,, 15	...	...	...	2	...	...	,,
	,, 17	...	...	...	2	...	...	,,
	,, 22	...	...	...	3	...	...	,,
	,, 24	...	...	...	3	...	...	,,
	,, 25	...	...	...	2	...	...	,,
	,, 27	12	3*	...	...	...	...	7–10
	,, 28	17	3*	...	...	...	...	,,
	,, 29	8	4*	...	...	...	...	,,
	,, 31	3	3*	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		3	...	...	29	...	...	3–6
		44	18	...	...	...	...	Over 6
	1886.					Doz.		
Arbroath Station.	Nov. 8	2	9	¼	1	1	...	10–15 S.E.
	,, 10	1	3	...	...	2	...	,,
Boat No. 26.	,, 11	2	5	...	2	...	...	,,
46 feet Keel.	,, 13	4	4	...	1	...	...	,,
20 Tons.	,, 15	...	9	...	...	...	...	,,
6 Men.	,, 16	1	4	...	1	...	...	,,
	,, 19	2	8	...	1	2	...	,,
	,, 20	2	4	...	...	3	...	,,
	,, 22	3	9	...	1	...	...	,,
	,, 23	2	8	...	1	...	...	,,
	,, 24	2	6	1	...	...	...	Over 15 S.E.
	,, 27	2	6	1	...	...	...	,,
	,, 30	2	4	...	1	...	...	10–15
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		25	79	2¼	9	8	...	Over 6
							Crans.	
	Dec. 2	2	3	...	1	...	...	10 S.
	,, 4	3	6	...	2	...	...	12 S.E.
	,, 9	5	5	...	...	...	...	14 ,,
	,, 11	2	4	...	...	...	...	9 ,,
	,, 14	...	...	...	...	...	2¼ her'g	2
	,, 15	...	...	...	...	...	1½ ,,	,,
	,, 16	...	...	...	...	...	1¾ ,,	,,
	,, 18	...	...	...	...	...	8¼ ,,	,,
	,, 20	...	...	...	...	...	14 ,,	,,
	,, 22	...	...	...	...	...	2 ,,	,,
	,, 24	...	...	...	...	...	¾ ,,	,,
	,, 29	...	...	...	...	...	1 ,,	,,
	,, 30	...	...	...	...	...	¾ ,,	,,
	Total for Month.	...	...	...	...	...	32¼	Under 2
		...	...	..	...	...	...	2–3
		...	...	...	...	...	...	3–6
		12	18	...	3	....	...	Over 6

* Spent fish.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.	Cwt.			
MONTROSE DISTRICT—*cont.* *Arbroath Station.*	Jan. 14	4	3	...	1	...	...	10 12 S.E.
	„ 15	2	4	...	1	...	...	„
	„ 19	4	4	...	2	...	...	„
Boat No. 26. 42 feet Keel. 20 Tons. 6 Men.	„ 20	...	6	...	2	...	...	„
	„ 21	4	6	...	2	...	...	„
	„ 24	...	4	...	2	...	...	„
	„ 25	2	8	...	1	...	...	„
	„ 26	2	8	...	1	...	...	„
	„ 27	...	5	...	1	...	...	„
	„ 31	...	5	...	...	...	...	„
	Total for Month.	 18	 53	... ...	 13	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	2	5	...	...	...	...	11 S.E.
	„ 2	...	5	...	...	...	...	9 „
	„ 3	1	5	...	...	...	...	10 „
	„ 5	2	6	...	...	...	...	9 E.S.E.
	„ 6	1	3	...	...	...	...	11 „
	„ 8	...	6	...	...	...	...	10 „
	„ 10	...	4	...	1	...	...	11 „
	„ 14	...	5	...	...	...	...	10 „
	„ 15	...	5	...	...	...	...	5 S.S.E.
	„ 17	2	5	...	...	...	...	10 S.
	„ 18	...	5	...	...	...	...	„
	„ 19	1	6	...	...	...	...	9 S.S.E.
	„ 21	6	4	...	...	...	...	10 S.E.
	„ 22	1	3	...	...	...	...	11 E.S.E.
	„ 25	1	2	...	...	...	...	10 E.
	„ 28	...	3	...	...	...	...	11 S.S.E.
	Total for Month.	 17	 72	... ...	 1	... ...	... ...	Under 2 2–6 3 -6 Over 6
	Mar. 1	2	2	...	...	...	...	10–12 S.E.
	„ 2	...	3	...	...	...	...	„
	„ 5	...	3	...	1	...	...	„
	„ 7	2	3	...	...	...	...	„
	„ 10	2	18	...	3	...	...	30–32 S.E.
	„ 15	8	7	...	1	...	...	„
	„ 17	7	7	...	1	...	...	„
	„ 29	15	15	...	1	...	...	„
	Total for Month.	 36	 58	.. ..	 7	... ...	... ...	Under 2 2–3 3–6 Over 6
	1886.					Doz.	No.	
Boat No. 27. 46 feet Keel. 20 Tons. 6 Men.	Nov. 8	2	5	¼	1½	1	...	10-12 S.E.
	„ 11	...	5½	¼	1	...	...	„
	„ 12	4	6	...	2	...	...	„
	„ 13	1	6½	...	2	...	...	„
	„ 15	3	9	...	1	...	...	„
	„ 16	1	3	...	½	...	...	„
	„ 18	...	5	...	¾	4	1 skate.	„
	„ 19	4	8½	...	½	...	...	„

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.	No.	Cwt.	Cwt.	Cwt.	Cwt.		
MONTROSE DISTRICT—*cont.* *Arbroath Station.* Boat No. 27. 46 feet Keel. 20 Tons. 6 Men.	Nov. 22	1	6½	...	¼	...	...	10–12 S.E.
	,, 23	1	14	...	1	...	...	21–24 S.E.
	,, 24	1	10	...	½	...	...	”
	,, 26	3	7	...	3¼	...	...	10–12
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		21	86	½	14¼	5	1	Over 6
	Dec. 3	3	3½	...	1½	...	...	10–11 S.E.
	,, 4	1	4	...	2	...	...	”
	,, 7	5	5½	...	3	...	...	”
	,, 10	2	4	...	2	...	...	”
	,, 11	1	3½	...	½	...	...	4 S.E.
	,, 13	7	3½	...	1	...	...	”
	,, 17	2	3½	...	1	...	...	”
	,, 20	3	8	...	1½	...	...	10 E.S.E.
	,, 21	4	6	...	½	...	...	”
	,, 23	1	4	...	1	...	...	4 S.E.
	,, 24	2	4	...	1	...	...	”
	,, 25	2	4	...	½	...	...	”
	,, 27	2	5	1	...	...	...	9 E.S.E.
	,, 28	...	2½	...	½	...	...	4 S.E.
	,, 29	5	9	...	2	...	...	12 ”
	,, 30	2	6	¾	...	...	1 turbot	” ”
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		15	25	...	5½	...	...	3–6
		27	51	1¾	12½	...	1	Over 6
	1887.							
	Jan. 13	2	2½	...	½	...	...	8–12 S.E.
	,, 14	...	2½	...	2	...	...	” ”
	,, 15	2	3	...	1	...	...	” ”
	,, 20	2	6	...	2	..	...	” ”
	,, 22	2	3	...	...	...	...	” ”
	,, 24	2	8	...	...	...	...	” ”
	,, 25	2	9	¼	...	...	...	” ”
	,, 26	1	7½	...	¼	...	...	” ”
	,, 27	4	3	...	¼	...	...	” ”
	,, 31	1	3	...	¼	...	...	” ”
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		18	47½	¼	6¼	...	...	Over 6
	Feb. 1	1	8	...	¼	...	...	10–12 S.E.
	,, 2	...	8	...	¼	...	...	” ”
	,, 4	1	3	...	...	...	...	” ”
	,, 7	...	6	...	¼	...	...	” ”
	,, 9	...	5	...	3¼	¾plaice	...	” ”
	,, 10	2	5½	½ s.	...	...	...	” ”
	,, 14	...	4	...	½	...	...	” ”
	,, 15	1	5	...	½	...	...	” ”
	,, 16	...	3	...	½	...	...	” ”
	,, 17	3	6	...	...	...	...	” ”
	,, 18	1	5½	...	...	...	...	” ”

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Cwt.	Cwt.	Cwt.	Cwt.		
MONTROSE DISTRICT.—*cont.* *Arbroath Station.*	Feb. 21	...	6	...	½	...	...	10–12 S.E.
	,, 23	3	5	...	...	...	...	,, ,,
	,, 25	1	3	...	...	...	...	,, ,,
	,, 28	2	3	...	...	...	...	,, ,,
Boat No. 27. 46 feet Keel. 20 Tons. 6 Men.	Total for Month.	 15	 76	... ... ½	 6	... ... ¾	... ...	Under 2 2–3 3–6 Over 6
	Mar. 1	...	3	...	...	...	...	10–16 S.E.
	,, 2	4	3	...	...	...	...	,, ,,
	,, 4	2	2	...	...	...	...	,, ,,
	,, 5	6	2	...	...	...	...	,, ,,
	,, 8	1	3	...	...	...	...	,, ,,
	,, 14	10	4	...	...	...	...	,, ,,
	,, 18	8	9	...	1	...	...	30–32 S.E.
	,, 26	9	10	...	1	...	...	,, ,,
	,, 29	8	5	1	1	...	...	,, ,,
	Total for Month.	 48	 41	 1	 3	... ...	... ...	Under 2 2–3 3–6 Over 6
	1886.							
Easthaven Station.	Nov. 8	1	1½ l.	⅛ s.	¼ s.	¼ s.	...	4–6 S.
	,, 10	1	2 l.	...	...	¼ s.	...	3
Boat No. 28. 22 feet Keel. 4 Tons. 5 Men.	,, 11	4	1	...	½	...	...	4–6
	,, 12	2	3 s.	...	½	...	...	3
	,, 13	4	2	...	...	½	...	,,
	,, 15	2	2 s.	...	½	...	...	4–6
	,, 16	3	1½ s.	...	½	½	...	,,
	,, 17	2	1 s.	...	...	½	...	,,
	,, 19	1	1 s.	...	...	½	...	8–12 S.E.
	,, 20	...	½ s.	...	...	½	...	,, ,,
	,, 22	1	2	...	...	½	...	,, ,,
	,, 23	...	1¾	...	...	...	...	,, ,,
	,, 24	1	2 s.	...	...	½	...	4–6
	,, 25	...	1½ l.	...	...	½	...	8–12
	,, 26	2	1¾ s.	...	...	⅛	...	4–6
	,, 27	3	1½ s.	...	...	⅛	...	,,
	,, 29	1	1 s	...	...	½	...	3
	,, 30	...	1 s	...	...	⅛	...	,,
	Total for Month.	... 8 18 2	... 9 12¼ 6¾	... ... ⅛ ...	... ½ 1¾ ...	... 1⅜ 2 2	... ...	Under 2 2–3 3–6 Over 6
	Dec. 1	2	1½ s.	...	...	½ s.	...	3 S.E.
	,, 2	1	1 s.	...	...	⅛ s.	...	4 ,,
	,, 3	2	2	...	½ s.	...	...	12 ,,
	,, 4	...	4	...	1 s.	½ s.	...	14 ,,
	,, 6	1	½ s.	...	...	⅛ s.	...	3 ,,
	,, 7	1	1½ s.	...	...	⅛ s.	...	,,
	,, 10	1	½	...	...	...	...	3 S.
	,, 11	1	1½ s.	...	½	...	...	4 E.S.E.
	,, 13	...	1½	...	⅛ s.	...	...	,, ,,
	,, 14	1	2	...	¼	...	...	5 ,,
	,, 17	...	1	...	½	...	...	3 ,,
	,, 18	...	2½	...	½	...	...	,,
	,, 20	1	2½ l.	...	1	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT—*cont.* *Easthaven Station.* Boat No. 28 22 feet Keel. 4 Tons. 5 Men.	1886.	No.	Cwt.	Cwt.	Cwt.	Cwt.		
	Dec. 21	1	1	...	...	...	...	4 S.S.E.
	„ 24	...	½ l.	...	½	...	...	3 S.
	„ 25	...	½	...	½ s.	...	...	„
	„ 27	1	2	...	1 s.	...	...	6 E.S.E.
	„ 28	...	1½	...	½	...	...	4 S.S.E.
	„ 29	...	3	...	...	...	...	9 S.
	„ 30	...	1 l.	...	...	...	...	„
	„ 31	...	1 s.	...	...	...	...	4 S.S.E.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		11	22½	...	5⅜	⅞	...	3–6
		2	10	...	1½	½	...	Over 6
	1887.						No.	
	Jan. 10	1	½	...	...	⅛	...	2–3 S.E.
	„ 12	...	3	...	...	⅛	1 lobster.	„ „
	„ 13	2	1 l.	...	3½	¼	...	„ „
	„ 14	1	2½	...	...	...	...	9–12
	„ 15	...	2½	...	...	...	...	„
	„ 21	...	...	...	1½	...	...	1
	„ 22	...	...	...	2	½	...	2–3
	„ 24	...	...	...	2½	½	...	„
	„ 27	2	3	...	¼	...	...	9–12
	„ 31	...	2	...	½	...	...	„
	Total for Month.	...	...	...	1½	...	...	Under 2
		3	4½	...	8	1½	1	2–3
		...	...	...	...	...	...	3–6
		3	10	...	¾	...	...	Over 6
	Feb. 1	1	1½ l.	...	...	¼ s.	...	12 E.S.E.
	„ 5	1	2	...	½	½ l.	...	13 „
	„ 7	...	...	...	1 s.	¼ s.	...	2 „
	„ 9	...	...	...	...	½	...	3 S.W.
	„ 10	...	...	...	...	1	...	„
	„ 11	...	...	...	1½	1	...	2 E.
	„ 12	...	...	...	3	½ s.	...	3 „
	„ 14	...	3	...	¼	¼	...	14 E.S.E.
	„ 15	1	2½ l.	...	...	...	...	„
	„ 17	...	2 s.	...	...	...	...	12 S.S.E.
	„ 18	...	3 s.	...	...	½	...	„
	„ 19	...	3	...	...	½ l.	...	„
	„ 21	2	½ s.	...	...	...	...	„
	„ 25	...	...	...	...	½	...	2 S.
	„ 26	...	1½	...	½	...	...	12 S.E.
	„ 28	...	2½	...	...	½	...	„
	Total for Month.	...	...	...	...	1½	...	Under 2
		...	...	...	5½	2¼	...	2–3
		...	...	...	...	...	...	3–6
		5	21½	...	1¼	2½	...	Over 6
	Mar. 1	...	5	...	...	¼	...	16–18
	„ 2	1	2	...	...	...	...	„
	„ 3	1	2 s.	...	...	½	...	„
	„ 4	...	1 s.	...	½	...	...	„
	„ 5	...	½ s.	...	...	¼	...	„
	„ 7	...	1	...	...	¼	...	„
	„ 8	2	1	...	...	¼	...	„
	„ 9	...	...	...	2	¼	...	3–4
	„ 10	...	...	...	2	...	...	„
	„ 14	...	...	...	1	...	...	„

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT.—*cont.* *Easthaven Stn.* Boat No. 28. 22 feet Keel. 4 Tons. 5 Men.	1887.	No.	Cwt.	Cwt.	dozen	Cwt.	Crans.	
	Mar. 16	...	...	...	¼	½	...	,,
	,, 17	...	...	...	...	½	...	,,
	,, 18	1	2 s.	...	...	¼	...	16–18
	,, 19	1	2½ s.	...	¼	...	...	,,
	,, 25	...	...	...	...	½	...	3–4
	,, 26	...	½	...	...	½	...	,,
	,, 28	...	¾	...	...	½	...	,,
	,, 29	...	½	...	...	½	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	1¾	...	5¼	3¼	...	3–6
		6	17	...	¾	1¾	...	Over 6
Broughty Ferry Station. Boat No. 29. 38 feet Keel. 13 Tons. 6 Men.	1886.					Doz.		
	Nov. 8	1	6	1	½	3	...	2–3 N.E.
	,, 12	2	15 l.	¼	¼	5	...	7-10 N.W.
	,, 15	2	10	½	¼	8	...	,,
	,, 17	3	11 l.	¼	½	3	...	,,
	,, 22	4	16	½	1	5	...	,,
	,, 24	2	14 l.	¼	½	11	...	,,
	,, 26	1	14	4	1½	3	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		1	6	1	½	3	...	2–3
		...	...	...	...	...	...	3–6
		14	80	5¾	4	35	...	Over 6
						Cwt.	Crans.	
	Dec. 6	1	4	...	...	¼ s.	...	St A. Bay.
	,, 7	...	3	...	...	¼ l.	...	,,
	,, 11	...	5 l.	¼	½	...	...	Bell R. 4 W.
	,, 18	...	4 l.	1	...	...	...	,, 1 N.
	,, 23	...	...	...	...	...	1½ herring.	Redhead ¼
	,, 24	...	...	...	...	...	½ ,,	,, ,,
	,, 28	...	4 l.	...	...	...	1 ,,	,, ,,
	,, 30	...	4	½	1	¼ l.	...	Bell R. N. 4
	Total for Month.	...	...	...	...	...	3	Under 2
		1	7	...	...	½	...	2–3
		...	12	2	...	¼	...	3–6
		...	5	¼	½	...	...	Over 6
	1887.						No.	
	Jan. 13	2	7	6 doz.	¼ cwt.	8 doz.	...	Bell R. 2–3 N.E.
	,, 15	2	...	3 ,,	5 doz.	¼ cwt.	1 turbot s.	,,
	,, 19	2	5 l.	¼ cwt.	½ cwt.	3 doz.	...	,,
	,, 21	1	7 l.	2 doz.	¼ ,,	4 ,,	...	,,
	,, 25	2	6 l.	1½ cwt,	¼ ,,	¼ cwt.	...	,,
	,, 28	4	8 l.	3 doz.	2 doz.	⅛ ,,	...	,,
	Total for Month,	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		13	33	2	1½	¾	1	Over 6
				Cwt.				
	Feb. 1	...	9 l.	½	¼ cwt.	6 doz.s.	...	Bell R. 2 N.
	,, 3	...	9¼l.	1½	2 doz.	4 ,, s.	...	3 N.N.E.
	,, 8	1	7 l.	¾ s.	½ cwt.	¼cwt.s.	...	2 N.
	,, 10	...	6½	½ s.	½ ,,	4 doz.	...	3 N.N.E.
	,, 12	1	4 l.	¼ l.	1 doz.	¼cwt.l.	2 brills.	Bell R. N.E. 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
MONTROSE DISTRICT—*cont.* *Broughty Ferry Station.* Boat No. 29.	1887.	No.	Cwt.	Cwt.				
	Feb. 15	...	7	½	¼ cwt.	3 doz.	...	Bell R. 3 N.N.E.
	,, 17	1	6 l.	¼	½ ,,	2 ,,	2 brills. l.	,, 1½ N.N.E.
	,, 22	...	3½ l.	¼	½ ,,	¼ cwt.	...	Bell R., N.E. 4
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		1	4	¼	1 doz.	¼	2	3–6
		2	48¼	4¼	2½	1	2	Over 6
						Doz.		
	Mar. 1	2	5	¼	...	2	...	Bell R. N.E. 2–3
	,, 3	1	3	¼	2 doz.	3	...	,, ,,
	,, 5	1	2½	¼	1 ,,	2	...	,, ,,
	,, 8	1	6	¼	½ cwt.	¼ cwt.	...	Bell R. N.W. 7–12
	,, 10	1	5	¼	½ ,,	½ ,,	...	,, ,,
	,, 15	1	1	2 doz.	¼ ,,	3 doz.	...	Tay Buoy 2 N.W.
	,, 17	8	6	¼ cwt.	½ ,,	...	...	Bell R. 7–12 N.W.
	,, 22	5	8	½ ,,	¼ ,,	6 doz.	...	,, ,,
	,, 26	4	6	½ ,,	¼ ,,	3 ,,	...	Bell R. 2–3 N.E.
	,, 30	1	4½	½ ,,	¼ ,,	6 ,,	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		1	1	2 doz.	¼	3 doz.	...	3–6
		24	46	¾ cwt,	2¼	1 cwt.	...	Over 6
Boat No. 30. 55 feet Keel. 31 Tons. 7 Men.	1886.				Cwt.	Cwt.		
	Nov. 8	...	7½	1	...	½	...	Bell R. 5 N.
	,, 13	3	12	½	...	¼	...	,, 12–16 N.
	,, 16	...	11	¼	...	¼	...	,, ,,
	,, 18	...	9 s.	¼	...	¼	...	,, ,,
	,, 23	...	13	...	1	...	...	,, ,,
	,, 25	1	14	...	½	¼	..	,, ,,
	,, 27	...	12	...	1	½	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		..	...	...	...	...	...	3–6
		4	78½	2	2½	2	...	Over 6
	Dec. 6	1	3¼	...	...	¼	...	3 off Mouth of Tay.
	,, 9	1	9	...	¼	¼ s.	...	Bell R. 7 N.W.
	,, 14	...	7	...	¼	7	...	Bell R. 5 N.W.
	,, 17	2	7	½	...	...	...	May I. 6–7 W.
	,, 21	2	13	½	...	...	...	,, ,,
	,, 24	6	9	¼	¼	...	...	Bell R. 5 N.
	,, 30	1	7	...	...	½	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		2	12¼	...	¼	½	...	2–3
		...	...	...	...	...	...	3–6
		11	43	1¼	½	7½	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codlings.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.			
MONTROSE DISTRICT—*cont.*	Jan. 13	2	7½	...	¼	...	...	Bell R. 3–5 N.
Broughty Ferry Station.	,, 15	1	6	...	1½	...	...	,, ,,
	,, 19	3	7	¼	½	...	...	,, ,,
	,, 21	1	10	...	1½	...	...	Bell R. 2 W.
Boat No. 30.	,, 25	6	7½	1½	2	...	...	,, 3–5 N.
55 feet Keel.	,, 28	3	9	½	½	...	...	,, 4 W.
31 Tons.	Total for Month.	...	...	...	...	...	...	Under 2
7 Men.		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		16	47	2¼	6¼	...	...	Over 6
							No.	
	Feb. 1	1	11	½	½	...	...	Bell R. 5 W,
	,, 3	...	12	½	...	...	1 ling.	,, 6N.W.
	,, 8	6	5½	1	¼	...	...	,, 5 W.
	,, 10	3	7	2	...	...	...	,, 5N.W.
	,, 12	2	4	¼	...	...	...	,, 5 N.E.
	,, 14	1	6	½	...	...	...	,, ,,
	,, 16	2	7	1	...	...	...	,, ,,
	,, 22	...	3¼	½	...	...	...	,, 4 N.E.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		15	55¾	6¼	¾	...	1	Over 6
	Mar. 1	2	5½	½	...	...	...	Bell R. 5–6 N.
	,, 3	...	4	½	...	...	...	,, ,,
	,, 5	5	7	1½	...	..	...	,, 22–30 N.W.
	,, 8	3	8	1	...	...	...	Bell R. 14 W.
	,, 11	...	10	¼	2	...	...	,, 22–30 N.W.
	,, 17	...	18	½	3	...	...	,, ,,
	,, 26	...	12	½	½	...	...	,, ,,
	,, 30	...	5	1	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		10	69½	5¾	5½	...	...	Over 6–20
	1886.		Boxes.					
ANSTRUTHER DISTRICT.	Nov. 1	...	3¾	...	...	...	...	Carr R. 1–3 S.
St Andrews Stn.	,, 2	...	2½ s.	...	...	...	...	St A. 4 W.
	,, 3	...	3¾ s.	...	...	...	...	,, ,,
	,, 4	...	5	...	...	...	...	Carr R. 1–3 N.
Boat No. 31.	,, 5	...	5	...	...	...	...	Carr R. 1–3 S.
28 feet Keel.	,, 8	...	3¾ s.	...	...	...	...	,, ,,
4 Men.	,, 9	...	3¾ s.	...	...	...	...	St A. 4 W.
	,, 12	...	5	...	...	...	...	,, ,,
	,, 13	...	5	...	...	...	...	,, ,,
	,, 15	...	1¼	...	...	...	...	,, ,,
	,, 17	...	7½	...	...	...	...	,, ,,
	,, 18	...	4⅜ s.	...	...	...	...	,, ,,
	,, 19	...	5	...	...	...	...	Carr R. 1–3 S.
	,, 22	...	2½ s.	...	...	...	...	St A. 4 W.
	,, 23	...	2½	...	...	...	...	Carr R. 1–3 S.
	,, 24	...	5	...	...	...	...	St A. 4 W.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Boxes.			Boxes.		
ANSTRUTHER DISTRICT—*cont.* *St Andrews Stn,*	Nov. 25	...	$4\frac{3}{8}$	...	...	...	...	St A. 4 W.
	,, 26	...	$4\frac{3}{8}$	...	...	...	...	,, ,,
	,, 30	...	7	...	...	...	...	,, ,,
Boat No. 31. 28 feet Keel. 4 Men.	Total for Month	...	20	...	...	...	...	Under 2
		...	5	...	...	...	...	2-3
		...	$56\frac{3}{8}$	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	$2\frac{1}{2}$ l.	...	...	...	...	St A. 4 W.
	,, 3	...	$1\frac{1}{4}$ l.	...	...	...	...	,, ,,
	,, 6	...	5 s.	...	...	...	...	Carr 1–3
	,, 7	...	$3\frac{3}{4}$	...	...	...	...	St A. 4 W.
	,, 8	...	$2\frac{1}{2}$	...	..	...	...	,, ,,
	,, 20	...	$7\frac{1}{2}$	...	...	...	...	Carr 7 W.
	,, 21	...	$6\frac{1}{4}$	...	...	...	...	,, 3 N.W.
	,, 22	...	$4\frac{3}{8}$	...	...	...	...	,, 2 S.E.
	, 23	...	$3\frac{1}{3}$	...	...	...	...	,, ,,
	,, 24	...	2 s.	...	...	...	...	St A. 7 W.
	,, 26	...	$2\frac{1}{2}$ s.	...	...	...	...	,, 4 W.
	,, 27	...	$3\frac{3}{4}$	...	...	...	...	,, 3 W.
	,, 28	...	$6\frac{1}{4}$ l.	...	...	...	...	Carr R. 4 S. W.
	,, 29	...	$9\frac{3}{8}$ l.	...	...	...	...	,, ,, W.
	Total for Month	...	$7\frac{3}{4}$	...	...	...	...	Under 2
		...	15	...	...	...	...	2–3
		...	$30\frac{1}{8}$	...	...	...	...	3–6
		...	$7\frac{1}{4}$	...	...	...	...	Over 6
	1887.							
	Jan. 10	...	$4\frac{3}{8}$	...	...	...	...	St A. 4 W.
	,, 12	...	$2\frac{1}{2}$	...	...	...	...	,, ,,
	,, 14	...	$3\frac{3}{4}$	...	...	...	...	Carr 1–3 S.
	,, 15	...	$1\frac{1}{4}$ s.	...	...	...	...	,, 4 W.
	,, 17	...	$7\frac{1}{2}$	...	...	...	...	,, 1–3 N.
	,, 18	...	$3\frac{3}{4}$ s.	...	...	...	...	Carr R. 1–3 S.
	,, 20	...	$3\frac{3}{4}$	...	...	...	...	,, 1–3 N.
	,, 24	...	$3\frac{3}{4}$ s.	...	...	...	...	,, 1–3 S.
	,, 25	...	5 l.	...	...	...	...	,, ,,
	,, 26	...	$1\frac{1}{4}$	...	...	...	...	,, ,,
	,, 27	...	...	...	...	$1\frac{1}{2}$	...	St A. $1\frac{1}{2}$ S.
	,, 29	...	...	...	...	5	...	,, ,,
	,, 31	...	...	...	...	4	...	,, ,,
	Total for Month	...	$17\frac{1}{2}$	...	...	$10\frac{1}{2}$	...	Under 2
		...	$11\frac{1}{4}$	...	...	...	...	2–3
		...	$8\frac{1}{8}$	...	...	...	...	3-6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	...	...	...	3	...	St A. $\frac{1}{4}$ S.
	,, 2	...	...	...	...	5	...	,,
	,, 4	...	...	...	.	$4\frac{1}{2}$	...	,,
	,, 5	...	...	...	...	5plaice	...	,,
	,, 7	...	...	...	...	3	...	,,
	,, 8	...	...	...	...	$3\frac{1}{2}$	...	,,
	,, 9	...	...	...	...	3	...	,,
	,, 10	...	...	...	...	$4\frac{1}{2}$	...	,,
	,, 11	...	...	...	...	4	...	,,
	,, 12	...	...	...	...	3	...	,,
	,, 14	...	...	...	...	$4\frac{1}{2}$	...	,,
	,, 15	...	...	...	...	$2\frac{1}{2}$	...	,,
	,, 16	...	5	...	...	...	...	Carr R. 3N.W.
	,, 17	...	...	...	...	$3\frac{1}{2}$	...	St A. $\frac{1}{4}$ S.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codlings.	Flounders.	Other Fish.	Miles.
	1887.		Boxes.			Boxes.		
ANSTRUTHER DISTRICT—*cont.* *St Andrews Stn.* Boat No. 31. 28 feet Keel. 4 Men.	Feb. 18	...	...	...	...	**4**	...	St A. ¼ S.
	,, 19	...	...	...	...	**3**	..	,,
	,, 21	...	...	...	...	**2½**	...	,,
	,, 22	...	...	...	...	**3**	...	,,
	,, 23	...	...	...	...	**3**	...	,,
	,, 25	...	...	...	...	**2½**	...	,,
	,, 26	...	3¾	...	...	...	...	St A. 3
	,, 28	...	2	...	...	...	...	,,
	Total for Month	...	...	...	...	67	...	Under 2
		...	...	...	...	...	...	2–3
		...	10¾	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	**2½**	...	...	**2**	...	St A. 3 S.W.
	,, 2	...	...	...	...	...	...	,, ,,
	,, 3	...	**3⅛**	...	...	...	...	,, ,,
	,, 4	...	2½	...	...	...	...	Carr R. 1–3 N.
	,, 5	...	...	...	...	**1**	...	St A. 4 W.
	,, 7	...	**1¼**	...	...	...	...	Carr 1–3 S.
	,, 9	...	...	...	...	**1½**	...	St A. 1½ S.
	,, 14	...	**2½**	...	...	...	...	Carr 1–3 S.
	,, 16	...	3⅛	...	...	...	...	Bell R. 3 N.
	,, 17	...	1¼	...	...	...	...	,, ,,
	,, 18	...	2½	...	...	...	...	,, ,,
	,, 21	...	2½	...	...	...	...	,, ,,
	,, 25	...	...	...	...	**2**	...	St A. 4 W.
	,, 28	...	...	...	...	**1**plaice	...	,, 1½ S.
	,, 29	...	3⅛	...	...	...	...	Bell R. 3 N.
	,, 30	...	2½	...	...	...	...	Carr R. 10 W.
	Total for Month	...	3¾	...	...	2½	...	Under 2
		...	...	...	...	...	...	2–3
		...	8⅛	...	...	5	...	3–6
		...	15	...	...	...	...	Over 6
	1886.		Cwt.	Cwt.				
Boat No. 32. 38 feet Keel. 6 Men.	Nov. 1	...	2½	...	...	...	...	May I. S.W. 4–8
	,, 2	...	4	1	...	...	...	Bell R. N.
	,, 4	...	5	1¼	...	...	...	,,
	,, 5	...	3¾	2	...	...	...	,,
	,, 8	...	2½	1¼	...	...	...	May I. S.W. 4–8
	,, 9	...	5	1¼	...	...	...	Bell R. N
	,, 12	...	5	1¼	...	...	...	,, W.
	,, 15	...	5	1¼	...	...	...	,, N.
	,, 16	...	5	1¼	...	...	...	May I. S.W. 4–8
	,, 17	...	3¾	...	...	...	...	St A. W.
	,, 18	...	5	⅝	...	...	...	Bell R. N.
	,, 19	...	3⅛	⅝	...	...	...	Carr R. S.W.
	,, 22	...	7½	1¼	...	...	...	May I. S.W. 4–8
	,, 23	...	6¼	1¼	...	...	...	Bell R. N.
	,, 24	...	7½	1¼	...	...	...	,,
	,, 25	...	7	1¼	...	...	...	,,
	,, 26	...	2½	1¼	...	...	...	May I. S.W. 4–8
	,, 30	...	3¾	...	...	...	...	St A. W.
	Total for Month	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	30⅝	5⅝	...	...	...	3–6
		...	53½	12⅜	...	...	...	Over 6

Statistics of Fish Caught—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codlings.	Flounders.	Other Fish.	Miles.
	1886.		Cwt.	Cwt.	Cwt.	Cwt.		
Anstruther District—*cont.* *St Andrews Stn.* Boat No. 32. 38 feet Keel. 6 Men.	Dec. 1	...	2½	...	...	...	...	St A. W. 6
	,, 3	...	6¼	1¼	...	...	...	Carr Rock W.S.W. 3
	,, 6	...	2 l. 2¼	1¼	...	...	...	
	,, 7	...	3⅛ 3⅛	1¼	...	...	...	Bell R. 8 N. ,, ,,
	,, 11	...	2½ l.	...	...	...	...	Tay Buoy N. 1½
	,, 17	...	2 l. 1	¾	...	...	...	Bell R. N.E. 6
	,, 20	...	7¼	1½	...	...	...	,, N.N.W. 8
	,, 21	...	2½ 4¾	1½	...	...	...	,, N.N.E. 7
	,, 22	...	2	...	...	...	...	,, E. 5.
	,, 23	...	3¾	...	...	...	...	,, E. 7.
	,, 24	...	2½	...	...	...	...	,, E.N.E. 7
	,, 25	...	3¾	...	...	...	...	,, ,,
	,, 27	...	4 l. 4	¾	...	...	...	,, N.N.E. 5
	,, 28	...	2½ l. 5½	¾	...	...	...	May I. W. 6
	,, 29	...	6¼	...	...	...	...	,, W.S.W. 7
	,, 30	...	3¾ l. 3¾	1¼	...	...	...	,, W. 9
	Total for Month	... ...	... 2½ 23¾ 56¾	... ... 2 8¼	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1887.							
	Jan. 11	...	2½	...	...	...	...	Carr R. S.W.
	,, 12	...	2	...	...	...	...	,,
	,, 14	...	4⅜	...	...	...	...	May I. S.W. 4–8
	,, 15	...	3⅛	...	⅝	...	...	,, ,,
	,, 17	...	8¾	...	...	...	...	,, ,,
	,, 18	...	5¼	...	1	...	...	,, ,,
	,, 20	...	2½	...	1¼	...	...	,, ,,
	,, 24	...	5⅜	3⅛	...	...	...	,, ,,
	,, 25	...	2½	1¼	...	...	...	,, ,,
	,, 26	...	2¾	1	...	...	...	May I. S.W. 4–8
	,, 27	...	4¾	1	...	...	...	,, ,,
	,, 29	...	4⅜	...	...	...	...	St A. W.
	,, 31	...	7	1¼	...	...	...	May I. S.W. 4–8
	Total for Month.	... ...	... 8⅞ 46⅜ ...	... ... 7⅝ ...	... ... 2⅞ ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	5⅝	1	...	...	...	May I. S.W. 7.
	,, 2	...	1¼ 2½	1¼	...	...	...	,, ,, 6.
	,, 4	...	3¼	...	...	3¾	...	St A. Bay, in-shore
	,, 5	...	...	...	...	2½	...	,, ,,
	,, 7	...	6¼	1¼	...	...	...	Bell R.N.N.E.6
	,, 8	...	3¼	1¼	...	...	...	,, ,,
	,, 9	...	1	⅝	...	...	...	May I. S.W. 5
	,, 10	...	3⅛		...	...	...	,, W.S.W. 2
	,, 11	...	4	...	...	3¾	...	St A. Bay, in-shore

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codlings.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.	Cwt.	Cwt.	Cwt.		
ANSTRUTHER DISTRICT—*cont.*	Feb. 14	...	2	...	⅞	...	...	Bell R. E. 2
St Andrews Stn.	,, 15	...	1½ l.	⅝	...	...	...	May I. W. S. W. 6
	,, 16	...	1⅜	⅝	...	...	...	May I. S.W. 4
	,, 17	...	2½ l.	⅝	...	...	...	May I. W. 6
Boat No. 32. 38 feet Keel. 6 Men.	,, 18	...	1¼ 1½ l. 1⅛	...	...	3¾	...	St A. Bay, inshore
	,, 19	...	...	...	...	3⅛	...	,, ,,
	,, 21	...	2⅜	¾	...	¾	...	May I. W. 9
	,, 25	...	...	...	...	1¼ s.	...	St A. Bay, inshore.
	,, 28	...	3¾	1¼	...	...	...	May I. S.W. 8
	Total for Month.	...	...	...	...	18⅛	...	Under 2
		...	38¾	...	...	...	...	2–3
		...	5¾	...	...	...	...	3–6
		...	8⅜	1⅜	⅞	...	...	Over 6
	Mar. 2	...	2¼	...	...	...	...	Carr R. S.W.
	,, 9	...	...	...	1¼	...	...	Inshore
	,, 14	...	1¼	...	...	...	...	Bell R. E.
	,, 15	...	2½	⅝	...	...	..	,, N.
	,, 17	...	3⅛	...	...	...	...	,, ,,
	,, 21	...	3⅛	⅝	...	...	...	,, ,,
	,, 25	...	3⅛	⅝	...	...	...	,, ,,
	,, 28	...	3¾	⅝	...	...	...	,, ,,
	Total for Month.	...	...	...	1¼	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	3½	...	...	...	...	3–6
		...	15⅝	2½	...	...	...	Over 6
	1886.		Bskts.					
Pittenweem Stn.	Nov. 1	...	2	...	...	...	...	Inside May I.
	,, 5	...	4½	...	...	...	...	May I. E. 1
Boat No. 33. 25 feet Keel. 5 Men.	,, 8	...	2	...	...	...	...	2–3
	,, 9	...	3	...	...	...	...	3–6
	,, 10	...	2½	...	...	...	...	2–3 off
	,, 11	...	3	...	...	...	...	1½ off
	,, 12	...	3	...	...	...	...	May I. E. 1
	,, 16	...	2	...	...	...	...	2–3
	,, 18	...	4½	...	...	...	...	May W. 2
	,, 19	...	4½	...	...	...	...	May I. N. 2
	,, 22	...	4	...	...	...	...	,, ,,
	,, 23	...	4	...	...	...	...	,, ,,
	,, 24	...	2	...	...	...	...	3-6 off
	,, 25	...	2	...	...	...	...	2–3 ,,
	,, 26	...	3½	...	...	...	...	,, ,,
	,, 30	...	2	...	...	...	...	,, ,,
	Total for Month.	...	3	...	...	...	...	Under 2
		...	14	...	...	...	...	2–3
		...	31½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	2	...	...	...	...	2 off Station
	,, 2	...	2	...	...	...	...	,,
	,, 3	...	3	...	...	...	...	2 off May
	,, 7	...	2	...	...	...	...	,,
	,, 10	...	2½	...	...	...	...	2 off Anstrth.
	,, 13	...	3	...	...	...	...	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Bskts.	Bskts.				
ANSTRUTHER DISTRICT—*cont.* *Pittenweem Stn.* Boat No. 33. 25 feet Keel. 5 Men.	Dec. 14	...	**2**	...	...	...	...	2 off Station
	,, 15	...	**4**	...	...	...	...	May I. E. 1
	,, 17	...	**4** l.	...	...	...	...	,, ,,
	,, 20	...	5 l.	...	...	...	...	,, W. 2
	,, 21	...	**2**	...	...	...	...	2 off Anstrth.
	,, 23	...	**3**	...	...	...	...	2 off Station.
	,, 24	...	**2**	...	...	...	...	,,
	,, 27	...	**2** l.	..	...	...	...	2 off Anstrth.
	,, 29	...	**4** l.	...	...	...	...	May I. E. 1
	,, 30	...	**6** l.	...	...	...	...	,, ,,
	,, 31	...	5 l.	**2**	...	...	...	,, N. 1
	Total for Month.	...	22½	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	31	2	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 7	...	**1**	...	...	...	...	2–3 off Stn.
	,, 8	...	**6**	...	...	...	...	May I. E. 1
	,, 10	...	**3**	...	...	...	...	2–3 off Stn.
	,, 12	...	**1**	...	...	...	...	,, ,,
	,, 13	...	**2½**	...	...	...	...	,, ,,
	,, 14	...	**2**	...	...	...	...	May I. E. 1
	,, 18	...	**2**	...	...	...	...	2–3 off Stn.
	,, 20	...	**4**	...	...	...	...	May I. E. 1
	,, 25	...	**4½**	...	...	...	...	,, ,,
	,, 27	...	**7½**	...	...	...	...	,, ,,
	,, 31	...	**8**	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	9½	...	...	...	...	2–3
		..	32	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 2	...	3 l.	...	...	...	...	May I. W. 1–2
	,, 7	...	5 l.	...	...	...	...	,, ,,
	,, 8	...	5 l.	...	...	...	...	,, ,,
	,, 9	...	4½	...	...	...	...	,, ,,
	,, 10	...	5 l.	...	...	...	...	,, ,,
	,, 11	...	5 l.	...	...	...	...	,, ,,
	,, 14	...	**5½**	...	...	...	...	,, ,,
	,, 15	...	**7** l.	...	...	...	...	,, E. 3
	,, 16	...	**4½**	...	...	...	...	,, S. 1
	,, 17	...	**5** l.	...	...	...	...	,, E. 2
	,, 18	...	**3**	...	...	...	...	,, E. 1
	,, 19	...	**4**	...	...	...	...	,, W. 1
	,, 21	...	**4**	...	...	...	...	,, N.
	,, 26	...	**4**	...	...	...	...	,, ,,
	,, 28	...	**2**	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...		...	...	...	...	2–3
		...	66½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	3	...	...	...	...	May I. N. 2
	,, 2	...	**3** l.	...	...	...	...	,, E. 1
	,, 3	...	**4** l.	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Bskts.		Bskts.			
ANSTRUTHER DISTRICT—*cont.*	Mar. 4	...	2½ l.	...	...	...	...	May I. E 1.
Pittenweem Stn.	,, 7	...	1½ l.	...	...	...	...	,, W. 2
	,, 8	...	4 l.	...	...	...	...	,, N.
Boat No. 33.	,, 9	...	3½ l.	...	...	...	...	,, ,,
	,, 10	...	2½	...	...	...	...	,, ,,
	,, 14	...	1½	...	...	...	...	1½ off Station.
	,, 15	...	3	...	...	...	...	May I. N.
	,, 16	...	2½	...	...	...	...	,, ,,
	,, 17	...	2	...	...	...	...	May I. W. 2
	,, 18	...	4	...	...	...	...	May I. E. 1.
	,, 21	...	2	...	...	...	...	,, ,,
	,, 23	...	3½	...	...	...	...	1½ off Station.
	,, 25	...	4 l.	...	...	...	...	,, ,,
	,, 28	...	9 l.	...	...	...	...	,, ,,
	,, 29	...	8½ l.	...	...	...	...	,, ,,
	,, 30	...	6	...	...	...	...	,, ,,
	Total for Month.	...	32½	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	37½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
Boat No. 34. 24 feet Keel. 5 Men.	1887.							
	Nov. 1	...	2	...	...	...	...	3 off Stn.
	,, 2	...	1	...	...	...	...	,, ,,
	,, 5	...	3	...	...	...	...	,, Anstrth.
	,, 8	...	2	...	...	...	...	5 off Stn.
	,, 9	...	2½	...	...	...	...	3 ,,
	,, 11	...	...	...	6 l.	...	...	¼ ,,
	,, 12	...	...	...	6 l.	...	...	¼ ,,
	,, 13	...	3 l.	...	...	...	...	2 ,,
	,, 15	...	3 l.	...	...	...	...	3 ,,
	,, 17	..	1½ l.	...	...	...	...	1 ,,
	,, 18	...	...	...	2 l.	...	...	,, ,,
	,, 19	...	4	...	...	...	...	7 S.E.
	,, 22	...	1¾	...	...	...	...	3 off Anstrth.
	,, 23	...	4	...	...	...	...	7 S.E.
	,, 24	...	4½	...	...	...	...	8 S. off Stn.
	,, 26	...	2	...	...	...	...	1½ S.E.
	,, 27	...	2½	...	...	...	...	2 ,,
	,, 30	...	2	...	...	...	...	,, ,,
	Total for Month.	...	3½	...	14	...	...	Under 2
		...	25¼	...	...	...	...	2–3
		...	10	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 3	...	1½	...	...	...	...	8 off Station
	,, 4	...	1	...	...	...	...	2–3 ,,
	,, 7	...	1¾	...	...	...	...	4–7 ,,
	,, 10	...	2½	...	...	...	...	,, ,,
	,, 11	...	2	...	...	...	...	2-3 ,,
	,, 13	...	3	...	...	...	...	,, ,,
	,, 14	...	2	...	...	...	...	,, ,,
	,, 17	...	2	...	...	...	...	,, ,,
	,, 18	...	4½	...	...	...	...	,, ,,
	,, 20	...	4	...	...	...	...	,, ,,
	,, 21	...	1	...	...	...	...	,, ,,
	,, 23	...	1	...	...	...	...	4-7 ,,
	,, 24	...	3	...	...	...	...	2–3 ,,
	,, 25	...	6½	...	...	...	...	2–3 ,,
	,, 28	...	3½	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Bskts.					
ANSTRUTHER	Dec. 29	...	**2**	...	...	...	...	2–3 off Stn.
DISTRICT—*cont.*	,, 30	...	**2½**	...	...	...	...	4–7 ,,
Pittenweem Stn.	,, 31	...	**7**	...	...	...	...	2–3 ,,
Boat No. 34.	Total for Month.	...	...	...	...	...	...	Under 2
24 feet Keel.		...	42	...	...	...	...	2–3
5 Men.		...	9¼	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 4	...	1⅔	...	...	...	...	2 off Stn.
	,, 7	...	1⅔ l.	...	...	...	...	2 ,,
	,, 8	...	2½ l.	...	...	...	...	1 S.E.
	,, 10	...	1½	...	...	...	..	3 ,,
	,, 12	...	2	...	...	...	...	2 S.
	,, 14	...	2	...	...	...	...	3 ,,
	,, 15	...	3	...	...	...	...	5 ,,
	,, 19	...	1	...	...	...	...	2 ,,
	,, 25	...	2	...	...	...	...	3 ,,
	,, 27	...	8¼ l.	...	...	...	...	6 S.E.
	,, 31	...	2 l.	...	...	...	...	3 S.
	Total for Month.	...	2½	...	...	...	...	Under 2
		...	12¾	...	...	...	...	2–3
		...	11¼	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1886.							
St Monance Stn.	Nov. 1	...	**2**	...	...	...	...	1–1½ off Stn.
	,, 5	...	**2**	...	...	...	...	,, ,,
Boat No. 35.	,, 8	...	**2**	...	...	...	...	,, ,,
24 feet Keel.	,, 9	...	**2**	...	...	...	...	2–3 ,,
6 Men.	,, 10	...	**2½**	...	...	...	...	1–1½ ,,
	,, 12	...	**3**	...	...	...	...	2–3 ,,
	,, 15	...	**3**	...	...	...	...	,, ,,
	,, 16	...	**2**	...	...	...	...	1–1½ ,,
	,, 17	...	**2**	...	...	...	...	,, ,,
	,, 18	...	**2**	...	...	...	...	2–3 ,,
	,, 19	...	**2½**	...	...	...	...	1–1½ ,,
	,, 22	...	**1½**	...	...	...	...	,, ,,
	,, 23	...	**3½**	...	...	...	...	Bass R. E. 2
	,, 24	...	**4**	...	...	...	...	2–3 off Stn.
	,, 25	...	**3**	...	...	...	...	,, ,,
	,, 26	...	**4**	..	...	...	...	,, ,,
	Total for Month.	...	20	...	...	...	...	Under 2
		...	21	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	**4**	...	...	...	...	3 off Stn.
	,, 2	...	**1½**	...	...	...	...	1–2 ,,
	,, 3	...	**2**	...	...	...	...	,, ,,
	,, 7	...	**2½**	...	...	...	...	,, ,,
	,, 10	...	**2**	...	...	...	...	,, ,,
	,, 11	...	**3**	...	...	...	...	,, ,,
	,, 13	...	**4½**	...	...	...	...	,, ,,
	,, 14	...	**1**	...	...	...	...	,, ,,
	,, 16	...	**4** l.	...	...	...	...	,, ,,
	,, 17	...	**4** l.	...	...	...	...	,, ,,
	,, 18	...	**3½** l.	...	...	...	...	,, ,,
	,, 20	...	**4** l.	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codlings.	Flounders.	Other Fish.	Miles.
	1886.		Bskts.					
ANSTRUTHER DISTRICT—*cont.* *St Monance Stn.* Boat No. 35.	Dec. 21	...	3½ l.	...	...	...	...	1–2 off Stn.
	,, 23	...	4 l.	...	...	...	...	,, ,,
	,, 24	...	3 l.	...	...	...	...	,, ,,
	,, 25	...	3½ l.	...	...	...	...	,, ,,
	,, 27	...	4	...	...	...	...	,, ,,
	,, 28	...	2½ s.	...	...	...	...	,, ,,
	,, 29	...	2¾ s.	...	...	...	...	,, ,,
	,, 30	...	3½ l.	...	...	...	...	,, ,,
	,, 31	...	2½ l.	...	...	...	...	,, ,,
	Total for Month.	...	61¼	...	...	...	...	Under 2
		...	4	...	...	...	...	2–3
		...	...	...	...	...	...	3-6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 5	...	1 l.	...	...	...	...	1–1½ off Stn.
	,, 7	...	1 l.	...	...	...	...	,, ,,
	,, 10	...	2 l.	...	...	...	...	,, ,,
	,, 12	...	2 s.	...	...	...	...	2–3 ,,
	,, 13	...	6	...	...	...	...	,, ,,
	,, 14	...	3 l.	...	...	...	...	,, ,,
	,, 18	...	2 s.	...	...	...	...	,, ,,
	,, 20	...	6½ s.	...	...	...	...	,, ,,
	,, 24	...	2 s.	...	...	...	...	1–1½ ,,
	,, 26	...	5½ s.	...	...	...	...	2–3 ,,
	,, 27	...	4 s.	...	...	...	...	1–1½ ,,
	,, 31	...	2½ s.	...	...	...	...	2–3 ,,
	Total for Month.	...	10	...	...	...	...	Under 2
		...	27½	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	2½ s.	...	...	...	...	1–2 off Stn.
	,, 2	...	2½ s.	...	...	...	...	,, ,,
	,, 7	...	3 s.	...	...	...	...	,, ,,
	,, 8	...	3 s.	...	...	...	...	,, ,,
	,, 9	...	2 s.	...	...	...	...	,, ,,
	,, 10	...	3½ s.	...	...	...	...	Bass R. S. 1
	,, 11	...	3 l.	...	...	...	...	2 off Station.
	,, 12	...	3 l.	...	...	...	...	1 off Anstrth.
	,, 14	...	2 l.	...	...	...	...	,, ,,
	,, 15	...	2 s.	...	...	...	...	Bass R. S. 1
	,, 16	...	2 s.	...	...	...	...	1 off Station.
	,, 17	...	1½ s.	...	...	...	...	2 ,,
	,, 18	...	2 l.	...	...	...	...	½ off Pittenwm.
	,, 21	...	2 l.	...	...	...	...	May ½ E.
	,, 22	...	2 s.	...	...	...	...	Bass R. S. 1
	,, 28	...	2 s.	...	...	...	...	May I. ½ E.
	Total for Month.	...	22	...	...	...	...	Under 2
		...	12	...	...	...	...	2–3
		...	4	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 2	...	1½ s.	...	...	...	...	Bass S.E.
	,, 3	...	1 s.	...	...	...	...	,, S.
	,, 4	...	1½ s.	...	...	...	...	May I. E.
	,, 5	...	2 s.	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.* *St Monance Stn.* Boat No. 35.	1887. Mar. 7	...	Bskts. 2 s.	...	...	...	...	May I. N.
	„ 8	...	2 s.	...	...	...	...	„ „
	„ 9	...	2 s.	...	...	...	...	„ „
	„ 10	...	1 s.	...	...	...	...	Off Pittenweem.
	„ 14	...	1 l.	...	...	...	...	May I. W.
	„ 15	...	1 s.	...	...	...	...	„ E.
	„ 16	...	2 s.	...	...	...	...	Off Station.
	„ 17	...	3 s.	...	...	...	...	May I. N.
	„ 18	.	3½ s.	...	...	...	...	„ „
	„ 22	...	2½ s.	...	...	...	...	„ „
	„ 23	...	1½ s.	...	...	...	...	May I. E. ½
	„ 25	...	5 s.	...	...	...	...	„ „
	„ 26	...	4 s.	...	...	...	...	„ „
	„ 28	...	7½ s.	...	...	...	...	„ „
	„ 29	...	5 s.	...	...	...	...	„ „
	„ 30	...	5½ s.	...	...	...	...	„ „
	„ 31	...	4 s.	...	...	...	...	„ „
	Total for Month.	...	...	...	...	...	...	Under 2
		...	5½	...	...	...	...	2–3
		...	53	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
Boat No. 36. 27 feet Keel. 6 Men.	1886. Nov. 1	...	Cwt. 3	...	...	...	...	Close inside May
	„ 2	...	2½	...	...	...	...	„ „
	„ 4	...	3	...	...	...	...	„ „
	„ 5	...	3	...	...	...	...	E. of May
	„ 8	...	2½	...	...	...	...	Close inside May
	„ 9	...	2½	...	...	...	...	„ „
	„ 10	...	3	...	...	...	...	„ „
	„ 11	...	4	...	...	...	.	„ „
	„ 12	...	5	...	...	...	...	E. of May
	„ 15	...	3½	...	...	...	...	„ „
	„ 16	...	4	...	...	...	...	„ „
	„ 17	...	2½	...	...	...	...	W. of „
	„ 18	...	4	...	...	...	...	E. of „
	„ 19	...	3½	...	...	...	...	„ „
	„ 22	...	3	...	...	...	...	„ „
	„ 23	...	2½	...	...	...	...	„ „
	„ 24	...	3	...	...	...	...	„ „
	„ 25	...	3	...	...	...	...	„ „
	„ 26	...	1½	...	...	...	...	„ „
	„ 30	...	1 l.	...	...	...	...	Close inside May
			3					E. of „
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	63	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	1⅓ l. 2⅔	...	...	...	...	Close E. of May I.
	„ 2	...	1⅓ l.	...	...	...	...	„ „
	„ 3	...	1 l. 2½	...	...	...	...	„ „
	„ 7	...	2½	...	...	...	...	„ „
	„ 9	...	1	...	...	...	...	W. of „
	„ 10	...	⅔ l. 1⅓	...	...	...	...	Within 1 E. of May I.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.* *St Monance Stn.*	1886. Dec. 11	...	Cwt. 1 l. 2½	...	...	...	...	Within 1 W. of May.
	" 13	...	1 l. 1	...	...	...	...	" "
	" 14	...	1½ l.	...	...	...	...	" W. "
Boat No. 36.	" 15	...	4½ l.	...	...	...	...	" "
	" 16	...	4 l.	...	...	...	...	" "
	" 17	...	8 l.	...	...	...	...	" E. "
	" 18	...	5½ l.	...	...	...	...	" W. "
	" 20	...	4½ l.	...	...	...	...	" E. "
	" 21	...	5 l.	...	...	...	...	" "
	" 22	...	1½ l.	...	...	...	...	" W. "
	" 23	...	5 l.	...	...	...	...	" N. "
	" 24	...	4 l.	...	...	...	...	" W. "
	" 25	...	4½ l.	...	...	...	...	" "
	" 27	...	3½ l.	...	...	...	...	" E. "
	" 28	...	4½ l.	...	...	...	...	" "
	" 29	...	5 l.	...	...	...	...	" "
	" 30	...	4 l.	...	...	...	...	" "
	" 31	...	4½ l.	...	...	...	...	" "
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	92	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887. Jan. 5	...	1¼ l.	...	...	...	...	W. of May I.
	" 7	...	1 l.	...	...	...	...	" "
	" 8	...	6 l.	...	...	...	...	" "
	" 10	...	1½ l.	...	...	...	...	E. of "
	" 12	...	2½ l.	...	...	...	...	W. of "
	" 13	...	3 l.	...	...	...	...	" "
	" 14	...	3½ l.	...	...	...	...	" "
	" 15	...	3 l.	...	...	...	...	" "
	" 17	...	3 l.	...	...	...	...	" "
	" 18	...	2 l.	...	...	...	...	" "
	" 20	...	5 l.	...	...	...	...	E. of "
	" 24	...	1½ l.	...	...	...	...	W. of "
	" 25	...	3 l.	...	...	...	...	" "
	" 26	...	6½ l.	...	...	...	...	" "
	" 27	...	5 l.	...	...	...	...	E. of "
	" 31	...	5 l.	...	...	...	...	" "
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	52¾	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	3½ l.	...	...	...	...	Within 1 W. of May
	" 2	...	3 l.	...	...	...	...	" "
	" 7	...	8 l.	...	...	...	...	1–2 E. of May
	" 8	...	10 l.	...	...	...	...	" "
	" 9	...	9 l.	...	...	...	...	" "
	" 10	...	9½ l.	...	...	...	...	" "
	" 11	...	3½ l.	...	...	...	...	" "
	" 12	...	2 l.	...	...	...	...	" "
	" 14	...	1½ l.	...	..	...	...	" "
	" 15	...	2 l.	...	...	...	...	" "
	" 16	...	1 l.	...	...	...	...	" "
	" 17	...	1½ l.	...	...	...	...	" "
	" 18	...	4 l.	...	...	...	...	" "

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.					
ANSTRUTHER DISTRICT—*cont.* *St Monance Stn.* Boat No. 36.	Feb. 19	..	2 l.	…	…	…	…	1–2 E. of M.
	,, 21	…	2 l.	…	…	…	…	,, ,,
	,, 22	…	4 l.	…	…	…	…	,, ,,
	,, 26	…	1 l.	…	…	…	…	,, ,,
	,, 28	…	1½ l.	…	…	…	…	,, ,,
	Total for Month.	… … … …	… … 69 …	… … … …	… … … …	… … … …	… … … …	Under 2 2–3 3–6 Over 6
	Mar. 1	…	1	…	…	…	…	E. of May I.
	,, 2	…	2	…	…	…	…	,, ,,
	,, 3	…	2½	…	…	…	…	,, ,,
	,, 4	…	2	…	…	…	…	,, ,,
	,, 7	…	1	…	…	…	…	W. of ,,
	,, 8	…	½	…	…	…	…	,, ,,
	,, 9	…	1½	…	…	…	…	,, ,,
	,, 10	…	1	…	…	…	…	,, ,,
	,, 14	…	1	…	…	..	…	,, ,,
	,, 15	…	1½	…	…	…	…	E. of ,,
	,, 16	…	1	…	..	…	…	,, ,,
	,, 17	…	1½	..	…	…	…	,, ,,
	,, 18	…	2½	…	…	…	…	,, ,,
	,, 21	…	1½	…	…	…	…	,, ,,
	,, 22	…	2	…	…	…	…	W. of ,,
	,, 23	…	1½	…	…	…	…	,, ,,
	,, 25	…	2	…	…	…	…	E. of ,,
	,, 28	…	4	…	…	…	…	,, ,,
	,, 29	…	3½	…	…	…	…	,, ,,
	,, 30	…	3½	…	…	…	…	,, ,,
	,, 31	…	3	…	…	…	…	,, ,,
	Total for Month.	… … … …	… … 40 …	… … … …	… … … …	… … … …	… … … …	Under 2 2–3 3–6 Over 6
	1886.	No.	Boxes.					
	Nov. 1	…	2¼	…	…	…	…	Inside May I.
Boat No. 37. 25 feet Keel. 6 Men.	,, 4	…	2½	…	…	…	…	,, ,,
	,, 5	…	3	…	…	…	…	,, ,,
	,, 8	…	2¾	…	…	…	…	1½–2 off Pittenweem.
	,, 9	…	3¼	…	…	…	…	,, ,,
	,, 10	…	2½	…	…	…	…	,, ,,
	,, 11	…	1½	…	…	…	…	Inside May I.
	,, 12	…	2⅔	…	…	…	…	,, ,,
	,, 15	2	2	…	…	…	…	,, ,,
	,, 16	…	2¾	…	…	…	…	,, ,,
	,, 17	…	3	…	…	…	…	,, ,,
	,, 18	…	2	…	…	…	…	,, ,,
	,, 19	…	3	…	…	…	…	,, ,,
	,, 22	1	2	…	…	…	…	,, ,,
	,, 23	…	3	…	…	…	…	,, ,,
	,, 24	…	3	…	…	…	…	,, ,,
	,, 25	…	3	…	…	…	…	,, ,,
	,, 26	…	2	…	…	…	…	,, ,,
	,, 30	…	3	…	…	…	…	Station 7 N.
	Total for Month.	… … 3 …	8½ … 40⅔ …	… … … …	… … … …	… … … …	… … … …	Under 2 2–3 3–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.* *St Monance Stn.* Boat No. 37. 25 feet Keel. 6 Men.	1886.		Boxes.					
	Dec. 1	...	3¼	...	...	...	...	4 off Station
	,, 2	...	3¼	...	...	...	...	2 off Elie
	,, 3	...	2⅓	...	...	...	...	2 ,,
	,, 7	...	3⅓	...	...	...	...	,, ,,
	,, 9	...	1½	...	...	..	...	,, ,,
	,, 10	...	3⅓	...	...	...	...	Bass R. 1 S.
	,, 11	...	4	...	...	...	...	,, ,,
	,, 13	...	4⅓	...	...	...	...	,, 2–3 S.
	,, 14	...	2	...	...	...	...	,, ,,
	,, 17	...	3⅓	...	...	...	...	,, ,,
	,, 18	...	3	...	...	...	...	2 off Station
	,, 20	...	4⅓ l.	...	...	...	...	2 off Anstħr.
	,, 21	...	3⅓	...	...	...	...	Bass R. 2 S.
	,, 22	...	2	...	...	...	...	2 off Station
	,, 23	...	12⅔ l.	...	...	...	...	2–3 off Ansth.
	,, 24	...	5½ l.	...	...	...	...	,, ,,
	,, 25	...	5 l.	...	...	...	...	4 ,,
	,, 27	...	7 l.	...	...	...	...	May I. 1 W.
	,, 28	...	3¾	...	...	...	...	2 off Station
	,, 29	...	4 l.	...	...	..	...	May I. ½ E.
	,, 30	...	5 l.	...	...	...	...	,, ,,
	,, 31	...	6 l.	...	...	...	...	2 off Anstħr.
	Total for Month.	... ...	... 58½ 53⅔ ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1887.							
	Jan. 3	...	1⅓	...	...	...	...	2–3
	,, 5	...	1⅔	...	...	...	...	,,
	,, 7	...	1¼	...	...	...	...	1–1½
	,, 8	...	2	...	...	...	...	2–3
	,, 10	...	4	...	...	...	...	,,
	,, 12	...	4 l.	...	...	...	...	,,
	,, 13	...	2	...	...	...	...	,,
	,, 14	...	2	...	...	...	...	,,
	,, 15	...	5 l.	...	...	...	...	May I. S. 1
	,, 18	...	1	...	...	...	...	2–3
	,, 20	...	3 l.	...	...	...	...	,,
	,, 24	...	1 l.	...	...	...	...	,,
	,, 25	...	3	...	...	...	...	,,
	,, 26	.	5	...	...	..	...	Bass R. S. 2
	,, 27	...	8	...	...	...	...	May I. E. ½
	,, 31	...	4	...	...	...	...	Bass R. S. 2
	Total for Month.	... ...	1¼ 34 13 ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Feb. 1	...	2	...	...	...	...	2 off Stn.
	,, 2	...	4	...	...	...	...	Bass R. S. 2
	,, 3	...	1	...	...	...	...	2 off Pitt'wm.
	,, 7	...	4	...	...	...	...	May I. 2 N.
	,, 8	...	3½	...	...	...	...	Bass R. S. 2
	,, 9	...	3½	...	...	...	...	2 off Anstrth.
	,, 10	...	8 l.	...	...	...	...	May I. 1 E.
	,, 11	...	4 l.	...	...	...	...	,, ,,
	,, 12	...	3 l.	...	...	...	...	,, ,,
	,, 14	...	2	...	...	...	...	2 off Pitt'wm.
	,, 15	...	4	...	...	...	...	,, ,,
	,, 16	...	½	...	...	...	...	Bass R. S. 1
	,, 17	...	1½	...	...	...	...	2 off Anstrth.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.*	1887.		Boxes.					
St Monance Stn.	Feb. 18	...	1¾	...	...	...	...	May I. E. 1
	,, 21	...	1¾	...	...	...	...	2 off Anstrth.
	,, 22	...	1¾	...	...	...	...	,, ,,
Boat No. 37.	,, 28	...	1	...	...	...	...	2 off Pittenweem.
25 feet Keel. 6 Men.	Total for Month.	... ...	... 26½ 20¾ ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	Mar. 1	...	2½	...	...	...	...	Bass R. S. 1–2
	,, 2	...	2	...	...	...	...	,, ,,
	,, 3	...	1¼	...	...	...	...	,, ,,
	,, 4	...	1⅓	...	...	...	...	2 off Station
	,, 5	...	2⅓	...	...	...	...	May I. N. 1
	,, 7	...	2	...	...	...	...	,, ,,
	,, 8	...	3	...	...	...	...	Bass R. S. 2
	,, 9	...	1	...	...	...	...	2 off Station
	,, 10	...	½	...	...	...	...	,, ,,
	,, 14	...	2	...	...	...	...	,, ,,
	,, 15	...	1¾	...	...	...	...	,, ,,
	,, 16	...	2	...	...	...	...	,, ,,
	,, 17	...	1½	...	...	...	...	,, ,,
	,, 18	...	1	...	...	...	...	,, ,,
	,, 21	...	2	...	...	...	...	May I. S. 1
	,, 22	...	2⅓	...	...	...	...	,, ,,
	,, 25	...	2¾	...	...	...	...	,, ,,
	,, 26	...	2½	...	...	...	...	,, ,,
	,, 28	...	7	...	...	...	...	,, W. 1
	,, 29	...	7	...	...	...	...	,, ,,
	,, 30	...	6	...	...	...	...	,, ,,
	,, 31	...	2	...	...	...	...	Bass R. S. 2
	Total for Month	... ...	... 21⅚ 34 ...	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6
	1886.		Bskts.					
Elie Station.	Nov. 1	...	1¼	...	...	...	...	3
	,, 5	...	1½	...	...	...	...	,,
Boat No. 38.	,, 8	...	2	...	...	...	...	,,
23 feet Keel.	,, 9	...	1	...	...	...	...	,,
4 Men.	,, 10	...	1¼	...	...	...	...	,,
	,, 11	...	½	...	...	...	...	1½
	,, 12	...	1	...	...	...	...	3
	,, 13	...	½	...	...	...	...	1½
	,, 15	...	1	...	...	...	...	3
	,, 16	...	1¼	...	...	...	...	,,
	,, 17	...	1	...	...	...	...	,,
	,, 18	...	1½	...	...	...	...	,,
	,, 19	...	1	...	...	...	...	,,
	,, 20	...	1¼	...	...	...	...	,,
	,, 22	...	1½	...	...	...	...	,,
	,, 23	...	1¼	...	...	...	...	,,
	,, 24	...	1	...	...	...	...	,,
	,, 25	...	1	...	...	...	...	,,
	,, 30	...	1	...	...	...	...	,,
	Total for Month	... ...	1 20¾	... ...	... ...	... ...	... ...	Under 2 2–3 3–6 Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.		Bskts.	Bskts.	Bskts.			
ANSTRUTHER DISTRICT—*cont.* *Elie Station.* Boat No. 38. 23 feet Keel. 4 Men.	Dec. 1	...	1	...	...	...	...	3 off Station.
	,, 2	...	1¼	...	...	...	...	4 ,, ,,
	,, 3	...	1½	...	...	...	...	,, ,,
	,, 4	...	1	...	...	...	...	,, ,,
	,, 6	...	1¼	1¼	...	...	...	3 ,, ,,
	,, 7	...	¾	¾	...	...	...	,, ,,
	,, 8	...	1	...	...	...	...	,, ,,
	,, 9	...	½	...	...	...	...	,, ,,
	,, 11	...	1	...	...	...	...	,, ,,
	,, 13	...	1	...	...	...	...	,, ,,
	,, 14	...	1	...	...	...	...	,, ,,
	,, 15	...	1	...	...	...	...	,, ,,
	,, 16	...	1	...	...	...	...	,, ,,
	,, 17	...	1	...	...	...	...	,, ,,
	,, 18	...	1½	...	...	...	...	,, ,,
	,, 20	...	1	...	1	...	...	,, ,,
	,, 21	...	1¼	...	...	...	...	,, ,,
	,, 22	...	1¼	...	...	...	...	,, ,,
	,, 23	...	1¼	...	...	...	...	,, ,,
	,, 24	...	1¼	...	...	...	...	,, ,,
	,, 25	...	1¾	...	...	...	...	,, ,,
	,, 27	...	1½	...	...	...	...	,, ,,
	,, 28	...	2	...	...	...	...	,, ,,
	,, 29	...	1½	...	...	...	...	,, ,,
	, 30	...	1¾	...	...	...	...	,, ,,
	,, 31	...	1¾	...	...	...	...	,, ,,
	Total for Month	...	...	...	...	...	...	Under 2
		...	28¼	2	1	...	...	2–3
		...	3¾	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 1	...	1	...	...	...	...	3 off Station
	,, 3	...	1¾	...	...	...	...	,, ,,
	,, 4	...	1½	...	...	...	...	,, ,,
	,, 5	...	1	...	...	...	...	,, ,,
	,, 6	...	1½	...	...	...	...	,, ,,
	,, 7	...	1½	...	...	...	...	,, ,,
	,, 8	...	1½	...	...	...	...	1½ off Station
	,, 10	...	1½	...	...	...	...	,, ,,
	,, 12	...	½	...	...	...	...	,, ,,
	,, 13	...	1	...	...	...	...	,, ,,
	,, 14	...	1	...	...	...	...	,, ,
	,, 15	...	1	...	...	...	...	,, ,,
	,, 17	...	1	...	...	...	...	,, ,,
	,, 18	...	1½	...	...	...	...	,, ,,
	,, 19	...	1½	...	...	...	...	,, ,,
	,, 20	...	1½	...	...	...	...	,, ,,
	,, 24	...	1	...	...	...	...	,, ,,
	,, 25	...	½	...	...	...	...	,, ,,
	,, 26	...	½	...	...	...	...	6 off ,,
	,, 27	...	1¼	...	...	...	...	3 off ,,
	,, 29	...	¾	...	...	...	...	,, ,,
	,, 31	...	1	...	...	...	...	,, ,,
	Total for Month	...	13½	...	...	...	...	Under 2
		...	11¼	...	...	...	...	2–3
		...	½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	1	...	...	...	...	3 off Station.
	,, 2	...	¾	...	...	...	...	,, ,,
	,, 5	...	1	...	...	...	...	,, ,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Bskts.		Bskts.			
ANSTRUTHER DISTRICT—*cont.*	Feb. 7	...	1¼	...	...	...	...	May I. E. 3
Elie Station.	,, 8	...	1	...	...	...	...	3 off Stn.
	,, 9	...	¾ l. ¾	...	...	...	...	May I. E. 3
Boat No. 38. 23 feet Keel. 4 Men.	,, 10	...	1 l. 1	...	...	...	...	,, ,,
	,, 11	...	1¾	...	...	...	...	,, ,,
	,, 12	...	1½	...	...	...	...	,, ,,
	,, 14	...	1	...	...	...	...	,, ,,
	,, 15	...	1¾	...	...	...	...	,, ,,
	,, 16	...	...	...	½	...	...	2 off Stn.
	,, 17	...	1½	...	...	...	...	May I. E. 3
	,, 18	...	1	...	...	...	...	Bass R. S. 2
	,, 19	...	1	..	...	...	...	May I. E. 4
	,, 21	...	2	...	...	...	...	,, S.E. 4
	,, 22	...	½	...	...	...	...	,, E. 3
	,, 25	...	½	...	...	...	...	2 off Stn.
	,, 26	...	¾	...	...	...	...	,, ,,
	,, 28	...	1¼	...	...	...	...	May I. S. 2
	Total for Month	...	...	...	...	...	...	Under 2
		...	6½	...	½	...	...	2–3
		...	13¾	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	1½	...	...	...	...	May I. S. 1
	,, 2	...	1¾	...	...	...	...	,, ,,
	,, 3	...	2	...	...	...	...	,, ,,
	,, 4	...	1¼	...	...	...	...	,, ,,
	,, 5	...	1	...	...	...	...	,, ,,
	,, 7	...	1¼	...	...	...	...	,, E. 2
	,, 8	...	1¼	...	...	...	...	,, ,,
	,, 9	...	½	...	...	...	...	,, ,,
	,, 10	...	1	...	...	...	...	,, S. 1
	,, 11	...	1¼	...	...	...	...	,, ,,
	,, 12	...	1	...	...	...	...	,, ,,
	,, 14	...	1	...	...	...	...	,, ,,
	,, 15	...	1	...	...	...	...	,, ,,
	,, 16	...	1¼	...	...	...	...	,, ,,
	,, 17	...	...	...	1½	...	...	Pittenweem Traith.
	,, 18	...	...	...	1½	...	...	,,
	,, 19	...	½	...	...	...	...	2 off Station.
	,, 21	...	...	...	1½	...	...	Pittenweem Traith.
	,, 22	...	½	...	...	...	...	2 off Pittenweem.
	,, 23	...	...	...	1½	...	...	Pittenweem Traith.
	,, 24	...	...	...	1½	...	...	,,
	,, 26	...	½	...	...	...	...	2 off Station.
	,, 28	...	...	...	1½	...	...	Pittenweem Traith.
	,, 29	...	...	...	2	...	...	,,
	,, 30	...	1	...	...	...	...	May I. E. 4
	,, 31	...	½	...	...	...	...	2 off Station
	Total for Month.	...	2	...	11	...	...	Under 2
		...	...	...	...	...	...	2-3
		...	18	...	...	...	...	3-6
		...	...	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.* *Elie Station.* Boat No. 39. 18 feet Keel. 3 Men.	1886.		Bskts.					
	Nov. 1	...	½	...	...	...	...	2–3
	,, 5	...	½	...	...	...	...	,,
	,, 8	...	**2**	...	...	...	...	,,
	,, 9	...	**1**	...	...	...	...	,,
	,, 10	...	**2**	...	...	...	...	,,
	,, 11	...	½	...	...	...	...	,,
	,, 12	...	**1**	...	...	...	...	4–5
	,, 13	...	**1** l.	...	...	...	...	2–3
	,, 15	...	½	...	...	...	...	4–5
	,, 16	...	**2** s.	...	...	...	...	,,
	,, 17	...	**1**	...	...	...	...	2–3
	,, 18	...	**1**	...	...	...	...	,,
	,, 19	...	**1½**	...	...	...	...	,,
	,, 20	...	**1**	...	...	...	...	,,
	,, 22	...	**2** s.	...	...	...	...	4–5
	,, 23	...	**1** s.	...	...	...	...	2–3
	,, 24	...	**1** s.	...	...	...	...	,,
	,, 25	...	**1½** s.	...	...	...	...	,,
	,, 26	...	**1½** s.	...	...	...	...	4–5
	,, 27	...	**1**	...	...	...	...	2–3
	,, 30	...	**2** s.	...	...	...	...	4–5
	Total for Month.	...	...	...	...	...	...	Under 2
		...	16½	...	...	...	...	2–3
		...	9	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	**1¾** s.	...	...	...	...	3 off Station
	,, 2	...	**2** s.	...	...	...	...	,, ,,
	,, 3	...	**2**	...	...	...	...	4 off Station
	,, 4	...	**1**	...	...	...	...	2 ,,
	,, 7	...	**2½**	...	...	...	...	,, ,,
	,, 9	...	...	...	¼	...	...	1 ,,
	,, 10	...	**1**	...	...	...	...	2–3 ,,
	,, 11	...	**1***	...	...	...	...	,, ,,
	,, 13	...	**1**	...	...	...	...	,, ,,
	,, 14	...	**1**	...	...	...	...	,, ,,
	,, 15	...	**1**	...	...	...	...	,, ,,
	,, 17	...	½ l.	...	...	...	...	,, ,,
	,, 18	...	**2** l.*	...	...	...	...	,, ,,
	,, 20	...	**2** l.	...	...	...	...	,, ,,
	,, 21	...	**2**	...	...	...	...	,, ,,
	,, 22	...	**2**	...	...	...	...	,, ,,
	,, 23	...	**1½**	...	...	...	...	,, ,,
	,, 24	...	**1**	...	...	...	...	,, ,,
	,, 25	...	**1½**	...	...	...	...	,, ,,
	,, 27	...	**2**	...	...	...	...	4 off Station
	,, 28	...	**2**	...	...	...	...	2 ,,
	,, 29	...	**2**	...	...	...	...	,, ,,
	,, 30	...	**1** s.	...	...	...	...	,, ,,
	,, 31	...	**1** s.	...	...	...	...	,, ,,
	Total for Month.	...	...	...	¼	...	...	Under 2
		...	30¾	...	...	...	...	2–3
		...	4	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.	No.						
	Jan. 1	...	**2** s.	...	...	...	...	4–5 oft
	,, 4	**2**	**2** s.	...	...	...	...	,,
	,, 5	...	**1** s.	...	...	...	...	,,
	,, 6	...	**1¼** s.	...	...	...	...	,,

* Includes Codlings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.	No.	Bskts.		B'skts.			
ANSTRUTHER DISTRICT—*cont.* *Elie Station.* Boat No. 39. 18 feet Keel. 3 Men.	Jan. 7	...	1 s.	...	...	...	...	4–5 off
	,, 9	...	1½ s.	...	...	...	...	,,
	,, 11	...	2	...	...	...	...	,,
	,, 12	...	2	...	...	...	...	,,
	,, 13	...	2	...	...	...	...	,,
	,, 15	...	1½	...	...	...	...	,
	,, 17	...	1 s.	...	...	...	...	,,
	,, 18	...	1	...	...	...	...	,,
	,, 20	...	1½ s.	...	...	...	...	,,
	,, 24	...	1½ s.	...	...	...	...	,,
	,, 25	...	1 s.	...	...	...	...	,,
	,, 26	...	1 s.	...	...	...	...	,,
	,, 27	...	1 s.	...	...	...	...	,,
	,, 31	...	2	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		2	26¼	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	...	...	4	...	...	1½ off Station.
	,, 7	3	2	...	...	...	...	4 off ,,
	,, 8	...	1½	...	...	...	...	3 ,, ,,
	,, 9	...	2 s.*	...	...	...	...	,, ,,
	,, 10	...	1	...	...	...	...	,, ,,
	,, 11	...	½ s.	...	...	...	...	2 ,, ,,
	,, 12	...	...	...	3	...	...	Station W. 10
	,, 14	...	1½	...	...	...	...	2–3 off Stn.
	,, 15	...	1	...	...	...	...	,, ,,
	,, 16	...	1	...	...	...	...	,, ,,
	,, 17	...	1*	...	...	...	...	,, ,,
	,, 18	...	1¼	...	...	...	...	,, ,,
	,, 19	...	1	...	...	...	...	,, ,,
	,, 21	...	1	...	...	...	...	4 ,,
	,, 26	...	1 s.	...	...	...	...	2–3 ,,
	,, 28	...	1	...	...	...	...	Station W. 10
	Total for Month.	...	...	...	4	...	...	Under 2
		...	9¾	...	3	...	...	2–3
		3	7	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	1½ s.	...	...	...	...	4–5 off
	,, 2	...	1½ s.	...	...	...	...	,,
	,, 4	...	1½	...	...	...	...	Stn. W. 7–10
	,, 5	...	1	...	...	...	...	,, ,,
	,, 7	...	1½	...	...	...	...	,, ,,
	,, 8	...	1½ s.	...	...	...	...	,, ,,
	,, 9	...	2	...	...	...	...	,, ,,
	,, 10	...	2	...	...	...	...	,, ,,
	,, 12	...	1 s.*	...	...	...	...	2–3 off
	,, 15	...	1	...	...	...	...	Stn. W. 7–10
	,, 16	...	1	...	...	...	...	,, ,,
	,, 17	...	1	...	...	...	...	,, ,,
	,, 18	...	1	...	...	...	...	4–5 off
	,, 19	...	1½*	...	...	...	...	2–3 off
	,, 21	...	1½*	...	...	...	...	,,
	,, 23	...	1 s.*	...	...	...	...	4–5
	,, 25	...	1 s.*	...	...	...	...	,,
	,, 26	...	1½*	...	...	...	...	,,
	,, 28	...	2*	...	...	...	...	Stn. W. 7–10

* Includes Codlings

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.*	1887.		Bskts.		Bskts.			
Elie Station.	Mar. 29	...	**3***	...	...	...	...	,, ,,
	,, 30	...	**2***	...	...	...	...	,, ,,
	,, 31	...	**1***	...	...	...	...	,, ,,
Boat No. 39.	Total for Month.	...	24½	...	...	...	...	Under 2
		...	7½	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1886.							
Largo Station.	Nov. 1	...	**1**	...	...	...	...	2–3
	,, 3	...	**1**	...	...	...	...	3–6
Boat No. 40.	,, 8	...	**2½**	...	...	...	...	2–3
22 feet Keel.	,, 9	...	**3**	...	...	...	...	,,
4 Men.	,, 10	...	**3**	...	...	...	...	,,
	,, 11	...	**2**	...	¼	...	...	,,
	,, 12	...	**1**	...	...	...	...	3–6
	,, 13	...	**2½**	...	...	...	...	,,
	,, 15	...	**2½**	...	...	...	...	,,
	,, 16	...	**2**	...	...	...	...	,,
	,, 17	...	**3**	...	¼	...	...	,,
	,, 18	...	**1**	...	...	...	...	2–3
	,, 19	...	**4**	...	...	...	...	,,
	,, 20	...	**2½**	...	...	...	...	,,
	,, 22	...	**2**	...	½	...	...	,,
	,, 23	...	**2½**	...	...	...	...	3–6
	,, 24	...	**2**	...	½	...	...	,,
	,, 25	...	**3**	...	¼	...	...	,,
	,, 26	...	**2**	...	¼	...	...	,,
	,, 27	...	**2½**	...	¼	...	...	2–3
	,, 30	...	**1**	...	...	...	...	3–6
	Total for Month.	...	...	...	...	...	...	Under 2
		...	23½	...	1	...	...	2–3
		...	22½	...	1¼	...	...	3–6
		...	...	...	...	...	...	Over 6
	Dec. 1	...	**1**	...	...	...	...	2 off Elie
	,, 2	...	**2***	...	...	...	...	,,
	,, 3	...	**3**	...	...	...	...	,,
	,, 4	...	**2**	...	...	...	...	,,
	,, 7	...	**2***	...	...	...	...	3 off Station
	,, 10	...	**2***	...	...	...	...	,,
	,, 11	...	**2**	...	...	...	...	3 off Elie
	,, 13	...	**2**	...	...	...	...	2 ,,
	,, 14	...	**2***	...	...	...	...	2 off St Mon.
	,, 15	...	**2½***	...	...	...	...	,, Pitt'wm.
	,, 16	...	**2½** l.*	...	...	...	...	3 S.S.E. off Stn.
	,, 17	...	**2½** l.*	...	...	...	...	,, ,,
	,, 18	...	**2***	...	...	...	...	5 ,, ,,
	,, 20	...	**1½***	...	...	...	...	,, ,,
	,, 21	...	**2***	...	...	...	...	3
	,, 23	...	**1***	...	...	...	...	4–6
	,, 24	...	**2***	...	...	...	...	5 ,, ,,
	,, 25	...	**3½***	...	...	...	...	6S.S.E.offStn,
	,, 27	...	**2***	...	...	...	...	3 off Elie.
	,, 28	...	**3***	...	...	...	...	6 S.E. off Stn.
	,, 29	...	**3½***	...	...	...	...	,, ,,
	,, 30	...	**4***	...	...	...	...	,, ,,
	,, 31	...	**2½***	...	...	...	...	4 off Elie.
	Total for Month.	...	...	...	...	...	...	Under 2
		...	32	...	...	...	...	2–3
		...	20½	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

* Includes Codlings.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
ANSTRUTHER DISTRICT—*cont.* *Largo Station.* Boat No. 40. 22 feet Keel. 4 Men.	1887.		Bskts.			Bskts.		
	Jan. 1	...	3	...	...	...	...	3–6
	,, 5	...	2	...	...	...	...	,,
	,, 6	...	2	...	...	...	...	2–3
	,, 7	...	2½	...	...	...	...	3–6
	,, 8	...	2½	...	...	...	...	2–3
	,, 10	...	2	...	...	...	...	,,
	,, 12	...	2½	...	...	...	...	3–6
	,, 13	...	2	...	...	...	...	Off N. Berwk.
	,, 14	...	2	...	...	...	...	3–6
	,, 15	...	2½	...	...	...	...	2–3
	,, 18	...	2½	...	...	...	...	,,
	,, 20	...	1½	...	...	...	...	,,
	,, 24	...	1½	...	...	...	...	,,
	,, 25	...	3	...	...	...	...	Off Craigleith.
	,, 26	...	3	...	...	...	...	,, Fiddra.
	,, 27	...	4½	...	...	...	...	,,
	,, 31	...	1½	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	28½	...	...	...	...	2–3
		...	12	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	2	...	...	...	...	2 off Fiddra.
	,, 7	...	2 *	...	...	...	...	,, Pitt'wm
	,, 8	...	1¼	...	...	...	...	,, ,,
	,, 10	...	...	...	...	3½	...	Largo Bay.
	,, 11	...	...	...	...	3	...	,, ,,
	,, 12	...	...	...	...	2	...	,, ,,
	,, 14	...	3 *	...	...	...	...	3 off Anstrh.
	,, 15	...	3 *	...	...	...	...	,, ,,
	,, 17	...	1	...	...	...	...	,, ,,
	,, 18	1½	...	...	...	...	...	2off Craigleith
	,, 19	1½	...	...	...	...	...	4 S.S.E. Stn.
	,, 21	½	...	...	...	...	...	,, ,,
	,, 22	...	1½†	...	...	...	...	2 off Stn.
	,, 25	...	2 †	...	...	...	...	,, ,,
	,, 26	...	2 †	...	...	...	...	,, ,,
	,, 28	...	2 †	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	24¼	...	...	8½	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Mar. 1	...	2 *	...	...	...	...	2–3
	,, 2	...	1½*	...	...	...	...	,,
	,, 3	...	1½*	...	...	...	...	,,
	,, 4	...	1*	...	...	...	...	,,
	,, 5	...	1½	...	...	...	...	3–6
	,, 7	...	1	...	...	...	...	3 off Anstrh.
	,, 8	...	1 †	...	...	...	...	2–3
	,, 9	...	1 †	...	...	...	...	,,
	,, 10	...	1½†	...	...	...	...	,,
	,, 14	...	2 †	...	...	...	...	,,
	,, 15	...	1 †	...	...	...	...	,,
	,, 16	...	...	...	...	2	...	Off Pit'weem.
	,, 17	...	1½†	...	...	...	...	2–3
	,, 18	...	1½†	...	...	...	...	,,
	,, 19	...	1½†	...	...	...	...	,,
	,, 21	...	2½*†	...	...	...	...	Off Pit'weem.

* Includes Whitings. † Includes Flounders.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
AUSTRUTHER DISTRICT—*cont.* *Largo Station.* Boat No. 40. 22 feet Keel. 4 Men.	1887. Mar. 22	...	**2** *	...	...	...	...	Off Pit'weem.
	,, 23	...	**2**	...	...	...	...	3–6
	,, 25	...	**1½**	...	...	...	...	,,
	,, 26	...	**1½**	...	...	...	...	,,
	,, 28	...	**1½**	...	...	...	...	,,
	,, 29	...	**2½**	...	...	...	...	Off Anstruth.
	,, 30	...	**2**	...	...	...	...	,,
	,, 31	...	**1**	...	...	...	...	2–3
	Total for Month.	...	...	...	...	...	...	Under 2
		...	28	...	...	2	...	2–3
		...	8	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
							Herrings. No.	
LEITH DISTRICT. *Newhaven Stn.* Boat No. 41. 23 feet Keel. 5 Tons.	1886. Dec. 9	...	...	...	...	...	**200**	Leith Roads.
	,, 10	...	...	...	...	...	**2000**	Burntisland.
	,, 11	...	...	...	...	...	**1200**	”
	,, 13	...	...	...	...	...	**700**	Leith Roads.
	, 14	...	...	...	...	...	**3000**	Inchkeith.
	,, 15	...	...	...	...	...	**1200**	Burntisland.
	,, 16	...	...	...	...	...	**3000**	”
	,, 17	...	...	...	...	...	**4000**	”
	,, 18	...	...	...	...	...	**2000**	Leith Roads.
	,, 20	...	...	...	...	...	**1700**	Kinghorn.
	,, 21	...	...	...	...	...	**300**	Inchkeith.
	,, 22	...	...	...	...	...	**1200**	”
	,, 23	...	...	...	...	...	**700**	”
	,, 24	...	...	...	...	...	**400**	”
	,, 25	...	...	...	...	...	**800**	Burntisland.
	,, 27	...	...	...	...	...	**1300**	Inchkeith.
	,, 28	...	...	...	...	...	**2000**	”
	,, 29	...	...	...	...	...	**600**	”
	,, 30	...	...	...	...	...	**700**	Leith Roads.
	,, 31	...	...	...	...	...	**700**	”
	Total for Month.	...	...	...	...	...	**27,700**	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887. Jan. 5	...	...	...	...	...	**300**	Leith Roads
	,, 6	...	...	...	...	...	**700**	”
	,, 7	...	...	...	...	...	**700**	”
	,, 8	...	...	...	...	...	**600**	”
	,, 10	...	...	...	...	...	**1700**	”
	,, 12	...	...	...	...	...	**4000**	”
	,, 13	...	...	...	...	...	**2000**	”
	,, 14	...	...	...	...	...	**1200**	”
	,, 15	...	...	...	...	...	**700**	”
	,, 19	...	...	...	...	...	**800**	”
	,, *25	...	...	...	...	...	**4000**	”
	,, *26	...	...	...	...	...	**5000**	”
	Total for Month,	...	...	...	...	...	**21,700**	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6

* Circle-net; other takes with drift-net.

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
LEITH DISTRICT —*cont.* *Newhaven Stn.* Boat No. 41*a*. 55 feet Keel. 35 Tons. 7 Men.	1887.		Cwt.					
	Feb. 15	...	11¼	...	...	...	...	May I. W. 10
	,, 17	...	11¼	...	...	...	...	,,
	,, 19	...	6½	...	...	...	...	,,
	,, 22	...	¼	...	...	...	...	,,
	,, 26	...	¾	...	...	...	...	,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	30	...	...	...	...	Over 6
	Mar. 1	...	4¼	...	...	...	...	May I. W. 15–18
	,, 5	...	9⅝	...	...	...	...	,, W. 23–30
	,, 10	...	5¼	...	...	...	...	,, ,,
	,, 15	...	4⅜	...	...	...	...	,, ,,
	, 17	...	6⅛	...	...	...	...	,, W. 15–18
	,, 19	...	6¾	...	...	...	...	May W. 15–18
	,, 24	...	5¼	...	...	...	...	,, W. 23–30
	,, 26	...	12	...	...	...	...	,, ,,
	,, 29	...	7	...	...	...	...	,, ,,
	,, 31	...	5¼	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2-3
		...	...	...	...	...	...	3-6
		...	65⅞	...	...	...	...	Over 6
Boat No. 42. 24 feet Keel. 5 Tons.	1886.						Herrings. No.	
	Dec. 3	...	...	...	...	...	**250**	Inchkeith
	,, 4	...	...	...	...	...	**100**	W. of Granton
	,, 5	...	...	...	...	...	**350**	,,
	,, 6	...	...	...	...	...	**650**	,,
	,, 8	...	...	...	...	...	**800**	Between Inchkeith and Inchcolm
	,, 9	...	...	...	...	...	**300**	,, ,,
	,, 10	...	...	...	...	...	**1700**	Inchkeith
	,, 11	...	...	...	...	...	**2300**	W. of Granton
	,, 13	...	...	...	...	...	**1200**	,,
	,, 14	...	...	...	...	...	**3000**	Inchkeith
	,, 15	...	...	...	...	...	**1100**	,,
	,, 16	...	...	...	...	...	**2400**	,,
	,, 18	...	...	...	...	...	**1500**	W. of Granton
	,, 21	...	...	...	...	...	**3200**	Between Inchkeith and Inchcolm
	,, 22	...	...	...	...	...	**3000**	,, ,,
	,, 23	...	...	...	...	...	**1400**	W. of Granton
	,, 24	...	...	...	...	...	**900**	,,
	,, 27	...	...	...	...	...	**2500**	Inchkeith
	,, 28	...	...	...	...	...	**500**	,,
	Total for Month.	...	...	...	...	...	**27,150**	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 3	...	...	...	...	...	**1000**	near Inchkeith
	,, 4	...	...	...	...	...	**1100**	,,
	,, 5	...	...	...	...	...	**400**	,,

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
			Cwt.				Herrings. No.	
LEITH DISTRICT. —*cont.* *Newhaven Stn.* Boat No. 42.	1887. Jan. 6	...	...	...	...	...	**1000**	near Inchkeith
	,, 7	...	...	...	...	...	**3300**	,,
	,, 8	...	...	...	...	...	**2200**	,,
	,, 10	...	...	...	...	...	**500**	,,
	,, 11	...	...	...	...	...	**2200**	,,
	,, 12	...	...	...	...	...	**1200**	,,
	,, 13	...	...	...	...	...	**900**	,,
	,, 14	...	...	...	...	...	**1300**	,,
	,, 15	...	...	...	...	...	**100**	,,
	,, 18	...	...	...	...	...	**600**	,,
	,, 19	...	...	...	...	...	**700**	,,
	,, 20	...	...	...	...	...	**1200**	,,
	,, 21	...	...	...	...	...	**400**	,,
	,, 24	...	...	...	...	...	**2100**	,,
	,, 25	...	...	...	...	...	**800**	,,
	,, 27	...	...	...	...	...	**2200**	,,
	,, 28	...	...	...	...	...	**1000**	,,
	Total for Month.	...	...	...	...	...	**24,200**	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	Feb. 1	...	...	...	...	...	**1400**	Inchkeith
	,, 7	...	...	...	...	...	**400**	off Burntisland
	,, 8	...	...	...	...	...	**200**	,,
	,, 15	...	7 l.	...	...	...	...	May I. W. 1
	,, 17	...	10 l.	...	...	...	...	,, W. 8–9
	,, 19	...	11 l.	...	...	...	...	,, ,,
	,, 22	...	7 l.	...	...	...	...	, ,,
	,, 26	...	5 l.	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	2000 (No.)	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	40	...	...	...	...	Over 6
		Score.						
Boat No. 42*a*. 52 feet Keel. 30 Tons. 7 Men.	Mar. 1	...	4	...	...	...	...	May I. W. 10
	,, 4	...	1	...	...	...	...	,, ,,
	,, ,,	...	12	...	...	...	...	May W. 25–30
	,, 10	2½	...	...	...	...	...	,, ,,
	,, 19	4	...	...	...	...	...	,, 70-85
	,, 27	1¼	...	...	...	...	...	,, 25-30
	,, 31	...	19	...	...	...	...	,, 70-85
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		7¾	36	...	...	...	...	Over 6
Boat No. 43. 45 feet Keel. 20 Tons. 6 Men.	1886. Nov. 2	...	19	...	...	...	...	May I. W. 20–28
	,, 4	...	18	...	...	...	...	,, ,,
	,, 6	...	18	...	...	...	...	,, ,,
	,, 9	...	16	...	...	...	...	,, ,,
	,, 11	...	17	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	88	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1886.						Herrings. No.	
Leith District	Dec. 2	...	...	...	...	...	600	Inchkeith
—*cont.*	,, 4	...	...	...	...	...	200	,,
Newhaven Stn.	,, 7	...	...	...	...	...	300	,,
	,, 8	...	...	...	...	...	2000	,,
Boat No. 43*a*.	,, 9	...	...	...	...	...	1100	,,
	11	...	...	...	...	...	3000	Burntisland
	,, 14	...	...	...	...	...	1800	Inchkeith
	,, 15	...	...	...	...	...	1700	,,
	, 16	...	...	...	...	...	2500	Burntisland
	, 17	...	...	...	...	...	4000	,,
	18	...	...	...	...	...	2000	,,
	, 20	...	...	...	...	...	1400	off Kinghorn
	21	...	...	...	...	...	5000	Inchkeith
	22	...	...	...	...	...	2600	,,
	23	...	...	...	...	...	1800	,,
	24	...	...	...	...	...	700	,,
	27	...	...	...	...	...	1100	,,
	28	...	...	...	...	...	1200	,,
	, 29	...	...	...	...	...	2200	,,
	30	...	...	...	...	...	1700	,,
	,, 31	...	...	...	...	...	1300	,,
	Total for Month.	...	...	...	...	...	38,200	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
	1887.							
	Jan. 5	...	...	...	...	...	3000	near Inchkeith
	, 6	...	...	...	...	...	600	,,
	, 7	...	...	...	...	...	2000	,,
	8	...	...	...	...	...	1800	,,
	, 11	...	...	...	...	...	2700	,,
	12	...	...	...	...	...	1700	,,
	13	...	...	...	...	...	5000	,,
	,, 14	...	...	...	...	...	1400	,,
	15	...	...	...	...	...	1000	,,
	17	...	...	...	...	...	800	,,
	, 18	...	...	...	...	...	400	,,
	, 19	...	...	...	...	...	1500	,,
	,, 20	...	...	...	...	...	1000	,,
	,, 21	...	...	...	...	...	1400	,,
	,, 24	...	...	...	...	...	400	,,
	, 25	...	...	...	...	...	3900	,,
	27	...	...	...	...	...	300	,,
	Total for Month	...	...	...	...	...	28,000	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	...	...	...	...	...	Over 6
			Cwt.					
Boat No. 43.	Feb. 14	...	9	...	...	...	...	May I. W. 7
	,, 16	...	10	...	...	...	...	,, ,,
	, 18	...	7	...	...	...	...	,, 10
	,, 21	...	7	...	...	...	...	,, ,,
	,, 26	...	6	...	...	...	...	,, ,,
	Total for Month	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	39	...	...	...	...	Over 6

STATISTICS OF FISH CAUGHT—*continued.*

District and Station.	Date.	Cod.	Haddock.	Whiting.	Codling.	Flounders.	Other Fish.	Miles.
	1887.		Cwt.					
LEITH DISTRICT —*cont.* *Newhaven Stn.* Boat No. 43.	Mar. 1	...	5	...	...	...	...	Bass 10–20 W.N.W.
	,, 2	...	9	...	...	...	...	,, ,,
	,, 5	...	12	...	...	...	...	,, ,,
	,, 9	...	10	...	...	...	...	May I. 24–26 W.S.W.
	,, 15	...	7	...	...	...	...	,, ,,
	,, 18	...	7	...	...	...	...	Bass W.N.W. 20–30
	,, 23	...	11	...	...	...	...	,, ,,
	,, 26	...	7 s.	...	...	...	...	,, ,,
	,, 31	...	13	...	...	...	...	May I. 50 W.N.W.
	Total for Month	...	...	...	...	...	...	Under 2
		...	...	...	...	...	...	2–3
		...	...	...	...	...	...	3–6
		...	81	...	...	...	...	Over 6
	Feb. 2	...	1	...	...	...	...	2–3 off Stn.
	,, 5	...	2	...	...	...	...	,, ,,
	,, 7	...	3¾	...	...	...	...	4–7 ,,
	,, 9	...	4¼	...	...	...	...	,, ,,
	,, 10	...	2½	...	...	...	...	,, ,,
	,, 11	...	2½	...	...	...	...	2–3 ,,
	,, 13	...	3½	...	...	...	...	4–7 ,,
	,, 14	...	3	...	...	...	...	2–3 ,,
	,, 15	...	1	...	...	...	...	,, ,,
	,, 16	...	1½	...	...	...	...	4–7 ,,
	,, 17	...	1	...	...	...	...	2–3 ,,
	,, 21	...	1½	...	...	...	...	,, ,,
	Total for Month.	...	...	...	...	...	...	Under 2
		...	12	...	...	...	...	2-3
		...	...	...	...	...	...	3–6
		...	15½	...	...	...	...	Over 6

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS.

Date	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other Kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Leith District.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
	I. BY NET AND LINE BOATS.																									
Dec. 1886	Cove, . .	–	–	–	–	–	16	–	–	–	30	30	–	–	–	16	–	–	–	–	–	–	–	140	20	140
	Dunbar, . .	–	6	–	–	–	18	8	–	6	1,018	169	–	–	–	–	–	6	–	–	46	–	–	140	160	604
	North Berwick, .	–	72	–	–	–	20	–	–	–	173	–	–	–	–	–	–	–	–	–	–	–	–	–	10	122
	Port-Seton & Cockenzie	–	–	–	–	–	368	–	–	–	2,640	580	–	–	–	–	–	–	–	56	–	1136	–	–	–	1,394
	Prestonpans, .	–	–	–	–	–	–	–	–	–	750	330	–	–	–	–	–	–	–	35	–	320	–	–	–	431
	Fisherrow, . .	–	700	–	–	–	400	12	–	–	1,400	135	–	–	–	–	–	20	–	–	300	–	–	–	–	1,082
	Leith, . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	30	–	100	30	–	–	–	22
	Newhaven, . .	–	8028	4290	–	–	314	76	–	7	8,694	124	10	7	–	2	21	76	967	–	200	–	–	–	–	8,004
	Granton, . .	–	–	–	–	–	328	–	–	–	–	–	–	–	–	–	20	50	–	–	–	–	–	–	–	225
	Queensferry, .	–	108	980	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	41
	Alloa, . .	–	13	7	–	–	5	–	–	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	19
	Limekilns, . .	–	24	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Aberdour, . .	–	195	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68
	Burntisland, .	–	144	–	–	–	5	–	–	–	6	4	–	–	–	3	–	2	–	–	8	10	–	–	6	59
	Kinghorn, . .	–	120	–	–	–	20	–	–	–	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	71
	Kirkcaldy, . .	–	84	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	28
	Dysart, . .	–	20	–	–	–	38	–	–	–	–	–	–	–	–	23	–	–	10	–	–	–	–	–	–	47
	Totals, .	–	9514	5277	–	–	1534	96	–	13	14,726	1372	10	7	–	50	41	154	1007	91	654	1496	–	280	196	12,362
	II. BY STEAM BEAM TRAWL BOATS.																									
	Newhaven, . .	–	–	–	–	–	121	29	–	16	5,969	216	51	1	210	1351	2	19	1214	–	–	–	–	–	–	4,960
	Granton, . .	–	–	–	–	–	570	10	–	2	651	155	15	–	20	142	–	25	63	–	–	–	–	–	6	867
	Totals, .	–	–	–	–	–	691	39	–	18	6,620	371	66	1	230	1493	2	44	1277	–	–	–	–	–	6	5,827

TABLE G.—Showing Fish Landed by Net and Line Boats and by Steam Beam Trawl Boats—*continued.*

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Leith District—*contd.* I. By Net and Line Boats.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
Jan. 1887.	Cove, . . .	–	–	–	–	–	20	–	–	–	60	40	–	–	–	22	–	–	–	–	–	–	–	175	14	184
	Dunbar, . .	–	1173	–	–	–	26	6	–	–	760	128	–	–	–	–	–	–	–	–	36	–	–	108	110	863
	North Berwick, .	–	2	–	–	–	20	–	–	–	316	–	–	–	–	–	–	–	–	–	–	–	–	–	20	176
	Port-Seton & Cockenzie	–	–	–	–	–	227	–	–	–	1,911	255	–	–	–	–	–	–	–	40	–	1250	–	–	–	1,135
	Prestonpans, . .	–	–	–	–	–	–	–	–	–	790	110	–	–	–	–	–	–	–	40	–	350	–	–	–	433
	Fisherrow, . .	–	369	–	–	–	350	15	–	–	1,080	100	–	2	–	6	4	22	–	–	300	–	–	–	–	904
	Leith, . . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	25	–	100	40	–	–	–	21
	Newhaven, . .	–	4446	9,360	–	–	191	84	–	21	6,638	942	5	3	–	9	2	52	1246	–	80	–	–	–	–	6,358
	Granton, . .	–	–	234	–	–	310	–	–	–	–	–	–	–	–	–	–	32	–	–	–	–	–	–	–	236
	Queensferry, . .	–	204	1,398	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	97
	Alloa, . . .	–	18	471	–	–	–	–	–	–	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	17
	Limekilns, . .	–	3	1,029	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	19
	Inverkeithing, .	–	96	153	–	–	5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39
	Aberdour, . .	–	153	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	46
	Burntisland, . .	–	165	–	–	–	10	–	–	–	2	4	–	–	–	6	–	2	–	–	5	7	–	–	–	77
	Kinghorn, . .	–	90	–	–	–	40	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	60
	Kirkcaldy, . .	–	9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	4
	Dysart, . .	–	–	–	–	–	38	–	–	–	–	–	–	–	–	12	–	–	–	–	–	–	–	–	–	22
	Totals, .	–	6728	12,645	–	–	1237	105	–	21	11,557	1579	5	5	–	61	6	108	1271	80	521	1647	–	283	144	10,691
	II. By Steam Beam Trawl Boats.																									
	Newhaven, . .	–	–	–	–	–	132	25	–	5	4,612	742	41	½	264	710	–	9	1261	–	–	–	–	–	–	3,171
	Granton, . .	–	–	–	–	–	680	10	–	4	1,610	328	27	–	42	270	–	65	162	–	–	–	–	–	–	1,587
	Totals, .	–	–	–	–	–	812	35	–	9	6,222	1070	68	½	306	980	–	74	1423	–	–	–	–	–	–	4,758

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS—*continued.*

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Leith District—*contd.*	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
	I. BY NET AND LINE BOATS.																									
Feb. 1887.	Cove, . . .	–	109	–	–	–	15	–	–	–	40	40	–	–	–	10	–	–	–	–	–	–	–	90	11	110
	Dunbar, . .	–	4050	–	–	–	90	16	–	–	658	160	–	–	–	–	-	–	–	–	–	–	–	48	80	1176
	North Berwick, .	–	68	–	–	–	30	–	–	–	266	–	–	–	–	–	–	–	–	–	–	–	–	–	40	153
	Port-Seton & Cockenzie	–	24	–	–	–	273	–	–	–	2236	220	–	–	–	–	–	–	–	50	–	1550	–	–	–	1322
	Prestonpans, . .	–	–	–	–	–	–	–	–	–	850	100	–	–	–	–	–	–	–	34	–	310	–	–	–	444
	Fisherrow, . .	–	465	–	–	–	210	36	–	–	940	135	–	2	–	332	–	50	–	–	500	–	–	–	–	916
	Leith, . . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	20	–	240	40	–	–	–	29
	Newhaven, . .	–	915	1,290	–	–	139	56	–	12	4396	121	15	21	–	98	17	76	1210	–	400	150	–	–	–	2944
	Granton, . .	–	–	2,600	–	–	82	–	–	–	20	–	–	–	–	–	–	9	–	–	–	–	–	–	–	162
	Queensferry, . .	–	168	2,733	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	108	101
	Alloa, . . .	–	57	2,358	–	–	–	–	–	–	–	–	–	–	–	10	–	–	–	–	–	–	–	–	–	60
	Limekilns, . .	–	–	2,097	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39
	Aberdour, . .	–	75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	17
	Burntisland, . .	–	39	–	–	–	13	–	–	–	10	6	–	–	–	12	–	3	–	–	8	10	–	–	6	40
	Kinghorn, . .	–	–	–	–	–	220	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	116
	Kirkcaldy, . .	–	–	–	–	–	–	–	–	–	-	–	–	–	–	6	–	–	–	–	–	–	–	–	–	2
	Dysart, . .	–	–	–	–	–	48	–	–	–	–	–	–	–	–	63	–	–	–	–	–	–	–	–	–	49
	Totals, .	–	5970	11,078	–	–	1120	108	–	12	9416	782	15	23	–	531	17	138	1230	84	1148	2060	–	138	245	7680
	II. BY STEAM BEAM TRAWL BOATS.																									
	Newhaven .	–	–	–	–	–	65	21	–	3	3916	824	51	2	196	1241	–	91	1600	–	–	–	–	–	–	4000
	Granton	–	–	–	–	–	560	5	–	4	676	273	12	–	14	125	–	30	146	–	–	–	–	–	–	918
	Totals, .	–	–	–	–	–	625	26	–	7	4592	1097	63	2	210	1366	–	121	1746	–	–	–	–	–	–	4918

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS—*continued.*

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Leith District—*contd.*	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
	I. BY NET AND LINE BOATS.																									
March 1887.	Cove, . . .	–	340	–	–	–	5	–	–	–	15	10	–	–	–	–	–	–	–	–	–	–	–	8	30	72
	Dunbar, . .	–	6498	–	–	–	36	–	–	30	480	87	–	4	–	12	–	–	–	–	–	–	1	140	90	1514
	North Berwick, .	–	–	–	–	–	86	–	–	–	200	–	–	–	–	–	–	–	–	–	–	–	–	–	–	165
	Port-Seton & Cockenzie	–	–	–	–	–	137	–	–	–	1323	260	–	–	–	–	–	–	–	40	–	1200	–	–	–	867
	Prestonpans, . .	–	–	–	–	–	–	–	–	–	710	75	–	–	–	–	–	–	–	25	–	250	–	–	–	364
	Fisherrow, .	–	629	–	–	–	352	65	–	10	720	67	–	10	–	372	–	72	–	–	500	–	–	–	–	1095
	Leith, . . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	45	–	100	80	–	–	–	28
	Newhaven, . .	–	390	–	–	–	990	219	–	26	4961	1211	6	87	–	37	2	125	962	3	1000	600	–	–	–	4905
	Granton, . .	–	–	576	–	–	75	–	–	–	51	–	–	–	–	–	–	9	–	–	–	–	–	–	–	104
	Queensferry, . .	–	–	1260	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	24	24
	Alloa, . . .	–	5	210	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	5
	Limekilns, . .	–	–	2247	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	38
	Burntisland, . .	–	–	–	–	–	25	–	–	–	6	12	–	–	–	10	–	4	–	–	12	20	–	–	12	40
	Kinghorn, . .	–	–	–	–	–	200	–	–	–	–	–	–	–	–	12	–	–	–	–	–	–	–	–	–	111
	Kirkcaldy, . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	–	1
	Dysart, . .	–	–	–	–	–	16	–	–	–	–	–	–	–	–	87	–	–	–	–	–	–	–	–	–	47
	Totals, .	–	7862	4293	–	–	1922	284	–	66	8466	1722	6	101	–	533	2	210	1007	68	1612	2150	1	148	156	9380
	II. BY STEAM BEAM TRAWL BOATS.																									
	Newhaven, .	–	–	–	–	–	312	42	–	11	4985	1186	34	4	42	9	3	26	1210	–	–	–	–	–	5	3633
	Granton, . .	–	–	–	–	–	855	10	–	5	976	170	16	–	36	315	–	35	312	–	–	–	–	–	–	1465
	Totals, .	–	–	–	–	–	1167	52	–	16	5961	1356	50	4	78	324	3	61	1522	–	–	–	–	–	5	5098

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS.

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Anstruther District. BY NET AND LINE BOATS.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
Dec. 1886.	Buckhaven,	–	1,770	–	–	–	45	–	–	–	557	30	–	–	–	–	–	–	–	–	–	–	–	–	–	957
	Methil and Leven,	–	–	–	–	–	7	–	–	–	21	6	–	–	–	3	–	–	–	–	–	–	–	–	–	18
	Largo,	–	51	–	–	–	124	–	–	–	373	10	–	–	–	7	–	–	–	–	–	–	–	–	20	262
	Elie and Earlsferry,	–	39	–	–	–	45	2	–	–	51	2	–	–	–	8	–	4	–	–	–	–	–	–	–	94
	St Monance,	–	444	–	–	–	367	35	–	18	698	67	–	–	–	–	–	36	–	–	–	–	–	–	–	926
	Pittenweem,	–	723	–	–	–	25	7	–	5	50	10	–	–	–	–	–	–	–	–	–	–	–	–	–	289
	A'struther & Cellardyke	–	1,247	–	–	–	377	19	–	16	395	10	–	2	–	–	33	60	–	–	–	–	–	–	5	1070
	Crail,	–	–		–	–	290	20	–	–	94	–	–	–	–	–	10	20	–	–	–	–	·50	–	–	171
	Kingsbarns & Boarhills	–	–	–	–	–	6	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	·45	–	10	6
	St Andrews,	–	–	–	–	–	–	–	–	–	1932	154	–	–	–	–	–	–	80	–	–	–	–	–	–	760
	River Eden,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	944	–	–	–	–	68
	Tayport,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	817	–	–	–	–	51
	Newburgh,	–	–	1720	9	–	–	–	–	–	–	–	–	–	–	7½	–	–	–	–	–	–	–	–	–	81
	Totals,	–	4,274	1720	9	–	1286	83	–	39	4171	289	–	2	–	25½	43	120	80	–	1761	–	·95	–	35	4753
Jan. 1887.	Buckhaven,		791	–	–	–	44	–	–	–	140	12	–	–	–	–	–	–	–	–	–	25	–	–	–	440
	Methil and Leven,	–	–	–	–	–	2	–	–	–	19	3	–	–	–	4	–	–	–	–	–	–	–	–	–	15
	Largo,	–	–	–	–	–	39	–	–	–	185	–	–	–	–	–	–	–	–	–	–	–	–	–	40	136
	Elie and Earlsferry,	–	38	–	–	–	24	2	–	3	46	–	–	–	–	–	–	–	–	–	–	–	–	–	–	68
	St Monance,	–	3,147	–	–	–	204	30	–	–	630	69	–	–	–	–	–	–	–	–	–	–	–	–	–	1323
	Pittenweem,	–	1,299	–	–	–	5	–	–	5	70	–	–	–	–	–	–	–	–	–	–	–	–	–	–	398
	A'struther & Cellardyke	–	12,688	–	–	–	829	18	–	164	207	–	–	2	–	–	2	18	–	–	–	–	–	–	–	3888
	Crail,	–	204	–	–	–	229	–	–	–	140	–	–	–	–	–	–	–	–	–	–	–	–	–	–	231
	Kingsbarns & Boarhills	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	St Andrews,	–	5	–	–	–	42	–	–	–	1372	90	–	–	–	211	–	–	–	–	–	–	–	–	–	841
	River Eden,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	901	–	–	–	–	64
	Tayport,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	618	–	–	–	–	39
	Newburgh,	–	–	2000	18¾	–	–	–	–	–	–	–	–	–	–	10	–	–	–	–	–	–	–	–	–	109
	Totals,	–	18,172	2000	18¾	–	1418	50	–	172	2809	174	–	2	–	225	2	18	–	–	1519	25	–	–	40	7552

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS—*continued.*

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Anstruther Dis.—*con.* By NET AND LINE BOATS.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
Feb. 1887.	Buckhaven, . .	–	495	–	–	–	18	–	–	–	100	5	–	–	–	–	–	–	–	–	–	60	–	–	18	127
	Methil and Leven, .	–	–	–	–	–	4	–	–	–	10	3	–	–	–	18	–	–	–	–	–	–	–	–	–	18
	Largo, . .	–	–	–	–	–	21	–	–	–	61	3	–	–	–	179	–	–	–	–	–	–	–	–	80	144
	Elie and Earlsferry, .	–	–	–	–	–	12	–	–	–	43	–	–	–	–	30	–	–	–	–	–	–	–	–	–	45
	St Monance, . .	–	6,264	–	–	–	145	29	–	–	548	56	–	–	–	–	–	19	–	–	–	–	–	–	–	1,002
	Pittenweem, . .	–	1,892	–	–	–	37	4	–	2	182	21	1	–	–	–	–	5	–	–	–	–	–	–	–	320
	A'struther & Cellardyke	–	42,660	–	–	–	2490	25	–	13	102	–	1	2½	–	–	2	28	–	–	–	–	–	–	–	7,269
	Crail, . . .	–	1,401	–	–	–	548	–	–	–	350	–	–	–	–	–	–	–	–	–	–	–	–	–	–	533
	Kingsbarns & Boarhills	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1·50	1¼	30	13
	St Andrews, . .	–	–	–	–	–	30	–	–	–	1085	55	–	–	–	1157	–	–	–	–	–	–	–	–	–	1,052
	River Eden, . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1214	–	–	–	–	82
	Tayport, . .	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	440	–	–	–	–	23
	Newburgh, . .	–	–	3010	10¾	–	–	–	–	–	–	–	–	–	–	12	–	–	–	–	–	–	–	–	–	122
	Totals, .	–	52,712	3010	10¾	–	3305	58	–	15	2481	143	2	2½	–	1396	2	52	–	–	1654	60	1·50	1¼	128	10,750
March 1887.	Buckhaven, . .	–	360	–	–	–	19	–	–	–	210	10	–	–	–	–	–	–	–	–	42	150	–	–	–	180
	Methil and Leven, .	–	–	–	–	–	2	–	–	–	26	2	–	–	–	17	–	–	–	–	–	–	–	–	–	25
	Largo, . .	–	–	–	–	–	43	–	–	–	64	–	–	–	–	92	–	–	–	–	–	–	–	–	60	124
	Elie and Earlsferry, .	–	–	–	–	–	10	–	–	–	44	–	–	–	–	56	–	–	–	–	–	–	–	–	–	55
	St Monance, . .	–	4,014	–	–	–	160	10	–	–	364	59	–	1¾	–	21	–	15	–	–	–	–	–	–	–	1,001
	Pittenweem, . .	–	582	–	–	–	30	8	–	–	186	43	–	1¼	–	–	–	11	–	–	–	–	–	–	–	174
	A'struther & Cellardyke	–	21,210		–	–	1619	424	–	42	36	3	12	80	–	–	6	451	–	–	–	–	·47	35	–	3,877
	Crail, . . .	–	159	–	–	–	388	–	–	–	96	–	–	–	–	–	–	–	–	–	–	–	1·32	158¼	40	252
	Kingsbarns & Boarhills	–	–		–	–	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	–	1·03	12	–	13
	St Andrews, . .		–			–	24	–	–	–	995	60	–		–	147	–	–	–	–	–	–	–	–	–	640
	River Eden, . .	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1190	–	–	–	–	83
	Tayport, .			–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	411	–	–	–	–	26
	Newburgh, .		–	1000	35¾	–	–	–	–	–	–	–	–	–	–	7	–	–	–	–	–	–	–	–	–	103
	Totals, .	–	26,325	1000	35¾	–	2295	442	–	42	2021	177	12	83	–	342	6	477	–	–	1643	150	2·82	205¼	100	6,553

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS.

Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
Montrose District.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s.	cwt.	£
I. BY NET AND LINE BOATS.																									
December 1886,	–	3309	410	–	–	933	38	–	72	5,773	637	10	5	–	75	55	40	953	–	6,612	–	–	–	35	5,541
January 1887,	–	486	1605	–	–	624	47	–	3	10,591	842	7	1	–	86	13	31	1135	–	10,483	–	–	–	26	6,927
February 1887,	–	459	5000	–	–	398	30	–	3	9,432	813	2	2½	–	514	9	20	1013	–	12,689	–	216	2	80	6,655
March 1887,	–	–	2800	–	–	411	26	–	17	7,273	456	1½	2	–	373	6	18	616	–	10,278	–	727	53,017	59	5,545
Totals,	–	4254	9815	–	–	2066	141	–	95	33,069	2747	20½	10½	–	1048	83	109	3717	–	40,064	–	943	53,019	200	24,663
II. BY STEAM BEAM TRAWL BOATS.																									
December 1886,	–	–	–	–	–	43	5	–	4	1,078	123	18	–	40	359	–	19	76	–	–	–	–	–	–	945
January 1887,	–	–	–	–	–	53	8	–	8	2,038	47	41	–	88	502	2	27	244	–	–	–	–	–	–	1,570
February 1887,	–	–	–	–	–	43	6	–	8	1,163	47	37	4	60	421	–	20	120	–	–	–	–	–	–	1,052
March 1887,	–	–	–	–	–	159	13	–	14	647	39	27½	–	78	141	–	15	156	–	–	–	–	–	–	772
Totals	–	–	–	–	–	298	32	–	34	1,086	256	123½	4	266	1423	2	81	596	–	–	–	–	–	–	4,339

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS.

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Stonehaven District.																									
	I. BY NET AND LINE BOATS.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s	100s	cwt.	£
Dec. 1886.	Shieldhill, . . .	–	25	–	–	–	25	–	–	1	4	–	–	–	–	–	2	–	–	–	–	–	–	–	–	26
	Catterline, . . .	–	385	–	–	–	39	–	–	1	115	5	–	–	–	–	3	–	–	–	–	–	–	–	–	211
	Crawton, . . .	–	245	–	–	–	66	–	–	–	8	2	–	–	–	–	–	–	–	–	–	–	–	–	–	117
	Stonehaven, . .	–	2275	–	–	–	260	30	–	20	920	150	5	5	–	10	26	20	–	–	–	–	–	–	–	1503
	Cowie, . . .	–	46	–	–	–	7	–	–	–	100	20	–	–	–	–	–	–	–	–	–	–	–	–	–	70
	Stranathra, . .	–	–	–	–	–	2	–	–	–	36	4	–	–	–	–	–	–	–	–	–	–	–	–	–	20
	Skateraw, . . .	–	525	–	–	–	8	–	–	–	140	20	–	–	–	–	–	–	–	–	–	–	–	–	–	259
	Totals, . .	–	3501	–	–	–	407	30	–	22	1,323	201	5	5	–	10	31	20	–	–	–	–	–	–	–	2206
Jan. 1887.	Shieldhill, . .	–	15	–	–	–	24	–	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	17
	Catterline, . .	–	210	–	–	–	30	–	–	–	206	5	–	–	–	–	–	–	–	–	–	–	–	–	–	168
	Crawton, . .	–	53	–	–	–	27	–	–	–	22	–	–	–	–	–	–	–	–	–	–	–	–	–	–	33
	Stonehaven, . .	–	2450	–	–	–	112	11	–	10	500	36	1	1	–	20	10	10	2	–	–	–	–	–	–	1040
	Cowie, . . .	–	–	–	–	–	4	–	–	–	120	6	–	–	–	2	–	–	–	–	–	–	–	–	–	65
	Stranathra, . .	–	–	–	–	–	3	–	–	–	50	2	–	–	–	–	–	–	–	–	–	–	–	–	–	27
	Skateraw, . .	–	134	–	–	–	12	–	–	–	390	8	–	–	–	6	–	–	–	–	–	–	–	–	–	245
	Totals . .	–	2862	–	–	–	212	11	–	10	1290	57	1	1	–	28	10	10	2	–	–	–	–	–	–	1595

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS—*continued.*

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Montrose District—*continued.*	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
	BY NET AND LINE BOATS.																									
Feb. 1887.	Shieldhill,	–	11	–	–	–	6	–	–	–	7	–	–	–	–	–	–	–	9	–	–	–	–	–	–	11
	Catterline,	–	210	–	–	–	3	–	–	–	236	–	–	–	–	–	–	–	30	–	–	–	–	–	–	146
	Crawton,	–	–	–	–	–	–	–	–	–	42	–	–	–	–	–	–	–	45	–	–	–	–	–	–	30
	Stonehaven,	–	834	–	–	–	84	6	–	2	1340	10	1	2	–	32	2	5	2	–	–	–	–	–	12	895
	Cowie,	–	–	–	–	–	–	–	–	–	170	–	–	–	–	–	–	–	16	–	–	–	–	–	12	113
	Stranathra,	–	–	–	–	–	2	–	–	–	44	–	–	–	–	–	–	–	3	–	–	–	–	–	–	24
	Skateraw,	–	224	–	–	–	10	–	–	–	495	–	–	–	–	10	–	–	10	–	–	–	–	–	–	298
	Totals,	–	1279	–	–	–	105	6	–	2	2334	10	1	2	–	42	2	5	115	–	–	–	–	–	24	1517
March 1887.	Shieldhill,	–	–	–	–	–	8	–	–	–	2	–	–	–	–	–	–	–	18	–	–	–	–	45	–	37
	Catterline,	–	–	–	–	–	9	–	–	–	156	–	–	–	–	–	–	–	32	–	–	–	–	8½	–	98
	Crawton,	–	–	–	–	–	2	–	–	–	76	–	–	–	–	–	–	–	19	–	–	–	–	3½	–	47
	Stonehaven,	–	–	–	–	–	194	16	–	2	480	5	1	1	–	30	–	6	8	–	–	–	–	1	86	383
	Cowie,	–	–	–	–	–	2	–	–	–	78	–	–	–	–	–	–	–	6	–	–	–	–	–	300	80
	Stranathra,	–	–	–	–	–	2	–	–	–	10	–	–	–	–	–	–	–	3	–	–	–	–	–	–	7
	Skateraw,	–	–	–	–	–	10	–	–	–	250	5	–	–	–	5	–	–	5	–	–	–	–	–	–	137
	Totals,	–	–	–	–	–	277	16	–	2	1052	10	1	1	–	35	–	6	91	–	–	–	–	58	386	789

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS.

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk. (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value
	Aberdeen District.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
	I. BY NET AND LINE BOATS.																									
Dec. 1886.	Downies,	–	47	–	–	–	5	–	–	–	97	52	–	–	–	–	–	–	–	–	–	–	–	–	–	105
	Portlethen,	–	95	–	–	–	58	–	–	–	229	93	–	–	–	–	–	9	–	–	–	–	–	–	–	255
	Findon,	–	34	–	–	–	9	–	–	–	110	41	–	–	–	–	–	–	–	–	–	–	–	–	–	104
	Cove,	–	325	–	–	–	8	–	–	–	178	39	–	–	–	–	2	–	8	–	–	–	–	–	–	186
	Burnbank,	–	101	–	–	–	2	–	–	–	56	17	–	–	–	–	–	–	4	–	–	–	–	–	–	64
	Aberdeen,	–	871	–	–	–	709	43	–	46	807	366	2	–	–	–	21½	97	207	–	–	–	–	–	–	1698
	Totals,	–	1473	–	–	–	791	43	–	46	1477	608	2	–	–	–	23½	106	219	–	–	–	–	–	–	2412
	II. BY STEAM BEAM TRAWL BOATS.																									
	Aberdeen,	–	–	–	–	–	516	37½	–	14	2756	60	93	½	372	2286½	3	140	635	–	–	–	–	–	–	5735
	Totals,	–	–	–	–	–	516	37½	–	14	2756	60	93	½	372	2286½	3	140	635	–	–	–	–	–	–	5735
	I. BY NET AND LINE BOATS.																									
Jan. 1887.	Downies,	–	41	–	–	–	3	–	–	–	125	4	–	–	–	–	–	–	–	–	–	–	–	–	–	91
	Portlethen,	–	34	–	–	–	24	–	–	–	413	17	–	–	–	–	–	–	8	–	–	–	–	–	–	282
	Findon,	–	10	–	–	–	6	–	–	–	187	5	–	–	–	–	–	–	–	–	–	–	–	–	–	120
	Cove,	–	26	–	–	–	4	–	–	–	424	3	–	–	–	3	–	–	15	–	–	–	–	–	–	219
	Burnbank,	–	15	–	–	–	3	–	–	–	112	3	–	–	–	3	–	–	6	–	–	–	–	–	–	65
	Aberdeen,	–	1890	–	–	–	255	19½	–	21	1838	136	1½	3	–	–	1	30	209	–	–	–	–	–	–	1664
	Totals,	–	2016	–	–	–	295	19½	–	21	3099	168	1½	3	–	6	1	30	238	–	–	–	–	–	–	2441
	II. BY STEAM BEAM TRAWL BOATS.																									
	Aberdeen,	–	–	–	–	–	409	51	–	10	3160	13	67	7	88	6633¼	2¾	99	256	–	–	–	–	–	–	7058
	Totals,	–	–	–	–	–	409	51	–	10	3160	13	67	7	88	6633¼	2¾	99	256	–	–	–	–	–	–	7058

TABLE G.—SHOWING FISH LANDED BY NET AND LINE BOATS AND BY STEAM BEAM TRAWL BOATS.

Date.	Stations or Creeks.	Salmon.	Herring.	Sprat.	Sparling.	Mackerel.	Cod.	Ling.	Torsk (Tusk).	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Oysters.	Mussels.	Clams.	Lobsters.	Crabs.	Other kinds of Shell Fish.	Total Value.
	Aberdeen Dis.—*cont.* I. BY NET AND LINE BOATS.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	100s	cwt.	cwt.	100s.	100s	cwt.	£
Feb. 1887.	Downies,	–	58	–	–	–	3	–	–	–	178	7	–	–	–	2	–	–	8	–	–	–	–	–	–	114
	Portlethen,	–	78	–	–	–	17	–	–	–	545	18	–	–	–	5	–	–	10	–	–	–	–	–	–	319
	Findon,	–	–	–	–	–	6	–	–	–	200	10	–	–	–	4	–	–	6	–	–	–	–	–	–	111
	Cove,	–	–	–	–	–	4	–	–	–	639	20	–	–	–	6	–	–	10	–	–	–	–	–	–	237
	Burnbank,	–	–	–	–	–	4	–	–	–	143	8	–	–	–	5	–	–	5	–	–	–	–	–	–	55
	Aberdeen,	–	241	–	–	–	267	45	–	5	2597	295	2¼	3¾	–	33	1	62	210	–	–	–	–	–	–	1546
	Totals,	–	377	–	–	–	301	45	–	5	4302	358	2¼	3¾	–	55	1	62	249	–	–	–	–	–	–	2382
	II. BY STEAM BEAM TRAWL BOATS.																									
Feb. 1887.	Aberdeen,	–	–	–	–	–	970	93	–	15	6822	6	118¼	23	249½	5345¾	3¼	167½	343¾	–	–	–	–	–	–	6466
	Totals,	–	–	–	–	–	970	93	–	15	6822	6	118¼	23	249½	5345¾	3¼	167½	343¾	–	–	–	–	–	–	6466
	I. BY NET AND LINE BOATS.																									
Mar. 1887.	Downies,	–	–	–	–	–	–	–	–	–	94	–	–	–	–	6	–	–	4	–	–	–	–	–	–	62
	Portlethen,	–	–	–	–	–	9	–	–	–	277	14	–	–	–	7	–	–	16	–	–	–	–	–	–	187
	Findon,	–	–	–	–	–	4	–	–	–	86	7	–	–	–	4	–	–	5	–	–	–	–	–	–	61
	Cove,	–	–	–	–	–	6	–	–	–	360	58	–	–	–	6	–	–	5	–	–	–	–	–	–	200
	Burnbank,	–	–	–	–	–	4	–	–	–	70	15	–	–	–	2	–	–	5	–	–	–	–	–	–	49
	Aberdeen,	–	7	–	–	–	1504	944	17	168	920	74	41	136¼	–	187	22	668	206	–	–	–	–	–	–	2648
	Totals,	–	7	–	–	–	1527	944	17	168	1807	168	41	136¼	–	212	22	668	241	–	–	–	–	–	–	3207
	II. BY STEAM BEAM TRAWL BOATS.																									
Mar 1887.	Aberdeen,	–	–	–	–	–	1535	57	–	25	4751	31	101	3¾	343	2883	5	174	315	–	–	–	–	–	–	6061
	Totals,	–	–	–	–	–	1535	57	–	25	4751	31	101	3¾	343	2883	5	174	315	–	–	–	–	–	–	6061

TABLE H.—SHOWING FISH LANDED DURING THE YEARS 1884, 1885, AND 1886.

Year.	Stations.	Herring.	Sprat.	Cod.	Ling.	Saith (Coalfish).	Haddock.	Whiting.	Turbot.	Halibut.	Sole (Lemon Sole).	Flounder, Plaice, Brill.	Eel.	Skate.	Other kinds of White Fish.	Total Quantity and Value.	
	Leith District.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	cwt.	£
1884,	Leith, . . .	–	–	114	14	3	27	–	–	–	–	–	–	13	–	171	103
1885,	,, . . .	–	–	140	34	9	–	20	10	–	–	–	–	18	20	251	122
1886,	,, . . .	31	–	278	64	42	25	3	–	32	–	–	–	42	234	751	373
1884,	Newhaven, . . .	24,123	9,819	7,412	2,261	324	23,717	4,294	332	343½	26	8,974	–	3,714	9,197	94,536½	53,912
1885,	,, . . .	8,442	10,596	19,697	8,735	4,331	60,055	19,113	1,484	1,052	87	12,818	–	6,365	13,233	166,008	91,989
1886,	,, . . .	11,879	4,290	14,016	2,166	2,404	105,576	15,180	451	844	1,284	12,742	60	3,079	27,795	201,766	113,348
1884,	Granton, . . .	–	960	5,859	358	112	16,911	5,431	34½	119	305	7,248	–	435	4,255	42,027½	23,424
1885,	,, . . .	–	–	6,662	755	70	17,400	4,746	184	3	150	5,405	–	180	5,203	40,758	21,652
1886,	,, . . .	297	–	7,958	709	67	18,808	2,476	134	38	458	3,501	20	666	2,799	37,922	17,440
1884, 1885, 1886,	GRAND TOTAL, .	...	...	...	...	...	...	...	...	...	...	...	...	...	...	136,735 207,017 240,439	

APPENDIX F.—No. II.

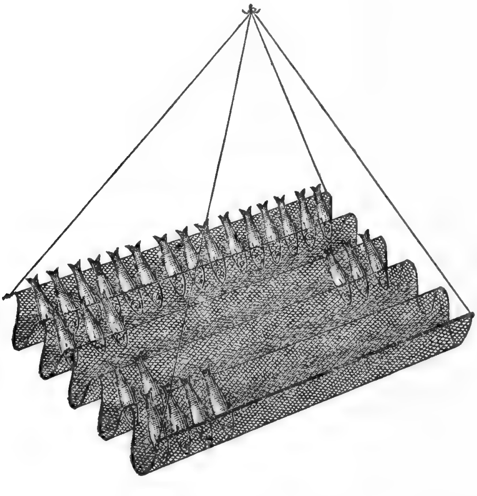
THE PREPARATION OF SPRATS AND OTHER FISH AS "SARDINES." By C. E. FRYER, Inspector of Fisheries for England and Wales.

THE following suggestions for the preparation of sprats in tins *à la sardine* are based upon the results of my investigation into the methods adopted in France for the treatment of "sardines," and my subsequent experience in the application of the system to the preservation of pilchards in Cornwall.

The fish should be landed in as fresh a state as possible, spread on the floor, and sprinkled with salt. They should then without delay be beheaded and gutted—all bruised fish being rejected—thoroughly washed, and immediately placed carefully in vats, with a thin layer of coarse British salt between each layer of fish. Here they should remain for one or two hours, after which they should be taken out, again washed, and ranged in specially prepared wire baskets (*grilles*) to dry.

One great object to be aimed at is to handle the fish as little as possible, and to pass them through the preliminary stages with all speed. With this object the maunds or baskets into which the fish are thrown by the 'gutter' should be of a size to be easily handled, and should be constructed of open wicker-work, so that the fish in them can be effectually washed by merely plunging the baskets into an open tank plentifully supplied with fresh water. The wire drying-baskets are so contrived that the fish will not need to be touched by the hand again, after they are once placed in them, till they are ready to be packed in the tins.

The following sketch (fig. 1) represents the form of these wire receptacles, which, as they are filled with fish, are ranged in the sun, or under shelter in a dry atmosphere in wet weather, and in a free current of air, till the fish are thoroughly dry. The *grille* is then taken to the cooking stove. This consists of a series of shallow pans (each large enough to hold a *grille* full of fish) containing boiling olive oil, in which the fish are cooked. This will take from two to three minutes, according to size.



After standing a minute or two to allow the superfluous oil to drain off, the *grille* is hung up to cool, when the fish are ready to be 'tinned.'

In the bottom of the tin a piece of bay leaf and a clove-head or allspice (pimento) seed are placed, two or three hands being specially told off to prepare the tins and pass them on to the packers, who carefully but firmly place the fish in the tins in layers, with their tails right and left alternately. The tins are next passed to the oil-fillers, who fill them up with cold olive oil. After standing sufficiently long to enable the oil to settle down into all the interstices, and filling up if necessary, the tins reach the hands of the tin-men or solderers, who fasten down the lids. This operation requires the greatest care, and is the only one (except the analogous one of *making* the boxes) which calls for the services of skilled workmen. All the other operations of working and packing, &c., require neatness and dispatch, but need no technical skill; but the smallest air-hole left by the solderer in the joint of a tin will spoil it.

After closing down, the tins are collected in a crate, and lowered into a large boiler, where they are kept boiling for two or three hours, according to size. This operation serves a triple purpose; it completely cooks and softens the fish, it expels any remaining air from the tins, and it proves whether or not they are hermetically sealed. On emerging from the boiler all the tins are bulged (*bombés*), but as they cool they naturally contract—the top and bottom of the tin becoming slightly concave. Any tins, however, which have been imperfectly soldered remain bulged, and are spoiled.

A rub in sawdust will cleanse the tins, when cool, and they then are ticketed (unless made of 'decorated' tin plate), and packed in wooden cases ready for the market.

Having thus described in general outline the method of preserving fish in tins *à la sardine*, I may perhaps usefully refer to one or two points of detail which it would be well to observe in the arrangement of any factory established for its adoption.

The buildings should be so arranged that the fish can find their way directly from the hands of those who perform one stage in the process into the hands of those who complete the next stage. The sketch plan (Plate VI.) will serve as a guide to the general arrangement of the premises. The sketch only shows the ground floor; the upper stories being set apart for the machinery for cutting out and stamping the tin plates for tin-making, for packing the tins in wooden cases, and for storage purposes.

When necessary, an arrangement of flues from the cooking range and boiler (and even from the soldering room) may be made to utilise the waste heat to assist the drying process.

The tables on which the *grilles* are allowed to drain after cooking, and those at which the operation of 'oiling' the boxes is carried on, should be covered with tinplate, and fitted with gutters and collectors for saving the waste oil which is marketable.

The oil should be stored on the floor above, and conveyed to the 'oiling' tables through a series of pipes with taps, so that the supply may be under immediate control, only olive oil of the best quality should be used. Oil of a second quality may be used for working purposes. Olive oil adulterated with cotton seed oil, or even the latter alone, is often used in preparing French 'sardines;' but, for the best brands, the best olive oil only is employed. This is the most costly item in the whole process of manufacture.

In cooking the fish, care should be taken to renew the oil before it becomes thick or discoloured.

It is hardly necessary to enter here into any further details of the nature of the cooking apparatus employed.

For soldering the tins, the only special apparatus required consists of an ingenious but simple turn-table, revolving on a pivot, and furnished at the top with a 'cage,' into which the tin fits closely, while the top (or bottom) is being soldered in. A foot plate at the bottom enables the workman to rotate the table at will; while, with the soldering-iron in one hand and a thin stick of solder in the other, he rapidly closes the 'joint' between the body of the box and the lid.

As already stated, this operation is the crucial one in the whole process of preparation. In order to keep a check on indifferent workmanship, it is usual to pay the tin-men so much for every hundred boxes 'made' and 'soldered down,' and to deduct so much for every tin that remains '*bombé*' after boiling. As a means of identification, each workman marks the tins he makes and the lids he solders down with a special mark; and it is easy for the foreman, when examining and counting the tins, to check the number turned out by each workman, and to trace to its author every flaw that leads to the rejection of a tin.

Other methods of making and closing tins are being introduced, and in this and various other details the process of preparing fish *à la sardine* is open to modification. The system above described, however, is that commonly adopted in France, and was successfully applied by me to the preparation of pilchards in Cornwall. In some French sardine factories the fish are baked in hot ovens, instead of being boiled in oil. Occasionally, again, the fish, whether baked or boiled in oil, are soldered down as soon as packed (*emboîtés*), without the addition of oil in the tins. Sometimes the fish are not subjected to any preliminary cooking, but are packed as soon as dry, and thoroughly cooked by prolonging the operation of boiling in the tins. How far sprats can be treated in these (and other) various ways can only be determined by actual experience. The exact length of time during which they must be subjected to the several operations of salting, cooking, and boiling, and the proper proportions of spice and so forth, will depend on the size of the fish, the size of the tins in which they are packed,* and other considerations which must also be determined by careful experiment. That sprats can, however, be preserved in tins *à la sardine*, is proved by the fact that at least one factory of the kind already exists on the south-east coast of England, and a ready market can no doubt be found for a largely increased supply abroad, if not at home, and more particularly in India and in our southern Colonies where supplies of fish are scarce. But, owing to the shortness of the sprat season, no curing establishment could probably afford to be dependent solely on the supplies of this one fish. During a great part of the year the tin-men would no doubt find continuous employment in making the tins, in anticipation of the curing season; but it would be found economical to keep the other hands at work in the tinning of other kinds of fish in their season. In the factory at Mevagissey, in Cornwall, where I was instrumental in establishing (with the help of Messrs G. C. Fox & Co.) the industry of preserving pilchards in tins, other kinds of fish are similarly prepared, and find a ready market. In Scotland, herrings, hake (in slices), cod, ling, and other kinds of fish, besides crabs and lobsters, would no doubt readily lend themselves to modifications of the mode of cure above described. The 'tinning' of vegetables also serves, in Cornwall and in France, to keep the works going at times when fish are scarce.

Considerable quantities of young herrings are, I believe, taken at certain times in the garvie or sprat nets. This admixture of the two species has the effect of reducing the value of the catch under ordinary circumstances, but

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* The small tins, known as '¼-tins,' are best for the Colonial market.

there is every probability that young herrings would make a valuable article of food if preserved *à la sardine;* and, as each fish has to be individually handled in the process of cure, it would probably not be difficult to distinguish the herrings from the sprats, and 'tin' them separately. On the other hand, it could easily be ascertained by experiment whether for the purpose of preparation in tins any such separation would be necessary.

The heads and entrails of the fish, and all fish rejected as unsound, should be utilised in the manufacture of fish guano.*

It will be understood that there are various circumstances under which the application to sprats of the French system of preserving sardines must be attended with disadvantage. In the first place, the sardine season in France is in the summer months, when the fish can be readily dried without artificial heat. In Cornwall the pilchard harvest takes place later than that of sardines in France, and towards the end of the season the occurrence of rainy or damp weather is a great drawback. The sprat season is later than either, and the provision of artificial means of drying the fish will become more necessary. On the other hand, the heat of a French or Cornish summer is a disadvantage as compared with the comparative coolness of the weather at the time of the sprat harvest, while the sprat has the additional point in its favour that it is less delicate, and will stand carriage and handling better than the sardine. The bones of the sprat, however, are much harder than those of the small immature sardines generally preserved in France. The bones of the pilchard (which is an adult sardine) are much harder than those of its French relative, and those of the sprat are probably harder still. This is one of several points (such, *e.g.*, as the relative delicacy of flavour of the flesh—as to which the warning, *de gustibus*, advises me to offer no observations) which must be taken into consideration in any proposal to place tinned sprats into competition with tinned sardines. The greater cheapness of sprats will, no doubt, be a question of some importance in determining the issue of such competition.

APPENDIX F.—No. III.

ON THE NUTRITIVE VALUE AND RELATIVE DIGESTIBILITY OF FRESH FISH. PART I.—INTRODUCTORY. By R. D. CLARKSON, B.Sc., Baxter Scholar, University of Edinburgh.

In the last Report of the Scotch Fishery Board, Professor Ewart drew attention to the facts that there is a very general prejudice against the use of fish as food, that the working classes too often regard it as not fitted to furnish a satisfying meal on the strength of which hard work can be done, and that the better classes regard it only as an accessory to the staple dishes prepared from beef or mutton. Professor Ewart suggested that some investigations should be made into the nutritive value and relative digestibility of fish, and at his request I have prepared the following paper, in the introductory part of which I shall endeavour to state some of the chief facts which we already know as to the chemistry and digestibility of the muscles or flesh of fish, and I hope, before the issue of the next Report, to be able to add to this an account of some experiments specially intended to test the digestibility of our ordinary food-fishes.

Much more is known with regard to the chemical composition of fish

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* The manufacture of fish into guano, instead of simply throwing them in their raw state on the land, is a matter which deserves more attention than it has hitherto received in this country.

than with regard to its digestibility, and it is not at all easy from the chemical point of view to find any reason for the notion, above referred to, that fish is incapable of furnishing a solid meal. For in fish there is a very fair percentage of solid matter; indeed in the flesh of several species there is usually as much (and often more) solid matter as there is in lean beef. The method of ascertaining the amount of solid matter in a given species of fish is very simple; but different observers using it sometimes obtain very different results. The method consists in taking the flesh from a number of fish of the same species, freeing it from skin, bone, and tendon as completely as possible, chopping it up thoroughly, and then mixing well the different specimens. A portion of flesh is then taken from the mass so prepared, and after being weighed, is placed in a chamber full of dry air, which is kept at 100° C. by being surrounded with boiling water. It is taken out and weighed occasionally until two successive weighings give the same result. This weight is that of the solid matter in the portion of flesh taken, and from this the percentage of solid matter in the fish is calculated. Table III. shows the results obtained by two sets of observers working at different places and different times. The first column is taken from Professor Atwater's paper 'Zur Chemie der Fische,* and the second is from a paper 'On the Relative Digestibility of Fish Flesh in Gastric Juice,' by Messrs Chittenden and Cummins.† The causes of the divergent results obtained by this method by such competent observers as Professor W. O. Atwater and Messrs Chittenden and Cummins must be sought for in the fish themselves, and may be such as sex, age, food, and period of spawning, the latter three of which cannot commonly be ascertained in the case of fish from the market. The influence of the spawning season was noticed by Professor Atwater* in the case of salmon, and he found that the male fish had then more solid matter in their flesh than the female, though both had a great deal less than at other periods. The percentages he obtained from the common salmon (*Salmo salar*) during the spawning season were, male fish 24·66 per cent., female fish 21·66 per cent. The average of the two is 23·16 per cent., while the average of three trials made at other times was 37·07 per cent. Another condition which has probably a great influence on the amount of solid matter is the degree of fatness. We know that the amount of solid matter in beef is very largely dependent on the condition of the animal in this respect. The fatter the beef is, the less water and therefore the more solid matter does it contain. Lean beef contains about 28 per cent. of solid matter, while very fat beef may contain as much as 48 per cent. These facts will serve to explain to some extent at least the difference between the amount of solid matter discovered by Professor Atwater, and that discovered by Messrs Chittenden and Cummins in the same species of fish. It will, however, be noticed, that in spite of the discrepancies many fish usually contain as much solid matter as lean beef, and that one of the commonest and most important of our food fish, namely the herring, contains between 24 and 31 per cent. of solid matter, and is therefore very often more solid than lean beef.

The nutritive value of foods, however, does not depend so much on the whole amount of solids present as on the amount of those containing nitrogen, the so-called proteids. These substances form the basis of blood and muscle, and are therefore very important in any estimate of the relative nutritive value of foods. In this respect, as in so many others, fish compares very favourably with beef and mutton. Lean beef

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* *Berichte der deutschen chemischen Gesellschaft.* Band xvi. S. 1839.

† Report of United States Commission of Fish and Fisheries for 1884, Appendix. Published 1886.

contains 19 per cent. of proteid matters, fat beef about 15 per cent., lean mutton contains 18 per cent., fat mutton 12 per cent. It will be seen from Table IV. that salmon contains 22·93 per cent. of proteids, and that many of our common fish, and notably the herring, mackerel, and eel, contain very nearly as much proteid material as beef.

The extractives of beef also contain nitrogen, but are only present in small amount. They are nevertheless of great nutritive importance, though their action on the system is not yet explained. They most probably act as stimulants, and the commonest preparation of them, namely, beef-tea, can maintain the strength for weeks when no other form of nourishment can be taken. The Normal Company in Aberdeen have discovered that fish is capable of yielding an extract which compares favourably with extract of beef both for flavour and nourishing properties. and they have been manufacturing it on a large scale for some time past, This shows that though little is known as to the chemical nature of the extractives of fish flesh, they have nevertheless substantially the same properties as those of beef.

Although it is very important to know that fish contains nearly as much nutritive material as beef, it is if anything more important to ascertain whether this wealth of material can be readily rendered available for nourishing the tissues of the body. Very few investigations with this as their object were undertaken prior to 1884, the most remarkable being the experiments on digestion performed by Dr Beaumont on the Canadian Alexis St Nieffe, who had an accidentally formed gastric fistula. The Canadian was found to be able to digest most fish in less time than beef, though the time taken varied considerably with the mode of preparation, and no experiments were made with the raw flesh. Salmon trout, whether boiled or fried, took an hour and a half, dry cured codfish boiled took two hours, fried flounder took three hours and a half, while salted salmon boiled took four hours. Beef took from two hours and three quarters to four hours and a quarter, according to the previous preparation and the condiments administered with it. In 1884 an extensive series of experiments was undertaken by Messrs R. H. Chittenden and G. W. Cummins,* with the object of determining the relative digestibility of fish flesh in gastric juice. The method adopted in these experiments was novel, and so were the results obtained, so that a short account of both may not be out of place here.

The method was that of artificial digestion, because of the inconveniences attending the natural method of making gastric fistulæ in animals, and also because of the greater accuracy which may be attained by the former method.

The juice used in the experiments resembled natural gastric juice as closely as possible, and was prepared by dissolving 5 grammes of 'pure pepsin' in 1 litre of a 0·2 per cent. solution of hydrochloric acid in distilled water.

Twenty-four kinds of fish were experimented with, and beef, veal, mutton, lamb, lobster, crab, and frog's legs were tried under similar conditions for comparsion. The flesh used in the experiments was usually cooked by steaming for half an hour before being digested. 100 grammes of each kind of flesh were taken, free from skin, fat, tendons, and bones, and thoroughly minced. Two portions of 20 grammes each were taken from this mass, and after being finely divided were placed in beakers containing 200 cubic centimetres of the digestive fluid. The beakers were placed on a perforated tin plate in the middle of a chamber with a few inches of

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* Report of United States Commission of Fish and Fisheries for 1884, Appendix. Published 1886.

water at the bottom. The lid of this chamber fitted tightly, and so the interior could be kept full of saturated water vapour, and evaporation of the contents of the beakers prevented. A small gas flame kept the whole at a temperature of 100° to 105° F., and the contents of the beakers were occasionally stirred. Several trial experiments were made in order to ascertain whether the action of the digestive fluid was ever interfered with by the accumulation of the products of digestion; but when 30 or 40 grammes of flesh were put in, the percentage digested from it was only slightly diminished, and in one experiment a large but indefinite quantity of blood fibrin was added and completely digested.

The amount of material digested was determined by a method so novel, that I quote the author's account of it in full. 'After the gastric juice 'has been allowed to act for the requisite time on the 20 grammes of flesh, 'the mixture is cooled to 20° C., and diluted to 250 c.c. in a graduated 'flask, with distilled water. After being thoroughly mixed it is filtered on a 'dry filter, and then 50 c.c., or one-fifth of the entire mixture, is transferred 'by a pipette to a small weighed dish, and to it are added 5 c.c. of a 'standard solution of sodium carbonate of such strength as exactly to 'neutralise the acid present. The fluid is then evaporated to dryness on 'the water bath, and finally dried at 100° C. till of constant weight.' The reason the authors give for discarding the old method of estimating the digestibility, by observing the time taken by various substances to dissolve, is, that the results of that method largely depend on the amount of solid matter in the flesh which is being digested. They give as an instance an experiment performed by Jessen by the natural method. He made a gastric fistula in a dog, and on introducing 2 grammes of the raw flesh of frog's legs he found that it was digested 4·46 hours. The same amount of beef took 5·58 hours under similar conditions. Jessen, apparently assuming that digestibility is proportional to the time taken to digest, states that the digestibility of frog's legs is to that of beef as 84 : 100. Messrs Chittenden and Cummins use a totally different definition of digestibility. They take it as proportional to the amount digested from 20 grammes of a substance after being left for 22 hours in 200 cubic centimetres of the above described digestive solution at a temperature of 100° F. Using this definition they arrive at the conclusion that the digestibility of frog's legs is to that of beef as 80·46 : 100. They compare these figures with those given by Jessen, and explain that the difference is accounted for by the fact that while beef contains 25 per cent. of solid matter, frog's legs only contain 17 per cent. That this is the true explanation does not seem probable. It is more likely that the differences in the results are to be explained by the very different definitions adopted. Neither of the above ways of defining digestibility is good; for Jessen's definition is really a definition of indigestibility, the inverse of digestibility, and with regard to Messrs Chittenden and Cummins' definition any dyspeptic will tell you that it is a matter of almost vital importance to him whether his stomach can extract the nutriment from a given sample of food in two hours or in twenty-two. That Messrs Chittenden and Cummins' results are not altogether independent of the amount of solid matter in the fish being digested is shown by a glance at Table II. There the amount of fat in 20 grammes of each kind of fish as determined by Professor Atwater is subtracted from the amount of solid matter in 20 grammes as determined by Chittenden and Cummins. What is left is of course the amount of proteids and salts in 20 grammes, that is the amount of solid matter capable of being dissolved by the gastric juice. When this is compared with the amounts actually digested from 20 grammes, a most remarkable correspondence, considering the uncertainty of the data, is found between them.

Taken as a whole, however, the results obtained by Chittenden and Cummins seem to show that all fish are much less digestible than beef. This result is to some extent, at all events, explained by one reason which they give for adopting the above somewhat complicated method of ascertaining the amount of material digested. The simplest method is of course to weigh the residue left on the filter, and by comparing this with the weight of the flesh before digestion to ascertain the amount which has been dissolved. They did not adopt this method because 'the 'undissolved residue of the fish is so gelatinous that it is next to an 'impossibility to wash it entirely free from peptones.' If the new method be adopted no attempt can be made to wash the peptones from the residue, a considerable proportion of them must be left adhering to it, and the digestibility of fish tested by this method must of necessity be lowered.

In this relation it is interesting to refer to a paper by Professor Stirling* on the red and white muscles of fish, in which he shows that most white fish have two kinds of muscles:—first, the ordinary white muscle arranged in myotomes, which when deprived of its blood is quite white; second, a band of red muscular fibres generally arranged in connection with the lateral line, which retains a yellow or yellowish-red colour even when all the blood has been washed out by careful injection of a half per cent. salt solution. This colour is in the sarcous substance itself; and is due to the same cause as that of blood, namely the presence of hæmoglobin. Similar differences in the flesh of other animals have long been known. Thus everyone is familiar with the fact that the muscles on the breast of a chicken, are, after boiling, much whiter than those of the limbs. There is a considerable difference in the nutritive value of the two, as is shown by some of Chittenden and Cummins' experiments. Thus 20 grammes of the light meat of the shad (*Clupea sapidissima*) was found after digestion by the method described above to have yielded 3·9352 grammes of peptones and salts in a state of solution; 20 grammes of the dark meat of the same fish only yielded 3·5332 grammes. The difference in the case of chicken was much less striking; but 20 grammes of the light meat of that animal yielded 3·509 grammes of nutritive material in solution, while 20 grammes of the dark meat only yielded 3·4160 grammes. These figures were compared with the amount digested from 20 grammes of beef, which was taken as 100. The result was that the light meat of the shad was as 97, while the dark meat was as 87. The proportion in the case of chicken proved to be, light meat 86·72, dark meat 84·42.

The cause of this difference is at first not very easy to see, for the amount of solid matter in the dark muscle of the shad is 32·63 per cent., while in the light muscle it is only 20·38 per cent. In the dark muscle of the chicken the percentage of solid matter is 26·70, in the light muscle it is 26·64. From these figures one would *a priori* expect the red muscle to furnish a larger supply of nutritive material than the white. But, as pointed out above, it is not merely the amount of solid matter in a given sample that determines the amount which may be digested from that sample, and in the case of beef the more solid matter there is present the less is the amount of proteids. This would seem also to be the case with the red muscles of fish, for Professor Stirling observed that in the muscular fibres there are numbers of minute, bright, highly refractile globules, which are dissolved by ether, and blackened by osmic acid, and therefore undoubtedly fatty in their nature. Fat is not only unacted on by digestive fluids, but has long been thought to diminish their action on proteids with which it is associated. Thus Voit remarks that 'the 'digestibility is probably in part dependent on the nature of the fat present

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*Report of Scotch Fishery Board for 1885, Appendix F, No. IX.

'and the manner of its distribution; the presence of a difficultly fusible fat 'with considerable stearin would tend to hinder digestibility (as in 'mutton), and the same thing probably occurs when the contents of 'the sarcolemma are permeated with much fat, as in the lobster and eel.'

This is probably also the reason for Pavey's* statement and the common belief 'that fish with white flesh is less stimulating and lighter to the 'stomach or more easy of digestion than fish with red flesh.' For when a fish with white flesh absorbs more nutriment than it requires for its immediate needs, it stores it up in its liver, and also probably in the layer of red muscle along its sides, in the form of fat, whereas a fish with red flesh, and more particularly the salmon, stores up its fat among the fibres of its muscles, and in a distinct layer beneath its skin. In the salmon this fat is more particularly stored on the abdominal side of the body and hence this part has a richer flavour, and is more sought after by epicures and more avoided by dyspeptics than the dorsal region. Chittenden and Cummins state that their results confirm Pavey's experience, but the figures which they give do not bear out this statement. They give as the digestibility of the American whitefish (*Coregonus clupeiformis*), which they believe to be similar to our whiting, 94·78, that of salmon, 92·92; but, as I have shown, this does not necessarily prove that salmon is only a little less digestible than whiting; it only shows that from a given weight of it rather less material can be dissolved that can be got from the same weight of whitefish. Probably all the peptones can be extracted from the whiting in far less time than they can be from the salmon. But some fish with white flesh have also a greater or smaller amount of fat incorporated with their flesh. The eel above referred to by Voit is a good example, and the mackerel, herring, and sprat also contain a very considerable quantity of fat in their flesh, as is shown in Table IV. These fish are well known to be less digestible and more trying to a delicate stomach than such as whiting, haddock, sole, turbot, or plaice. Codfish, however, is not nearly so digestible or so nutritive as most other kinds of whitefish. Dr Pavey has observed several cases where eating cod in a state of high perfection, that is, in a firm, flaky and opaque state, after being boiled, resulted in an attack of indigestion. This is doubtless partly due to the fact that cod will eat anything. When they feed chiefly on Crustacea, as is generally the case with cod from the Dogger Bank, they are as a rule finer flavoured and more digestible than fish which have indulged in a more varied, though not so choice diet. That cod is less nutritive than most other fish was shown by Chittenden and Cummins; from 20 grammes of steamed cods' flesh only 2·9292 grammes were obtained after 22 hours digestion. This when compared to beef as in other cases gives 72·39 as the nutritive value.

These facts will suffice to show that our knowledge of the digestibility of fish is not extensive, that in fact the only definite experiments made on the matter are those of Dr Beaumont above referred to. I hope before the issue of the next Report, to be able to publish the result of a series of experiments as to the relative time taken by our ordinary food fishes to dissolve. But although no definite experiments have proved that fish is more digestible than beef or mutton, that conclusion has been arrived at by all who have had a wide experience in dietetics. In consequence of this, fish diet is largely recommended in cases of weakness, where the stomach is unable to attack such a highly nitrogenous and concentrated form of nourishment as beef, and it may be that this fact has had more influence in determining the popular prejudice against fish than any other. Now, however, fish is being recommended in the case of people who are

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* *A Treatise on Food and Dietetics*, by Dr F. W. Pavey, London, 1874, p. 155.

perfectly healthy, but who are obliged by their employment to lead more or less sedentary lives, and for old people who, having passed their period of greatest activity, are no longer able to work off any superfluous nutriment they may have absorbed by muscular exercise, and are therefore liable to periodical attacks of gout or biliousness as their excretory organs become over burdened. The most notable advocate of this view is Sir Henry Thompson,[*] who strongly advises all such people to use a much lighter dietary than is common at present, and for this purpose nothing can be better than one in which fish bulks largely. It is to be regretted, nevertheless, that Sir Henry Thompson should be so absorbed in regarding the advantages of a fish diet for those who lead sedentary lives and whose work is chiefly mental, that he cannot see the advantage of it for those who have to do severe manual labour. He refers to 'the obvious and admitted 'value of a highly nitrogenous food, of which meat is a concentrated form, 'to the labouring man,' and regrets that this should have led to the popular creed—'If you wish to be strong eat plenty of meat.' But, as I have shown above, so far as present analysis goes, fish is nearly as highly nitrogenous and concentrated a form of nourishment as meat, and so far as its chemical composition goes it ought to support a man doing hard labour nearly as well as beef.

Sir Henry Thompson has drawn attention to the great waste which results from our ordinary methods of preparing fish. The bones, skin, and internal parts of all fish form a very considerable proportion of the whole weight. This proportion may be as high as one-half in such fish as flounders and soles. These fish are generally prepared by filleting. The head, skin, bones, and internal parts, that is one half of the fish, are all removed and thrown away as useless. All this 'waste' may be used for making a stock, which will form the basis of many admirable soups.

It must be admitted, however, that fish is less satisfying than butcher meat. Hunger returns sooner after a fish dinner than after one of which beef or mutton has formed the *piece de resistance*, and a larger amount of fish has to be consumed in consequence. The cause of this probably lies in the fact that fish is more digestible than beef, that the stomach is therefore sooner emptied after a fish dinner than after a meat dinner, and that in consequence it begins to crave sooner for a fresh supply. The best answer to all attempts to show that a fish diet is incapable of supporting a man during severe manual labour lies in the fact that fishermen, who work as hard probably as any other class of the community, live almost entirely on fish, and yet are ever well nourished and ready for their work. As Dr Davey[*] long ago remarked, 'If we give our attention to classed 'people—classed as to the quality of food they principally subsist on— 'we shall find that the ichthyophagous class are especially strong, healthy 'and prolific. In no other class than in that of fishers do we see larger 'families, handsomer women, or more robust and active men.'

[*] *Food and Feeding,* by Sir Henry Thompson, Fourth Edition, London, 1885.

[†] *The Angler and his Friend,* by John Davey, M.D., F.R.S., Lond. 1855, p. 117.

TABLE I.

Showing proportions of amounts digested from 20 grammes of 17 kinds of flesh. Chittenden and Cummins.

Beef,	100·00
Veal,	94·89
Mutton,	92·15
Lamb,	87·93
Spring Chicken (light meat),	86·72
,, ,, (dark meat),	84·42
Whitefish (Coregonus clupeiformis),	94·78
Salmon (Salmo salar),	89·90 and 92·29
Mackerel (Scomber scombrus),	86·24
Halibut (Hippoglossus vulgaris),	85·51
Flounder (Paralichthys dentatus),	85·32
Pike (Esox lucius),	82·99
Haddock (Gadus æglefinus),	82·50
Herring (Clupea harengus),	82·34
Fresh Cod (Gadus callarias),	72·39
Eel (Anguilla rostrata),	71·82
Lobster (young),	87·81
,, (large female),	79·06
,, (large male),	69·13
Crab,	67·13

TABLE II.

Comparison of approximate amounts of proteids and salts in 20 grammes of various kinds of fish with amounts digested from 20 grammes as found by Chittenden and Cummins.

	Solids in 20 grms. Chittenden and Cummins.	Fat in 20 grms. Atwater.	Solids in 20 grms. exclusive of fat.	Amount digested from 20 grms.
Coregonus clupeiformis,	5·112	1·27	3·842	3·8350
Salmo salar,	6·256	2·56	3·696	3·5997
Tautoga or Hiatula onitis,	4·120	·27	3·85	3·5660
Scomber scombrus,	5·102	1·41	3·692	3·4895
Hippoglossus vulgaris,	4·056	1·03	3·026	3·4600
Pomatomus saltator,	3·930	·25	3·66	3·5885 2·9717 } 3·2851
Paralichthys dentatus,	4·608	·14	4·468	3·4525
Esox lucius,	3·926	·58	3·346	3·3582
Clupea harengus,	4·898	2·19	2·708	3·3317
Roccus lineatus,	4·164	·56	3·604	3·2770
Lutjanus blackfordii,	4·418	·25	4·168	3·3040
Salvelinus fontinalis,	3·916	·42	3·496	3·1745
Gadus morrhua,	3·658	·07	3·588	2·9292
Cynosium regalis,	3·956	·48	3·476	2·9180
Perca fluviatilis,	3·624	·17	3·455	2·9037
Anguilla rostrata,	4·356	1·82	2·536	2·9062
Pleuronectes americanus,	3·430	·08	3·35	2·7065

TABLE III.

	Percentage of Solid Matter. Atwater.	Percentage of Solid Matter. Chittenden and Cummins.
Coregonus clupeiformis,	30·78	25·56
Salmo salar,	37·07	31·28
Tautogo or Hiatula onitis,	21·09	20·60
Scomber scombrus,	26·90	25·51
Hippoglossus vulgaris,	24·75	20·28
Pomatomus saltator,	21·84	19·65
Paralichthys dentatus,	16·00	23·04
Esox lucius,	20·27	19·63
Clupea harengus,	31·43	24·49
Roccus lineatus,	22·47	20·73
Lutjanus blackfordii,	21·94	22·09
Salvelinus fontinalis,	22·49	19·58
Gadus morrhua,	17·96	18·29
Cynosium regalis,	21·30	19·78
Perca fluviatilis,	20·80	18·12
Anguilla rostrata,	28·55	21·78
Pleuronectes americanus,	16·08	17·15

TABLE IV.

Showing the chemical composition of some of the commercial food fishes. From Professor Atwater.

	Proteids.	Fats.	Mineral matter.
Gadus morrhua, average of 5 analyses,	16·38	0·36	1·22
Anguilla rostrata, „ 2 „	18·46	9·09	1·00
Paralichthys dentatus, 2 „	14·03	0·69	1·28
Hippoglossus americanus, 3 „	18·53	5·16	1·06
Clupea harengus,	18·99	10·95	1·49
Scomber scombrus, „ 6 „	18·57	7·07*	1·28
Perca fluviatilis, „ 2 „	18·73	0·83	1·24
Esox lucius,	18·66	0·58	1·03
Salmo salar, „ 3 „	22·93	12·81	1·33
Salvelinus fontinalis, 3 „	19·18	2·10	1·21
Coregonus clupeiformis,	22·73	6·45	1·60

* In one analysis the percentage of fat was 16·18.

APPENDIX F.—No. IV.

ON THE ARTIFICIAL HATCHING AND REARING OF SEA FISH. By J. C. Ewart, M.D.

With Plates VII., VIII., IX. and X.

The publication last autumn of *The History of Howietoun*[*] marks an epoch in the history of fish culture. It affords abundant proof that the Salmonidæ at least can be bred and reared in confinement as successfully as any of the smaller domestic animals, and that fish culture, notwithstanding all the reverses it has suffered through the misplaced zeal and energy of its many would-be advocates, has a great future before it, not only in restocking our own rivers and lakes, but also in peopling the waters of all countries where the conditions are favourable to the development and growth of the Salmonidæ and other valuable food fishes.

Although the fame of the Howietoun fishery has long been world-wide, few, before its history appeared, knew of the magnificent scale on which it had been constructed, or of the care with which everything had been designed so as to minister to the great object in view, viz., the production of the largest possible number of strong active fry, not the hatching of the largest possible nnmber of eggs. As an indication of the hatching powers of Howietoun, it may be mentioned about 6,000,000 of the large eggs of the Salmonidæ may be laid down in the hatching boxes in a single season. But the rearing ponds are equally extensive, for in addition to accommodating a sufficient number of full-grown artificially reared fish (over six years old) to produce 4,000,000 eggs, they can receive annually 800,000 fry, to be reared for breeding purposes, and a large number to be afterwards sold as one or two year old fish. In a single season 2,000,000 incubated eggs (almost ready to hatch) may be despatched from the fishery, and in addition 450,000 fry, 85,000 yearlings, and 12,000 two-year olds.

The Howietoun eggs and young fish find their way into all the more important waters in Britain, many cross the Channel to the Continent, and last winter 600,000 salmon eggs (sent to the fishery from the Tweed, Forth, and Tay to be partly incubated) were despatched under the personal superintendence of Sir James Maitland to New Zealand.

Further, no fewer than seven ponds at Howietoun are, in the meantime, devoted to hybridisation experiments, under the direction of Sir James Maitland and Dr Francis Day,—the experimental work alone representing an outlay of five or six hundred pounds annually.

Fish culture at Howietoun has been reduced to a science. Every step in the process, from the impregnation of the eggs to the rearing of the mature fish, has been thoroughly mastered and systematised. So careful have the observations been from first to last, that it is now possible to produce, within certain limits, considerable modifications in the time at which the eggs mature and hatch, and in the rate of growth of both the fry and the older fish; and further, many hybrids have been bred, the

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[*] *The History of Howietoun*, by Sir J. Ramsay Gibson Maitland, Bart. Stirling, 1887.

genealogy of which is not a little hard, without the aid of an ancestral tree to fully comprehend.

Complete success having been gained, it may now be asked, Why the necessity of interfering with nature in the production of trout and salmon? Why not leave her unaided, believing that, as in olden times, she maintained an abundant supply of fish in our rivers and lakes, she will continue to do this in the future?

There are two pregnant reasons why great good may result from a judicious use of our power to hatch and rear trout and salmon.

The first and most obvious is, that the demand for salmon is infinitely greater than it was a generation ago.

The second and more important is that the character of the spawning grounds has in many instances been greatly altered by the necessities of civilisation.

Nature provided for enormous losses during the development of the salmon and most other fish ; in fact, so wide is the margin, that were half of the eggs produced to hatch, and half the young to develop into adult fish, even the boundless sea in a few years would be overcrowded—be almost solid from the presence of fish, and our rivers would contain more fish than water. But although this is true, nature has not blundered ; she has not been prodigal with the material at her command without the best possible reasons.

In the higher animals, not only are the eggs protected, but even the young are hedged in with the greatest care, in most cases, until they are able to care for themselves, and fight their own battles in the struggle for existence.

In most fish, on the other hand, the eggs as soon as they are ripe escape into the world of waters, to enter an unequal struggle from which, at the best, few can escape. And even when the eggs succeed in bringing forth their precious harvest of fry, the dangers are not over—in many cases they are only beginning—for the fry may not only have to run the risk of a thousand enemies, they may even fall a prey to the hungry members of their own family. That the dangers are many and great will be sufficiently evident, when it is remembered that in the case of the cod and some other fish, nature, in order to preserve the species from extinction, has found it necessary to produce every year several millions of eggs. But there are other and less apparent dangers. From observations made in the case of both fresh water and sea fish, it is evident that a very large number of the eggs never have a chance of producing fry, because they have never been fertilised, and even the fertilised eggs may soon succumb owing to unfavourable surroundings — impure water, rapid changes of temperature, &c. And further, the fry may be hatched too weakly to survive, or in water where there is an entire, or almost entire absence of the food on which, during their fryhood, they must depend. For all these ordinary losses, nature has, however, sufficiently provided, as soon appears when the natural conditions are restored. But for the difficulties which arise from the construction of impassable dams, and the still worse pollutions from factories, she has not been able to cope, and as far as we can judge, she never will. It is at this stage intelligence steps in, either to break down the obstructions or provide the necessary conditions for the early stages of development and growth, no longer found in the rivers and streams.

Because of the wide margin nature has allowed for the destruction of her offspring by natural causes, this interference is not only possible, but when judiciously rendered, better results are obtained than even nature herself anticipated.

From what has been stated it will be evident that man can interfere with the greatest possible advantage when (1) there is a tendency to deficient impregnation; (2) when the eggs are in great danger of being destroyed during development; and (3) when there is a danger of the fry succumbing soon after they are hatched for want of suitable nourishment.

All these dangers exist in the Salmonidæ, and it is probably chiefly because of their presence that the successes at the British hatcheries have been so marked.

We are, however, not so much concerned with fresh water as with sea fish. For some years the cultivation of sea fish has been anxiously considered in this country, and in the United States and Norway experimental hatching of sea fish has been carried on. Many already advocate the hatching of sea fish on a large scale.

Now that we are prohibiting beam trawling in some of our firths and bays, and beginning to look upon the territorial waters more as nurseries for young fish, we must soon consider carefully whether the hatching of millions of sea fish is likely to aid materially in maintaining or rather increasing the fish supply.

We have indicated that complete success has at last, after long years of experiments, attended the hatching and rearing of fresh water fish. Let us now consider whether success is likely to attend the attempt to increase by artificial means the numbers of sea fish and lobsters.

To some fish nature has been more generous than others, and sometimes it is difficult to understand the reason of her bounty. For example, sharks and rays either bring forth their young alive and well developed, or they protect their eggs for months in curious capsules (mermaids' purses), which seem sufficiently uninviting to the all-devouring cod and the other hungry 'jackals' of the deep. The result is that, from a fisherman's point of view, our waters contain far larger herds of wolf-like dogfish than there is any necessity for.

On the other hand, in the ordinary food fishes (the sole, turbot, flounder, cod, haddock, whiting, herring, &c.) there is practically no attempt at protection. The eggs are either deposited at the bottom, as in the herring, at the mercy of all comers—the cod, haddock, and others which follow in the wake of the herring shoals—or they float at or near the surface, tempting little morsels which seem specially designed for the myriads of pelagic forms that move about in the surface waters.

For the herring eggs I cannot think of any protection that nature has provided. The herring, as it were, lead their enemies to the very gates of their innermost harbours, and make no attempt to conceal or defend their precious eggs. But the fry when once hatched are comparatively safe, because of their extreme transparency. Many floating eggs may be said to be protected in the same way. They are so small and transparent, so like the medium in which they float, that they may often readily escape from many of their enemies.

The lobster, unlike the ordinary food fishes, has its eggs ('berries') cleverly fixed under its powerful tail, where they are not only protected but carefully aerated as development advances, and the young when hatched swim actively about near the surface of the water until the adult dress is assumed, when they seek shelter under rocks and stones at the bottom.

A very limited acquaintance with the life history of sea fish enables one to readily understand that though the culture of salmon and trout may be highly advantageous, and often all but imperative, it does not follow that this is the case with the herring and cod and their allies. In the first place, nature seems to succeed better in fertilising the small eggs of the sea fish than the large eggs of the salmon. Again, the fry are usually hatched in a few days (3 to 20) in the sea fish referred to, while in the Salmonidæ hatching is delayed for several months; and further, while from pollutions and other causes food for the salmon and trout fry may no longer exist in the rivers, there is little if any chance of the young cod and herring fry suffering for want of food in the open sea.

Thus far the two cases are not quite parallel. But, further, in the case of salmon and trout we are pretty certain of our results. If, other conditions being the same, the numbers of fish increase in any given river or lake into which known quantities of fry have been set free, it may be taken for granted that the increase is the direct result of man's interference. On the other hand, in the case of sea fish which are either more migratory or less true to their original birthplace than trout and salmon, it is next to impossible to say, should there be an increase where hatching has been carried on, whether the increase is accidental or due to the formation of a local race sprung from the artificially hatched fry.

It may be taken for granted that the most sanguine pisciculturist would scarce dare propose to increase the number of the more migratory fish that live in the open sea. It has been suggested that by hatching fish inshore local races might be formed, but this is taking for granted that during the process of incubation the fish are brought under some remarkable spell which arrests their strongly inherited instincts, and leads them to settle down for life in the vicinity of their birthplace, instead of roaming about to see the world like their free-born cousins.

I have elsewhere pointed out that, although haddocks may abound in the Forth during summer, they seem to desert it almost completely in the autumn, and that the cod only visits the Firth in any force when there is an abundance of herring or herring spawn. It seems, therefore, too much to expect cod and haddock and other wanderers to remain always about our doors because they happened to see the light under artificial instead of natural conditions. But though fish hatching may not be able to influence much if at all the number of fish in the open sea, and though it may not be able to establish local races or shoals, it may still be of great service.

In the first place, it may be the means of introducing fish which have the migratory instinct fairly well developed, into waters where they practically did not previously exist. For example, by instituting hatcheries in the upper reaches of some of the long fjords in Norway, a large school of haddocks or other round fish might be readily created which might find all the conditions necessary to their existence without wandering into the open sea; and, in fact, the same results might follow the hatching on a large scale of round fish in some of our own firths and bays.

Again, as in America, it might be possible to produce shoals of fish, such as the shad, which, by wandering along the coast or living in the estuaries, would be the means of attracting large and more valuable forms to the inshore grounds. Fish, in fact, which would act the part of the herring, but be a more constant source of attraction—remaining in the firths for several months at a time.

Lastly, fish culture may have a great future before it in hatching flat fish, which have the double advantage of being extremely valuable, while they are often very limited in their migrations.

The culture of sea fish is still, however, only passing through the initial stages, and we have much to learn before we can hope to hatch by millions some of our best flat fishes,—the hatching of the sole *e.g.*, presenting this one great difficulty, that males are rarely ever captured, or at least, if captured, are seldom identified.

Lobsters, however, seem to lend themselves readily to artificial culture, and were arrangements made for hatching even the 'berries' that are found on the adults when captured, the lobster fisheries might, in a few years, yield double what they do at the present day.

Since it has been discovered how to artificially fertilise trout eggs, more or less continuous experiments have been made in the culture of the Salmonidæ, but several generations have been required to bring the process to perfection. This being the case, it need not be wondered that the artificial hatching of sea fish has not yet obtained a firm footing, for the first trustworthy experiments made were those of the German Commissioners (Meyer, Möbius, and others), who hatched numerous herring in 1874, in the Bay of Kiel. A still more striking experiment was made in 1878 by the United States Fish Commission, who set free some millions of artificially hatched cod into Gloucester Harbour, Mass. What became of the fry it is impossible to say with certainty, but the Gloucester fishermen allege that the fry gave rise to a small shoal of cod, which for several years lived in the vicinity of the harbour. They were said to be abundant in 1882, when they had reached a length of 14 inches, and a few were supposed to pay occasional visits to their birthplace as late as the winter of 1884.

When at Woods Holl (the Marine Station of the U.S. Fish Commission), in 1884, arrangements were being made for engaging in the hatching of cod and other sea fish on a large scale. The Commissioner (Professor Spencer Baird) seems sanguine of ultimate success, for in March 1886 he wrote to a correspondent in the following terms:—

'I have read with much interest your letter relating to the abundance 'and disappearance of fish in Penobscot Bay. It is a very difficult matter 'to say, positively, what has been the most potent of the many causes for 'the disappearance of fish from their accustomed haunts. I think, however, I can answer with some certainty, that it is within our power, by 'means of artificial propagation, to overstock waters and re-establish such 'fish as cod and haddock in localities where they formerly abounded.

'From experiments which have already been made, it can be asserted, 'with considerable confidence, that a shoal of cod may be established in 'any given locality by constant deposits of fish produced by artificial 'means.'

By having absolute control of the fishery work, Professor Baird has had striking successes in fields where a timid Board would never have dared enter. He has introduced shad into the Pacific, and he has done his best to attract cod and other valuable fishes to the inshore grounds of the Atlantic seaboard by introducing millions of shad fry annually into the estuaries and bays along the coast. But the Fish Commissioner will accomplish a greater feat still, if he succeeds in establishing local shoals of cod and haddock in the vicinity of Gloucester and other fishing centres.

What success has attended the experiments at Woods Holl during the present season I have not yet learned. This much is certain, that they will not fail for want of enterprise on the part of the Fish Commission, or for want of supplies from the enlightened Government of the United States.

Let us now consider what has been accomplished in Norway. Norway is more directly interested in the fisheries than any other country in Europe. It has been estimated that one in every 22 of the inhabitants of Norway is engaged in the fishing industry—in Scotland there is one fisherman for every 75 inhabitants, in Ireland one for every 200, and in England only one for every 600 of its inhabitants. It is only natural that Norway should possess a 'Society for Promoting the Norwegian 'Fisheries,' with branches at the principal fishing centres. In 1882 the

Arendal branch of the Society, chiefly I understand at the instigation of Captain G. M. Dannevig, decided to erect a hatchery for the propagation of sea fish, lobsters, &c. The necessary funds having been raised, an experimental station was started at Flödevig, near Arendal.

Hatching operations were begun in February 1884, and although the work had to be carried on in the face of many disadvantages, Dannevig succeeded in hatching and setting free during March and April over 5,000,000 young cod and nearly 2,000,000 young flounders, and later in the season he made a successful experiment in hatching lobsters. Young cod 2½ to 4 inches in length were abundant in the vicinity of the hatching station in September—presumably they were some of the survivors of the fry turned adrift during March and April. In the autumn of 1885 I visited the Flödevig hatching station, and through the kindness of Captain Dannevig had an opportunity of examining the hatching appliances and carrying off specimens of artificially-hatched young cod and other fish, and also of young lobsters at various stages of development, which had been bred from 'berries' placed in special hatching boxes.

During the spring of 1885, over 27,000,000 of cod fry were turned out from the hatchery, and about 10,000 lobsters were hatched, of which a considerable number were still in the station on my arrival in August. Some of them had assumed the form of the adult lobster, while others had not got beyond the larval stages. During the spring of 1886, still better success was obtained by Dannevig.

The scale on which the operations are carried on at Flodevig (though still in the nature of experiments), will be best understood from the following table, which gives the results of the hatching work for 1886.

From this table it will be observed that, during the months of February, March, and April, 68,880,000 artificially fertilised eggs were placed into the hatching boxes. From these 32,518,000 fry were obtained, and set free soon after they were hatched; that is, 52·9 per cent. of the eggs were successfully hatched. Whether this is a better result than unaided nature gains, it is impossible to say. The table further shows that the temperature varied from 1·0 R. (1·25 C.) to 4·5 R. (5·62 C.), and that the specific gravity of the water was sometimes as low as 1·015 – ·005 lower than the specific gravity of the eggs, at other times as high as 1·027.

The large percentage of deaths seems to have resulted partly from the changes in the salinity of the water, and partly from the presence of exceedingly minute particles in the water which, by coating the eggs, prevented sufficient oxygen reaching them during development. Hence one might expect that, with thoroughly filtered water, having a specific gravity of from 1·024 to 1·026, better results would be obtained.

Not only has Dannevig succeeded in hatching millions of sea fish, he has managed to rear a number of cod and herring. Some of the cod fry, hatched on the 27th of April 1885, were introduced into a small pond near the hatchery on the 3rd of May. A number of the cod are now (April 1887) nearly 12 inches in length, while others are only about half this length. We thus learn (I believe for the first time) that a cod may during its first year reach a length of 12 inches. If it grows thus rapidly in confinement, it may grow at a still greater rate in the open sea. Some of the old fishermen of the Forth believe that cod reach maturity in about two years; in this they may be fairly near the truth.

In the same pond, Dannevig set free a number of young herring, but they nearly all fell victims to the hungry cod. Some of the survivors are now about 4 inches in length. If this is an indication of the rate at which herring grow in the open sea, it is evident they cannot reach

TABLE showing Hatching Work at Flodevig during Winter of 1886.

Date.	No. of Eggs fertilised.	Eggs rejected.	Fry hatched.	Water.	
				sp. gr.	temp.
February 10	300,000	...	...	...	× R.
,, 12	400,000	100,000	...	...	...
,, 15	600,000	150,000	...	...	...
,, 17	500,000	200,000	...	...	...
,, 19	1,400,000	200,000	...	...	...
,, 20	500,000	...	...	...	...
,, 22	700,000	140,000	...	...	...
,, 23	650,000	200,000	...	1·023	1·9
,, 25	300,000	...	...	1·021	0·2
,, 28	900,000	...	...	1·025	2·3
March 1	900,000	...	...	1·025	2·3
,, 3	600,000	1,470,000	...	1·023	1·2
,, 6	1,500,000	...	...	1·025	2·0
,, 8	1,500,000	...	...	1·024	1·3
,, 9	480,000	450,000	...	1·025	1·6
,, 11	1,500,000	...	...	1·025	1·5
,, 13	2,350,000	580,000	...	1·024	1·4
,, 15	...	1,470,000	...	1·021	0·5
,, 16	2,100,000	...	...	1·015	0·2
,, 17	1,500,000	365,000	...	1·016	0·5
,, 18	1,500,000	...	...	1·022	1·2
,, 19	900,000	1,060,000	...	1·023	1·8
,, 20	1,200,000	210,000	...	1·026	2·5
,, 22	1,500,000	...	...	1·026	2·6
,, 23	2,100,000	...	...	1·026	2·7
,, 25	2,400,000	1,830,000	...	1·026	2·8
,, 26	1,500,000	2,060,000	...	1·025	1·3
,, 27	900,000	...	300,000	1·021	1·0
,, 29	600,000	2,000,000	...	1·021	1·8
,, 31	4,000,000	200,000	...	1·023	2·5
April 1	1,200,000	870,000	...	1·021	2·0
,, 3	1,500,000	460,000	300,000	1·021	1·5
,, 5	2,100,000	455,000	...	1·027	3·8
,, 7	1,200,000	2,480,000	...	1·024	3·0
,, 8	600,000	...	...	1·024	3·0
,, 9	1,500,000	40,000	700,000	1·024	3·2
,, 10	1,800,000	600,000	...	1·024	3·5
,, 11	...	720,000	...	1·021	3·2
,, 12	2,000,000	...	...	1·022	3·0
,, 14	2,000,000	...	2,420,000	1·021	3·2
,, 15	2,000,000	360,000	...	1·022	3·2
,, 16	1,500,000	2,625,000	...	1·023	3·3
,, 17	1,200,000	1,000,000	900,000	1·019	3·5
,, 19	2,400,000	1,380,000	1,490,000	1·021	3·6
,, 20	2,000,000	920,000	3,000,000	1·021	4·0
,, 21	1,300,000	945,000	1,800,000	1·021	3·6
,, 23	1,800,000	1,440,000	...	1·027	4·0
,, 24	1,500,000	...	1,300,000	1·023	4·0
,, 27	1,500,000	...	...	1·020	4·5
,, 28	...	2,340,000	2,000,000	1·021	4·5
,, 29	1,200,000	1,100,000	1,500,000	1·024	4·2
May 1	1,200,000	...	2,000,000	1·025	3·2
,, 3	...	2,000,000	3,900,000	1·023	4·4
,, 4	900,000	...	2,000,000	1·024	4·0
,, 6	1,200,000	1,000,000	2,000,000	1·023	3·7
,, 8	...	400,000	800,000	1·023	4·2
,, 9	...	...	6,500,000	1·024	4·3
,, 10–20	...	2,550,000	4,600,000	...	...
Total	68,880,000	36,370,000	32,510,000		

Summary for Years 1884, 1885, 1886.

Year.	Fertilised Eggs.	Fry hatched.	Per cent.
1884	12,575,000	5,095,000	59·5
1885	48,760,000	29,620,000	39·3
1886	68,880,000	32,510,000	52·9
Total	130,215,000	67,225,000	

maturity until at least the second year. In all probability, if the Flodevig herring survive they will spawn next spring, and be from 7 to 8 inches in length. It may be mentioned that the young cod reared at Flodevig differ greatly in colour. This seems to indicate that they have descended from fish which lived under different conditions—the darker specimens from inshore 'rock' cod, the lighter from the 'silver' or 'grey' cod of the open sea.

Dannevig has thus proved beyond doubt (1) that sea fish can be hatched in great numbers, and (2) that the artificially hatched fry have energy enough to survive when set free.

In this country the hatching of sea fish has only been attempted on a small scale. In the spring of 1883 I hatched some thousands of herring in the Rothesay Aquarium, and since then the eggs of most of our common food fishes have been hatched at one or other of the Board's marine laboratories.

The question of hatching sea fish is under consideration at the present moment at Grimsby. Arrangements are being made to found a Fishery Institute and Marine Fish Hatchery at Cleethorpes, where it is proposed to propagate round and flat fish, with the view of replenishing if possible the exhausted inshore waters of the North Sea. It is conceivable that by fish hatching some firths and bays and some inshore banks might be made more productive. It is, however, somewhat difficult to imagine how the introduction of at the most a few millions of fry at one or two points along the coast would, as some predict, have any influence in replenishing the North Sea as a whole. But even although the Cleethorpes hatchery should fail to improve the fisheries in its immediate neighbourhood, it is extremely desirable that it should be established, for no industry more than the fishery industry stands in need of technical education, and it is only by means of institutions such as is proposed at Grimsby that the much-needed information can be collected and spread broadcast amongst those engaged in the fisheries.

To successfully hatch sea fish in large numbers, the first and last requisite is an abundant supply of pure sea water. This necessitates a small sea water pond and a number of large tanks, from which a constant supply of pure filtered water can be readily obtained. In order to command suitable water, and at the same time provide accommodation for large floating fish cars or pens, the United States Fish Commission has constructed, at a cost of £10,000, a small harbour in connection with their laboratory at Wood's Holl. Water is pumped from this sea pond or harbour into a large wooden tank lodged in an adjacent tower. From the tank the water is conveyed to the hatching and other tanks in the laboratory.

At Flodevig the fyord near which the hatching house stands is so protected, and the tides are so imperceptible, that the construction of an expensive pond at the outset was unnecessary. The water was simply pumped from the creek into a tank in the station, from which after being filtered it passed to the hatching boxes.

Even for floating eggs it is more essential to have the water pure than to have a high specific gravity, for as soon as the eggs get coated with sediment, development is arrested, and the embryos not only soon die, but by undergoing putrefactive changes, seriously endanger all the other eggs in the hatching apparatus.

In addition to having at command an abundant supply of sea water, it is, of course, necessary to have the hatching station in the vicinity of some rich fishing ground, where plenty ripe fish may be obtained when wanted. It is, however, hopeless to trust to obtaining fish ready to spawn. It is absolutely necessary to be in a position to keep the spawners for several months: this can of course be easily accomplished by means of large floating pens or cars, or well-boats, such as are sometimes used by fishermen. The necessity of this will be still more evident when it is mentioned that only about 300,000 eggs can be 'stripped' from a cod at a time—that, in fact, a cod takes several weeks to get rid of its spawn.

Given plenty pure sea water and a number of ripe fish, the next desideratum is a hatching apparatus. The form of the hatching apparatus must depend on the nature of the eggs to be manipulated. While herring eggs are heavy, and not only fall to the bottom, but adhere to whatever they touch, the eggs of most of the food fishes are non-adhesive and lighter than sea water, and hence they float at or near the surface. The egg of the cod, *e.g.*, has a specific gravity of 1·020, while the water of the North Sea varies from 1·024 to 1·026 or more. Numerous hatching boxes have been suggested for both heavy and floating eggs.

I have recently designed a hatching jar for adhesive eggs, which promises good results. The structure of this apparatus will be readily understood by referring to the drawing (Plate VII.). It consists of an outer glass cylinder (A), in which a smaller cylinder (B), is suspended from a wooden cover (C) held in position by a circle of iron fixed by nuts (*a*) to three uprights from an iron band (*b*), which surrounds the neck of the outer cylinder. The sea water passes along the glass tube (*c*) into the outer cylinder, from which it escapes by the tube (*d*). The outer surface of the inner cylinder (B) may be coated with eggs, or eggs may be placed both on the outer surface of B, and the inner surface of the larger jar (A). The centre of the small jar or cylinder (B) may be filled with some filtering material, or if a low temperature is required, water from an ice chamber or a freezing mixture may be conveyed into B by the lead pipe (*e*), and allowed to escape by the pipe *f*, and, if necessary, the whole apparatus may be introduced into an insulated wooden box, from which the water from *f* might be conducted so as to ensure a still more equable temperature.

For floating eggs, entirely different arrangements are required. The most successful apparatus hitherto devised is the one used at Arendal.

Through the courtesy of Captain Dannevig, I have obtained one of the Arendal hatching boxes, with all the necessary fittings. The various parts of this hatching box are illustrated in the accompanying plates. The apparatus, which is both simple and inexpensive, consists of a wooden box, 8 feet in length, 2 feet 3 inches in breadth, and 1 foot deep, equally divided into two by a longitudinal partition, and each of these is again divided by transverse partitions into seven compartments, the five in the centre being larger than the end ones.

The whole apparatus, therefore, contains 10 large compartments (Pl. VIII. G) and four small ones (D). The larger compartments are not in communication with each other, but the end ones are connected by an aperture in the longitudinal partition. The first pair of compartments receive the water from the inflow pipe (E); the last pair serve to collect the water for the outflow pipe (F).

Into the large compartments square boxes (H), adapted for floating eggs, or sloping boxes (I), suitable for lobster berries, may be introduced.

The hatching boxes (H) for the floating eggs of the cod, plaice, &c., are 12 inches in length, 10 inches in breadth, and 10 inches in depth (Pl. IX., fig. 3). The sides are made of deal $\frac{5}{8}$ths of an inch in thickness, and the bottom is made of hair netting, sufficiently fine to keep in the eggs and fry, but yet wide enough to admit of a free passage of water.

These boxes are attached by leather hinges to the transverse partitions (Pl. IX., AA).

Into the top of each transverse partition a short spout of galvanised iron, 3 inches in length, and $\frac{3}{4}$ths of an inch deep, is fitted (Pl. IX., B); and in the corresponding edge of the box below another spout, which fits underneath the first, and so directs the water into the box to which it belongs.

By referring to Plate VIII. the general plan of the hatching apparatus and the course of the water will be easily understood. The apparatus is supplied with water by pipe (E), and as it has a slope from top to bottom of half an inch per foot, the circulation goes on briskly, the water being carried away by the outflow pipe (F). In Plate VIII. a portion of the side has been removed, in order that the mode of circulation in the individual compartments may be the more easily understood.

The boxes in these compartments, being only attached by one border, float up, and attain their natural level on the entering of the water (Pl. VIII., H). From the spout the water freely circulates around the particular box, passes through its bottom, rises to the surface outside the box, and passes out by a lower spout into the next box.

If the apparatus is clean, and the water sufficiently salt, it is found that the circulation so caused keeps the eggs floating clear of the bottom, and separate from each other. On the specific gravity being less than that of the eggs, these naturally fall to the bottom, and lodge about the corners. To prevent this, which means failure, a method has been adopted for regulating the current in the following manner:—

In Plate VIII. will be seen an iron bar running almost the entire length of the apparatus, from K to L. The end L is fixed, but the lower end K can be moved up and down, and opposite each pair of boxes a short transverse bar is fastened (M), sufficient to catch on the edges of the boxes. A cord (P) is attached near the free end of the bar. This cord is in connection with an excentric wheel, driven by an engine, and through the cord the bar is made to rise and fall, through a cleft upright, from four to seven times in the minute. The boxes rise and fall with the bar. The result of this arrangement is that when the boxes are depressed a quantity of water rushes up through the hair net bottom, carrying with it the sunken eggs. The backward current may sometimes be hurtful to the eggs during the early stages of development, but it does not appear to be injurious when the embryo is fairly well developed. The object of this arrangement is to keep the eggs always floating; it is especially necessary when the specific gravity of the water is rather low. Extra outlets are also found to be needed, in the shape of holes below the spouts, in order to relieve the pressure caused in the several compartments by the working of the boxes.

When the young are ready for hatching the movement of the bar is done away with; or if in the same apparatus there are other boxes with eggs of an earlier stage still requiring movement, the bar is still allowed to move; only such transverse pins as are necessary being left.

If the whole apparatus is working, there will be contained in it about four million eggs. About one half of these, under ordinary circumstances, will hatch out, *i.e.*, two million eggs, or 200,000 for each box.

In the case of the cod, if the whole apparatus be filled with eggs fertilised at the same time, about two days will elapse between the hatching of the first and the last eggs. The empty egg capsules require to be at once removed; but, as in the cod there are two days between the hatching of the first and last boxes, there is plenty of time for this operation. In the flounder, however, all the boxes hatch about the same time, and there is considerable difficulty in clearing the boxes. When this is not effected, the meshes of the hair net get filled, and the circulation being arrested the hatching boxes may overflow and lead to loss of large numbers of the fry.

When the fry are hatched it is found advisable to have a gentle movement of the surface of the water, to prevent the young fish crowding together and undergoing suffocation. This is obtained in the following manner:—

A frame (Pl. X., *a*) is suspended ten inches above the hatching box by four cords (*b*) attached to the roof of the hatching shed. This frame is able to swing backwards and forwards between the four uprights (*c*). The frame is the same breadth as the apparatus, but a foot shorter. It is divided longitudinally in a similar manner to the apparatus below. A cord is carried through a pulley (*d*), and, like the cord in Plate VIII., connected to the revolving cylinder. By means of the cord (*g*) the frame is pulled forward, and it is pulled back again by a weight attached to the cord passing over the pulley (*e*); the frame should move backwards and forwards about eight times per minute.

Suspended from the cross-bars of the frame are glass tubes, which, as the frame moves, are carried backwards and forwards immediately below the surface of the water. This effectually prevents the crowding together of the fry during the first few days. After the third day, the danger of crowding is practically over. In fig. 2, Plate IX., one of the glass tubes (*b*) referred to above is represented suspended by two threads (*d, d*) to a piece of wood (*a*) which is fixed to the frame.

For hatching detached lobster eggs, sloping boxes are used. One of them is represented in Plate IX. fig. 1. It is constructed of tin plate, and is made of such a size as will fit the compartment where it is to be used. Each box requires a perforated screen (*a*) to prevent the escape of the young lobsters when hatched. The spout (*b*) fits into the notch of the partition below (Plate VIII., I).

The stream of water passes upwards, and thus has a better chance of coming into contact with all the eggs, which being heavy lie on the perforated bottom.

With the apparatus described, Dannevig believes that it will be possible at a very small outlay to hatch millions of the floating eggs of the cod, haddock, flounder, and other fish, and he is convinced that it is only by artificial hatching that the inshore fisheries can be restored to, and maintained at, their original productiveness.

From the results already gained there seems no escape from the conclusion that we ought at one or more centres to establish hatching stations. One might be erected for round and flat fish and another for lobsters. From all we have recently learned as to the Forth, it seems to be the favourite resort for five or six months of the year of young haddocks and whitings. During last summer there was a large shoal of haddocks from six to ten inches in length in the Forth. Of this school the Buckhaven fishermen alone captured over 700,000. These haddocks increased several inches in length during July and August, and in September they left the Firth for the open sea. Probably they are now spawning for the first time in the vicinity of the May, and their descendants may by-and-by enter the Forth to share the food and protection it now offers. By hatching annually millions of haddocks at Inchcolm, North Berwick, Elie, or Inchkeith, the take of both large and small haddocks in the Forth district might soon be at least doubled, and by instituting a close time for lobsters, and forming lobster farms on some of the western islands great benefits might be conferred on the inhabitants.

The Cromarty Firth seems extremely well adapted for a large experimental hatching station. At present the Firth contains extremely few fish, either round or flat, so that after introducing several millions of artificially hatched haddocks and flounders, if local schools were formed, there could be little doubt as to their origin. One great point about the Cromarty Firth is that, like the Moray Firth, minute pelagic forms, such as the young fry feed on, are remarkably abundant. A hatching station with all the necessary appliances, exclusive of ponds, could be provided for about £1000. Unfortunately, hitherto the Board has not succeeded in obtaining a vote for this purpose, but now that the hatching of sea fish and lobsters may be considered as beyond the experimental stage, special sums may be provided.

Since the hatching operations began at Flodevig, a number of difficulties have arisen, and a number of practical questions have been settled. One of the most serious obstacles to extensive hatching was the difficulty in obtaining ripe fish, but even worse than this was getting eggs capable of being fertilised from the fish when once secured. Again and again the eggs when taken from the fish were dead, or at least incapable of impregnation. As is well known, living cod eggs float in water with a specific gravity of 1·024, while dead eggs fall to the bottom even when the specific gravity is considerably higher, hence it is easily ascertaining whether the eggs are dead or alive, by introducing them into ordinary sea water. Dead eggs can further be easily distinguished from living ones by microscopic examination, or by their change in colour and loss of translucency. Dannevig, after a time, discovered that the death of the eggs had resulted, not so much from the handling, as from the rapid change in the surroundings of the ripe fish, more especially in their being transferred from water with a specific gravity above, to water with a specific gravity considerably below 1·024. Fortunately the difficulty can be easily overcome by allowing the fish time to adapt themselves to the altered conditions.

In order to indicate the nature of the work of a hatchery for sea fish, I shall now, by way of concluding this paper, give some extracts from the report recently presented by Captain Dannevig to the Arendal branch of the Society for Improving the Norwegian Fisheries.

In discussing the influence of introducing fish from the open sea into water with a low specific gravity, Dannevig writes as follows:—

'Among the many cod purchased were a pair of remarkably fine 'specimens of the light grey deep sea cod, one of which was a male, while 'the other was a female. All the roe obtained from the female was, to my 'great regret, damaged, and I gave up all hope of making any use of her; 'but as the fish, apart from its handsome appearance, was of considerable 'size, I determined, for the sake of our many visitors, to set it free into a 'large tank in the hatching house, which was supplied with fresh sea water 'from a depth of 9 fathoms. When I some time afterwards accidentally 'took it up again, I obtained, to my great surprise, a considerable quantity 'of ripe living eggs. A similar experiment was now made with a great number of fish which, to a greater or less degree, yielded damaged roe, and 'as the result always was the same, it was evident that the salinity of the 'water played, in this matter, an important part. (It is to be observed 'that the water pumped into the hatchway from 9 fathoms, has, on the 'average, about twice as much salt in it as the water from the surface of 'the sea.)

'It still remained to explain how only some fish were attacked, while the 'whole of them lived in the same conditions and in the same place. I 'observed that generally the smaller and dark-coloured fish gave hatchable 'roe, while the reverse was the case with the lighter sorts; and as the 'latter generally keep off the coast in contrast to the others, which are 'known as fjord cod, I came to the conclusion that it was not so much 'the greater or less salinity which made the difference, as the sudden 'transition from the salter to the fresh water.

'This was confirmed by the fact, that a number of deep sea cod kept in 'confinement in the wharf from the one year to the other, were found to 'contain eggs in excellent condition for hatching.

'The results of this observation was, that all the brood fish purchased 'for this year were brought to tanks in the hatchery, and thus is 'obtained a greatly increased quantity of roe, which will be easily understood when I state that the number of fish in the best spawning time 'was about 150, against 400 to 500 in the previous year; and that, 'nevertheless, and in spite of the increased loss through the lower temperature during last winter, a larger number of fry were hatched than ever 'before. The result of the low temperature of the sea water during winter 'was the great loss of eggs in the hatching boxes, the loss being 52·9 per 'cent., against 39·3 per cent. in 1885. This is not to be understood as if 'the cold was directly hurtful to the eggs or the fry, but rather that the 'development goes on so much more slowly, which necessitates the eggs 'remaining longer in the apparatus where from knocking against the bottom 'and from other causes they greatly suffer.

'The longest previously observed hatching time for cod eggs was 26 days, 'while this year it lasted 42 days, though the average difference in temperature was only 2°·5 R.

'With a temperature of +4° R. it occupies 22 to 24 days, and as the 'fry appear strongest after such a hatching period, it is reasonable to 'suppose that this is the most natural time for the cod.

'If the water remains 6° warmer, *e.g.*, the development is accomplished 'in 15 to 18 days; but the fry are tender and weak, which is also the 'case, though in a less degree, when the temperature sinks to +2° or lower.'

As to rearing the fry, Dannevig says:—'I have found that to rear the 'fry successfully, it is necessary, not only that the temperature should be 'suitable, but that the density of the water should be at least 1·022, so 'that the tender young may keep clear of the bottom without too great 'exertion. When the specific gravity of fry is greater than that of the 'water, they have a tendency to sink, and as their swimming powers are 'small in the first stage of their growth they sink, in spite of all efforts, 'to the bottom, where their destruction is certain. The only way to get 'the necessary salinity, and at the same time have the water completely 'under control, was to build a great basin on land, and fill it with the 'help of steam pumps. A basin was constructed in 1885 (measuring—'greatest length, 43 metres; greatest breadth, 30 metres; and greatest 'depth, 5 metres), with a capacity of 2500 cubic metres. It is situated 'in a natural hollow, and has, on the south side, a wall 40 metres long, 'and on the north-east a similar wall 15 metres long.

'After the basin was cleaned and supplied with several sea plants, 'about 500,000 cod fry (hatched 27th April) were introduced on the '3rd May, and the pumping was then continued till the basin was full, 'and afterwards at suitable intervals.'

The results of this experiment will be best gathered from the following extracts from Mr Dannevig's diary:—

'May 3–8. Saw the fry every day, and always most in the east end of 'the basin, always swimming.

'13. Introduced 5000 young flounders (*Pleuronectes lemanda*) into the 'basin.

'18. The majority seem to keep near the supply pipe, probably for 'the sake of the fresh water streaming in.

'21. Towards evening observed the greatest number at the west end of 'basin. Length up to 10 mm. Temperature, surface +10° R.; sp. gr. '1·027.

'May 23. Fry remain most frequently in shade—in the east end of 'the basin in the morning, and the west in the evening.

'Differences in *size* of fry is very considerable, while stage of development is almost the same for all, the size of the different breeds already 'making itself felt.

'June 3. Fry a month in the basin. 50 specimens caught to be preserved 'in spirit; length from 16 to 9 mm. The smallest did not seem to have 'reached the same stage of development as the larger ones. The fry are 'to be found over nearly the whole basin. The east end appears to be 'their favourite place at all times of the day, or it may be that they are 'better seen on the background of the lighter bottom.

'8. In course of the last two days the number of the fry seem to have 'considerably decreased, but possibly this is only apparent. I saw a 'young cod right down on the bottom in 2 fathoms of water.

'10. After the most careful observation, I have come to the conclusion 'that the cod fry attack and eat each other in considerable numbers, while 'the larvæ of the crabs (both in the zoea and the megalops stage) are 'almost never pursued, and, as far as I have observed, never caught. The 'cod fry seem not to lack the will to attack, but the young crabs are 'excellent swimmers, and manage to get away. On the other hand, they 'do not seek to attack the cod fry, and at first it seems as if they would 'be able to grow up together. But the crabs will pretty certainly, in the 'long run, fall a prey to the cod, when the difference in size is more considerable than at present.

'As the cod, at least when they are larger, seldom attack individuals of 'their own species, their present rapacity may possibly be due to the fact 'that the basin, which is new, and consequently poorly supplied with 'plants, has too little means of nourishment in proportion to the number 'of fish. I made another attempt to feed them, and with some success, 'as some individuals swallowed pieces of fine-scraped mackerel.

'19. In the course of the last few days several fry have been examined, 'and the stomach has been found full of various sorts of small crustacea, 'and the larvæ and pupæ of flies, of which there are enormous numbers in 'the basin, and also of the food now daily thrown into the pond. The east 'end of the basin, which consists mainly of sand, seems to be their favourite 'place at all times of the day. To-day I tried if they would eat fine-'chopped mussels, fine-scraped fish, &c., but in vain. They fled with all 'haste.'

The following paragraphs relate to the rate of growth of the young cod:—

'When the young come out of the egg it has a length of about 3 mm. 'In course of the first eight days, while the yolk gives continual nourishment, it increases 2 mm., so that it has a length of 5 mm. when taken 'out of the apparatus.

'The further growth is extremely diverse in the several individuals, 'which may depend on difference of race as well as on the greater or less 'quantity of food the young creature manages to procure, and consequently, 'when I give a size, it must be understood as an average.

'Between 6th June and 8th July there is a great spurt in the development, which may be explained by the fact that the young begin to eat 'the food flung to them in considerable quantity twice a day.

'From middle of October to the middle of February the growth has 'been much slower, for reasons which are very easily explained. The fry 'of the cod in the open sea set out for deep water when the surface water 'begins to get cold, which generally happens in November. That they 'thus go, so to say, into the very jaws of their many enemies, and that a 'great part of them are thus destroyed, has nothing to do with the 'question in hand, for the individual which escapes these dangers gets 'into warmer water and more comfortable existence. Such an emigration 'cannot take place in the basin except in as far as they seek the deepest 'hollows, where they usually remain; that this must exercise a great influence on their development was easy to foresee. In cold weather they 'entirely abstain from food.'

TABLE showing Rate of Growth of Young Cod.

Date.	Age.	Size in millimetres.
April 26	0 days	3
May 3	6 ,,	5
,, 16	19 ,,	7
,, 18	21 ,,	8
,, 21	24 ,,	9
,, 31	1 month 5 ,,	10
June 3	1 ,, 8 ,,	12
,, 6	1 ,, 11 ,,	15
July 12	2 ,, 15 ,,	55
Aug. 12	3 ,, 15 ,,	70
Sept. 12	4 ,, 15 ,,	85
Oct. 12	5 ,, 15 ,,	115

(Longest example caught at same time, 157 mm.).

Since February, notwithstanding many adverse circumstances (including for a time the stoppage of the pumping of sea water), the young fish have considerably increased in length, and, as already mentioned, some of the cod are now over a foot in length.*

During recent years, by numerous and often extensive experiments, the great principles of fish culture have been established for both sea and fresh water fish. The observations of Dannevig owe a great part of their importance to the fact that they confirm, as far as they go, the conclusions reached at Howietoun and elsewhere as to the influence of extreme temperatures, sudden changes in the surroundings, rate of growth, &c., on the eggs and young, and also on the full-grown fish.

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* I am indebted to Mr Webster, Librarian, University of Edinburgh, for preparing abstract of Mr Dannevig's Report.

APPENDIX F.—No. V.

NOTE ON THE OVA FRY AND NEST OF THE BALLAN WRASSE (*LABRUS MACULATUS*). By J. DUNCAN MATTHEWS, F.R.S.E.

With Plate XI.

On 21st June, Mr Rosie, Fishery officer at Broadford, Skye, sent up two fish nests procured about five miles from Broadford. Owing to delay in transit and other causes, these were too much injured for observation of any kind, but the following description is taken from the Fishery officer's report:—The nests were found closely wedged into a crevice of rock, the mouth of which faced the shore, and was about 12 inches high. The nests filled the height of the crevice at the back, and in (longitudinal) shape formed fully a quarter of a circle on their outer edge. The front wall of the nest at its extremest projection measured about 4 inches in thickness, but as it curved round to the rock on each side it tapered away to nearly a point. It was thus crescentic in outline, and wedge-shaped from the front inwards, owing to the narrowing of the crevice. Across the base of the nest from point to point of the crescent, *i.e.*, at the inner angle of the crevice, it measured 15 inches, and its projection in the centre to the inside of the crescentic wall was 6½ inches.

Mr Rosie adds that he has good authority for the statement that before spawning the fish have been seen passing through similar nests, and that when the tide was rising they partly leapt out of the water to reach the nests. These observations he has been as yet unable to confirm, but while stating that he did not observe such openings in these nests, it has to be noted that Mr Allan, who subsequently sent up two other nests from the same locality, says that in them there was a hole at least at one end of the nest.

The first nests having been spoiled, the two just referred to were sent in damp seaweed to the Zoological Laboratory of the University of Edinburgh on July 16th. Although their shape was much destroyed in transit, they arrived otherwise in fairly fresh condition. The nests were composed of numbers of tufts of coralline (*Corallina officinalis*) and seaweed (*Polysiphonia fastigiata*), fixed together principally at their bases by what seemed like threads of semi-solid mucus.

These two nests arrived late on Saturday the 17th July, and in consequence were left unnoticed until the forenoon of Monday the 19th. They had thus been for at least 72 hours in a box among damp seaweed when first examined. The ova were found scattered over the whole nest, and adhering to its material, but not very firmly, some washing off when (as was done later) pieces of the nests were put in water. It is probable, however, that they are more firmly adherent in the natural condition, and these may have loosened from their partially drying. The eggs freed from the weed sank in the water.

The eggs varied somewhat in size, but the extremes were $\frac{1}{24}$th to $\frac{1}{25}$th of an inch in diameter. The embryos were alive and well advanced in development, being in fact almost ready to hatch out.

Some of the weed with adhering ova was put in a jar of salt water, but the embryos died during the night, probably from sufficient precautions not having been taken to keep this small quantity of water cool.

The remainder of the nests, a mass about 10 inches diameter by 4 inches thick, was put in a large glass dish covered closely on the top, but with no water whatever added; the nests were still, however, pretty damp. Next day, 72 hours after their arrival, the embryos on the damp weed were still alive, and pieces of the nests were put in salt water; next morning many embryos were found to have hatched out, and were lively. Twenty-four hours later (22nd July) the embryos on the nests in the dish, and which had, therefore, not been in water for 144 hours, were still living. Some were found to have hatched out, and were wriggling on the damp—now nearly dry weed, mixed up with the nests. Other embryos on being put in salt water immediately commenced to jerk violently, and very soon broke their way out. These young wrasses in the salt water gradually died off about the time when the yelk was nearly exhausted. Many lived after hatching for four or five days, and a few lived for fully six days, at which time the caudal portion of the notochord was still quite straight, and there was yet no sign of pelvic fins. In the water these little larval wrasses of about $3\frac{3}{4}$ mm. in length when hatched, were very active, continually wriggling up to the surface of the water, with a quick jerky movement of the tail and a rapid vibratory movement of the pectoral fins, to sink slowly again for several inches, when the upward movement was repeated. When the glass jar in which they were kept was placed opposite a window they all, without exception, crowded to the bright side, mostly keeping near or close to the water's surface. The procedure described was repeated daily with the same results until July 26, when the weed and nests were found to be nearly dry, warm, and slightly decomposing; the remaining ova in the nests being now dead. They had, therefore, lived without water in this merely damp state for nearly ten days.

The place in which the nests were found was about half-tide mark, so that they must in the natural state have been about six hours at a time uncovered by water, and that repeated twice every twenty-four hours. Half their embryonic existence then is passed out of the water, but even knowing this it is surprising to find that they could survive such a length of time as that recorded above. If the parent fish, as would seem probable, take some considerable time to construct these nests, or if they visit the nests after the ova have been deposited, it is interesting to note that from the position of the nests in this instance they would have to retire from them during the above periods of time, and for a distance of at least 30 yards (at low water) twice every twenty-four hours.

In the egg when received the embryo was curled up with its head doubled over the yelk-sac and the tip of the tail reaching, and before hatching overlapping, the anterior end. The pectoral fins appeared as folds, without evidence of rays. The eyes were large; the ears simply showed a pair of small circles within them. After hatching, however, the semicircular canals could readily be made out. The general appearance of the embryo when hatched will be better understood from the sketch (Plate XI.) than from description. Before hatching there were visible a few primitive rays about the tip of the tail, and these increased anteriorly, although not over the whole length of the fins, while the embryos were kept alive after hatching. In the free embryo the pectoral fins were relatively long, and each appeared as a strong anterior thickening, supporting behind the delicate fin, in which primitive rays like those of the median fins appeared. At hatching the jaws were slightly open, and the lower one could be moved slightly. The embryos, which were examined while on the semi-dry weed, were always found to be quiescent, and the action of the heart was very slow, if not entirely inactive. When placed in water the action of the heart invariably commenced. The larval fish on hatching were pigmented in single spots of black and dull yellow. The pigmentation extended along almost exactly two-thirds of the total length of the body from tip to tip, the posterior third having no spots, and the black spots were sparsely scattered over the yelk-sac, but in general were of a rather smaller size in that region than those on the body. There was a slight irregularity in the arrangement of the pigment spots, but it generally was thus:—Two rows of dense black spots along each side, one row close to the notochord when looked at from above, the other row running along near the side of the fish. The spots composing each of these rows were arranged two on each segment, so that each segment had four black spots on each side—eight in all; and they were so arranged on the segments that the more dorsal spots were placed slightly in front of the lateral ones. They thus formed a slightly lozenge-shaped figure when viewed from the side, and were invariable in position. An irregular dark and rather sparse spotting on the continuous median fin also occurred anteriorly. The irregularity in the pigmentation referred to was occasioned by the somewhat varying position occupied by the yellow spots. As a rule, these formed a kind of double row also on each side, and approximately in the same line as the black spots, but they were situated on the lines of segmentation. There were thus two yellow spots on each side (four in all) of each segment, or rather there were four half spots on each segment. The following list gives various measurements of the young wrasse made the day after hatching:—

Tip of jaw to front of eye,	·10	mm.
„ back do.,	·37	„
„ front of ear,	·41	„
„ centre of heart,	·47	„
„ insertion of pectoral fins,	·63	„
„ anal aperture (apparently still closed),	2·10	„
„ end of pigmentation,	2·48	„
„ tip of tail (total length),	3·80	„
Length of eye,	·25	„
„ ear,	·23	„
„ pectoral fin,	·41	„
Breadth of head over eyes,	·52	„
„ „ ears,	·41	„
„ (diameter) of heart,	·06	„

The nests are described above as being formed by the ballan wrasse. When received, the Fishery officer was asked to describe or procure the fish which constructed these nests, and on the 24th August he forwarded two of the fish which form these nests, 'secured from the very ground upon which the nests were found.' These were specimens of *Labrus maculatus,* 235 mm. and 220 mm. long respectively; and there seems no reason to doubt the connection between these fish and the nests examined, the more especially as it is recorded (Moreau) that both the *L. maculatus* and *L. mixtus* construct nests for the reception of their ova.

APPENDIX F.—No. VI.

ON THE DEVELOPMENT OF THE COMMON MUSSEL (*Mytilus edulis,* L.). By John Wilson, B.Sc., Demonstrator of Zoology, University of St Andrews.

The common mussel is well known to all zoologists as the inhabitant of tidal rock-surfaces and estuarine flats. In the latter position mussels attain to their fullest development, by reason of the abundance of food available there, and the immunity from wave-action. The beds or scalps may or may not be uncovered during ebb-tide. The largest specimens live in the bed of the stream in whose estuary the scalps lie. In the bed of the River Eden, near St Andrews, for instance, examples are commonly dredged measuring 4¾ inches, and of proportionate girth. Mussels carpeting tidal rocks, although sexually perfect, are seldom of commercial size.

General as the distribution of the common mussel is, its early life history has been hitherto, in great measure, matter of conjecture. Lacaze-Duthiers,[*] in his classical memoir on the development of the gills of the mussel, states that he found young forms of the length of ¼ mm., presenting four gill-papillæ, fixed to seaweeds, &c., in the beginning of the month of September. He surmised that younger embryos rose to the surface by means of a ciliary locomotor apparatus, but he had not actually seen this.

Professor M'Intosh,[†] while prosecuting scientific research on behalf of Her Majesty's Trawling Commission, noticed that the surface of St Andrews Bay 'swarmed with minute mussels, ... much younger 'than the forms procured by Lacaze-Duthiers in the Mediterranean, 'as they were settling on the blades and similar structures, within 'tide-marks, and which showed four branchial processes behind the foot.'

Lovén[‡] figures and describes a mussel 0·586 mm. in length, having eight gill filaments, but as yet possessing no heart.

During the summer of 1885, under the direction of Professor M'Intosh, and at the instance of the Fishery Board for Scotland, the writer made observations on the fertilisation and early stages of development of the mussel.[§] During last summer (1886) the investigations were continued under the same auspices, and the results of these are here presented.

Before proceeding to give embryological details, reference to the generative organs and products may be most conveniently made now. Historically treated, so early as 1761, Baster[||] seems to have satisfied himself as to the unisexual condition of the common mussel. Poli,[¶] however, some thirty years later, while aware that the reproductive glands occupied the mantle, held the opinion that the mussel was hermaphrodite. Treviranus[**] figures faithfully the reproductive organs in full maturity. He hazards the opinion that the ova are passed by way of the stomach out of the mouth, but, being unable to believe that such a mode of exit would suffice for the ova in the mantle, he suggests that the two tubes (afterwards found to be the genital canals) may serve for their expulsion. He did not know the mussel to be unisexual.

Lacaze-Duthier's memoire[††] (*Organes Génitaux des Acéphales Lamellibranches*) includes the common mussel. His figure of the genital glands and their ramifying canals in the mantle is diagrammatic. Sabatier[‡‡] evidently made his elaborate study of the anatomy of the common mussel at its period of quiescence, as little mention is made of the reproductive system.

The genital glands are gradually developed during the winter and early spring months, and come to maturity in March and April. They occupy both mantle lobes almost entirely, floor the pericardial region, fill the walls of the lateral cavities (the *cavités des flancs* of Sabatier), swell and give form to the wedge-shaped abdomen, and ramify to a greater or less degree over the outer walls of the liver. In the quiescent period the mantle lobes are delicate and transparent, and the abdomen (that is, the median

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[*] *An. Sc. Nat.*, ser. iv., tom. v. p. 19.

[†] *An. Nat. Hist.*, Feb. 1885, p. 151.

[‡] *Beiträge zur Kenntniss der Entwicklung der Mollusca Acephala Lamellibranchiata*, Stockholm, 1879. (Translation from *Kongl. Vetensk. Acad. Handl.* Stockholm, 1848.)

[§] Report of the Fishery Board for Scotland (Append. F, No. xiv.), 1886.

[||] *Opuscula subseciva*, &c., Harlemi, 1759–1765.

[¶] *Testacea utriusque Siciliæ*, Paris, 1791–1795.

[**] *Zeitschr. für Physiologie*, Band i. Darmstadt, 1824, tab. v.

[††] *An. Sc. Nat.*, ser. iv. tom. ii.

[‡‡] *An. Sc. Nat.*, ser. vi. tom.

organ between the posterior adductor and the foot), when not distended with corpusculated fluid, is a small ridge of flabby tissue. The follicles are racemose outgrowths of the minor genital canals. The follicles and minor canals undergo coincident development, and may be observed pushing their way in the mantle until they reach nearly to the pallial muscle. With a little experience it is possible to detect the sex of the specimen examined by sight, the darker orange tinge, and the less distinctly botryoidal arrangement of the female, as contrasted with the male glands, being usually marked. The colour may be almost absent in comparatively young forms of both sexes. The genital ducts lie mostly towards the outer side of the mantle. In favourable specimens their ciliary action may be seen under the microscope. Where the branches enter the follicles they may have ciliated columnar epithelium on one side, and germinal epithelium on the other (Pl. XIV. fig. 1, *ce*, *ge*). The well-defined canals have cilia arranged in conspicuous lines or ridges. In the large canals the longitudinal ridges, formed by the infolding of the walls, may project for a considerable distance into their lumen. This feature is best seen in a section of the genital tube—that is, one of the two common ducts which pass to the outside (Pl. XIII. fig. 4). The ridges and sulci are bounded by columnar epithelium, bearing long, powerful cilia. Muscular fibrillæ are present, forming a circular sheath, which becomes most apparent at the termination of the tube, leading one to suppose that the tube can be closed when there is occasion. Its orifice is often distinctly lipped. Behind the orifice a cavity is formed by the bulging of the tube (Pl. XIII. fig. 3, *b*). When a piece of mature generative tissue is punctured, much dense milky fluid accompanies the exuded ova or spermatozoa, that with the former being usually of a much redder tinge than that with the latter. The colour is quickly removed from a piece of similar tissue by methylated spirit. As has been pointed out by Sabatier,* the duct of the organ of Bojanus (the so-called kidney) is in close proximity to the genital duct. The orifice of the former is much smaller than, and opens a short distance behind the orifice of, the latter (Pl. XIII. fig. 3, *kt.*)

In a section of the mantle of a large adult female, fully ripe, the ovarian follicles are found in a closely-packed array, with but little areolar tissue visible. The ova are so numerous in them as to assume, by mutual compression, the characteristic polygonal and pedunculated condition seen in other mollusks—for example, in the American oyster,† and European oyster.‡ The ova rise from the germinal epithelium of the follicle, which is very delicate, and their area of attachment thereto is of considerable width when development is proceeding. The nucleus and nucleolus appear very early, and are large and distinct throughout intra-ovarian growth (Pl. XIII. fig. 2.) The vitellus is granular at an early stage, and becomes gradually more so till the egg is fully ripe. A hyaline coat, probably albuminous, is seen to invest later intra-ovarian ova. If a section be made of the mantle of a female an inch and a half in length, taken in July, when the follicles are nearly empty, the few ova remaining are found to be mostly oval or spherical (Pl. XIII. fig. 2). In many regions the germinal epithelium is seen giving rise to incipient ova, one layer, but often two or more layers deep. In some of the canals granular matter is found surrounding the ova.

The epithelium of the inner (pallial) side of the mantle is richly ciliated, the cilia helping to cause the currents which pass along the pallial chamber. The columnar epithelium, bounding both the outer and inner sides of the

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* *An. Sci. Nat.*, ser. vi. tom. v. pl. ii. fig. 5.

† Brooks, Report of the Commissioners of Fisheries of Maryland, 1880, pl. ix.

‡ Hoek, *Verslag Oesteronderzoekingen*, Leiden, 1883-84, pl. iv. fig. 28.

mantle, rests on an ill-defined basement layer of longitudinal cells, associated here and there with large aggregations of nuclei (Pl. XIII. fig. 2, *nb*). The areolar cells of the stroma are nucleated.

The mature-sperm follicles of a full-grown adult seen in section are circular, irregularly rounded, or sinuous in outline. They are densely filled with spermatozoa. The sperm mother-cells are crowded, spherical, refractive bodies, containing the spermatozoa in all stages of development. The liberated spermatozoa arrange themselves in streaks or bands which radiate from a point in some follicles, while in others they are pinnate (Pl. XIV. fig. 1, *sf*). The bands may unite in the central area of the follicle and form reticulations. As the spermatozoa are carried off by the efferent action of the cilia in the canals communicating with the follicles, translucent, protoplasmic filaments are left (Pl. XIV. fig. 1, *pf*). The spermatozoa are evidently grouped on those filaments. A mass of free spermatozoa was found in the genital tube which is figured in section (Pl. XIII. fig. 4, *s*). In young forms, half an inch in length, the mantle can accommodate only a single series of sperm-follicles, they being proportionately so large as to occupy the whole breadth of the mantle (Pl. XIV. fig. 2, *sf.*)

The mature egg, after extrusion, is quite spherical and very opaque, on account of the large development of deutoplasmic (vitelline) granules (Pl. XII. fig. 1). The vitellus appears greenish-brown by transmitted light. The egg membrane is distinct. The nucleus and nucleolus are not visible in a normal, mature egg, a less opaque region marking their position. The hyaline investment referred to above as noticeable around the intra-follicular eggs, forms a broad, very translucent sheath to the ripe extruded egg. It may be slightly stained and crumpled by eosin. It is presumably adherent to mature eggs naturally extruded, certainly so in the case of artificially liberated ones. Whatever other function it may perform, it is of service as a protective covering to the egg, and as a medium by which spermatozoa are detained. Many spermatozoa wriggle into it, and cause the egg to rotate. It may be seen, in some cases, to enclose segmenting ova (Pl. XII. fig. 9, *hy*), spermatozoa being still present in it. No micropyle has been observed in it.

The vitelline membrane is clearly defined. If ruptured by osmotic action, the nucleus escapes as a spherical body bounded by a definite membrane, and enclosing the nucleolus (Pl. XII. fig. 6, *n*).

Fertilisation is effected in the laboratory by mixing spermatozoa with ova, both being liberated by mincing the tissue containing them in sea-water. The head of a spermatozoon is rounded posteriorly, and tapers forward to a point (Pl. XII. fig. 33), the point being longer than that represented by Lacaze-Duthiers.* Ripe spermatozoa are free and independent, and when liberated artificially, are accompanied by a whitish secretion. They disseminate very rapidly when put into sea-water. Their vitality is noteworthy, and has been referred to by Professor M'Intosh.†

When the ova are extruded they descend to the bottom of the beaker, hence, after allowing time for the attachment of the spermatozoa, it is possible to remove completely the milky secretion which accompanies both, and which, if not carefully removed, would speedily cause putrefaction, and would lead to the early death of the embryos. The time taken by the spermatozoa to effect fertilisation varies considerably, according to the depth of the hyaline zone, the vigour of the spermatozoa, and other more occult conditions. The first token of success is the protrusion of the polar

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* In the Report for 1886 the spermatozoa are inadvertently described as having the head rounded anteriorly, whereas it is pointed, and does not taper to the tail.

† *Loc. cit.*, p. 150.

cell (Pl. XII. fig. 2, *pc*). The processes leading to its protrusion have not yet been made out. The earliest observed instances of the appearance of the polar cell, after the mixing of the ova and spermatozoa, was about four hours. It may, however, occur much sooner. The polar cell is typically a highly refractive vescicle, projecting beyond the vitelline membrane, its long axis in line with the radius. Sometimes a little clear cell may project into it (Pl. XII. fig. 4). It often contains refractive particles. The distal portion may become constricted off, a partition being formed between it and the proximal stalk-like portion. By the application of a substance causing endosmotic action, the deutoplasm finds an easy exit into the polar cell, which, if the action be continued, bursts and allows the egg-contents to flow forth to the exterior (Pl. XII. fig. 8, *d*).

The following account of the segmentation is built up from many series, not from continued observation of one ovum. Definite developmental phases in the segmentation, such as are affirmed to occur in *Modiolaria marmorata*, *Cardium exiguum*,* and American oyster,† have not been determined. In three hours or less, the ovum first segments into two blastomeres or segments,—the macromere and the micromere. Normally, the latter is about a third smaller than the former; sometimes they are equal in size. It is not mere bipartition, for, after the process, the macromere is not much smaller than the unsegmented ovum. The segments are nucleated. The egg capsule accommodates itself to the outline of the segments. The polar cell is situated in the sulcus between the segments (Pl. XII. fig. 10, *pc*). In one instance there appeared lenticular refractive bodies, apparently identical with those figured by Bobretzky ‡ as found in *Nassa mutabilis* (Pl. XII. fig. 11, *la*). Proliferation of the micromeral segments goes on apace, following a course essentially similar to that pursued by *cardium* and oyster, the result being that a body of very irregular outline, and considerably larger than the original ovum, is produced (Pl. XII. fig. 18). In advancing to the blastosphere stage, the micromeral segments become more numerous and smaller, and envelop the macromere. Meanwhile, the opaque brownish deutoplasmic granules disappear, leaving the embryos translucent. For a time the macromere is visible, enclosed by the cap of blastomeres, its still exposed peripheral portion being now distinctly crenate (Pl. XII. fig. 19, *ma*). At this stage the polar cell may still persist, asymmetrically placed with respect to the macromere. Bipartition of the macromere was noticed (Pl. XII. fig. 21, *ma*). Finally, becoming completely enclosed by the micromeral segments, the macromere is coincidently broken up into many comparatively large, distinct, hypoblastic cells. The blastosphere is now spherical or subspherical. The approximation of the micromeral cells gives rise to the blastopore (Pl. XII. fig. 22, *bl*); the macromeral cells become arranged as the hypodermal layer; the now translucent blastosphere acquires external cilia, and swims or rotates at first near the bottom of the vessel. The cilia are very minute, and apparently form a general coat. Soon a zone of much longer cilia appears near one pole of the now somewhat elongated embryo, the pole being occupied by one, or sometimes two, long, strong, flexible flagella (Pl. XII. figs. 22 and 23, *f*). The trochosphere stage may be attained in twenty-eight hours. The cilium composing the velum vibrate rapidly towards and away from the pole, propelling the embryo rapidly forward. The central flagellum is kept antenna-like in front. The fine cilia are still seen to clothe a great part of the trochosphere. The fate of the blastopore was not satisfactorily determined. It is apt to be confounded with the shell-

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* Lovén, *loc. cit.*

† Brooks, *loc. cit.*

‡ *Vide* Balfour (after Bobretzky), *Compar. Embryology*, vol. i.

gland, which arises as a distinctly refractive body near the velum (Pl. XII. fig. 23, *sh*). The shell-gland soon assumes a bilateral form (Pl. XII. fig. 24, *sh*), and its component cells may be made out (Pl. XII. fig. 26, *sh*). After the valves have become differentiated, the stomodæum is seen to invaginate (Pl. XII. fig. 27, *sd*), but whether at the point formerly occupied by the blastopore or not has not yet been settled. The velum comes to be placed at the anterior region. It is relatively very large. For a considerable period the shell-valves are too small to accommodate the whole of the embryo (Pl. XII. fig. 27). When they have grown sufficiently to do this, the velum, which at an early age exhibited ability to fold together (Pl. XII. fig. 25, *vl*), can now be infolded and drawn within the valves. The movement is accomplished by transparent muscular bands, having their origin in the dorsal region of the valves. When the velum is fully protruded, it projects laterally far beyond the external margins of the valves, the latter being brought so closely together as to leave only a narrow slit between them. The velum is excessively sensitive, being withdrawn with a jerk the instant an obstacle is touched by it. Simultaneously with the formation of the stomodæum, the stomach, proctodæum, and body-cavity become defined. The stomach is first distinguished as an oval body, composed of spherical closely-set cells. The limiting tissue intervening between the velum and hinge, anteriorly and posteriorly, is clothed with active, minute cilia. The œsophagus (stomodæum) becomes ciliated soon after its formation, and the stomach and intestine follow suit. The body-cavity enlarges, and the stomach having acquired muscular power, may be moved about independently within it. The velum in embryos of two days and three hours has two pairs of retractor muscles visible. They are triangular or bifurcate at their extremities. The posterior pair are the stronger (Pl. XII. fig. 28, *pm*). A pair of similar band-like retractors are inserted in the anal region (Pl. XII. fig. 28, *m*). They are all highly contractile. In complete contraction, they may form loops or present a beaded appearance. The fully expanded velum consists of loose tissue, greenish by transmitted light. The cirri are strong and regularly arranged. The long flagellum arises from a central mass of tissue (Pl. XII. fig. 29, *f*). It is capable of independent movement. A clearly-outlined arch-like excavation, concave outward, is seen in the expanded velum. The dome of sectodermal tissue external to it is, in other forms, associated with the supra-œsophageal ganglion* (Pl. XII. fig. 31, *d*). When the velum is about to be retracted, the cirri are bent inwards towards the centre (Pl. XII. fig. 30), and the margins of the velum approximated so as to enclose them. The pallial muscle is early developed as a band of considerable width running round the whole free margin of the valves. The valves themselves are, at an early period, finely sculptured or pitted. At the stage at present under consideration they are almost semicircular, the hinge-line being straight. There is a noticeable bulging of the curve of the free margin anteriorly—that is, in the velar region (Pl. XII. figs. 28 and 31). The valves are transparent, and already somewhat brittle. A few large scattered mesoblast cells are found in the posterior dorsal region, and a few similar cells in front of the velum. The latter (Pl. XII. fig. 31, *aa*) are the precursors of the anterior adductor muscle, which is the first to be differentiated, not the posterior, as stated by Lacaze-Duthiers† and Balfour.‡ Diverticula, one on each side of the stomach, are the rudiments of the liver. They are composed of loosely-grouped, spherical cells, and early

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* Hoek (European Oyster), *loc. cit.*

† *An. Sc. Nat.*, ser. iv. tom. v. p. 21.

‡ *Loc. cit.* p. 215.

acquire the brown tinge characteristic of hepatic tissue. They increase rapidly in size. At first the intestine forms a simple arch from the pylonus to the anus, but it soon lengthens, and, bending abruptly to the left, forms a loop (Pl. XII. fig. 31, *i*). During development it loses its early rugose and granular structure, becoming translucent, especially near the anus, where, when dilated, as it often is, the double contour of its walls is well seen. The œsophagus is large, and leads from the posterior border of the velum to the stomach by a slightly sinuous, and gradually narrowing, course. It is lined by stout cilia, whose vibrations direct the currents inward (Pl. XII. fig. 31, *œs*). Its inner termination is surrounded by a circlet of cilia directed into the stomach cavity. They are often agglutinated together by mucus. The stomach-cavity is divided into two portions by a well-defined band (Pl. XII. fig. 31, *bn*). It is clothed with cilia, which cause the ingested particles to gyrate. In some cases these cilia are seen to vibrate in wave-like zones.

Embryos presenting the features above indicated are ·134 mm. in length, and are at most twelve days old. Many reared artificially reached this stage, but although kept alive for forty days they made no progress in development, mostly lying closed at the bottom of the beakers they were reared in. On the 4th June, by simply dipping from the surface of the sea over rocky mussel ground at high tide, numbers of embryos were procured from the trochosphere stage up to that described above. Many were kept in vessels standing in.running sea-water, but they also ceased to develop. By means of tow-net and bottle attached, occasional examples of more advanced forms were procured in St Andrews Bay, at various points from the shore to beyond the three-mile limit. The largest example seen swimming (for an instant) by means of its huge velum, measured ·188 mm. This specimen (Pl. XIV. fig. 3) was taken while on board the 'Garland.' In the contracted state the organs are so packed together as to be difficult to detect.

The embryo, immediately previous to the deposition of the blue prismatic shell substance, is ·28 mm. in longest diameter, and fairly translucent. At this stage the posterior adductor has become well developed (Pl. XII. fig. 32, *pa*). The liver is composed of large loosely-aggregated globules. The intestine has elongated greatly, and when seen, in the contracted state at all events, its condition approaches that found in the adult. The velum and its retractors are still present. The œsophagus is similar to that seen in earlier forms. The foot is differentiated, and three or four gill-papillæ have arisen posteriorly. An aggregation of dark-brown particles on each side over the œsophagus is the eye-spot, and in proximity to it, dorsally and posteriorly, is the auditory capsule, with its contained rotating otoliths. The outlines of the shell is now roughly oval, broadest posteriorly, and the hinge sunk between two lateral elevations of the valves. The pallial muscle is wide and striated. The mantle is ciliated internally. The oval space (Pl. XII. fig. 32, *v*) immediately anterior to the posterior adductor is identified with the organ of Bojanus by Lovén and Lacaze-Duthiers,* but not without doubt.

In later forms the prismatic shell-substance begins to be deposited round the margins of the valves. Its growth takes place most rapidly antero-posteriorly, the mussel thus assuming the elongated form characteristic of the adult. As it gains in length, room is afforded for the developing gill-papillæ. The foot is originally moved by two pairs of muscles, one pair inserted in the umbonal region, and the other pair close to the posterior adductor. The anterior retractors of the foot have not yet appeared. They are probably derived from the posterior retractors

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* *Loc. cit.*, ser. iv. tom. v. p. 28.

by a portion remaining stationary, while the main mass follows the retreating posterior adductor—that is, as it travels backward coincident with the growth of the shell. With the advent of the prismatic shell the velum is atrophied, and the mussel sinks to the bottom. The foot is then used as an organ of locomotion over the sea-weeds, zoophytes, &c. It is in young forms capable of great extension, appearing as a long, white, highly flexible thread. Its adhesive qualities enable it to be fastened at will, so that by a process of full extension, adhesion, and contraction, the mussel can drag itself forward with much readiness. The foot is covered with uniform active cilia. The rate of growth of the mussel is very variable, according to circumstances of situation, temperature, and the amount of food available. On lifting, on the 2nd September, anchor, anchor-rope, and buoy (used in salmon nets), which had been submerged for four months, the following measurements of young mussels were taken. On the under side of the barrel-buoy mussels were found measuring 4·5 mm. and downwards, and on the anchor (in six fathoms) from 1·28 mm. downwards. It cannot be doubted but that they were embryos of the current season—that is, at most five or five and a half months old. The largest were found close to the surface, the smallest at the bottom, and intermediate grades on the rope. In such situations they occur in dense masses, more especially where they are intercepted in their swimming stages by the sieve-like structure of feathery sea-weeds, hydroid zoophytes, and the like (Pl. XIV. fig. 5).

The development of the heart is about to be investigated. As a pulsating organ it appears first in young forms of ·65 mm.,—that is, almost simultaneously with the reflection of the second lamella of the inner gill. At that period the latter organ is composed of ten or eleven papillæ. When it has twenty papillæ, the mussel then measuring about a millimetre in length, the first papillæ of the outer gill-lamellæ appear.

Follicles containing developing ova have been found in mussels from rock-surfaces $\frac{1}{6}$ inch (4 mm.) in length. It is possible that individuals a year old may be sexually mature. Horst * has found the European oyster thus early attains maturity.

Sections of decalcified mussels are being studied. A striking peculiarity in preparations of young forms is the tendency of the distal half of the foot to bend upwards at right angles to the proximal half. Its apex lies in a chamber between the œsophagus and the mantle. In a section taken parallel to the foot protractor—that is, obliquely, at about an angle of 25° with the long axis of the mussel—the foot is twice cut through (Pl. XIII. fig. 1, *ft*). The plane of the section is represented by a line passing from A to B in fig. 7, Pl. XIV. The chamber containing the distal portion of the foot is well defined, and bounded more or less by cæca of the liver. The cæca ramify to a considerable extent in the subjacent tissue. The cells of these cæca are loose and polygonal, and contain much brownish granular matter in patches. The foot is bounded by columnar, ciliated epithelium, and blood sinuses appear in the general muscular tissue. In the longitudinal section of the mussel (Pl. XIV. fig. 7) three nerve ganglia are cut—viz., the parieto-splanchnic, the supra-œsophageal (cerebral), and the pedal. In the cerebral the commissure only is seen, as it passes across the œsophagus. In the transverse section (Pl. XIII. fig. 1, *pg*) the pedal is well seen as a large paired ganglion. They all exhibit a clearly differentiated outer layer, consisting of deeply-stained, nuclei-like bodies (nerve-cells), which encloses a finely striated central mass. The œsophagus in both sections is seen to contain much mucus. The mucus also fills the greater portion of the stomach cavity. By hardening it forms the crystalline style

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* Horst, *Verslag Oesteronderzoekingen*, 1883–84.

in older forms. The places of origin of the pedal muscles are indicated in Pl. XIV. fig. 7, *pp, pr*. The anterior is seen (Pl. XIII. fig. 1, *pp*) to break up in the foot into the fine lamellæ of the byssus. In the present section there are nine lamellæ on each side of the organ. Barrois * finds them to be very numerous and closely set in the adult. The gills have already been studied by Holman Peck,† and the structure of the shell by Ehrenbaum.‡ The aggregations of dark particles on a level with the œsophagus (Pl. XIII. fig. 1, *e*) are the so-called ocular spots. The development of these and other organs of interest it is the writer's intention to follow out, by means of serial sections.

The habits of the common mussel in early life may be thus briefly summarised. The eggs and spermatozoa are extruded from the follicles, through the genital tubes of the respective sexes, and come in contact at or near the bottom of the water into which they are shed. Fertilisation of a vast number of eggs ensues, and in twenty hours, or a shorter time, the ciliated embryos rise, it may be to the very surface, in warm calm weather. They are moved hither and thither by currents, and by their own locomotor apparatus—the cilia, and latterly the velum. The velum atrophies and they sink to the bottom, or are intercepted by sea-weeds, zoophytes, nets, &c. The foot at first vermiform, adhesive, very sensitive, and a means of considerable progression, is developed. At the proximal region of the foot the byssus-gland secretes the byssus, wherewith, when a suitable site is reached, the mussel may be anchored.

EXPLANATION OF FIGURES.

Plate XII.

Fig. 1. Ripe egg, ·061 mm. in diameter, enclosed by hyaline investment, and diagrammatically exhibiting nucleus and nucleolus. *hy*, hyaline investment; *n*, nucleus; *no*, nucleolus.

Fig. 2. Protrusion of polar cell from fertilised egg. *pc*, polar cell.

Figs. 3, 4, 5. Different polar cells.

Fig. 6. Effect of osmotic action in an egg, causing the expulsion of the nucleus by rupture of the egg-capsule.

Fig. 7. Abnormal or exceptional elongation of the egg after fertilisation.

Fig. 8. Effect of endosmotic action on the fertilised egg, causing the deutoplasmic granules to pass out by way of the polar cell.

Fig. 9. Effect of reagent (eosin) on segmenting egg, displaying the nuclei, and crumpling the still adherent hyaline investment.

Figs. 10, 11, 12. Eggs presenting two blastomeres, fig. 11 showing lenticular areas in the sulcus. *ma*, macromere; *mi*, micromere.

Fig. 13. Segmentation taking place within a membrane.

Figs. 14, 15, 16, 17, 18. Serial stages in the process of segmentation.

Figs. 19, 20, 21. Ciliated gastrulæ (the cilia not indicated in figs. 20 and 21).

Figs. 22 and 23. Trochospheres. *f*, flagellum.

Fig. 24. Trochosphere, with shell-gland. *sh*, shell-gland.

Fig. 25. Velum of the above, showing limited power of contraction. *vl*, velum.

Fig. 26. Embryo with developing shell, stomach, and body cavity. *st*, stomach; *bc*, body-cavity.

Fig. 27. Further advanced embryo, ·072 mm. in diameter, with stomodæum invaginating. *sd*, stomodæum.

Fig. 28. Still further advanced embryo, with retractor muscles of the velum and anal region, œsophagus, stomach, and intestine well defined. *am*, *pm*, velar muscles; *œs*, œsophagus; *i*, intestine.

Figs. 29 and 30. The velum of above respectively expanded and half-contracted.

Fig. 31. Embryo ·134 mm. in diameter, and 12 days old. Intestine looped; the liver diverticula differentiated; the anterior adductor of the valves taking shape. *lv*, liver; *aa*, anterior adductor.

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* Barrois, *Les Glandes du pied et les pores aquifères chez les Lamellibranches*, Lille, 1885.

† Holman Peck, *Quart. Jour. Mic. Science*, lxv. 1877.

‡ *Zeitschrift für Wiss. Zool.*, 1885.

Fig. 32. Embryo ·28 mm. in length. Foot well marked, gill-papillæ appearing, eye-spot, auditory capsule, anterior and posterior adductor muscles; velum still present. *f*, foot; *gp*, gill-papillæ; *e*, eye-spot; *ot*, auditory capsule; *pa*, posterior adductor.

Fig. 33. Spermatozoa, greatly magnified.

PLATE XIII.

Fig. 1. Section* of young mussel (1·5 mm. in length) along the line of, and close to, the foot-protractor. *ls*, larval shell; *prs*, prismatic shell; *by*, byssus-gland.

Fig. 2. Transverse section of the mantle of a young female mussel, to show the egg-folicles and their canals. *gc*, genital canal.

Fig. 3. Longitudinal vertical section of the termination of the genital and excretory canals. *kt*, excretory canal.

Fig. 4. Transverse section of the genital tube of a male mussel, to show the ciliated ridges and the free spermatozoa. *s*, spermatozoa.

PLATE XIV.

Fig. 1. Transverse section of the mantle of an adult male mussel, to show the sperm-follicles. *sf*, sperm-follicle; *ce*, columnar, ciliated epithelium; *ge*, germinal epithelium.

Fig. 2. A corresponding section of the mantle of a male mussel, half an inch long, the single series of follicles occupying the whole breadth of the mantle.

Fig. 3. Embryo ·188 mm. in length.

Fig. 4. Its expanded velum, from below.

Fig. 5. Portion of zoophyte clad with young mussels.

Fig. 6. Ramifications of the generative follicles shortly after the reproductive elements are shed.

Fig. 7. Longitudinal section of a mussel 1·5 mm. in length, showing foot, foot-retractor, foot-protractor, adductors of the valves, œsophagus, liver, gills, parieto-splanchnic, pedal and cerebral ganglia. *pr*, foot-retractor; *pp*, foot-protractor; *psg*, parieto-splanchnic ganglion; *pg*, pedal ganglion; *cg*, cerebral ganglion; *pl*, pallial-muscle.

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* The sections were stained with borax carmine.

APPENDIX F.—No. VII.

ON THE STRUCTURE OF THE HERRING AND OTHER CLUPEOIDS. PART I. — THE SKELETON. By J. DUNCAN MATTHEWS.

With Plates XV.–XVIII.

Although many points in the anatomy of the herring have been more or less thoroughly examined and described, there seems to have been no systematic and detailed description of its anatomy accomplished. Valencienne's account is in many respects erroneous and superficial, while his drawing of the skeleton is useless. The skull has only been indirectly referred to by Weber in connection with his most accurate account of the ear, and most other references to the anatomy of the herring are short and scattered, the fuller accounts of the Teleostean skeleton having been made from altogether distinct genera. The following description has been prepared to supply this want so far as the skeleton is concerned. The British herring, for obvious reasons, has been chosen as the type to be described in detail, and notes of the more important differences occurring in other members of the Clupeidæ, limited meantime to those of British seas—the twaite and allis shads, the pilchard, and sprat—are added. In describing the herring's skeleton, a detailed account of variations, such as occur in the number of vertebræ, fin-rays, &c., is omitted. The more minute and detailed examination has been made entirely on West Coast of Scotland herring, supplemented, however, by references to other herrings (which showed exactly similar relations in every respect except enumeration). Of the fin and other variations a complete account will be found in another paper.*

THE VERTEBRÆ.

The vertebral column, like that of other fishes, can be divided into only a trunk and caudal portion, and these may be distinguished only by the presence of the ribs and complete hæmal arches, the form of the vertebræ being no guide. It consists of a variable number of vertebræ, generally 56 to 58, which differ in size only to a small extent. They vary somewhat in their relative size in different fish, but the following account is fairly typical:—

The first vertebra is only about half the length of the others, except the second, which is only slightly longer than the first, sometimes indeed very slightly so. The recognition of two short anterior vertebræ forms a necessary evidence in counting the vertebræ that all are included, otherwise the anterior one is, from its sometimes very short length, liable to be overlooked. The longest vertebræ are those between the 30th and 40th in position. There is not much variation in length from the 3rd to the 45th, but they generally increase in length slightly up to the 30th and

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* "Report as to Variety among the Herrings of the Scottish Coasts," by J. Duncan Matthews, Part 1, *Fourth*, Part 2, *Fifth Annual Report of Fishery Board for Scotland.*

35th, after which they decrease again. In a herring of 292 mm. (11½ inches) total length, the 1st vertebra measured 1·9 mm. in length, the 2nd was 2·6 mm., the nine succeeding measured 26 mm., giving an average of 3·1 mm. each; the following nine were 30·5 mm. long, an average of 3·4 mm. each; the next nine—the 21st to the 29th—equalled 32 mm., being an average of 3·5 mm.; the 30th to 38th, 33·5 mm., being an average of 3·7; the 39th to 47th, 32·4 mm., average 3·6; and the 48th to 56th were 28·8 mm. in length, their average being 3·2 mm.,—these figures including the extremely narrow intervertebral portions.

The first vertebra is more flattened from above downwards than the others, which are almost circular in end outline, the first being elliptical, and the notochordal perforation in it is not central, but considerably nearer the dorsal surface. The anterior faces of the first and second vertebræ are much flatter than their posterior faces and than both faces of the succeeding vertebræ. Indeed, in most cases there can scarcely be said to be any hollowing of the anterior face of the first vertebra. The anterior end of the largest vertebræ in the 292 mm. herring measured from 3·5 mm. to 3·8 mm. in diameter, the central perforation for the notochordal remnant being ·45 mm. in diameter.

Where the greatest constriction of the notochord at the centre of the vertebra occurs, the two deeply hollowed cone-like ends of the centrum are connected by a perforation about ¼ the vertebral length and ½ mm. in diameter. Externally the vertebral centrum follows this form, except that it is subdivided by those ridges or septa lying both longitudinally and transversely, which are the original centres of the circumnotochordal ossification. These, while in the adult scarcely projecting so far as the outer edge of the terminal expansions of the centre, divide its external surface into a series of sunk chambers, while, as will be described, certain of these ossifications project to form articular processes. The arrangement of these ridges or septa on the external surface of the vertebræ of the adult herring, and which appear in the larval herring as primary bars of ossification in the notochordal sheath, is as follows:—

The under surface of the majority of the vertebræ is divided into two chambers longitudinally by a median partition and by a latero-ventral on each side. On each side of the centrum, and slightly below the median line, is another longitudinal lateral septum, and on the dorsal surface of the vertebra is a central chamber formed by two latero-dorsal ridges. These ridges extend outwards from the narrow central portion of the vertebra nearly to the plane of its ends, dividing it therefore into seven sunk chambers—two ventral, two ventro-lateral, two dorso-lateral, and one (median) dorsal—each of which, at the surface, is nearly the full length of the vertebra, and sinks inwards to a point at the centre (Pl. XVI. figs. 2, 3).

In the pair of ventro-lateral chambers of the 3rd to the 24th vertebræ, and wholly filling them up, lie or are fixed the basal pieces afterwards to be described.

The median ventral ridge becomes reduced about the 30th vertebra, and gradually dies away until the 40th vertebra, where it has disappeared, leaving in the vertebræ posterior to this a single median ventral concavity.*

There is in addition to, but less prominent than, these longitudinal septa, one formed across the pair of ventral chambers, and this cross partition is sometimes rather irregular in form, so as to give the under surface of the vertebræ a somewhat reticulated appearance.

In the first and second vertebræ these appearances are more varied.

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* This statement applies to the particular herring examined; slight variations have been found to exist in others.

Owing probably to the shortening of these vertebræ, the direct longitudinal and cross pieces are absent, and in their place appears generally a series of three or four smaller triangular-shaped cavities, formed by the partitions running more or less off the direct line and fusing with each other.

The latero-ventral ridges on each successive vertebra become more prominent towards especially their posterior ends, so that on the 24th (immediately before the 1st complete hæmal arch) they each end in a slight sharp-pointed downwardly and backwardly projecting process—the posterior ventral zygapophysis. At the 31st vertebra this sharp process is more prominent, and is overhung, though not touched, by a process (anterior zygapophysis) of the hæmal arch.

About the 36th or 37th vertebra, and posteriorly, this articular process or zygapophysis overlaps externally the forward projecting process of the hæmal arch.

In the 1st vertebra these articular processes are largely developed, forming strong sharp-pointed spurs (Pl. XVI. fig. 2), and on the 2nd vertebra they are also of considerable size; behind this and up to the 24th, while gradually increasing, as has been described, they are very minute.

Beyond the 40th vertebra they appear again to die away, disappearing about the 53rd vertebra.

The lateral ridges of the centra run along the anterior vertebræ rather below the median line, so as to make the chambers (ventro-lateral) containing the basal pieces rather narrower than the dorso-lateral (muscle) chambers; but towards the middle of the vertebral column these partitions get shifted into a more directly median lateral position on the vertebræ, and about the 27th vertebra the centrum is divided into two equal longitudinal portions.

Each of the latero-dorsal ridges form, at their posterior ends, a distinct sharp-pointed articular process, projecting upwards and backwards—the posterior dorsal zygapophyses (Pl. XVI. fig. 4, *pz.*). These processes are present on all the vertebræ, and they overlap on and behind the 23rd (?) vertebra, corresponding anterior processes of the neural arches—the anterior dorsal zygapophyses. As a fact they are applied to the neural arches throughout, although in a different manner to be described later. The anterior ends of these latero-dorsal ridges terminate, just posterior to the ring forming the end of the vertebra, in a cup-shaped cavity which forms the articulation for the neural arch (fig. 3, *a.c.*). This description applies to the anterior vertebra, where the arch articulates so loosely with this cup-shaped cavity that in preparation it generally falls out. Proceeding backwards, however, it becomes more firmly fixed, and posterior to about the 28th vertebra it is so fused to the centrum that the cup is obliterated as such. Exceptions to the above description of the various vertebræ, which are found on the last two or three, will be referred to in describing the skeleton of the caudal fin. In the young herring of 25 mm. to 30 mm. long, these divisions of the vertebræ are not seen, ossification not having proceeded so far, and it is found that they are formed as a rod-like deposit along the vertebræ, where the whole circumference of the external membrane of the notochord has but a slight deposit of bony matter in it, and before its constriction. These divisions then are ossifications partly antecedent to the ossification of the remainder of the centrum.

The articulation of the various vertebræ, one with another, behind the 2nd is simple. The ring forming the ends of each amphicœlus vertebra simply butts against its neighbour, each being held against the other by ligament, the articular processes forming but a slight additional security against transverse movement, and that not in every part of the column.

In the case of the articulation of the 2nd to the 3rd vertebra this also holds good, but its articulation to the 1st, as also of the 1st to the head, is different (Pl. XVI. figs. 2, 3). The anterior end of the 2nd vertebra is on the dorsal side slightly hollowed on each side of the median line. Into or rather over these hollows slight rounded projections on the dorsal edge of the posterior end of the 1st vertebra project. Necessarily between these two slight hollows on the 2nd vertebra there is a slight projection, and this fits into a small hollow on the posterior upper edge of the first. A similar but more pronounced arrangement occurs with the anterior end of the 1st vertebra. In it there is a distinct dorsal median process, strengthened by a couple of diverging bars or rather thickenings on its upper side. This process projects forwards, and fits into a corresponding median hollow or pit in the posterior dorsal surface of the basioccipital—the basioccipital overlapping the 1st vertebra on each side of this process just as the 1st overlaps the 2nd. The ventral edge of the 1st vertebra shows generally a very slight curve forwards, fitting into a corresponding shallow concavity on the posterior (ventral) face of the basioccipital. The basioccipital, viewed from above, appears to overlap (except in the middle) the atlas, and the atlas overlaps the 2nd vertebra.

THE HÆMAL ARCHES.

On the 2nd to the 24th or 25th vertebræ are found certain structures, which may be called basal pieces, to distinguish them from bony processes (hæmapophyses),* forming more directly the hæmal arches. These are somewhat triangular-shaped pieces of a spongy bony nature, and which lie in the latero-ventral chambers of the vertebræ (Pl. XVI. figs. 2, 4, 14, *bp.*). There are, therefore, a pair to each vertebra, one on each side. They are more or less firmly fixed in these positions, but there is no ossification connecting them absolutely with the vertebræ, and they can be removed pretty readily from their position; they often, indeed, drop out when dried, in both the adult and the very young (30 mm. long) herring. In the young herring of this size the vertebræ have the thinnest possible wall of ossification formed round the notochord, and the latter is not yet constricted, the whole inside of the ossified vertebra being of almost the same diameter throughout its length. Round each end, however, ossification has proceeded further, forming a slight bony ring, and the septa described above as being present on the external parts of the vertebræ, are in such a young fish also evident as narrow bony bars, which have already the sharp terminal articular processes developed on them. The two partitions, however, which form the ventro-lateral chamber in which the basal pieces lie in the adult, have in the young fish not separated throughout the entire length of the vertebra. The posterior third of the vertebra shows them only as a single bar, which, passing forwards, bifurcates, the two bars curving round at the anterior end to meet again, and thus form an oval-shaped shallow cavity in which sits the basal piece. The basal piece at this stage then is only from half to two-thirds the length of the vertebra, or smaller according to the size of the fry (Pl. XVI. fig. 14, *bp.*), while in the adult it occupies as far as possible the full length of the vertebra. The basal piece in the young fish is tooth-shaped, having an oval-shaped base, and stands nearly directly outwards and downwards, and curved slightly backward terminates in a blunt-pointed tip. In the adult it lies more outwards, showing a flat side on ventral view, and is more equila-

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* I have limited the term 'transverse process' to the long appendages of the ribs (posteriorly of the vertebræ). 'Hæmaphphysis' being applied to the processes which form the hæmal arch.

terally triangular than in the young fish, while its edge is slightly irregular in outline. In the first two vertebræ these basal pieces are wanting, and they disappear again at the 24th or 25th vertebra. Along the anterior vertical edge of these basal pieces a more complete ossification takes place. At first it is a bony edge merely, but becomes stronger on the latter ones, and forms a sharp point below (fig. 4, *hæm*). It is noticeable, however, that if the basal piece is removed from the vertebra, this bony piece which forms the true hæmal arch comes with it, *i.e.*, it is not fused to the vertebral body, and this may be the case on the vertebra bearing the last fixed rib, though more or less ossification between the vertebra and this spur may have taken place on the 23rd or 24th, where also the basal piece, as a distinct element, disappears. On the vertebra, however, behind the last fixed rib, the basal piece has almost disappeared, and the bony anterior edge (now become a strong-pointed hæmapophysis) is firmly fused with the vertebral body. In the young fish a similar condition of things is to be seen, except that the ossified bar is not so completely developed on the more anterior of these basal pieces (fig. 14, *hæm*). It appears as a small bony bar not reaching the base or tip of the basal piece, but gradually increasing in length backwards until it comes to fuse with the vertebra. In the young fish also the basal piece can be distinguished, although becoming much smaller, as far as about the 30th vertebra.

In the young fish the hæmapophysis and neurapophysis of each side, together with and connected by a curved bony bar, formed by the gradual extension along the anterior lateral edge of the vertebra immediately behind the terminal thickening, may be completely removed from the vertebral centrum, in which the slightest ossification only at this stage may have occurred (Pl. XVI. fig. 13). Ossification proceeds also backwards over the basal piece to form a short sharp-pointed downwardly and backwardly projecting process. From examination by sections, &c., of the youngest herrings procurable (27 mm. long), in which the development of these parts could be studied, the basal pieces appeared as paired cartilaginous nodules on each side of the ventral surface of the notochord, before ossification takes place generally to form the vertebral bodies, and this ossification, when it does take place, forms a small bar around the basal piece, without however, as we have seen, becoming completely fused with it. The neural arches appear to be originally formed in the same way, only that instead of forming on the anterior part only of the original nodule, the remainder of which posteriorly disappears, the neural ossification seems to envelop the whole nodule, which in the first is smaller than the hæmal basal piece. The original dorsal nodules, therefore, would appear to wholly ossify as the bases of the neural arches, and having, as with the hæmapophyses, a bony ridge developed around their bases on the vertebræ. This ridge forms the cup-shaped cavity already described with which the neural arch articulates.

The bony bars or hæmapophyses developed on the basal pieces form the complete hæmal arches posterior to the 24th or 25th vertebra. The complete arches are formed in the case of the anterior three or four, not by the contiguity of the two hæmapophyses directly, but by a relatively strong perfectly horizontal bar (which in front of this appears on them as a small sharp internal process), passing across between them slightly dorsal to, *i.e.*, within the tips of the hæmapophyses, which project downwards beyond this 'bridge,' in a sharp pointed process on each side (Pl. XVI. fig. 6).

The vertical parts of the hæmapophysis of each side, however, gradually approach each other, the bridge between them becoming correspondingly shorter and deeper. While this inclination is taking place at the level of the bridge, it does not do so so rapidly at the tips, and consequently these sharp tips look somewhat outwards as well as downwards here. At the 33rd vertebra the hæmapophyses of each side are applied against each other, and fused together in the position of the bridge, which of course, as such, has disappeared, their tips, however, being still apart; but behind this the hæmapophyses meet at their tips, and the long sharp-pointed hæmal spine is developed as a single median process. This spine, as is the case also with the neural spine, being due to a separate median and originally posterior ossification which becomes fused with the hæmal arch.

On the hæmapophyses, which form the first hæmal arch (24th or 25th), is seen the commencement of the formation of the more posterior and strongly prominent articular processes or anterior ventral zygapophyses. This appears first simply as a sharp angle formed on the anterior edge of the hæmapophysis, caused by its bending inwards and backwards a short distance below its origin (Pl. XVI. fig. 13). On the 28th to 30th vertebra this angle shows as a distinct but very minute process, and it gradually increases in length, at the 40th vertebra being nearly 2 mm. long, overhung by, and nearly touching, the posterior zygapophysis of the preceding vertebra. At this vertebra, too, it springs so near the base of the hæmapophysis that it seems to arise from the vertebra, to which, in fact, its base becomes partly fused.

About the 38th vertebra the hæmal spines become towards their tip bent more backwards, and the whole arch runs also more backwardly than do those in front. At the 50th vertebra the hæmal arch bends so much backwards that it becomes attached near its base by its posterior (and now partly upper) surface to the anterior edge of the vertebra from which it springs. This in the adult looks, except in occasional favourable specimens, like a mere fusion of the spine with the vertebra, owing to their close apposition, but examination of very small fish show that a blunt process arises from the posterior edge of the vertebræ, projecting slightly downwards and forwards, and it is these processes—a pair to each vertebra—which, meeting a corresponding slight projection on the upper side of each limb of the hæmal arch, fuses with them (Plate XVI. fig. 13, *pr.*). At this point the posterior (ventral) zygapophyses have almost disappeared. A change occurs in the form of the hæmal spine on the third from the last vertebra, which will be described in reference to the caudal fin.

The Ribs.

Two sets of ribs may be recognised. The anterior 'fixed' ribs, though 'floating,' in so far as they are quite free at their distal extremities, are to be distinguished by their articulation with the vertebral part of the skeleton from the posterior 'free' ribs, which lie loose, attached only by the intermuscular connective tissue, and unconnected by direct ossification or articulation with any part of the skeleton.

Along the anterior portion of the basal pieces of the 3rd to the 24th vertebræ inclusive are attached the anterior series of ribs. The first pair of ribs lie close behind, and partly covered by, the pectoral girdle, and they all pass down the sides of the body cavity, terminating with their tips near each other on its ventral edge, but not touching nor in connection with one another, otherwise than by intervening tissue.

The first half-dozen pairs have a short expanded flat scale-like bony projection from their posterior inner edges immediately beyond their heads, which, as in all the others, are formed merely by the blunt end of the rib, a few only being enlarged so much as to warrant the name of a 'head' (Pl. XVI. fig. 9, *lam.*, *hd*).

The heads of these ribs overlap the anterior dorsal, or rather external surface of the basal pieces, and lie immediately behind the bony hæmapophysial bar, which, though small in the more anterior, affords, from its increasing size, a considerable support to the more posterior ribs. The connection between these ribs and the basal pieces is firm, although not intimate, and as seen by examination of the fry is secondary.

Behind the 24th vertebra there are fourteen more ribs on each side, but these are not attached to basal pieces (which disappear at this point), nor directly to the hæmapophyses. They are simple rods of bone attached at their proximal ends by ligament only to the hæmapophyses, and are therefore quite movable (Pl. XV. fig. 1).

The most anterior pair, the 25th (that of the 27th vertebra), are attached to the hæmapophyses close to their bases, but just as from that point onwards to the end of the abdominal cavity the hæmal spines elongate, their tips (instead of the vertebral column) now forming the dorsal wall of the abdominal cavity, so the ribs shorten; their attachment consequently becomes gradually shifted down from the base of the hæmal arch to near the tip of the hæmal spine (Pl. XV. fig. 1). Their proximal ends run up for a short distance behind and partially within the tips of the hæmal spines. While their position is not absolutely constant, it is generally found that the last (36th) rib, which is considerably shorter than the 35th, does not overlap the hæmal spine, but arises ventral to it, and the heads of this pair—and, to a certain extent, of two or three in front of it—lie close together, and are attached to each other in the middle dorsal line of the body cavity by the connective tissue. This last pair of ribs lies close behind the vent.

TRANSVERSE PROCESSES.

There appears to be connected to the anterior series of ribs a corresponding series of elongated appendages (Pl. XVI. figs. 4, 5, 9, 14, *r.ap.*).

These are firmly attached to all the fixed ribs (except occasionally the last pair). They originate just below the head of the rib, and pass directly outwards and backwards, their tips lying within the lateral line. The first two vertebræ, however, while not having ribs, have these appendages (as transverse processes) directly articulated with the centrum. Where the fixed ribs end the appendages again appear as direct vertebral transverse processes, and quite unconnected with the free ribs; but here, while arising at first from the side of the centrum, close to the base of the hæmal arch, their origin gradually moves to a more median position, following, in fact, the latero-ventral septum already described.

Going backwards, they are found (gradually shortening in length) present as far as the 38th vertebra (sometimes the 37th), holding a median lateral position on it, but behind this point they no longer appear as ossifications, being represented merely by a continuously shortening and thickened thread of the connective tissue.

An examination of herring fry makes more clear the condition of these rib appendages. In the young fish they more closely approach the condition of transverse processes of the vertebræ, holding, though already attached to the ribs, a more distal position from them. The rib-head in the youngest herrings examined by me, was found in some cases to lie alongside of, but not actually in contact with, the basal piece, the rib developed apart from the basal piece, and apparently not having yet at this stage become attached to it. The head of the rib is recognised by its appearance as a slight thickening, but it does not actually at this stage commence there, for there is a prolongation of the head as a narrow rod, which meets with the head of the appendage; this appearing as a rounded thicker termination of the delicate stem (Pl. XVI. fig. 14). Going backwards, we find this short rod or bar becoming thinner, and about the 25th vertebra its central portion disappears, the appendage now arising from the vertebra, and the rib showing merely a small pointed remnant of the connecting bar projecting from its thickened head (figs. 14*a*, 14*b*).

The distance of the appendage from the rib (although connected with it), as well as its complete independence of it on the first two vertebræ, and the latter series of ribs, seems to point to its connection with the rib being a secondary one.

It has been stated that these processes project directly outwards, their tips terminating internal to the position of the lateral line. If the stratum of red muscles in this region be stripped off, a series of over-lapping, triangular-shaped pieces of connective tissue are seen lying along the side of the fish. These are found to be partly connective tissue, with more or less of cartilaginous element deposited in it, and supported by a pair of short (in the herring about 6 mm. long) cartilaginous rods widely separated at their posterior (distal) extremities, which form the base of the triangle, but conjoined towards their anterior ends (internal in position), which forms the apex. The slightly cartilaginous connective tissue filling up the space between the two arms forming this angle overlaps the apex of the succeeding one. On the internal surface of the apex is a short groove, and into this fits the fine terminal tip of the lateral appendage of the rib (or transverse process). The connective tissue, in fact, surrounding the tip of the appendage is undergoing the ossification to which in the herring there seems throughout such a strong tendency.

The Neural Arches.

The whole of the vertebræ bear neural spines. The anterior neural arch and spine are stronger than the succeeding eighteen or twenty, and the length is also less, the neural spines becoming longer and longer as far as about the 12th vertebra. From thence they retain a similar length as far the 30th, after which they shorten somewhat, and like the hæmal spines come to lie with a more pronounced backward slope.

Up to about the 30th the neurapophyses of each vertebra are separated to their tips from each other, beneath by the spinal cord, above by the ligamentous cord and connective tissue; behind this point, however, both sides of the spine become completely fused together, and the spinal cord lies in a dorsally closed canal. To the 24th, or even 28th vertebra the neural arches may be removed complete from the cup-shaped cavities on the centrum, with which they articulate, although after the 24th this cavity rapidly becomes shallower and less circular in outline, but beyond this point the arches lose their articulation, and become perfectly fused to the vertebræ.

Each neurapophysis of the 1st vertebra shows a very slight inwardly and backwardly directed process above and partly roofing the neural canal, while their diverging bases [this term being employed for the part laterally enclosing the neural cord, and lying immediately above the rounded nodular articular 'head'] are gradually and slightly expanded in an antero-lateral direction. Close to their articulation (which, owing to the shortness of the vertebra, may partially overlap the basioccipital) is given off an outwardly and backwardly extending long fine appendage running between the myotomes, but at a deeper level than will be found to be the case further back (Pl. XVI. figs. 4, 5, 10–12, *n.ap.*). The second pair of neurapophyses is similar to the first, but the expanded base is much shorter, and forms a slightly forward projecting process. Posterior to these, and as far as the 24th vertebra, the neurapophyses all have a similar form—a rounded articulating head expanding into a somewhat lozenge-shaped portion (when looked at in a backward and lateral direction) the lower angle of which passes into the head; the upper is continued upwards as the spine, and the anterior median angle forms a projecting sharp process shutting in the neural cord laterally, while the outer median angle passes backwards as the lateral appendage of the neurapophysis up to the 23rd vertebra, where a change occurs to be described later. Above this again, and forming a roof to a secondary canal for the longitudinal ligamentous band, is the sharp process above referred to, projecting at first forwards and somewhat inwards, but further back forming a bar across and projecting slightly in front of and behind each neurapophysis, the pair being closely approximated in the middle line. This disappears where the neurapophyses become fused at their upper end (Pl. XVI. fig. 6). Although the vertebral zygapophyses are present from the first, they do not overlap the neurapophyses until about the 23rd vertebra, where the anterior zygapophyses commence to be formed on the neural arches. Here the basal expansion already described begins to disappear; its lower angle formed by the anterior edge and the base of the articulating head (and which is not visible as more than that anterior to this point), now enlarging continually backwards and forming the sharp pointed dorsal anterior zygapophyses, which reach their maximum length about the 50th vertebra.

As in the hæmal arch the posterior (vertebral) zygapophyses disappear at the 52nd vertebra, and the neurapophyses come to slope so much backwards as to touch and fuse with the posterior edge of the vertebra on which they arise, and they even here form an articulation with the succeeding vertebra, the anterior edge of which fits into a small notch in the lower (posterior) surface of the neurapophysis, which lies close down on it.

THE INTERMUSCULARS.

Along each side of the body, ventral to the lateral line—which almost exactly corresponds to the line of vertebral column—are arranged a series of delicate bones—intermuscular bones—situated in the connective tissue between the myotomes (Pl. XV. fig. 1, *i.m.*; Pl. XVI. figs. 4, 5, *i.m.*). These bones do not articulate directly with any other part of the skeleton. They are developed in the intermyotomic fascia, and are, in the anterior half of the herring, attached at their proximal ends by a short (2 to 3 mm.) ligament to the ribs near their heads (in 292 mm. fish about 3 to 4 mm. from the head). From this point they pass, with a slight curve, outwards, backwards, and downwards, lying (owing to the slope of the sides of the masses of muscle) with a more pronounced inclination backwards, and a greater curvature outwards, than do the ribs. The distal portion of each intermuscular bone in this part of the body lies therefore almost directly external to (and about 2 mm. from) the rib following that near the head of which it arises. The only departure from this arrangement in the anterior half of the body is that where the ribs, as already described, are free, *i.e.*, not closely applied to the vertebræ, the short ligament fixed to the inner end of the intermuscular arises not from the rib itself, but as a branch of the thread of connective tissue attaching the rib head to the hæmal arch, and in such a way as to pull principally on the latter. There is a short intermuscular in front of the 1st rib, *i.e.*, the first intermuscular corresponds in position to the 2nd vertebra.

This simple form of the bones and their arrangement becomes more complicated along the latter half of the body. The 24th intermuscular (that of 25th vertebra) becomes bifurcated.

About 4 mm. (in the 292 mm. herring), from its proximal end, there arises from its outer side a bony branch which runs upwards, though in the same plane, *i.e.*, between the myotomes, terminating in the connective tissue close to, and therefore practically attached to the tips of the lateral appendages of the hæmal arches (the transverse processes). This branch, at first a mere process 1 to 2 mm. long, increases in length posteriorly. The head of the main stem gets shifted further and further downwards, and consequently also backwards, so that at the 30th vertebra we find the tip (or as it now really is the head), of the branch just described lying nearest the original position of the head of the main bone, viz., near the outer side of vertebral column; the original head being ventral to it, and some distance from the vertebra, and attached near the tips of the hæmal spines. This rearrangement becomes most pronounced at the 36th rib; for the branch bone has not only been getting longer and longer in consequence of its tip retaining its original position, while the main stem from which it arises has been getting more and more ventral; but in consequence of this it has come to lie more and more in line with the distal portion of the original stem, and the proximal part of the latter here strikes inwards so sharply as to form a considerable angle with its distal portion (Pl. XV. fig. 1, *b.i.m.*). The appearance of this 36th intermuscular, therefore, would lead to the supposition that what we know to be the original proximal part was a branch of the remaining portion which forms a slightly curved and continuous bone. This real head of the bone, however, is still as at first connected more directly with the skeleton by the connective tissue, than is the case with the original branch which gives attachment along its length simply to the intermyotomic fascia.

Towards the end of the tail the myotomes both narrow, and come to lie so much more longitudinally than on the body proper, that the intermuscular bones become more closely approximated, and lie almost parallel to the vertebral column. In the adult herring about 40 or 50 mm. of the terminal caudal portion of the fish is, on each side and beneath the superficial red muscles, completely sheathed by these bones, which have now lost their curvature, and gradually shorten to the last, which in the 292 mm. long fish is about 12 mm. in length.

In this position each of the ventral intermusculars (those dorsal to the vertebral column will be referred to below), principally consists of what originally was its outer branch, continuous with the shortened distal part of the original bone; while the inner branch—the original head of the intermuscular—has been getting shorter and shorter, although still attached to the hæmal spines. At the 47th vertebra, in the herring always referred to, the outer branch was 12 mm., the inner 3 mm. long, attached by a ligament 4 mm. in length. At the 48th vertebra the inner original head is a mere process attached by 6 mm. long ligament, and on the 49th process and ligament have disappeared.

These laterally placed terminal intermusculars are present as far back as corresponds with the 54th, beyond which they are only represented by connective tissue.

In describing the neural arches, it was said that a change occurred in the form of their lateral processes at the 22nd or 23rd vertebra, viz., that instead of—as is the case on the previous arches—springing from and being completely ossified with the bases of these, they are attached to them only by connective tissue—they in fact become exactly similar to the intermuscular bones of the lower part of the body. These neural appendages (or dorsal intermusculars as, posterior to this point, they must now be called), run much backwards here and near the outer surface of the myotomes, just as do the corresponding ventral intermusculars. Where they become detached from the neural spine (22nd vertebra), these bones show a slightly thickened portion at about 3 mm. or 4 mm. from their base, which gives attachment to a short connective tissue thread. This latter ossifies further back as a branch of these bones, growing longer posteriorly, that of the 25th vertebra being quite a short process.

The branch is given off from the outer anterior face of the main stem, and runs nearest the surface. It gives attachment along its length externally and internally to the sheet of connective tissue surrounding the myotomes.

Going further back, we find the position and attachment of the proximal portion of the bone being shifted further and further in an upward direction from the vertebral column, and along the neural spines, so that about the 30th vertebra it springs from near the tip of the neural spine, and is attached to it. In consequence of this the curvature of the bone gets greater, the position of the bifurcation gets nearer and nearer its tip, and eventually the proximal part looks like a branch given off from its own distal portion, while the real branch already referred to, becoming gradually longer, comes to lie in a directly continuous line with the distal portion, forming with it the main intermuscular bone. The shortening inner process (original head of bone), disappears at the position of the 47th or 48th vertebra, and the bones lie side by side longitudinally along the posterior caudal portion of the herring, terminating with that corresponding to the 54th vertebra, and which in the 292 mm. long fish is about 12 mm. in length. These dorsal intermusculars are in fact similar in almost every respect to the posterior intermusculars ventral to the vertebral column. But there are no dorsally situated bones corresponding exactly either in form or position to the anterior ventral intermusculars, although the neural arch lateral appendages partially fill their place.

It has been stated that the 1st vertebra is provided with a neural arch and its lateral appendage. In front of this, however, come a couple of bones, lying between the anterior myotomes there. One of these slender bones is provided with a short branch, springing from its head and projecting upwards and backwards, and the whole lies in front of and above the first vertebral neural arch. Its form is exactly that of a neural arch and its appendage, and it belongs to what may be called a prevertebral myotome. In front of, in actual position dorsal to, this bone come one or two long and slender bones, having their single, slightly thickened, heads fixed close to the epiotic bone of the cranium, and their backward projecting terminal portions broken up into two or three delicate bones or branches, which lie close together. These seem to be ossifications of the ligaments attaching some of the dorsal muscles.

THE VERTEBRÆ AND ARCHES OF THE TAIL.

It has already been stated, that while the vertebræ may vary in number in the herring from 56 to 58, the usual numbers are 56 and 57, the more common being 57. It must be understood, however, what this means. In the adult herring the last fairly visible vertebra is not so complete in its form as are the others; whereas its anterior end is of the usual form, and articulates in almost the normal manner with the previous vertebra, its posterior end is so contracted in size, the vertebra appearing to end just at its centre and therefore without the usual posterior expansion, as generally to be scarcely noticed. The numbers of vertebræ given above include, of course, the first two, and also this modified terminal vertebra. While calling it terminal, however, because it appears to be so to a superficial examination of its condition in the adult herring, it is really not so. This vertebra turns slightly, but distinctly, upwards—indeed, a slight tendency upwards is sometimes noticeable in the previous vertebra—but if the remnant of notochord is removed its central perforation is still perfectly patent. Beyond it come two small nodules, which continue still further the upward or dorsal direction of the vertebral column from the previous general straight horizontal line. In some adult herrings these nodules are scarcely to be distinguished as more than a small bony mass or rod; in others they are distinctly to be made out as separate bones; and in favourable examples they bear the appearance of much modified vertebræ, contracted in size, but with distinct evidence of original separateness, and possibly showing slight traces of the central notochordal perforation. That these are really vertebræ is completely proved by an examination of herring fry of 25 mm. to 35 mm. or more in length.

In these cases there are found at least three more vertebræ beyond the one described above as the last. This row of vertebræ is formed round the turned-up portion of the notochord, which is usually described as having a single urostylar bone developed around it. These vertebræ are similar to the others, except that they are not provided with distinct zygapophyses, and that the first two have their posterior diameters rather less than their anterior. This in the last vertebra seems more pronounced, owing to its rather greater length than that of the others. This increase in length I believe, from the examination of several specimens, to probably proceed from its representiug two vertebræ. The narrow terminal end of this vertebra very commonly becomes closed up, partly by dry cellular matter, partly by encroaching cartilage. All these vertebræ in the herring fry distinctly surround the notochord, and are so complete that with care they can be readily separated from one another and strung on a hair. These terminal narrow vertebræ which I have described appear to be homologous with the more elongated ossification in many other fishes, which forms the urostyle, and which is probably only a coalescence in these more specialised forms of several vertebræ (Pl. XVIII. fig. 28).*

Taking in the adult herring the vertebra above described as the terminal one, to be the 57th in position, we find that the 54th, as originally described, is normal in all respects—*i.e.*, it bears a neural and hæmal arch, each provided with a spine, free at its tip. The 55th vertebra, however, while it is provided with the normal free-ending neural spine, has its hæmal spine thickened, especially towards its distal extremity, which is hollow, or filled merely with dry cellular matter. This spine acts as a support to certain accessory rays ventral to and at the root of the main part of the caudal fin. The 56th vertebra, as has been said, may be very slightly turned upwards—it bears a normal neural spine; but the hæmal spine, while thickened like that of the 56th vertebra, in addition is expanded on its ventral (anterior) face into a thin bony (laterally compressed) lamina, which fills up most of the space intervening between the 56th hæmal spine and itself. These, of course, are still perforated, or form arches for the blood-vessels.

The so-called terminal vertebra (the first which distinctly inclines upwards) is somewhat reduced in diameter at its posterior end—so much

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* This formation of the vertebral bodies round the upturned portion of the notochord is more clearly seen in the adult trout, where the upward inclination is more gradual, the vertebræ more persistent in their normal size and form than in the herring, but where the general arrangement of the vertebræ and their neural and hæmal arches are similar in nearly all respects, except that there is a more pronounced urostyle.

so in the adult as to look like scarcely more than half a vertebra. It is provided with a neural arch, forming a smaller aperture than usual; and the short sides of this arch expand into a spine formed of a thin (laterally compressed) lamina of bone, which is much shorter than the previous neural spines. Arising from near the median lateral part of the vertebra, and on each side of it, is a strong backwardly and upwardly projecting paired bone. These are closely approximated, but do not fuse together to form a complete arch, and the spinal cord lies dorsal to their basal portion, but towards their termination it passes in between them, and they cover and partly overlap laterally the semi-aborted vertebræ of the upturned part of the column. Sometimes the thin flat neural spine of this vertebra is found fused to these bones, which arise so closely behind it, or rather alongside it, as to leave practically no interval between them; in other cases, again, they can be separated. It would seem as if both of these represented the single neural arch of this vertebra, and the position of the previous two spines, with the strong bar given off at the posterior part of their bases, which forms a second connection with the vertebra, seems to indicate a similar condition. Their appearance in the young herring clearly shows that these are not direct notochordal ossifications. Closely applied to the terminal sharp-pointed portion of these bones, and appearing like splints from it, are three other short bones (two dorsal, one ventral), sharp pointed at their proximal (anterior) ends, and which carry small, partly developed, fin rays covering the dorsal root of the main caudal fin. It is difficult to say whether these entirely represent a single neural spine, or rather, as I incline to think, are an aggregation of the neurapophyses of these last upturned vertebræ.*

The hæmal arch of the terminal vertebra (57th) arises from the body of the vertebra in a rather more lateral position than do the previous arches. Not thickened so much at its tip as those of the 55th and 56th vertebræ, it still forms a fairly large arch, and it is expanded on its ventral edge into a thin lamina (as with the 56th) extending from its base to fully two-thirds of its length. It has however, in addition, on each side, a strong, short, laterally expanded portion at its base, the outer edge of which is continued backwards as a projecting process 2 or 3 mm. in length, which gives attachment to certain of the caudal fin muscles.

The whole remainder of the base of the caudal fin is composed of five completely ossified, or partly cartilaginous hypural pieces, the proximal portions of which appear to articulate with the bony mass of terminal vertebræ (they are seen to do so in the young fish, where this part is seen as distinct vertebræ). Examination of favourable adult examples, but especially of herring fry, seem to me to indicate clearly that these bones are partly true hæmapophyses arising from the upturned vertebræ, and partly ossified connective tissue between them, and that they are not wholly interspinous bones. Closely applied to the dorsal edge of the hæmal spine of 57th vertebra, is a wedge-shaped laterally compressed hypural. Its wide end forms its distal extremity, while its narrow proximal end is applied to the (in the adult) scarcely discernible 58th (?) vertebra. It is to be noted, however, that the ventral portion of this bone is flatter than its dorsal edge, and this dorsal edge arises as a somewhat enlarged base. A similarly shaped bone, though rather smaller in lateral area, holds a somewhat similar position dorsal to the central longitudinal line of the fish, as does the other ventral to it, and it appears in part of its substance to represent the hæmapophyses of the 59th vertebra. More or less of the expanded portion of these bones appears to be ossification arising from deposit in the intervening connective tissue. In the fry they are

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* They appear to be the displaced epurals of Ryder.

found in a cartilaginous condition when their thicker portion is already more or less ossified. Arising from the vertebræ near the base of the last described wedge-shaped hypural is a narrower bone of uniform thickness, which passes backwards and slightly downwards, so that arising dorsal to the median lateral line of the body, and therefore at the base of what principally composes the upper lobe of the caudal fin, it terminates closely applied to the upper distal corner of the ventral wedge-shaped hypural which chiefly supports the lower lobe; thus this median bone serves to bind the lower lobe of the fin firmly to the upper.* Finally, lying along the upper edge of the dorsal wedge-shaped bone, is another stout, rod-shaped shorter hypural or hæmapophysis of what appears in the fish to be the 60th vertebræ, and beyond it again another similar but still shorter bone (Pl. XVIII. fig. 28). In the herring fry of 27 mm. length each of these bones is provided with a somewhat nodular-like head, connected with the main portion by a rather narrower neck, which, although not forming aperture, is applied to the still well-marked vertebra, and bears a considerable resemblance to the bases of the last undoubted hæmapophyses, and especially would do so if these were coalesced.†

In nearly all respects the herring's tail bears a much nearer resemblance to that of the trout than of any other fishes which I have examined.

THE UNPAIRED FINS.

The rays of the caudal fin proper are 19 in number (an occasional—or less than 2 per cent.—variation from this occurs). In addition to these are three, sometimes four, short accessory rays (unsplit, but jointed like the others) already referred to, which form the dorsal and ventral edges of the root of the caudal fin, and are borne principally by the neural bones of the 57th vertebra, and the thickened hæmal spine of the 55th vertebra respectively.

The 19 caudal fin rays are all ventral to the notochordal axis, and are not arranged symmetrically—there being ten rays in the upper lobe and nine in the lower; that is to say, the tenth ray counting from either the dorsal or ventral edge of the fin is not the central ray so far as the centre line of the body, or the apparent homocercal form of the fin, is concerned. Excluding the short accessory rays, the outermost (the 1st and 19th) rays of the fin are the longest and thickest. They are unsplit longitudinally and laterally, but are jointed transversely to their tips, in lengths in a large herring of from 6 to 1 mm., there being from about 55 of such joints in the outer, to 25 or 30 in the central rays. The proximal joints are directly transverse, and form an irregular articulation, but they gradually become more diagonal towards the end of the ray. In the young fish these segments are always relatively and often actually longer than in the old fish. In a 40 mm. long herring the basal segments measured about 1¼

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* It is rather remarkable that in several fishes the appearance here is similar—a dorsal and ventral expanded hypural with a narrower rod-like bone diagonally situated between them. I am inclined to think from its appearance and situation (not directly on a vertebra, fig. 28) that it is not a true hypural, but possibly an ossified ligament.

† Since the above observations were made, I have seen Ryder's excellent paper giving details of an extensive examination of the median and paired fins of fishes (*Evolution of the Fins of Fishes, U.S. Com. of Fish and Fisheries Report for* 1884 [published 1886]). My observations on the herring and sprat, although not specially made for this purpose, as well as an examination of the caudal fin in trout, catfish (*Anarrhichas*), and some other unidentified larval fishes, almost entirely corroborate Ryder's statements. I incline to believe, however, there is a further spread of cartilage between the hypurals of the herring than represents these bones entirely, but I have been unable to procure the young fish from 15 to 25 mm. length, and have therefore missed their complete development.

mm., and the others from $\frac{3}{4}$ to 1 mm. in length. The 19th or ventral ray is generally longer than the most dorsal by 3 or 4 mm. in the adult herring. The intermediate rays become shorter consecutively from these outer rays to the centre of fin, and they are jointed like the others, but at about one-third from their roots they split longitudinally and laterally into numerous (commonly five or more) filaments, which, however, also are transversely jointed. All of these rays, including the accessories, consist of two lateral portions (as if split vertically from end to end) closely approximated throughout their whole length, and they each, with the exception of the central pair (10th and 11th from dorsal surface), arise proximally from a pair of longer bony unjointed basal pieces. These bases have the form of short (3 to 7 mm.) rods of less diameter than the rays, widest where they articulate with the jointed rays, and sharply pointed at their proximal ends, which overlap the bones of the tail (hæmapophyses or hypurals). As a consequence of this external overlapping of the hypural bones each limb of these basal bones is separated from the other—the left from the right by the thickness of the hypural bone which supports them. The pair of rays (10th and 11th from dorsal surface) forming the centre of caudal fin differ curiously in the form of their basal support, in so far as, instead of being short, sharp-pointed, rod-shaped bones, they take the form of much more elongated, thin, flat laminæ. The base of the most dorsal ray (1st) is supported by the most posterior short (dorsal) hypural, and is ventral therefore to the urostyle or 61st vertebra. Rays 2, 3, 4, and 5 are supported principally on the hæmapophyses (? 60th) immediately dorsal to the upper wedge-shaped hypural, which latter carries the 6th to 10th rays inclusive. The 11th is fixed to the narrower central diagonal bone, while the large ventral wedge-shaped hypural carries the 12th to 16th, the 57th hæmal spine the 17th, and the 56th the 18th and 19th ray bases.

The dorsal fin is of the usual construction, consisting of a series of paired and transversely jointed rays, a single unpaired series of interspinous bones acting as supports to the rays, and a series of median cartilaginous nodules forming an articulating joint between these two. Generally, the interspinous bones may be described as each consisting of a narrow, rod-like central portion, having a sharp-pointed ventral termination, and a thickened dorsal articular end. This central rod is for the upper half or third of its length expanded antero-posteriorly into a thin bony lamina on each side of the central stem, the posterior being the larger. But it is also expanded in a larger degree laterally into a similar pair of laminæ or wings. In the first interspinous bone the anterior lamina is much enlarged; it is as long as, and for most part of its length, is separated from the main stem. The anterior and posterior wings of the interspinous bones diminish both in projection and in length, going backwards, having almost disappeared on the 8th bone, and beyond the 12th they are in this respect simple rod-shaped bones. The upper end of the interspinous bones is bent somewhat backwards to form a kind of neck slightly hollowed on its upper (anterior) surface, and each slightly overlaps the one posterior to it. The posterior end of this neck is also somewhat cup-shaped, and the hollow formed by this end of one interspinous, and the upper surface of the neck of the succeeding one forms an articular hollow for the ball-shaped cartilage, which fits between the nodular laterally separated bases of the otherwise closely approximated fin rays. The usual number of rays readily visible externally is 17 or 18, but the actual common number is 19, the first being so small as to be partially hidden by the scales. The fourth ray is the longest, and from it to the last they consecutively shorten, the last being from one-third to one-half the length of the fourth; the third is three-fourths or more of the length of the fourth, and the second about one-half its length.

At the posterior end the last interspinous bone is short and somewhat modified, and there passes backward from it a bony strip lying horizontally, and about 3 mm. long in the adult fish, giving attachment to, and evidently being an ossification of, the ligamentous end of the muscle.

These interspinous bones do not symmetrically hold the position which their name implies. In most cases, the 19 interspinous bones are found to cover an interval (at their ventral ends) of only about 13 neural spines (about the 18th to the 31st). While the posterior bones are fairly regular in their position, and in the circumstance that they run in between the neural spines, the posterior four or five generally lying two in each interneural space; further forwards there comes to be only one interspinous bone to each interneural, and the anterior interspinous seldom reach or just touch the tip of the neural spines.

In regular interspinous position, however, there occurs a series of small bones anterior to the dorsal fin, and extending forwards from it to the head (Pl. XV. fig. 1). The first being anterior to the first neural spine, the succeeding ones being arranged in the median line with their distal (dorsal) extremities attached to connective tissue close beneath the skin, and their proximal ends passing down—each behind a neural spine. The first two or three of these interspinous bones have a slightly expanded flattened head, and though apparently homologous with the interspinous bones of the fin, are otherwise of a simple rod-shaped form. They are not found posterior to the dorsal fin.

The description of the dorsal fin rays and interspinous supports will apply equally to the anal fin. There are generally 16 or 17 (an additional minute one being generally present) rays in it, consisting of a very short first ray, a second nearly as long as the third, behind which they shorten again to the last, although not to such a marked degree as do the dorsal rays. The last and penultimate rays are peculiar, in that to superficial examination they appear to consist of a single ray more expanded distally than the others, —they however are distinct rays, but their roots are always more closely approximated to one another than occurs with the others, and behind them there is a similar little ossification to that found behind the dorsal fin. The interspinous bones again hold a pretty constant distance to each other, and do so also with respect to the hæmal spines in a more marked degree than do the dorsals—the 17 or 18 interspinous bones occupying the space of about 9 or 10 hæmal spines, each interspinous space therefore receiving as a rule a pair of interspinous bones. The interspinous bones and rays are similar to and articulate in the same manner as the dorsal, except that they are not provided with the bony expansions found in the anterior dorsals. It is seldom that an interspinous bone is distinctly developed for the anterior ray, and the first two or three interspinous bones have not the distinct head found in the others. In the young fish the rays are found ossified before their interspinous supports, and when the latter are still cartilaginous.

THE PAIRED FINS.

The pectoral girdle (Pl. XVIII. figs. 26, 27) has been described by Parker, and my examination of it modifies his description only in one or two minor details. It consists of a strong curved clavicular bone (*cl.*), the apex of which is bent slightly backwards; while the main stem curves gently forward, and terminates anteriorly in a narrow hook-shaped process (*cl.h.*), which is closely attached round the anterior extremity of the coracoid. The anterior face of the clavicular bar is smoothly rounded, but there runs up its external aspect a grooved ridge. On its anterior inner angle there projects inwards and forwards a semicircular shaped process attached to the clavicle by a narrower neck (*cl.pr.*). The coracoid (*cr.*) is closely attached by its anterior upper edge with the clavicle; while its lower edge, which lies close along the ventral edge of the fish, is closely approximated with that of the opposite coracoid,—in fact, the whole inner flat faces of the two coracoids lie close together. Parker figures an irregular ventral edge to the coracoid, and a truncated posterior process beneath the fin. In the many which I have examined the ventral edge is always straight, and the posterior process forms a sharp point. In almost all adult herring examined by me the post-coracoid process (*p.cr.*) is fused with the coracoid, and has no intervening cartilage, as shown in Parker's drawing, which probably is made from a younger fish, and it runs up the inner side to meet the inturned anterior edge of the clavicle. The flat coracoid is more or less perforated by numerous foramina; while in some cases it is almost solid, in others it is completely riddled, only a few delicate threads of bone remaining, and every variety of intermediate condition is to be found. I can find not the least evidence in favour of Parker's suggested divisions into pro- meso- and post-coracoid. Its edge, however, is always imperforate, and there runs across the coracoid a strengthening ridge or bar from the articulation of the first (dorsal) brachial ossicle to near its ventral edge.

The scapula (*sc.*), in all my cases, differs somewhat in form from that figured by Parker. It has a T-shape,—the central leg resting on the process of the coracoid, between the base of the precoracoid and the first brachial ossicle. The upper edge of the cross limb meets the clavicle. Bounded by the vertical and anterior limbs on its postero-dorsal side, and by the clavicle anteriorly is a nearly circular fenestra (*f.*), and the posterior edge of the vertical limb of the scapula nearly forms another.

To part of the vertical stem of the scapula are articulated, the first (dorsal) two proximal brachial ossicles, while the adjacent part of the coracoid bears the other three (*br.o.*). The lowest of these elongated ossicles is a thin scale, the next four are somewhat rod-shaped, shortening consecutively, the upper being a small rounded nodule, nearly fused with the fin ray. At the distal end of these ossicles comes a second series of smaller rounded ossicles. The upper one bears the large dorsal ray of the pectoral fin, the next three each are embraced by two or three rays, while the last articulates with the remaining five or six rays.

The post-temporal (*pt.*) is of the usual form, its dorsal long arm overlapping the dorsal surface of the epiotic, while its shorter and inner is firmly fixed to the tip of the opisthotic. The lower edge of the post, temporal overlaps a disc-like dorsal portion of the supra-clavicle (*s.cl.1.*), the ventral portion of which forms an elongated flat bar (*s.cl.2.*), overlapping the upper part of the clavicle. The line of the supra-clavicle is continued downwards by a short flat pear-shaped bone overlapping a more ventral and much narrower strip, which in turn is continued down within the skin behind the fin to near the ventral line by a delicate rod-shaped piece. These three pieces (*p.cl.1,2,3.*) constitute the post-clavicle, and the two upper portions lie upon the external surface of the clavicle. The mucus canal on the post-temporal is continued forwards into the triradiate supratemporal hereafter described.

The pelvic girdle consists of a pair of elongated, somewhat dagger-shaped bones lying close to the ventral edge of the fish (Pl. XV. fig. 1). Sharply pointed anteriorly, they gradually deepen towards their posterior ends, remaining however of great thinness, and having a thickened bar along their ventral edges. At their posterior ends they become much thicker, and form a strong nodular-like head for articulation of the fin. At this point they are closely approximated and attached by tissue to each other by their sharp disc-like inner and ventral edges. A slight hollow on the outer posterior end of the head forms an articulation for the pelvic fin. The nine fin rays are similar to all the others; but while articulating by their heads almost directly with the innominate bone, there lies deep between the bases of the rays a series of five small ossicles, similar to the arrangement found in the pectoral fin. These are found in the fry to be relatively larger than in the adult, where they may be rather obscure, and the first (dorsal or anterior) one is wholly in connection with the first ray only.

THE SKULL.

The cartilaginous skull of the adult herring may be said to extend only from the anterior auditory region as far forwards as the front of the nasal capsules; for posteriorly almost the whole of the cranial roof is absent, and the remainder of the brain case is almost entirely replaced by the strong otic and occipital ossifications, internal to part of which (part of the pterotic and epiotic) only a small amount of cartilage remains unossified (Pl. XVII. fig. 19; Pl. XVIII. fig. 22), appearing here and there on the external surface of the skull, as narrow strips between one or two of the bones composing it (Pl. XVIII. fig. 23). But for a small thin piece of cartilage the whole upper surface of the cranium, after removal of the frontal bones, would be one huge fontanelle (Pl. XVIII. fig. 22). Over the brain, and covered by the frontals, this cartilage appears as a small triangular-shaped piece covering the thalamencephalon and pineal gland, and connected posteriorly by its backwardly prolonged apex, with an anterior median process of the supra-occipital bone (fig. 22, *s.oc.*). The other angles of this cartilaginous triangle are connected with the tips of the alisphenoid bones, and the whole, therefore, divides the upper cavity of the skull into three fontanelles—two large and lateral over the optic lobes, hind brain, &c., and one small and median over the fore-brain.

Anterior to the auditory region, and closely invested above by the frontals, the cartilage is continued forwards above the interorbital septum as a shallow roof as far as the antorbital region, where it suddenly becomes deeper, passing downwards in front of the orbit, and extending forwards beyond the nasal region as a nearly trihedral mass excavated on each side to form the nasal capsules (Pl. XVII. figs. 18, 19). From its ventral surface there passes backwards to beneath the middle of the orbit a narrow median strip of cartilage (Pl. XVII. figs. 18, 19, *tr.c.*), on which is moulded the parasphenoid (Pl. XVII. figs. 18, 19, *eth.*), this being the only remainder of the trabecular cartilage here. The antorbital cartilage terminates anteriorly in an ossified median mass, slightly behind which stands out on each side a pair of cartilaginous nodules (the cornua) (Pl. XVII. fig. 18, *cor.*). Behind the nasal cavities there also projects laterally on each side a cartilaginous ethmopalatine boss (Pl. XVII. figs. 18, 20, 21, *eth.pal.*). Most of the dorsal surface of this cartilaginous region is raised into a slight median elevation, and is covered only by the skin, the frontal bones and ethmoidal ossifications investing its lateral portions (Pl. XVII. figs. 18, 20). The upper portion of the cartilage is centrally excavated to form an elongated cavity open only at its posterior end, and reaching from the anterior upper part of the orbit to beyond the middle of and close above the nasal capsules (Pl. XVII. fig. 19, *m.cav.*); in this cavity lie and are attached towards its anterior end the superior oblique muscles of the eyes. The actual internasal cartilage is comparatively thin but solid. The cartilage does not pass down between the eyes, the smaller (upper) portion of the interorbital septum being bony (orbito sphenoidal), the main part toughly membranous, with only the thread of cartilage already described, running along part of its lower edge.

The continuous cartilaginous skull in the adult herring is therefore almost entirely anterior to the brain case.

The bony skull, viewed from behind (Pl. XVIII. fig. 23), is of a somewhat square shape, with a pair of laterally projecting wings on its lower border, the upper surface being formed by the supraoccipital (*s.oc.*) and upper edges of the epiotic (*ep.*) bones, the lower narrower by the basioccipital (*b.oc.*) and exoccipitals (*ex.o.*), while the prominent pterotics form the lateral projections. The foramen magnum (*f.m.*), about equal in size to the excavated articulating end of the basioccipital, is entirely formed by the exoccipitals. These meet in the middle line along the upper surface of the basioccipital. The whole posterior end of the basioccipital forms the articulating concave condyle for the first vertebra. This posterior concave surface is very slightly arched and hollowed out on its under edge, while above there are two backwardly projecting small facets which overlap the first vertebra, and have between them a triangular-shaped excavation for the reception of a corresponding process, already described, on the first vertebra. The notochordal remnant is almost entirely obliterated, although in the young 40 to 60 mm. herring it can be traced forwards through two-thirds of the length of the basioccipital as a gradually narrowing process. Immediately in front of the articulating concavity, the basioccipital takes the form in cross section of a narrow solid bar (Pl. XVIII. fig. 24, *b.oc.*), which forms its dorsal edge, and from which pass downwards a pair of strong lateral wings. These pass slightly outwards at first and then inwards, the angle thus formed contributing on each side of the bone's external surface a median lateral ridge, the posterior portion of which meets with the exoccipitals. The basioccipital, therefore, viewed from below, appears to form along nearly its whole length a channel, the considerable depth of which is much increased by the wings of the parasphenoid (Pl. XVII. fig. 18; Pl. XVIII. fig. 24, *b.sph.w.*). In this channel lie the straight eye-muscles, and except that the wings of the parasphenoid approach each other and partially close it, it is open beneath. There is no floor formed to it by the parasphenoid, the median portion of which scarcely extends behind the commencement of the prootics.

Above and on each side of the basioccipital, and surrounding the whole foramen magnum, are the exoccipitals. Appearing posteriorly, and on each side of the middle line with a somewhat flattened surface, they send out and upwards from their lower outer posterior faces a strong rounded projection which meets on its upper surface with the lower part of the epiotic, and on its lateral portion with the pterotic bones. The lower part of this portion is excavated for the posterior end of the horizontal and the ampulla of the posterior vertical semicircular canals. From its lower inner part a process projects inwards and slightly backwards to be applied to the outer side of the condylar part of the basioccipital. This strong process is continued forwards on its lower side to meet with the posterior edge of the prootic. Above (but separated by a fenestra to be described later) the junction of that bone with the basioccipital, and partly filling the space between the bases of these two processes of the exoccipital, is a thinner portion which meets its fellow of the opposite side in the middle, and articulates with the dorsal surface of the basioccipital median ridge. They thus form a floor for the medulla, and shut out the basioccipital from any part in this. They also partially roof over the deep ventro-lateral cavities in which lie the membranous sacculi of the ears (Pl. XVIII. fig. 24, *cav.sac.*). From its junction with the pterotic and opisthotic, *i.e.*, from its extreme lateral projection, there runs down the lower posterior outer edge of the exoccipital to the outer edge of the basioccipital condyle, a sharp-pointed process formed by a pair of ridges, between which are the foramina for the 9th and 10th nerves (Pl. XVII. figs. 18, 21, ix. x.), while immediately above the termination of the upper (outer) ridge, and between it and the side of the basioccipital condyle, the tubular cartilaginous rod containing the membranous duct from the swim-bladder passes into the bone, the perforation running slightly upwards within that thickened portion of the exoccipital which forms the floor of the bony fold containing the posterior ampulla. The canal for this duct is in the pilchard about $\frac{1}{3}$ mm. in diameter, less in the herring, and still less in the shad, where it passes from the exoccipital into the pterotic, but the portion within the exoccipital expands in its course into a pear-shaped vesicle—the posterior of the three well-known vesicles in communication with the swim-bladder.

Separated from the upper edges of the exoccipitals by a narrow strip of cartilage (fig. 23) continuous with the portion which lies internal to the otic bones, and occupying the upper central posterior end of the cranium, is the supraoccipital. It is a comparatively thin bone, and in longitudinal vertical section forms almost a right angle (Pl. XVII. fig. 19, *s.oc.*). The posterior face is wide and somewhat triangular shaped, with a slight median ridge and a rounded lateral ridge or rather fold on each side, the ends of which meet the upper anterior ends of the epiotics, while they and the median ridge originate in the middle dorsal line forming a very small pointed backward projecting process, the only representative of an occipital spine (fig. 23, *sp.*). The supraoccipital takes no part in forming the foramen magnum, being separated entirely from it by the exoccipitals. From the base of the little spine above referred to, a slight dorsal ridge passes outwards to the edge of the bone, and in front of this ridge the bone takes a slightly depressed semicircular form with a short anteriorly projecting median process which meets with the median strip of cartilage (*tr.car.*) already described. Where it meets with the epiotics, the inner edges (within the brain cavity) of each of the lateral folds above described may be so approximated as to meet and fuse with each other so as to form a short complete or partial canal (continuous with that in the epiotic) containing the membranous posterior semicircular canal, where it passes inwards at its upper end (Pl. XVII. fig. 19; Pl. XVIII. fig. 24, *p.sc.c.*). Sometimes this supraoccipital canal is not entirely closed by a complete fusion of its sides, and sometimes it is closed only by the primitive cartilage.

The most prominent bones on the posterior face of the cranium are the epiotics which stand boldly outwards and backwards on each side. They take almost the shape of the posterior semicircular canals, most part of which is enclosed by them. Over the most prominent projection of the curve thus formed the epiotics are thickened slightly, and form a sharp angle. The outline of these rather flattened bones, therefore, forms an obtuse angle externally, while internally or anteriorly (forming their junction with the ex- and supra-occipitals), they form the segment of a circle. While the upper end of the projecting elbows which contain the semicircular canals and which are overlapped by the parietals, meet the supraoccipital, the lower ends articulate with a projecting rounded process of each exoccipital. The sharp angle above described as occurring on this elbow forms the most backwardly projecting point of the cranium, slightly exceeding that of the condyle. The portion of bone lying within the segment formed by the canal is somewhat compressed, and forms with a concavity in the pterotic a deep hollow, overhung by the upper limb of the epiotic, and open on the postero-lateral aspect of the cranium (Pl. XVII. fig. 18, *cav.*). Around and within this cavity, most of which is roofed by the parietals, are attached some of the dorsal muscles. The bone forming its anterior edge encloses part of the horizontal semicircular canal, most of which, however, is surrounded by the cartilage internal to this part. The ossification over it, and just behind the supraoccipital lateral ridges, is sometimes so slight as to scarcely withstand the removal of the skin. A portion of its inner anterior end is, except in the larger herrings, thin and cartilaginous, the cartilage of the auditory region here persisting on the inside of the epiotic and pterotic ossifications. This cartilage has been described as appearing in shape of a narrow band posteriorly between the exoccipitals and supraoccipital, and enclosed within the portion internal to the anterior upwardly projecting part of the pterotic is the anterior semicircular canal. Viewed from the side the cranium presents a quadrilateral form, hollowed on its upper edge when the frontals are removed, and is formed by the sphenotic, pterotic, and epiotic bones. The two lower corners terminate in a sharp process, the anterior of which belongs to the sphenotic which forms the anterior outer edge of the otic mass. This sphenotic is somewhat triangular in shape, the anterior basal portion curving outwards and downwards to form the sharp process just referred to; while the posterior border slopes slightly backwards and upwards, forming a sharp edge on its outer surface, separated from a similar posterior edge of the pterotic by a narrow elongated aperture (Pl. XVIII. fig. 22, *gr.*), which is covered externally by a process of the frontal bone (Pl. XVII. fig. 18, *fr.pr.*). On its inner ventral border the sphenotic meets the prootic. Immediately external to this junction, and therefore directly under the outer overhanging margin of the sphenotic is a groove for the articulation of the anterior part of the head of the hyomandibular (Pl. XVII. figs. 18, 21, *ar.hy.*). Joining posteriorly as the sphenotic does with the pterotic, this articular cavity is continued along the under outer side of the latter also, with which indeed the longer portion of the hyomandibular head articulates (Pl. XV. fig. 1). This articular hollow in the pterotic ends under a backwardly and slightly downward projecting sharp process for muscle attachment, just internal to which is the connection with the exoccipital and epiotic. It is the posterior part of the epiotic terminating in this process which forms the outstanding lateral wings referred to as seen in a posterior view of the skull.

On its inner ventral surface the pterotic meets the small opisthotic (Pl. XVII. fig. 21, *op.ot.*) and the outer posterior border of the prootic. Viewed from below, and projecting from that part of the pterotic bounded internally by the prootic and opisthotic, and externally by the hyomandibular articular cavity, there is seen a segment of the smaller and posterior of the two spherical air vesicles in connection with the swim-bladder (figs. 18, 21, *p.s.va.*). The larger segment of this capsule is seen from the side forming the lower part of the cavity referred to above as largely formed by the epiotic bone, and it is closely encircled by the membranous horizontal semicircular canal (Pl. XVIII. fig. 24, *p.s.vec.h.sc.c.*). The small opisthotic—between the pterotic, lower aspect of exoccipital and prootic—partly covers the point of junction where the single duct from the swim-bladder, after passing through the pear-shaped air cavity, branches into two canals, one leading to each spherical capsule.

The sphenotic and pterotic overhang the prootic and opisthotic, and face so directly outwards that, as a consequence, the real outer surface of the prootic looks almost directly downwards. The prootic articulates on its outer upper edge with the sphenotic and pterotic, posteriorly with the opisthotic and exoccipital, and on its posterior inner border with the basioccipital. Conspicuous on both its external and internal (to the brain cavity) surfaces is the bony wall of the larger spherical air vesicle (Pl. XVII. figs. 18, 21, *a.s.ves.*). A small part of the posterior portion of the prootic forms the apex of a triangular-shaped fenestra (figs. 18, 21, 24, *au.f.*), in the side, or rather in what, from its form, must be called the base of the herring's skull. Of the two longest sides of this foramen the outer is formed, as already mentioned, by part of the exoccipital, and is overhung by the opisthotic, and the inner (ventral) side by the outer edge of the basioccipital. Its base or posterior end is bounded by the descending part of the exoccipital which contains the swim-bladder duct. This fenestra is surrounded by connective tissue and muscle immediately dorsal to the pharyngobranchials, and is covered by a delicate tense semi-transparent membrane, within which, and closely applied to it, is the sacculus of the ear with its contained large otolith. This can be readily seen shining through the membrane, which almost bears the appearance of a tympanum. It seems to be the persistent homologue of the fenestra found in the young salmon.*

The anterior edge of the prootic forms the anterior boundary of the cranium, and its inner edge meets with that of its fellow of the opposite side in the middle line (Pl. XVII. fig. 21). The median portion of the prootics (*i.e.*, on each side of the suture), and about 2 mm. in width from before backwards, forms a flat shelf on which rests the pituitary body (Pl. XVII. fig. 19, *pt.f.*). This is let down behind a foramen in the anterior wall of the cranium formed by the transverse portion of the basisphenoid and this part of the prootic. Behind the pituitary body the prootics form an upstanding transverse ridge, rounded on the upper surface, and passing across like a rampart between the right and left large spherical air vesicles (Pl. XVII. fig. 19, *pr. ot.*). The ventral outer edges of the prootics projecting downwards are continuous with the ventral wings of the basioccipital, and form the sides—as the median part forms the flat roof—of the anterior moiety of the eye-muscle canal.

Articulating with the anterior inner corners of the prootics, and forming a bar across the anterior portion of the brain case, is a narrow bone. From its centre there projects downwards a relatively long but very delicate needle-like process, which partially separates the right and left recti muscles of the eye, where they pass backwards into the eye-muscle canal. This is the basisphenoid (figs. 19, 21, 25, *b.sph.*); the transverse part seems to correspond to the V-shaped portion and the spine to the vertical arm of the basisphenoid of the salmon and some other teleosts. The delicate vertical part generally arises from the stronger transverse part in a small bifurcated base, so small, however, as often to appear a single stem. Its lower tip is not applied to the parasphenoid, as in the salmon, but is only attached to the interorbital septum. Perforating each end of the transverse part of the basisphenoid are the foramina for exit of the oculo-motor nerves of the eye muscles.

From the upper anterior margin of the prootics there stand up a pair of nearly circular (in outline) flattened alisphenoids (*al.*), perforated near their centre for the abducent nerve to the superior oblique muscle. To their lower anterior corners are also articulated the end of the basisphenoidal arms above described. Articulating with the upper part of the alisphenoids is a hollowed or V-shaped orbitosphenoidal (Pl. XVII. figs. 18, 19, *or.sph.*) ossification, in which lies the fore-brain. Anteriorly the upper end of the limbs bend inwards to nearly meet in the middle line, while the lower angle is continued forwards as a median thin irregular ossification as far as the

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* "The Salmon's Skull," by J. S. Parker, *Phil. Trans.*, 1878.

front of the orbit, and forming a small upper part of the interorbital septum. From its appearance in the shad, a part of the anterior end of this would seem to correspond to a presphenoidal ossification.

This interorbital median bone is closely surmounted by the cartilaginous roof of the skull. The upper and posterior part of the V-shaped portion of this orbitosphenoidal ossification is bridged over by the previously described thin triangular sheet of cartilage (fig. 22, *tr.cr.*) which lies over the thalamencephalon.

A cross section of the skull through the orbits, looking back, shows the anterior face of the cranial mass perforated by three relatively large foramina (Pl. XVIII. fig. 25); the upper for passage of the olfactory nerves, bounded by the orbitosphenoids; the median and largest, for the optic nerves, having its lateral margins formed by the alisphenoids, and its base by the transverse portion of the basisphenoid; while the lower foramen, within which is situated the pituitary body, is roofed by the transverse part of the basisphenoid, floored by the prootics, and has the vertical basisphenoidal spine passing downwards across its face.

The arrangement of, and excavations in, the bones composing the cranium give to its inner aspect, when viewed from above, a peculiarly irregular appearance. The anterior (orbitosphenoidal) floor supporting the fore brain slopes backwards and slightly downwards to above the anterior margins of the prootics. There it suddenly drops to the level of the median portion of the latter, this anterior nearly vertical wall here being formed by the alisphenoids laterally and by the basisphenoid mesially, the main part, however, being open as the foramina already described. The floor for the brain here is partially formed by the large spherical air vesicles, in the posterior side of each of which is seen the somewhat ragged narrow aperture through which the prolongation of the membranous sacculi pass to their interior. From this point the floor extends back on one level to the posterior vertical extremity of the skull, formed by the ex- and supra-occipitals. This fairly wide anterior (prootic) floor for the brain is contracted as it goes backwards till it forms a mere median point posteriorly, by the pair of deep cavities containing the membranous sacculi of the ear. These cavities extend downwards on each side, and are formed principally by the ex- and basi-occipital and prootic bones. The bottom of the cavities is largely occupied by the membrane-covered fenestra already described. The floor to the brain is continued backwards from the median posterior point of the prootics by the thin (internal) expanded processes of the exoccipitals described in connection with these bones as meeting in the middle line over the dorsal median ridge of the basioccipital. Forming anteriorly a mere point meeting the prootics, these processes widen posteriorly, and extend upwards and outwards towards the main body of the bone (Pl. XVII. fig. 19; Pl. XVIII. fig. 24. *ex.oc.*), overhanging the posterior part of the auditory sacculus, and forming a curved rather triangular-shaped floor for the hind brain. Just within their anterior margin is a foramen for the 10th nerve, which then passes through the posterior corner of the ear cavity to again perforate the outer (exoccipital) wall of the skull for its final exit. The large apertures between the brain case proper and the latero-ventral cavities containing the sacculi are covered by the large optic lobes. The median bony ridge which interposes between the pair of ear cavities is formed principally by that median portion of the basioccipital which forms also the roof of the eye muscle canal. These muscles lie, therefore, below the level of the sacculi, the bones around which do not show as enlargements externally. The ear cavities are partially continued above the floor of the skull, and show two smaller apertures;—an anterior formed mainly by the prootic and pterotic bones, and containing the ampullæ of the horizontal and anterior vertical semicircular canals lying between the two spherical air vesicles,—the posterior formed, by the exoccipitals, contains the ampulla (Pl. XVIII. fig. 24, *am.*) of the posterior vertical canal. These two cavities are separated mainly by the bone surrounding the anterior spherical air vesicle. While the posterior vertical canal runs in the exoccipital, epiotic and supraoccipital, the horizontal in the pterotic encircling and generally in a groove around the outer surface of the smaller air vesicle, the anterior vertical is enclosed only by the cartilage internal to the pro- and sphenotics, and just within the foramen between these two, which is covered externally by the lateral wing of the frontal. The vertical part common to the anterior and posterior canals is not surrounded by bone or cartilage, but lies free in the brain cavity, although close to its otic wall.*

Of the membrane bones of the roof of the skull, the frontals are by far the largest. They are long bones extending from above the centre of the nasal cavities nearly the whole length of the head, terminating close to the supraoccipital, from which (except its median process) they are separated only by the small parietals. Widest over the centre of the orbital region, their outer edge is there turned slightly downwards and inwards (figs. 18, 25, *fr.*), overlapping the edge of the cartilaginous tegmen. They each terminate anteriorly in a pointed end overlapping the posterior processes of the ethmoid. Along their inner margins they are closely approximated from their posterior ends to a point just in front of the fore-brain, where they separate. The suture between them is nearly straight, except for a small interlocking zigzag portion over the fore brain, where the substance of the bone is about its thinnest. Anterior to the fore-brain then the separated frontals leave the cartilage uncovered except by skin. The thin part of the bones over the fore-brain is raised slightly as a central lozenge-shaped portion, posterior to which they slope slightly downwards from their outer margins towards the middle line—forming a hollow on the roof of the skull, filled with gelatinous tissue, slight in the herring, but much more pronounced in the pilchard. In line with the thalamencephalon, each frontal sends down from its outer edge a long relatively wide ridged process (fig. 18, *fr.pr.*), the posterior margin of which overlaps the anterior edge of the pterotic, while its anterior edge is covered by the posterior margin of the sphenotic. This lateral frontal process thus closes in the elongated aperture already described as occurring between the pterotic and sphenotic of each side.

Behind, and having their anterior borders overlapped by the frontals, and lying between the latter and the transverse ridge on the dorsal surface of the supraoccipital, are the small parietals (*par.*). These are triangular-shaped above, one-half being overlapped by the frontals, while the other moiety projects backwards over the outer surface of the epiotics, the apex of the triangle facing inwards, and meeting with the supraoccipital. The median process of the supraoccipital separates the parietals from one another. About the centre of their under surface there arises a process, which extends outwards and downwards, moulded in the cartilage within, and with its bifurcated tip terminating beneath the upper part of the pterotic. This process forms the anterior boundary of the postero-lateral cavity and the posterior margin of the foramen (*for*). In front of the parietal process occurs a large semicircular foramen (Pl. XVII. figs. 18, 19, *for.*) opening directly into the brain cavity. This foramen is occasioned by the downwardly hollowed upper edge of the cartilage and pterotic

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* Most of the details of the herring's ear and its swim-bladder connections were most accurately described by Weber, *De Aure et Auditu Hominis et Animalium*, pars. i., Lipsiæ, 1820.

ossification leaving a space between it and the margin of the frontal above. The anterior part of this foramen is bounded by the lateral arm of the frontal, and its upper straight border by the outer edge of the main body of the frontal behind its process. Immediately within the foramen lies the upper part of the hind brain, which, therefore, at this point is entirely unprotected on both sides except for the thin skin which covers these foramina.

Anteriorly the cartilage is partly replaced by the ethmoidal ossification (*eth.*). The anterior (prenasal) end of the cartilage is ossified as a nodular mass, so that no exact distinction can be made between what seems to represent both mesethmoidal and supraethmoidal elements. The bone terminates anteriorly in a median rounded tip, which is cut off from the remainder by a thin strip of cartilage, and represents the labials (*lb.*). Behind these, and on the dorsal surface, there rises a strong bony median ridge (*eth.r.*), which anteriorly ends abruptly, and passing backwards dies away, dividing into two flat supraethmoidal splints (figs. 18, 20, 22, *eth.*) which lie over each edge of the cartilaginous roof, and are overlapped at their tips by the frontals. The bony mass below the anterior end of its dorsal ridge sends downwards and outwards on each side a pair of (laterally) thin processes formed on the posterior faces of the cartilaginous laterally projecting prenasal cornua (figs. 18, 21, 22, *cor.*). The cartilage under the central ridge is ossified to form the nodular mesethmoidal mass described, and it is closely underlapped by the head of the vomer.

In close contact with the tips of the ethmoidal posterior processes is a pair of antorbital (ectethmoid) ossifications (*ec.eth.*) standing out with a sharp edge, and forming the anterior boundary of the orbit, just as the sharp anterior part of the sphenotic does the posterior. They send a short supraorbital process backwards, and in the shad or sometimes even in the herring, the median posterior portions are practically conjoined, and meet with the prolongation of the orbito-sphenoid. Just within the nostril, and lying immediately under the skin over the nasal cavity, and therefore unattached to any other bone, is a very small nasal bone, sometimes so slightly developed in the herring as to be difficult of demonstration; it is more pronounced in the other species.

Running along nearly the whole floor of the skull is the parasphenoid. Its anterior end reaches to beneath the nasal cavities, and is underlapped by the vomer. This vomer (*vo.*) is a narrow elongated somewhat dagger-shaped bone, closely applied at its anterior end to the ethmoidal and labial ossifications. Its anterior third bears on its ventral surface an elongated oval-shaped ridge bearing a double irregular row of teeth, while another and opposite but shorter ridge stands up from it dorsally, fitting into the mesethmoid.

For the anterior two-thirds of its length the parasphenoid (*p.sph.*) is narrow and flattened from above downwards, and is developed on the thin rod of cartilage previously described as extending back beneath the orbits. Near the cranial mass the parasphenoid becomes thicker, and articulates with an irregular suture by a pair of short upstanding processes (fig. 18, *p.sph.*) with the prootics. From this point a pair of very thin rather deep laminæ (*p.sph.w.*) pass backwards. Their upper edges are applied to the ventral ridges of the prootics and basioccipital, and they therefore further deepen, and although scarcely or just touching in the middle line, partly close in the eye muscle canal. These 'wings' extend as far back as the junction of the second and third vertebræ, terminating in somewhat rounded tips, which form, therefore, the most posterior projection of the skull bones. It is immediately behind these that the swim-bladder gives off its two ducts, which thence pass forwards on each side of them to enter the exoccipitals.*

The palato-pterygoid cartilage is not completely ossified. About its mid length is a cartilaginous expanded portion (Pl. XV. fig. 1, *pl.pt.car.*), from which passes forwards a short bar on which is moulded the palatine. At this central point the cartilage articulates with the antorbital ethmopalatine process of the cartilaginous skull. The palatines (fig. 1, *pal.*) lying on each side of the roof of the mouth extend from this point forwards to articulate by a thickened extremity, where most of the cartilage has ossified, with the anterior processes (trabecular cornua) of the cartilaginous skull and with the maxillæ. They are each overlapped posteriorly by a long thin narrow pterygoid (*pt.*) bent to the form almost of a right angle. Its upper limb is folded round the lower edge of the palatine so as to be partly outside, partly under it, while the downwardly projecting limb has its posterior edge closely applied to, and partly overlapping the anterior edge of the quadrate. At its angle it sends up a short flat spur over the outer side of the body of the cartilage which articulates with the ethmopalatine boss. Lying inside the pterygoid is the meso-pterygoid. An elongated triangular-shaped thin (depressed) bone, it lies with its apex forwards, its inner edge close to the parasphenoid, its outer edge applied partly to the horizontal arm of the pterygoid, partly to the tip of the quadrate. Its posterior rounded end (forming the base of the triangle) overlaps, and is closely attached to the upper part of the metapterygoid. The broad aspect of the bone, therefore, faces upwards, and it is bent downwards slightly towards its centre, and forms the anterior two-thirds of the floor of the orbit.

The quadrate (Pl. XV. fig. 1, *qu.*) has the form nearly of an equilateral triangle, its apex upwards, and the slightly downwardly curved base below. Its anterior straight almost vertical edge is closely applied to and partly overlapped by the posterior edge of the metapterygoid, while its lower anterior angle is truncated to form an articular cavity for the lower jaw. With the anterior part of its ventral margin is connected the lower part of the preopercular bone, and a groove on the inside of its ventral margin receives the symplectic.

Connected by its anterior border with the posterior edge of the quadrate is the thin metapterygoid (*mt.pt.*), its base being continuous with that of the latter bone. It also has an irregularly triangular shape, its anterior and ventral margins forming nearly a right angle, its apex (dorsal) in conjunction with the apex of the quadrate, while its third side (postero-dorsal) spreads out dorsally in its posterior two-thirds into a flat curved portion, with a projecting process lapping outside a corresponding curved process on the hyomandibular's anterior face. This portion forms part of the posterior floor of the orbit, being continuous here with the mesopterygoid.

The hyomandibular (Pl. XV. fig. 1, *h.mn.*) consists of a strong thick bone. The square-shaped upper portion articulates along its dorsal end, with the cavity underneath the projecting edge of the sphenotic and pterotic. From

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* These ducts are contained in a pair of cartilaginous rods, which pass into the exoccipitals as already described. They are rather flattened, being of an oval form in transverse section, and measure (according to the size of the adult fish) about ·25 mm. by ·35 mm. in diameter. The central perforation for the membranous duct is ·08 mm. in diameter. Nearly the half of this space is occupied by the walls of the duct, and as it is very difficult to keep the latter perfect in its whole length, this probably accounts for Valenciennes' failure to force air through it. This is no sufficient reason for the assertion by Valenciennes, of its non-tubular character, which I have disproved by a series of sections from end to end. The cartilage formed round the duct is sometimes found partially incomplete in the larval herring, its development being rather irregular. The ducts meet posteriorly, having a single aperture to the anterior end of the swim-bladder.

the lower posterior part of this quadrilateral head there projects backwards the facet for articulation with the operculum, and the enlarged part of the hyomandibular gives mainly attachment to the muscle raising that bone. From the upper part there passes downwards and slightly forwards a narrow thick bar, the anterior edge of which projects somewhat outwards as a thinner lamina, against which, and overlapping the main stem, lies the preoperculum. This outer ridge of the hyomandibular partly overhangs a thin widened triangular portion (Pl. XV. fig. 1, *a.h.mn.*) curved on its upper surface, and which projects forwards from the inner anterior face of the main stem. The apex of the triangle projecting forwards is terminated by the small hook-shaped process already referred to as overlapped by the similar process of the metapterygoid.

To the strong blunt ventral end of the hyomandibular, and continuous with it in nearly a straight line, is attached the symplectic (*sym.*), a narrow rod-like bone, with its slightly expanded posterior end articulating with the hyomandibular, while the narrowed rod lies partly against the ventral edge and partly (its anterior end) in a groove on the inner ventral surface of the quadrate. Articulating with the lower anterior corner of the quadrate is the articular portion of the lower jaw (*art.*), the basal thickened ridge of which is formed partly round Meckel's cartilage, which runs nearly to the symphysis along the inner side of the strong thick lower border of the dentary (*den.*). The anterior incurved part of the dentary bears small teeth, and is short, almost the whole bone being expanded into an upstanding square-shaped portion overlapped by the maxilla, its posterior edge slightly overlapping the front of the triangular-shaped articular, while its ventral edge extends backwards as a strong spine overlapping the lower articular edge almost to the condyle. Just below the latter, and not forming part thereof, is a very small solid angular (*an.*).

The maxilla (*mx.*) extends backwards as far as the middle of the orbit in the closed condition, but when widely open takes an almost vertical position (Pl. XV. fig. 1, *mx.*; Pl. XVII. fig. 15, *mx.*). Its upper inner end is flattened nodule, the inner edge of which meets its fellow of the opposite side in the middle line.

It consists of an elongated flattened external portion bearing minute teeth along its ventral edge; rounded at its posterior lower end it is contracted at its upper to pass into a short rod-like neck, which passes inwards nearly at right angles to the expanded flat portion of the bone. On its inner or posterior edge and middle of its length this neck bears a small condyle, while it terminates in a flattened nodular triangular head. The internal edge of this head meets its fellow of the opposite side, while the condyle on its posterior corner articulates with the ethmoidal cartilaginous boss. The condyle behind the external end of the 'neck' articulates with the outer end of the palatine, a cartilaginous pad intervening between their surfaces; consequently in the hollow formed between the two condyles on the posterior edge of this dorsal and mesial neck of each maxilla lies part of the ethmoid and palatine and the articular junction between them.

Anterior to the maxillæ are the short narrow premaxillæ (*pr.mx.*). Meeting with each other in a symphysis in the middle line, they pass downwards in front of the backward hollow formed by the necks of the maxillæ, so as to leave a narrow skin-covered space (Pl. XV. fig. 1, *f.*) between them, and they terminate in a pointed end loosely attached by connective tissue and skin to the upper anterior corner of the flattened part of the maxilla. Just inside the median part of their anterior thin edge they each bear about half a dozen sharp teeth. Their anterior edges form an almost straight continuous line, there being no emargination at their symphysis. Overlapping the posterior (lower) end of the maxilla is the jugal, its anterior end rod-like and lying in the closed mouth (Pl. XVII. fig. 15, *jug.*) parallel and dorsal to the maxilla; in the open mouth it stands nearly directly upwards (Pl. XV. fig. 1, *jug.*), surrounded only by muscle and connective tissue. Its posterior part, which overlaps and is closely attached to the maxilla, is expanded into a flat oval form. Filling the narrow interval, and between the rod-like portion of the jugal and the posterior edge of the maxilla, and extending upwards to near its upper angle, is a narrow splint-like bone. This, I believe, is the septo-maxillary of Parker,* but its appearance and position in the herring (it is fully developed in the 30 mm. herring) external to and separated entirely from the normal septo-maxillary position causes me to doubt its homology with that bone in other vertebrates. Dorsal to its upper end, and intervening between the nasal cavity and it, is a small bone forming part of the orbital circle, but it is peculiar, in so far as while its flattened posterior end is overlapped by a narrow elongated supraorbital lying along the edge of the frontal and extending backwards nearly over the whole eye, and while it is closely connected by its narrow rod-like anterior end with the suborbital (lachrymal) covering the antorbital cavity, it articulates, and is firmly attached by a slightly nodular head to the premaxilla. This bone forms partially the outer side of the nasal cavity. There are two strong crescentic sclerotic ossifications (*oc. os.*).

The suborbitals are five in number. Immediately beneath the eye, and forming a large flat surface on the side of the face, overlapping the preoperculum, is the largest of the series (Pl. XVII. fig. 15, *3*). Its upper edge curved for the eye, it descends as far as the level of the closed lower jaw, its anterior end being slightly sunk to receive the circular end of the maxilla and jugal when closed; its upper anterior portion therefore projects forwards, to be overlapped by a short narrow second suborbital (fig. 15, *2*), which in turn is overlapped by the anterior of the series the lachrymal (fig. 15, *1*), and which is above referred to. Second in width of these bones, its anterior end forms a continuous line just behind the so-called septomaxillary, while its posterior border is of an irregular waved form. Posteriorly the series is continued behind the eye from the large suborbital by three diminishing bones (fig. 15, *4*, *5*, *6*), the terminal (dorsal) small triangular one of which is attached over the auditory mass close to the tip of the preoperculum and in continuation of the anterior limb of a supratemporal (*sup.tem.*) triradiate scale bone. Its lower margin forms the upper edge of the branchial aperture, its upper limb overlies the epiotic, while its posterior overlaps the body of the post-temporal. From the latter there passes into this bone, and continued through the dorsal part of the suborbitals, a bony mucus canal.

Overlapped by part of the suborbitals, and overlapping the hyomandibular, which is completely covered externally by it and the suborbitals, is the preoperculum (fig. 15, *pr.oper.*), with a curved anterior border, near which it is thickened for a mucus canal. Terminating dorsally in a sharp end, close to the junction of the pterotic and sphenotic, and just external to the hyomandibular articulation, its posterior border forms a longer and sharper curve than its anterior, its ventral edge therefore is nearly horizontal, and it terminates anteriorly in a rounded end.

It largely overlaps the upper edge of the interoperculum (*inter.oper.*), an elongated bone with its rounded anterior end slightly notched in the middle. The interoperculum overlaps with its lower border the posterior branchiostegal, and with its posterior end the anterior edge of the suboperculum.

The latter (*sub.oper.*) is a somewhat oval-shaped bone, inclining upwards and backwards. At its upper anterior part is a process, which is

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* See reference to this in Parker's "Shoulder Girdle," *Phil. Trans.*

attached to the upper posterior corner of the interoperculum. Its upper anterior edge is overlapped by the lower edge of the oblong operculum (*oper.*). The upper corner of the latter is rounded, while its lower corners are somewhat sharp, the lower border forming a slightly curved descending line. Near its upper end, and on its anterior edge it is thickened to form a cup-shaped cavity for articulation with the hyomandibular. All the opercular bones are thin striated laminæ, bearing a close resemblance in structure to the scales.

Articulating with the ventral margin of the hyomandibular and symplectic at their junction, is a short rod-shaped interhyal (Pl. XV. fig. 1, *i.hy.*), the ventral end of which is connected with the posterior upper corner of the epihyal. The epihyal (*ep.hy.*) has its posterior end somewhat pointedly rounded, with a small articular surface on its upper posterior corner for the interhyal. It has attached loosely to its outer lower surface the three posterior branchiostegal rays. Its anterior edge is connected with the longer flat ceratohyal, which has its lower edge curved upwards or emarginated. Near its edge the ceratohyal is perforated by four or five small foramina, through which pass the proximal sharp ends of the five anterior branchiostegal rays. The bone completing the lower edge of these perforations is sometimes very slight, or even wanting, so that the rays may appear to pass directly to the inner side of the ceratohyal.

The eight branchiostegal rays become slightly shorter the one than the other from before backwards. The posterior (outer) three (*brs.r.*) are simple flat bones. The posterior widest, and with a straight anterior edge, and curved posteriorly, is slightly wider at its distal than its proximal extremity. The penultimate ray is narrower, and nearly the same width throughout. That anterior to it terminates in a sharp point. These have all more or less of a short process from their upper ends, by which they more particularly are attached to the epihyal. The five anterior rays are more rod-like and slender, and in place of overlapping each other like the posterior three, they lie apart, simply connected by the intervening membrane. At the anterior end each ceratohyal is terminated by a pair of thick short hypohyals, over and projecting in front of which is the lozenze-shaped cartilaginous tongue, bearing on its upper median surface a narrow oval thin bony scale, provided with a double series of small teeth; while posteriorly there projects backwards in the ventral middle line the long flat urohyal bone, widest posteriorly, with a rounded end, and articulating anteriorly by a small nodular head..

From the cartilaginous tongue extends backwards the short basibranchial of the 1st gill arch. It has a ventral median ridge, and articulates with the 1st hypobranchials on each side, the gill laminæ which lie in the postero-ventral groove of the latter running on to its sides. From the basibranchial there pass up on each side the longer hypobranchials, succeeded by the still longer cerato-branchials, beyond which, and forming an acute angle with them, are the epibranchials of similar length to the hypobranchials; the latter gives off a short upstanding process from its posterior margin near its tip, which is terminated by a short small outstanding pharyngobranchial. The first three pieces are grooved on their under surfaces, and the joint between each formed by a small intervening cartilage. Behind, and separated from the 1st basibranchial by a narrow cartilage comes the second, which is double the length of the first, and hollowed underneath like the remainder of the arch for the reception of the blood-vessels, gill filaments, &c. The second hypo-, cerato- and epi-branchials are shorter than the first, and wider at their distal (dorsal) ends, where, as before, a short process projects dorsally. The end of this epibranchial meets a considerably larger pharyngobranchial than the first, which passes backwards, its tip almost touching the root of the 1st, and a corresponding process on it underlapping (anterior face) and being closely attached to the 1st epibranchial process. The pharyngobranchial is also partly grooved for the gill filaments. The median basibranchial of the 3rd arch also is ossified, but only the anterior tips of the smaller pointed hypobranchials reach its posterior end, they themselves in their main portion being separated from one another by a central cartilaginous rod, which extends behind the 3rd basal piece. The 3rd cerato- and epi-branchials are nearly as the 2nd, and of similar form; but the pharyngobranchial, while firmly attached near its middle to the 2nd epibranchial process, and grooved up to this point, is continued forwards as far again, as a delicate needle-like rod lying close on the under surface of the 2nd pharyngobranchial, and reaching nearly to the tip of the latter. The 4th arch has a cartilaginous median portion, and no distinct hypobranchials; but the proximal ends of the ceratobranchials are wider than the others, each running forwards in a short point, which probably represents the hypobranchials, the base of these processes being indeed less completely ossified than the remainder. The epibranchial of this arch is totally different from the others, being a flat square bone with a short blunt process from its distal outer corner, which is continued by a short cartilaginous pharyngobranchial strip to connect it with the preceding epibranchial. The 5th arch is represented by the single ceratohyal (lower pharyngeal) (*ph. 5*), which articulates proximally with the median cartilage (which latter is continued backwards as a posteriorly pointed cartilaginous rod), and is attached distally to the posterior outer corner of the expanded 4th epibranchial. It is not grooved, and does not bear gill filaments. Nearly the whole length of the ossified basibranchials is covered by two elongated narrow scales of bone, bearing an irregular double row of small teeth. The antero-internal faces of the epi-, cerato-, hypo- and part of the basi-branchials of the first four arches support a band of tissue, giving attachment to a series of long gill rakers. These are flattened from side to side, pointed at their extremities, widened at their base, where they sit on the arch, and are further secured by sending down partly across the inner side of the arch a sharp narrow process similar to that found on the cartilaginous rods supporting the gill filaments. Along their inner edge is situated a double row of minute teeth. The gill rakers of the first arch are the longest, those on its ceratobranchial division being about two-thirds the length of that segment; those on the other arches are only about one-fourth of the length of the ceratohyals, being sufficiently long to fully cover the interspace between the arches. The 4th ceratobranchial bears in addition, and projecting backwards, a series of specially short rakers, which are opposed to a row of similar ones on the anterior face of the 5th ceratobranchial, and which occupy the place of the long rakers of the other arches.

The number of gill rakers on the first arch is about 66, there being about 27 on the cerato, and 21 on the epibranchial portion; the second arch has 60, 22 being on the cerato, 22 on the epibranchial; the third arch bears 46, 20 on the cerato, 16 on the epibranchial; the 4th arch has 17 on the cerato, 12 on the epibranchial, 34 in all, while on its posterior face it carries the 16 short rakers; those on the 5th ceratobranchial number about 12.

Apart from other anatomical characters (the swim-bladder, &c.), the herring shows a considerable similarity to the salmon in its skeleton. As with the tail, so its skull seems to approach nearly to that of the salmon, but the cranial ossification is much more complete. The arrangement of the palato-pterygoid and hyoid arches is very similar, as are also the otic bones, the opisthotic in both cases being small—the more prominent opisthotic of the salmon being very similar to the pilchard's. The basisphenoid, however, shows a considerable variation from its more strongly developed counterpart in the salmon. The internasal cavity of the salmon is wanting in the herring, and its cartilaginous interorbital septum appears in the latter as membranous. The skeletons of the shad, pilchard, and sprat bear a close resemblance to that of the herring.

THE SHAD (*Clupea finta*).

The shad has a similar number of vertebræ to the herring ; I have counted 56, Day records 55 to 56, and Günther 56. The additional degenerated vertebræ around the upturned part of the notochord, and the arrangement of the bones (neural and hypural) of the tail also are similar. The hæmal articular processes (anterior ventral zygapophyses) become longer and longer to nearly the end of the vertebral column ; from about the 43rd vertebra to the end they are so long as not only to pass forwards beyond (and beneath or inside) the posterior vertebral zygapophyses, but they extend forwards so far as to allow of their tips touching the base of the previous hæmapophysis; they each thus lie parallel to, and along the whole length of the preceding vertebra, and so closely applied to it as to almost appear part thereof. The neural articular processes are nearly as pronounced, and the posterior part of the vertebral column is, therefore, correspondingly laterally strengthened. The first complete hæmal arch is situated on the 20th vertebra, and the ribs, therefore, are fewer than in the herring, there being 33 (?) in all. The lateral processes of the vertebræ appear as far back as about the 23rd vertebra.

My enumeration of the fin rays corresponds with Günther's and Day's, viz., D 19, P 16–17, V 9, A 23, C 19. In the shoulder girdle the coracoid is much less perforated than the herring's, the scapula forms by a ventral process about two-thirds of the scapular foramen, and the 1st (dorsal) ray of the pectoral fin is relatively much stronger, less segmented, and its inner half articulates with the scapula by a relatively stronger head than occurs with the herring's.

The bones of the skull are relatively stronger than those of the herring, with apparently a corresponding reduction in the amount of cartilage present.

The posterior end of the skull is rather narrower. The supraoccipital spine is, though still small, sharper and more pronounced than the herring's, and the perforation for the posterior semicircular canal is complete. The posterior projection or elbow of the epiotic has a sharper termination, so as to form a distinct process, to which is attached a more numerously divided muscular ossification than the simple bifurcated one of the herring. Along the epiotic and exoccipital several others of these spines are attached. The side of the cranium (pterotic and sphenotic bones) is longer than the herring's. The anterior process of the sphenotic is broader, and though sharp-pointed, is less spike-like than the herring's ; on the other hand, the posterior pterotic process is longer and more slender. The aperture between the sphenotic and pterotic is relatively wider and deeper. The under face of the skull formed by the exoccipitals, opisthotic and prootic, is not so depressed, and therefore the auditory fenestra faces slightly more outwards. The prootics meet in the middle ventral line by a deep interlocking suture, so that when separated the internal edge of each has a comb-like appearance.

The anterior (prootic) air-vesicle is relatively larger than the herring's, but the posterior is small, and indistinguishable externally. The duct leading through the exoccipital to it is also very small in diameter.

The point of bifurcation of this duct is at the junction of the exoccipital, pterotic and prootic, and is overlapped by the opisthotic, which is larger than the herring's, and has a much more pronounced backward process giving attachment to the inner arm of the post-temporal. The lower part of the posterior semicircular canal lies in the junction between the pterotic and exoccipital, part of its diameter being in each. The median bar of the orbito-sphenoid is much stronger than in the herring, and has its full depth where it comes off from the paired part, instead of being there as in the herring a narrow rod; it passes forwards to be closely attached to the ectethmoids, where it is again double, the two sides, however, being closely applied to each other.

The foramen below the basisphenoid is smaller, owing to the lower lateral corners (beneath the aperture for 6th nerve) having grown downwards along the sides of the alisphenoids. The basisphenoid is therefore somewhat horse-shoe shaped, with the vertical spine passing across its hollow. The alisphenoids face more outwards, and less directly forwards than do the herring's, consequently their inner edges are more anteriorly placed than in the herring, and the floor of the forebrain (continued from the alisphenoids by the orbito-sphenoids) appears to reach relatively rather further forward than does that of the herring. The alisphenoids are not so circular in outline as the herring's. The anterior edge meeting with the orbito-sphenoid is nearly vertical, their dorsal edge horizontal, the posterior also nearly vertical, while the ventral curves down from the lower anterior corner to form with the lower posterior corner a short process articulating with the prootic. The dorsal anterior corners of the paired part of the orbito-sphenoid nearly reach to the posterior processes of the ectethmoids, and they form a shallow concavity over the posterior part of the orbit, while as in the herring the median bar appears in front of them as part of the interorbital septum.

The ethmoid agrees with the herring's in having two lateral projections posteriorly covering the cornua, while it passes backwards in a pair of splint-like processes which just overlap the ectethmoids; but it differs in so far as the median anterior portion, in place of forming a single median ridge, stopping abruptly over the labials, divides into two flat processes, which diverge laterally so as to give the termination of this bone a wide V-shaped form, somewhat like that in the trout. The ectethmoids send a splint nearly halfway across the orbits, and overlapped by the frontals. They are separated by a very thin sheet of cartilage.

The parasphenoidal wings are less deep and more pointed posteriorly, and the teeth on vomer are less prominent and fewer than in the herring. The pterygoid is thicker, less splint-like, and not so acutely angled. It spreads out more at its anterior end over the cartilaginous centre of the bar. The mesopterygoid is relatively shorter; while the palatine is much stronger, thicker, and the cartilage is more completely ossified than the herring's. Its small ridge projecting into the mouth is said by Günther to have no teeth, but I have found a few slight teeth on it. The quadrate differs from the herring's in so far as, instead of being triangular, it is roughly L-shaped. The lower angle articulates with the mandible, the anterior arm with the mesopterygoid, the lower upwardly inclined arm with the metapterygoid. This form is easily explained; it occurs from the central part and postero-dorsal edge of the herring's quadrate not being ossified, leaving a membranous unossified nearly circular portion between it and the metapterygoid, which has a slight emargination on its anterior edge to form the upper margin of the foramen. The hyomandibular does not articulate along its whole upper edge with the pterotic and sphenotic, but forms a single articulation with each of these, its two upper corners only being raised into distinct condyles. The lower jaw and most of the membrane bones of the skull are like the herring's, but generally stronger. The upper surface of the frontals is much more deeply sunk posteriorly behind the forebrain, and forms there a tri-radiate-bottomed depression. The maxillæ are less sharply toothed, and the gape is relatively less, while the premaxillæ, instead of meeting mesially to form a straight anterior border, are curved inwards at their symphysis, so as to leave a rather deep notch between them, into which fits the lower jaw. This notch forms a good external specific distinction from the herring. The nasals, though not longer, are stouter than the herring's. The orbital bones are the same in number as the herring's, and the opercular apparatus is similar, except that the external face of the operculum has a striated appearance, from the presence of several mucus-canal thickenings which radiate downwards and outwards from its articular head.

The branchiostegal and branchial arrangement is like the herring's, but there is more cartilage surrounding the edge of the enlarged (4th) pharyngobranchial, and the number of rakers differ, being 12 hypo- 14 cerato- and 14 epi-branchials on the first arch; on the second, 12, 13, 12; on the the third, 12, 12, 10; and on the fourth, 3, 12, 10, the fourth also having about 14 posterior short rakers interlocking with about 10 on the fifth arch. The tongue and basi-branchials are unprovided with teeth. The urohyal has a strong median longitudinal ridge along each side.

THE PILCHARD (*Clupea pilchardus*).

In the pilchard's vertebral column there are no important variations from that of the herring except that the arrangement of the more posterior zygapophyses is more like that of the shad. I find 19 caudal rays, 18 dorsal, 17 pectoral, 8 ventral, and 18 anal, which agrees with Day's record. The vertebræ number about 52 (Day gives 50, Günther 53, Lowe 50–51), and the first complete hæmal arch is on the 21st. There are 32 ribs. The loose bones attached to the back of the skull are more numerous than in the shad or herring, there being a great mass of them principally arising from only one head attached to the posterior tip of the epiotic.

The skull is rather narrower posteriorly, and considerably shallower from above downwards. The single hollow formed on the posterior external surface slightly above and on each side of the foramen magnum by the exoccipitals and epiotics in the herring is in the pilchard divided into two halves by a ridge which runs down from the inside of the epiotic 'elbow' towards the foramen, before reaching which, however, it dies away in the exoccipital. On account of the greater flatness of the cranium, the postero-lateral cavity is smaller and the dorsolateral foramen shallower. The posterior semicircular canal scarcely enters the supraoccipital. The posterior process of the pterotic is more delicate and sharper pointed, while the process of the prootic is rather longer, thinner, and rod-like, and projects more outwards. The anterior (prootic) air vesicle is more elongated (laterally) than the herring's, and the upper part of the posterior air vesicle seen externally at the base of the postero-lateral cavity, and also showing beneath the edge of the pterotic, is larger and more prominent. This is owing to the single spherical vesicle of the herring having nearly become double in the pilchard, the upper and larger part being connected to the smaller and lower by a narrow aperture. It is with the lower chamber that the duct from the swim-bladder communicates, and it is it that the horizontal semicircular canal principally encircles. The basisphenoid is similar to the herring's, but it has a stronger vertical spine, and the transverse part is more like the salmon's, sloping slightly upwards to each side. The part surrounding the foramen of the oculo-motor nerve below is a mere process. The thickening of this process to an equal size with the upper transverse part causes the herring's basisphenoidal arms to appear horizontal; while its great enlargement in the shad causes the bone to appear to grow downwards on each side, and thus gives it its horse-shoe shaped form. The anterior supraorbital part of the orbito-sphenoid is single for only a small part in the middle of its length, although the two sides lie close to one another. It passes back like the shad's, to meet the median part of the ectethmoids. The mesethmoidal ridge shows only the slightest emargination at its anterior tip, being therefore much more like the herring's than the shad's; there is a foramen underneath or through the ridge, just behind its anterior end. The ectethmoids are even of a more irregular shape than the herring's. From the median part there projects downwards and laterally a thin flat process forming the anterior upper boundary of the orbit; lying across the upper corner of this process, and mostly projecting backwards over the eye, is a thin depressed scale-like piece; while from its inner anterior corner there project two sharp-pointed narrow processes, one dorsal lapping forwards externally over the ethmoidal splints, and one passing downwards and outwards along the ethmo-palatine cartilage. The parasphenoidal wings are longer, less deep, and more pointed than the herring's. The vomer, long and delicate, has no teeth. The nasal is larger than the herring's, and the internasal cartilage is very thin, and the nasal capsules smaller than in the herring. The frontals are wider anteriorly, and therefore closer to one another mesially. The form of the quadrate and metapterygoid is intermediate to those of the herring and shad, the foramen seen in the shad being in the pilchard smaller, and forming a narrow slit between the quadrate and metapterygoid; the median part of these bones is, however, very delicate and thin. The symplectic is a delicate rod. The tongue has a bony scale, bearing very slight teeth (Day and Günther say the tongue has no teeth). The neck of the maxilla is more slender, the lateral part narrower and very slightly if at all toothed. The septo-maxillary is wider and shorter, scarcely attached to the maxilla, but overlapping and fixed to the jugal with its lower end. The pre- and inter-opercular bones are very firmly attached to the articular. The operculum has about six radiating ridges on it like those of the shad, and has a more horizontal lower margin, while the operculum is of an oblong form, and nearly right angled. The anterior branchiostegals are rather wider, less rod-like, than the herring's. The posterior one is peculiar in being continued with a curve upwards and backwards of nearly its full width to underlap the suboperculum; it is therefore a longer bone than the interoperculum, though not extending quite so far forwards, and it is but loosely attached to the epihyal· I have found seven branchiostegal rays (Günther gives six, Day six to eight). The epihyal is longer relatively to the ceratohyal than is the case in the herring. The urohyal is relatively longer and less deep, but has the strong lateral ridges like the shad's. The first branchial arch has approximately 28 basi- and hypo-, 45 cerato-, and 38 epi-branchial rakers; the second arch has 45, 45, and 50 respectively; the third has 36, 50, 53; the fourth arch has 65 hypo- and cerato-, and 45 epi-branchial rakers; it has also about 35 posterior short rakers. The fourth and fifth arches are curiously modified. The fourth epibranchial (upper pharyngeal), which is flattened like the herring's, bears gill filaments and long rakers on its anterior side, and also the posterior half of a curious comb-like organ. The fifth arch has a cartilaginous epibranchial strip, which is attached to the anterior edge of the flattened 4th epibranchial, and bears the anterior half of the comb-like organ. This organ is of an oval form by the apposition of its two parts, which each have a convexo-concave form, the concavity, however, being slight, so as to leave only a small intermediate space. Each of these segments is covered from end to end by a series of transverse very close-sitting thin laminæ or teeth. These are of a V-shaped form, one arm being longer than the other, and the apex in particular being attached to the body of the organ. There are from 100 to 150 of these laminæ side by side on each segment. The whole organ, *i.e.*, the 4th posterior epibranchial comb and the 5th anterior ditto approximated, together cover the whole under surface of the 4th flattened epibranchial (or superior pharyngeal), and form a pouch lined internally by the series of teeth described.

THE SPRAT (*Clupea sprattus*).

In the sprat the vertebral column consists of only 48 vertebræ, and variations from this number seem to be fewer than is the case with the herring. The arrangement of neural and hæmal spines, ribs, and intermusculars is similar to that of the herring, but the numbers are fewer in correspondence with the reduced number of vertebræ. The ribs number about 28 in all, the first being, as in the herring, on the 3rd vertebra, and 16 only are fixed. The first complete hæmal arch is on the 18th vertebra. The prominent articular processes (zygapophyses) found in the herring, especially on the caudal portion of the column, are absent in the sprat. The transverse processes (rib appendages anteriorly) are found about as far back as the 28th vertebra. The fin rays vary in number, but the normal condition gives 16–18 dorsal, 16 or 17 pectoral, 17–19 anal, 7 ventral, and 19 caudal. The skull in its general appearance is more like the herring's than either the pilchard's or shad's, the form and arrangement of the bones forming the posterior aspect and side of the cranium being very similar. There is a relatively more prominent anterior air vesicle situated in the prootic, and the auditory fenestra extends nearer to it than does the herring's; but no posterior air vesicle is developed. The supraoccipital has a distinct fold on its internal surface beneath the external dorsal laterally radiating ridge, and the two sides of this fold almost or altogether meet to form a short canal similar to the fold or complete canal formed as in the herring on its posterior outer surface and continuous with the epiotic. The latter, as in the herring, contains the upper part of the posterior semicircular canal, while the former embraces the upper part of the anterior horizontal canal. These apertures open close together just above the junction of the anterior and posterior membranous canals. The opisthotic is even smaller than the herring's. The basisphenoidal vertical spine is relatively rather larger than the herring's, and the parasphenoidal wings are more pointed and slightly emarginated posteriorly, like the pilchard's. The vomer has a short ventral ridge on it, but no teeth. The ethmoidal bones are like the herring's, the median ridge not being terminally bifurcated. The maxillæ are finely toothed, as are the premaxillæ, but the palate has no teeth on it. The metapterygoid has, however, on the outer side of its narrow under surface a very slight short ridge, with a few delicate teeth. These are not readily discernible inside the mouth, but if felt might be mistaken, without dissection, for palatine teeth, for the metapterygoid runs relatively far forward in the sprat, underlapping the palatine close behind the small oral ridge of which the teeth are situated. The metapterygoid of the sprat is otherwise a more prominent bone than the herring's, for it is more enlarged at its angle, very little cartilage being there left, and it sends a relatively strong process right up to the ethmo-palatine process, to which it is firmly attached. The quadrate, mesopterygoid, and hyomandibular are like the herring's, as are all the external membrane bones. The tongue bears on its median upper surface a small bony scale, with very minute teeth. Day says there are no teeth on the tongue, but with care they can be felt, and I have almost never missed seeing them if the scale is carefully removed and examined under a low power of the microscope. The first branchial arch has 16 basi- and hypo-, 20 cerato- and 14 epi-branchial rakers. The second arch bears 18, 18, and 14 respectively; the third arch, 6, 17, and 12; the fourth, about 20 rakers on its anterior and about 14 on its posterior face; while the fifth has about 10.

EXPLANATION OF THE PLATES.

Plate XV.

Fig. 1. Skeleton of herring (full size). The intermuscular bones, except the single one of the 22nd and the branched one of the 37th vertebræ, are omitted to avoid confusion. The opercular bones are removed to expose the hyoid and palato-pterygoid bars.

Plate XVI.

Fig. 2. Ventral surface of basioccipital and anterior three vertebræ.

Fig. 3. Dorsal surface of basioccipital and anterior three vertebræ.

Fig. 4. Side view of 18th vertebra and its appendages.

Fig. 5. End view (anterior) of 18th vertebra and its appendages.

Fig. 6. End view of 26th vertebra.

Fig. 7. View of inner side of 16th vertebral hæmapophysis of 200 mm. long herring (magnified).

Fig. 8. View of outer side of 16th vertebral hæmapophysis of 200 mm. long herring (magnified).

Fig. 9. View of outer side of rib head and appendage of 200 mm. long herring (magnified).

Fig. 10. Anterior aspect of 1st neural spine of 200 mm. long herring (magnified).

Fig. 11. Anterior aspect of 2nd neural spine of 200 mm. long herring (magnified).

Fig. 12. Anterior aspect of 3rd neural spine of 200 mm. long herring (magnified).

Fig. 13. Side view of anterior and posterior ends of 33rd vertebra of 40 mm. herring (× about 30).

Figs. 14, 14*a*, 14*b*. Side view of rib and appendage of 20th, 22nd, and 24th vertebræ respectively, of 40 mm. herring (magnified).

Plate XVII.

Fig. 15. Side view of head to show membrane bones.

Fig. 16. Side view of branchial arches.

Fig. 17. Dorsal view of branchial arches (the dorsal part of the left arches folded out).

Fig. 18. Side view of skull (opercular, &c., bones removed).

Fig. 19. Longitudinal section through skull (opercular, &c., bones removed).

Fig. 20. Upper aspect of skull.

Fig. 21. Under aspect of skull. (The posterior half of parasphenoid removed).

PLATE XVIII.

Fig. 22. Upper aspect of skull, with frontal, &c., membrane bones removed.

Fig. 23. Posterior view of skull.

Fig. 24. Transverse section (looking back) through posterior end of cranium (through posterior air vesicle).

Fig. 25. Transverse section (looking back) through orbit, showing anterior end of cranium in elevation).

Fig. 26. Outer aspect of left pectoral girdle.

Fig. 27. Inner aspect of left pectoral girdle.

Fig. 28. Outline (camera lucida) side view of tail of 38 mm. herring, the caudal fin rays being omitted (× about 32).

Note.—All the figures, unless otherwise stated, are twice natural size.

Reference Letters.

a.c. articular cup for neural arch.
al. alisphenoid.
a.h.mn. anterior part of hyomandibular.
am. ampulla.
an. angular.
ar.h. articular cavity of hyomandibular.
art. articular.
a.s.ves. anterior spherical air vesicle.
au.f. auditory fenestra.
b.ar. branchial arches.
b.br. basibranchial.
b.im. branched intermuscular bone.
b.oc. basioccipital.
b.p. basal piece of hæmal arches.
br.o. brachial ossicles (of pectoral girdle).
br.r. branchiostegal rays.
b.sph. basisphenoid.
cav. postero-lateral concavity of skull.
cav. sac. cavity containing sacculus of ear.
c.br. cerato-branchial.
cl. clavicle.
cl.h. clavicular hook.
cl.pr. clavicular process.
cor. cornu.
cr. coracoid.
den. dentary.
e.br. epibranchial (4th upper pharyngeal).
ec.eth. ectethmoid.
e.m.c. eye muscle (recti) canal.
ep. epiotic.
ep.hy. epihyal.
eth. ethmoid.
eth.r. mesethmoidal ridge.
eth.pal. ethmo-palatine cartilaginous boss.
ex.oc. exoccipital.
f. skin-covered interval between premaxilla and maxilla.
f.m. foramen magnum.
for. lateral foramen of skull.
fr. frontal bone.
fr.p. lateral process of frontal bone.
hæm. hæmapophysis.
h.br. hypobranchial.
hd. head of rib.
hm.n. hyomandibular.
h.s.c.c. horizontal semicircular canal.
h.z. anterior ventral (hæmal) zygapophysis.
im. intermuscular bone.
i.hy. interhyal.
in.oper. interoperculum.
j. jugal.
l. labials.
lam. posterior lamina on rib.
m.cav. median cavity in cartilage containing oblique eye muscles.
mn. mandible.
mt.pt. metapterygoid.
mx. maxilla.
na. nasal bone.
n.ap. neural appendage.
n.cap. nasal capsule.
n.sp. neural spine.
oper. operculum.
op.ot. opisthotic.
o.sph. orbito-sphenoid.
pal. palatine.
par. parietal.
p.br. pharyngo-branchials.
p.cr. post coracoid.
p.cl. 1, 2, 3. the three segments of post clavicle.
*pha.*5. lower pharyngeal bone (5th cerato-branchial).
pl.pt.car. palato-pterygoid cartilage.
p.ot. prootic.
pr. posterior process of vertebra (young).
pr.mx. premaxilla.
pr.oper. preoperculum.
p.s.s.c. posterior vertical semicircular canal.
p.sph.w. posterior wings of parasphenoid.
ps.ves. posterior spherical air vesicle.
p.tem. post-temporal.
pt.f. part of prootic on which rests the pituitary body.
pt. pterygoid.

pt.ot. pterotic.
p.z. posterior dorsal zygapophysis.
qu. quadrate.
r.ap. rib appendage (transverse process).
sc. scapula.
s.cl. 1, 2. parsixo supraclavicle
s.mx. septom altlary.
sp. supraoccipital spine.
sp.ot. sphenotic.
s.oc. supraoccipital.
sub.oper. suboperculum.
sup.or. supraorbital.
sup.tem. supratemporal.
sym. symplectic.
teg. cartilaginous tegment.
ton. tongue.
tr.c. trabecular cornu.
tr.car. triangular dorsal cartilage.
vo. vomer.
iii., iv., ix., x. nerve foramina.
1, 2, 3, 4, 5, 6. suborbital bones.

APPENDIX F.—No. VIII.

REPORT as to VARIETY among the HERRINGS of the SCOTTISH COASTS. PART II. By J. DUNCAN MATTHEWS, F.R.S.E.

In the previous part of this paper I dealt with the variations occurring in the principal external characters of the herring as each appeared separately, that is to say the variations of each character were ascertained for the herring generally, but without respect to the conditions of variations in any or all of the characters. It is clear that the normal condition of any one character, or the prevalence more or less common of certain forms of it as it was found in the herrings as a class, would not be increased when it came to be arranged, in terms of its constant combination with certain other definite characters, especially if these others were subject to variation. In ascertaining therefore how far what may be called the normal and extraordinary forms or conditions affecting the various characters are found in combination on the herrings, the percentage of the latter given in the first part of this paper are almost sure to be reduced. While this does not affect the absolute conditions in which the various characters are found, it may have considerable influence in determining whether the individuals concerned are to be considered as of different races or species; and this is always strengthened as the number of characters included in the combination is increased.

If any great variations of two or more characters were found to exist in the fish examined, it might be expected that we would find particular extremes of these generally common to certain of the fish, and this would be a good guide in determining their relationship; but while my first paper showed that the more or less variable common ground of certain characters held as a rule a somewhat different position in the summer as opposed to the winter herrings, the extremes of the variations found were not so very great in themselves, or so invariably present in the proper fish as to settle definitively whether or not they involved distinct races of the herring presenting them.

The further examination of the characters already dealt with, but taken in combination with one or more others, while expectedly reducing somewhat the value of the percentages of herring presenting them as given in my former paper, do not seem to so seriously affect the results there recorded as to alter the probability of the conclusions arrived at; but it must be remembered that so far as they go they do slightly tend to reduce the probability of the distinction of species considered to exist between the winter and summer herrings. On the other hand this reduction strengthens the opinion that there is no real racial distinction between the herrings of different localities around our coasts in these respective seasons.

The only combinations which in the comparatively narrow variations recorded have much interest, or indeed are common enough to be of any value, are those of two characters. When the combination of certain definite conditions in more than two characters on the same fish is looked for, the number of individuals having what may be called the normal state of these in combination is so much reduced as to lead to results of no special value. This of course depends much on the amount of variability affecting the characters, and especially on the artificial divisions of such which we must make for the purposes of comparison. In Heincke's paper the variability of each is divided into three classes, and this may be sufficient where the amount of variation in the whole of the fish examined is so great as to point to the probability of its representing a distinction of races. In other cases, however, such as we have to deal with, the divisions to be reliable should be more numerous. We have in most of the characters a more or less common ground of variation, *i.e.*, a region in which the character appears so commonly as to be entitled to the term normal, and an extreme of variation on one or both sides of this, and more or less great. By dividing the total variation into three equal divisions we perhaps in some cases include the normal in the first, in others in the second, or it may be in the third division. This would not necessarily be very confusing, but further, as in some of my cases, part of the normal cases would be included with one extreme of variation, part—probably an entirely different quantity—with another. If for facility in the investigation, so few artificial divisions of variation as three are used, they should be not equal in extent, but such as to cover a normal condition and an upper and lower extreme of variation, except where the variation is equally spread over the individuals. It has to be noted that with regard to every one of the characters—position of dorsal and anal fin centres, position of pelvic and pectoral fins, length of head, tail, dorsal and anal fins—there is in no case a marked division between the number of fish exhibiting each grade of variation. We never find either of the extremes of the ground of variation affecting a large body of the fish, while only a small number may be possessed of the intermediate condition. Taking the summer and winter fish separately, or both combined, we invariably find that the majority have a central ground of variation, while the numbers decrease gradually to the extreme on each side of this common area. Had a considerable portion of the fish been found showing one extreme of two or more characters, while another set presented a markedly separate condition it would be almost certain evidence of racial distinction, but none such is to be found in the herrings I have examined. Moreover, in every case the commoner condition of these characters in the summer fish—although they may, when compared with the winter, show a more or less striking divergence in any particular direction—are found either identical with or overlapping, or, at most, adjacent to the similar condition as found in the winter fish. Hence, if we combine the summer and winter fish, we either find no alteration in the result, or we only find that the commoner, and, as has been said, the central ground of variation is somewhat enlarged.

It is quite true that we may consider it a ground for viewing fish as of distinct races in the cases where we find, *e.g.*, in Table XXV., some fish with the centre of the dorsal fin holding the position of ·448 to ·460 of the body length, while others have it from ·533 to ·545, but we see that these extreme conditions are connected by a gradually increasing number of those in which the intermediate condition of the character is found. Hence it seems more probable that these extremes do not represent any real racial distinction, but are merely the outlying exaggerations of the typical condition. In addition, an extended investigation of the number of herrings representing each degree of the variation—a modified example of which is seen in Table XXIV., where the ground of variation is divided into eight classes—shows us the difficulty or even impossibility of fixing on any distinct line of racial demarcation, for up to a considerable limit we find the same gradual increase towards the centre of variation occurring. Consequently there is no reason why, if we form two or three races, we may not, from these data, form a dozen. If we separate, however, the summer from the winter fish, and examine them in this light, we do in some respects find reason to think such a racial distinction may be a fact. Where the difference between the summer and winter fish is not at all or only slightly marked, as in the case of the head, we find, as of course might be expected, that this occurs in similar combination with the other characters, both in the winter and summer fish. But where we find a distinction between the summer and winter fish in respect to any two characters, it will generally be found that the proportional form which the combination takes among the winter is held also among the summer, although of course not necessarily in the same actual condition—a ground, I think, rather for doubting their racial distinction than otherwise. The examination then of a large number of the different combinations in which two characters are found on the individual fish, leads me to the conclusion that no racial distinction is shown by these alone, *i.e.*, when the season in which they were caught is ignored, for there is a gradation towards each extreme of the variations which connects all the fish together. This is more marked the greater we make the number of divisions indicating the variations. When we come to a combination of more than two characters, the third character is found so scattered throughout the combinations of the others that no value can be placed on it. Taking all the fish, both summer and winter, and tabulating them according to the combination of the dorsal and anal fin positions as in Table XXXI., we see that from those with the most anterior dorsal combined with the most anterior anal position, there is a gradation towards those on which the median position is represented, and from them to those fish with both fins in their most backward position. This, while it may be due to variation not altogether irregular but altering according to the growth of the fish, may also indicate a racial distinction, the line of demarcation between which it would be difficult to fix, on account of the comparative regularity of the variation, and of the great predominance of the median position. We apply then another combination, say the position of the pectoral fin. If there is racial distinction we may expect to find certain conditions of the pectoral fin combining pretty regularly with certain definite combinations of the dorsal and anal, while the other conditions of the pectoral would be found present with separate and distinct grounds of dorsal and anal variation. At least, we should expect to find most, if not all those fish which possessed the pectoral fin of one extreme of variation, distinctly separated in the position of their dorsal and anal fins from those which possessed the pectoral fin in its opposite extreme position. If not, we can only conclude that the pectoral fin varies indiscriminately and irrespective of the condition of the dorsal and anal, and is, therefore, not of racial value. Such, in the herrings I have examined, is actually found to be the case. Dividing the ground of variation of the position of the pectoral fin into four classes (I have done it with eight classes, which gives similar but even clearer evidence), it is found that those fish in the first division, *i.e.*, with the fin in its most anterior position on the body, present all forms of combination of the position of dorsal and anal fins, from those which have the dorsal and anal fins in their most extreme anterior position to those which have them in the most posterior. The very same remark applies to those in the fourth division with the pectoral fin in its most posterior position. This is the more remarkable since very few of the fish, comparatively, have the fin in these extreme forms. A modified example of this follows. For instance if we divide the amount of variation of the dorsal, anal, and pectoral fin positions into two moieties the one indicating a position anterior and the other a position posterior to the centre of the area of variation, and form with these the different triple combinations which are possible, we find the result expressed in the following table. It seems to give no evidence of special racial distinction, the pectoral fin being, in respect to its position, combined in nearly equal numbers with most of the combinations of dorsal and anal fin positions.

TABLE XXIII., showing on what percentage of the Mature Herrings various combinations of the relative positions which the Dorsal, Anal, and Pectoral Fins occupy on the Body, are met with.

Position of Dorsal Fin,	Anterior	Anterior	Anterior	Anterior	Posterior	Posterior	Posterior	Posterior
Position of Anal Fin,	Anterior	Anterior	Posterior	Posterior	Anterior	Anterior	Posterior	Posterior
Position of Pectoral Fin,	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior	Anterior	Posterior
Percentage of Herrings, with the triple combination, . . .	18·7	15·5	13·0	4·4	6·1	18·7	8·7	14·8
Percentage of Pectoral Fin position to each double combination of Dorsal and Anal Fins, . . .	54·7	45·3	75·0	25·0	24·7	75·3	37·0	63·0

The pectoral fin then gives no support to the supposition that there may be a racial distinction between the various fish in either season. So it is with the other more important characters, as the commonest ground holds in all cases a median position in the whole extent of the variation. Of course the larger proportion of the fish show a combination of these, but in no case is the commonest ground found entirely in combination with the commonest ground of other characters. Thus the extreme conditions of any character are found not to be restricted to fish showing the extremes of any other such, but encroach on the commonest ground of others, or in many cases are even combined with both extremes of one or more others.

As I have already stated, no distinction sufficient for the determination of more than one race, can be found among the herring of any particular localities, but when we examine them as separated according to the seasons in which they were caught, we do find a small difference in some respects. This was stated for the herring as a whole, irrespective of size, but when we class them according to the length of their bodies as in Tables XXIV. to XXX., we find that the remark holds good for every size. Now if we take the summer and winter fish separately, and class them according to the date of their capture, say each of the three months of both seasons, we do not find that this circumstance holds good. Of course we find the characters varying at these times over the same ground, but the fish presenting them are found not to be confined to any one month—not even to show the slight tendency in that direction, which we find between the summer and winter herrings. The variations appear to be indiscriminately present on fish of the same date of catch and in the same shoal. Since the fish with the dorsal fin in its extreme positions are not to be considered separate races, because they are found intimately mixed up together and not presenting such special combinations of characters as to support this assumption, it may be questioned whether the summer and winter fish, both of which fall within the same extremes of variation, are to be considered as such. The circumstance that a similar slight distinction between the herring of the two seasons is found in respect to the position of the dorsal, anal, and pectoral fins, the two former being in general more backward, and the latter more anterior in the fish of summer than of winter, however, strengthens the assumption. But the distinction is so small, and so many fish are found in both seasons with these characters identical even in some cases to the greatest extremes of variability, that it would not be surprising to find further prolonged examination of the fish do away with this apparent distinction as a constant seasonal occurrence.

Apart from this question of race, however, the examination of these herrings gives some interesting results in showing to what extent variations in the characters are due to the size of the fish,—and the following tables are prepared in order to show this.

Of course these tables must be looked at in the way of ascertaining the general tendency towards any particular condition of a character, and are not to be expected to show an absolutely exact gradation in the particular direction expected ; for as we have already seen there is an unequal amount —in general not very great—of variation in all the characters investigated, which partially obscures the general rule applicable to each. This variation can only be expressed as individual variation, and may arise from various circumstances, partly no doubt of heredity, as well as the environment especially during their development and early life, but may differently affect many fish developed and living under exactly the same circumstances, or even produced by the same parent.

In the tables I have departed somewhat from the method of calculation employed in my previous paper. In it the characters are generally compared with the length of the fish, including the head length but excluding the tail. In the following tables, however, for more correct comparison, I have reduced all the measurements to a ratio of the length of the body proper, excluding, for reasons previously stated, the head length as well as that of the tail. The terminal point of the body is fixed as previously described, and the length of head excluded is anterior to the posterior dorsal ridge of the supra-occipital bone. I have already given a table indicating the proportional variation of the head length to the total length, less the caudal fin length, but no indication was given of the correctness of the general statement there made, that the head did not increase in length at an equal rate with increase in the body length ; a consequence of which is that taking into account the mature (sexually) fish only, the shorter of these are found as a rule to have the longer head. This is found to occur in both the summer and winter herrings.

If the figures showing this fact were artificially collected into one or two sets of percentages, it might be supposed therefrom that possibly the difference between the head length in the larger and smaller fish indicated a difference in race, but the greater the number of classes into which we collect the fish for the purpose of comparison—*i.e.*, the nearer we approach to an individual examination of them—the more do we see how gradual is the change in the ratio. Thus, if we put it down to racial causes, we must suppose an absurdly large number of these. Moreover, an examination of the circumstances under which the herrings exhibiting these varying characters were procured, effectually disproves this, for in fish of all the varying sizes procured at one and the same time and place, we find a corresponding variation in the head length, and most of the other characters. It seems quite clear, therefore—even without examination of the head of the immature fish, which shows a still less ratio to the body length than obtains among the mature, although subject to the variation and overlapping found to occur in nearly all the characters,—that this decrease in the proportional length of the head to the length of body is a result of increase of size, and presumably, therefore, of the age of the herring, and is not an indication merely of variety.

To express this the more clearly, the extent of variation is divided in the following table into eight divisions.

In Part I. I suggested that, so far as the inquiry had gone, it seemed to give evidence of there being some racial distinction between the herrings of summer and winter. We may examine this in light of the above table. We see there that the head does not increase in size at the same rate as the body of the herring, and if we consider the percentage to the total of each size received, it is found that winter fish were larger as a whole than those procured in summer. Of the winter fish referred to, 42 per cent. were over 210 mm. in body length, while in summer only 14 per cent. were so. Now, if the various columns of head ratios for each division of fish length in winter are compared with those of summer, it will be perceived that, although both the summer and winter fish agree pretty closely in the relative size of their heads, yet there is a tendency among the winter fish towards the possession of a proportionally longer head than belongs to the summer herrings. It has been previously stated, as a result of the examination of this feature in the fish *en masse*, that the percentage with the larger size of head was greatest among the winter herrings, and the table (XXIV.), which sufficiently shows this for all lengths of fish, confirms the statement. As the percentage of the smaller fish was greater in summer than winter, the distinction was partially obscured.

While such a small difference alone as occurs between the head length of the winter and summer fish does not warrant us in concluding it to be a good racial distinction, yet the fact brought out by the tables, that the difference applies to nearly all the gradations of size, makes it worthy of consideration as such, if other evidences can be brought forward. A similar table of the head length in the smaller and immature fish bears out the statement that the increase in length of head is not equal to that of the body length. I refrain from appending it, as it fails in giving a fair comparison between these fish in summer and winter, because a sufficient number of examples was not collected, only such being examined as were casually procured, while many of those in winter being got in sprat nets were too small for comparison with the larger winter immature fish.

The most evident difference, small although it may be thought, between the summer and winter herring has been stated to occur in the position of the dorsal fin. Table XXV. shows the frequency of the various dorsal fin-centre positions on the mature herrings of every 20 mm. difference in body length.

From the table it appears that there is a very slight gradation backwards in the position of the fin from the smaller to the larger fish. But the most important point to notice is that in herrings of all the lengths the common position of the dorsal fin centre is a stage further back on the summer than on the winter herrings. It will be seen, too, that the whole ground of variation is wider among the winter than among the summer herrings. Of course it might be expected, from the evidence given above, that the position in the summer fish would not have an extreme range of variation anterior to the normal position so great as would the winter herrings. But for the same reason it would be expected to exceed the variation on the winter fish in backward extent. It does not, however, and in fact, of all the fish examined, a slightly larger percentage of the winter fish fell into the last division—with fin centre from ·533 to ·545 of the body length—than of those of the summer season. This, of course, detracts somewhat from the value of the suggestion that the position of the dorsal fin is a distinguishing character between the summer and winter herrings.

If it is doubtful whether the dorsal fin position varies directly with the length of the body, it is more so in the case of the position of the anal fin (Table XXVI.), which seems to hold much the same position, and to

TABLE XXIV., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to ratio of Head Length to Body Length (less head and caudal fin).

		Winter.								Summer.							
Ratio of Head Length.		·147 to ·161	·162 to ·176	·177 to ·191	·192 to ·206	·207 to ·221	·222 to ·236	·237 to ·251	·252 to ·266	·147 to ·161	·162 to ·176	·177 to ·191	·192 to ·206	·207 to ·221	·222 to ·236	·237 to ·251	·252 to ·266
Length of Body.	mm. 150 to 169	% 5·3	% 5·3	% 15·8	% 36·8	% 31·6	% 5·3	% ·3	% ...	% ...	% 3·6	% 25·0	% 64·2	% 3·6	% 3·6	% ...	% ...
	170 to 189	...	11·8	47·4	31·5	6·6	2·6	...	...	·8	13·5	48·2	32·5	5·0	...	...	...
	190 to 209	2·6	15·8	50·0	26·3	2·6	1·3	1·3	...	·8	24·5	52·3	22·4	...	...	...	...
	210 to 229	7·0	27·0	50·6	15·4	...	...	...	...	4·2	46·0	33·0	12·6	4·2	...	...	...
	230 to 249	12·8	51·3	28·2	7·7	...	...	...	...	...	87·5	12·5	...	...	...	...	...
Percentage of all Lengths.		5·5	22·2	38·2	23·5	8·2	1·8	·3	...	1·1	35·0	34·2	26·4	2·6	·7	...	...

cover an equal extent of variation, whatever the length of the herring may be.

The more backward position of the anal fin centre in the summer time as compared with those of winter is generally less striking than in the case of the dorsal fin—the figures indeed not showing any such difference

TABLE XXV., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to ratio of position of Centre of Dorsal Fin to Body Length (less head and caudal fin).

		Winter.								Summer.							
	Ratio of Fin Position.	·448 to ·460	·461 to ·472	·473 to ·484	·485 to ·496	·497 to ·508	·509 to ·520	·521 to ·532	·533 to ·545	·448 to ·460	·461 to ·472	·473 to ·484	·485 to ·496	·497 to ·508	·509 to ·520	·521 to ·532	·533 to ·545
Length of Body.	mm. 150 to 169	% ...	% 5·7	% 33·3	% 33·3	% 16·6	% 11·1	% ...	% ...	% ...	% ...	% 10·4	% 34·4	% 38·0	% 17·2	% ...	% ...
	170 to 189	5·4	6·8	9·6	38·4	31·5	8·3	...	...	...	...	5·6	20·5	25·5	36·2	11·4	·8
	190 to 209	1·3	8·1	8·1	33·7	23·2	16·2	8·1	1·3	...	...	...	16·5	28·2	44·2	9·0	2·1
	210 to 229	1·1	3·5	10·5	32·1	26·4	17·2	5·7	3·5	...	...	...	4·1	28·5	44·9	20·4	2·1
	230 to 249	...	...	2·4	24·4	17·0	36·6	17·2	2·4	...	...	...	...	14·3	28·5	57·2	...
Percentage of all Lengths.		1·6	4·8	12·8	32·4	22·9	17·9	6·2	1·4	...	...	3·2	15·1	26·9	34·2	19·6	1·0

among the shorter fish—but the considerably larger number of summer than of winter fish with the relatively far-back fin is noticeable.

TABLE XXVI., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to ratio of position of Centre of Anal Fin to Body Length (less head and caudal fin).

		Winter.								Summer.							
Ratio of Fin Position.		·751 to ·762	·763 to ·773	·774 to ·784	·785 to ·795	·796 to ·806	·807 to ·817	·818 to ·828	·829 to ·839	·751 to ·762	·763 to ·773	·774 to ·784	·785 to ·795	·796 to ·806	·807 to ·817	·818 to ·828	·829 to ·839
Length of Body.	mm. 150 to 169	°/o ...	°/o 11·1	°/o 5·6	°/o 33·3	°/o 33·3	°/o 11·1	°/o 5·6	°/o ...	°/o 3·6	°/o 10·7	°/o 14·3	°/o 21·4	°/o 32·1	°/o 10·7	°/o 7·2	°/o ...
	170 to 189	2·9	12·8	32·8	21·5	25·7	4·3	...	...	·7	4·2	5·7	19·0	29·5	22·5	14·8	3·5
	190 to 209	1·4	11·4	24·3	24·3	25·7	8·6	2·9	1·4	·7	1·4	5·4	15·6	31·3	26·5	13·6	5·5
	210 to 229	...	10·8	22·9	22·9	25·3	14·4	2·4	1·2	...	...	...	10·8	39·1	24·0	19·6	6·5
	230 to 249	...	2·6	13·2	29·0	31·6	21·0	...	2·6	...	...	10·0	10·0	30·0	20·0	30·0	...
Percentage of all Lengths.		·9	9·7	19·8	26·2	28·3	11·9	2·2	1·0	1·0	3·3	7·1	15·4	32·4	20·7	17·0	3·1

Table XXVII. gives the position of the pectoral fin for the various body lengths of the fish. The extremes of the variation seem to be represented in a larger number of the fish than is usual with the other characters. The length of the fish does not seem to have any special relation to the position of this fin. While the more common position of the fin in the winter differs very little from that in the summer herring, there is a larger percentage among the former,—as much as 12 per cent.—with the fin in its more backward position than among the summer fish, where the percentage of those with this character reaches only 3.

TABLE XXVII., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to proportional position of Pectoral Fin to Body Length (less Head and Caudal Fin).

		Winter.								Summer.							
	Ratio of Fin Position.	·032 to ·040	·041 to ·049	·050 to ·058	·059 to ·067	·068 to ·076	·077 to ·085	·086 to ·094	·095 to ·103	·032 to ·040	·041 to ·049	·050 to ·058	·059 to ·067	·068 to ·076	·077 to ·085	·086 to ·094	·095 to ·103
Length of Body.	mm. 150 to 169	% 5·6	% 11·1	% 11·1	% 22·2	% 16·7	% 22·2	% ...	% 11·1	% 11·2	% 14·8	% 3·7	% 37·0	% 29·6	% 3·7	% ...	% ...
	170 to 189	5·6	9·7	16·6	15·2	26·3	8·3	11·4	6·9	8·5	13·5	23·4	24·2	19·1	7·8	3·5	...
	190 to 209	9·1	7·8	15·6	18·2	22·0	14·3	10·4	2·6	6·8	13·0	28·1	19·8	19·8	9·0	3·5	...
	210 to 229	3·6	4·7	11·7	36·4	21·2	18·8	1·2	2·4	8·3	12·5	20·8	31·3	16·6	6·3	...	4·2
	230 to 249	2·4	4·9	2·4	14·7	39·0	19·5	7·3	9·8	...	12·5	...	12·5	50·0	25·0	...	...
Percentage of all Lengths.		5·3	7·6	11·5	21·3	25·0	16·6	6·1	6·6	7·0	13·3	15·2	25·0	27·0	10·4	1·4	·8

Table XXVIII. gives the relative length of the dorsal fin to the body length. The extremes of variation of the length of the fin among the winter fish affects a larger number than among those of the summer season. Notwithstanding this, the majority of the winter fish have a slightly larger fin than most of the summer herrings. There is a tendency towards increase

TABLE XXVIII., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to Proportional Length of Dorsal Fin to Body Length (less Head and Caudal Fin).

		Winter.								Summer.							
	Ratio of Fin Length.	·123 to ·132	·133 to ·142	·143 to ·152	·153 to ·162	·163 to ·172	·173 to ·182	·183 to ·192	·193 to ·202	·123 to ·132	·133 to ·142	·143 to ·152	·153 to ·162	·163 to ·172	·173 to ·182	·183 to ·192	·193 to ·202
Length of Body.	mm. 150 to 169	% 5·3	% 15·8	% 26·3	% 26·3	% 21·0	% ...	% ...	% 5·3	% ...	% 3·6	% 28·5	% 39·3	% 7·2	% 17·8	% 3·6	% ...
	170 to 189	4·1	10·6	40·0	25·3	12·0	5·3	2·7	...	2·2	15·0	30·7	37·1	3·6	10·0	·7	·7
	190 to 209	3·9	20·8	40·2	14·3	9·1	10·4	1·3	...	4·2	13·9	47·2	27·7	2·8	4·2	...	...
	210 to 229	6·8	25·0	35·2	18·2	8·0	4·5	2·3	...	2·1	16·7	50·0	29·1	...	2·1	...	...
	230 to 249	7·6	31·0	41·0	10·2	5·1	5·1	...	...	...	...	75·0	25·0	...	...	...	...
Percentage of all Lengths.		5·5	20·6	36·5	19·0	11·0	5·0	1·3	1·1	1·7	9·8	46·3	31·6	2·7	6·8	·9	·2

in the basal length of the fin as the body length increases, but this is very slight, and the fin seems really to vary irrespective of the length of the fish and of its position on it.

TABLE XXIX., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to Proportional Length of Anal Fin to Body Length (less Head and Caudal Fin).

		Winter.								Summer.							
Ratio of Fin Length.		·102 to ·109	·110 to ·117	·118 to ·125	·126 to ·133	·134 to ·141	·142 to ·149	·150 to ·157	·158 to ·165	·102 to ·109	·110 to ·117	·118 to ·125	·126 to ·133	·134 to ·141	·142 to ·149	·150 to ·157	·158 to ·165
Length of Body.	mm. 150 to 169	% ...	% ...	% 16·7	% 38·8	% 16·7	% 27·8	% ...	% ...	% ...	% 3·5	% 10·4	% 20·7	% 41·3	% 17·2	% 6·9	% ...
	170 to 189	...	7·4	30·8	27·9	25·0	1·5	4·4	3·0	·7	11·0	22·6	26·2	21·9	8·8	8·8	...
	190 to 209	5·5	8·3	12·5	23·6	29·1	11·2	7·0	2·8	6·8	17·7	21·7	25·2	17·7	8·9	2·0	...
	210 to 229	1·2	7·2	10·7	27·3	35·7	10·7	3·6	3·6	10·0	12·0	18·0	26·0	32·0	2·0	...	...
	230 to 249	...	5·0	27·5	32·5	22·5	7·5	...	5·0	...	12·5	...	37·5	25·0	25·0	...	...
Percentage of all Lengths.		1·3	5·6	19·6	30 0	25·8	11·7	3·0	2·9	3·5	11·3	14·5	27·1	27·6	12·4	3·5	...

This table (XXIX.) of anal fin lengths shows no definite variation according to length of body, but there is a curious distinction, small and probably fortuitous though it be, between the summer and winter herrings, in that the smaller summer fish have a rather longer anal fin than the winter, while the larger have the reverse.

The caudal fin has been described as slightly shorter among the winter than among the summer herrings, but the method of measurement was not so exact in this case as in others. The base of the fin was taken, as already described, at the end of the scales, but the length of the fin was

TABLE XXX., showing Percentage of Mature Herrings of Progressive Lengths of Body, arranged according to Proportional Length of Caudal Fin to Body Length (less Head and Caudal Fin).

		Winter.								Summer.							
Ratio of Fin Length.		·138 to ·149	·150 to ·161	·162 to ·173	·174 to ·185	·186 to ·197	·198 to ·209	·210 to ·221	·222 to ·233	·138 to ·149	·150 to ·161	·162 to ·173	·174 to ·185	·186 to ·197	·198 to ·209	·210 to ·221	·222 to ·233
Length of Body.	mm. 150 to 169	% 11·2	% ...	% 16·7	% 27·7	% 27·7	% 16·7	% ...	% ...	% ...	% 6·9	% 6·9	% 10·2	% 38·0	% 20·7	% 13·8	% 3·5
	170 to 189	6·6	15·8	26·3	23·6	21·0	6·6	...	...	3·6	4·2	14·2	31·2	24·8	14·9	5·6	1·4
	190 to 209	2·6	13·2	33·0	35·6	9·2	2·6	3·9	...	3·4	6·7	25·6	29·7	21·0	10·8	1·4	1·4
	210 to 229	12·3	18·1	32·5	28·2	6·7	2·2	...	...	6·3	16·7	27·0	33·3	10·4	6·3	...	...
	230 to 249	15·8	15·8	42·1	23·7	2·6	...	...	...	12·5	...	62·5	...	25·0	...	...	...
Percentage of all Lengths.		9·7	12·6	30·1	27·8	13·4	5·6	·8	...	5·2	6·9	27·2	20·9	23·8	10·5	4·2	1·3

taken in a straight line to the perpendicular from its dorsal tip, and this point undoubtedly varied somewhat from its natural position according to the amount of its expansion. This source of error, however, would apply to both winter and summer herrings. The relative length of the caudal fin, as compared with the length of the head, will be seen further on. The table (XXX.) of its ratio to the body length seems to show, however, that the caudal fin increases in its relative length to the body, as the body itself increases in length.

The following tables show in numbers per cent. of the herrings, the degree of frequency with which the combinations of the variable conditions, as classified, of two characters occur. The ground of variation has been, for convenience, reduced here from the more minutely divided tables in which they were originally classified to four divisions, as these were found to present similar, if less gradual results.

TABLE XXXI., showing Percentage of Mature Herrings, arranged according to the Combinations in which are found the Relative Positions of the Dorsal and Anal Fins on the Body Length (less Head and Caudal Fin).

Ratio of Anal Fin Position.	Ratio of Dorsal Fin Position.							
	Winter.				Summer.			
	·448 to ·472	·473 to ·496	·497 to ·520	·521 to ·545	·448 to ·472	·473 to ·496	·497 to ·520	·521 to ·545
·751 to ·773	% 3·5	% 3·5	% 4·2	% ·4	% ...	% 3·3	% 1·6	% ...
·774 to ·795	3·2	23·8	18·2	2·8	...	5·0	17·0	·5
·796 to ·817	·8	15·2	17·5	3·5	...	11·0	34·3	8·2
·818 to ·839	·4	·8	·8	1·4	...	1·1	13·5	4·4

TABLE XXXII., showing Percentage of Mature Herrings, arranged according to the Combinations in which are found the Relative Position of the Dorsal Fin, and the Relative Length of the Head to the Body Length (less Head and Caudal Fin).

Ratio of Head Length.	Ratio of Dorsal Fin Position.							
	Winter.				Summer.			
	·448 to ·472	·473 to ·496	·497 to ·520	·521 to ·545	·448 to ·472	·473 to ·496	·497 to ·520	·521 to ·545
·147 to ·176	% ...	% 8·4	% 15·5	% 3·8	% ...	% 2·7	% 14·4	% 6·2
·177 to ·206	4·8	33·5	25·1	3·8	...	17·1	49·1	7·1
·207 to ·236	·3	2·8	1·4	...	...	1·4	2·0	...
·237 to ·266	·3	·3	...	...	...	...	...	...

TABLE XXXIII., showing Percentage of Mature Herrings, arranged according to the Combinations in which are found the Relative Position of the Pectoral Fin, and the Relative Length of the Head to the Body Length (less Head and Caudal Fin).

Ratio of Head Length.	Ratio of Pectoral Fin Position.							
	Winter.				Summer.			
	·032 to ·049	·050 to ·067	·068 to ·085	·086 to ·103	·032 to ·049	·050 to ·067	·068 to ·085	·086 to ·103
·147 to ·176	°/₀ ·4	°/₀ 5·0	°/₀ 15·9	°/₀ 5·4	°/₀ 1·4	°/₀ 10·0	°/₀ 10·8	°/₀ 2·2
·177 to ·206	10·5	27·8	22·7	6·4	18·1	35·6	17·8	1·1
·207 to ·236	1·4	2·0	1·4	·4	2·2	·8	...	...
·237 to ·266	·7	...	...	...	...	...	...	...

TABLE XXXIV., showing Percentage of Mature Herrings arranged according to the Combinations in which are found the Relative Lengths of the Caudal Fin and the Head to the Body Length (less Head and Caudal Fin).

Ratio of Head Length.	Ratio of Caudal Fin Length.							
	Winter.				Summer.			
	·138 to ·161	·162 to ·185	·186 to ·209	·210 to ·233	·138 to ·161	·162 to ·185	·186 to ·209	·210 to ·233
·147 to ·176	°/₀ 9·9	°/₀ 15·3	°/₀ 2·3	°/₀ ...	°/₀ 3·5	°/₀ 14·9	°/₀ 5·7	°/₀ ...
·177 to ·206	13·6	42·5	10·2	·4	6·7	35·1	27·3	3·8
·207 to ·236	...	2·7	1·7	·7	·3	1·1	1·6	...
·237 to ·266	...	...	·7	...	...	...	...	...

TABLE XXXV., showing Percentage of Mature Herrings arranged according to the Combinations in which are found the relative positions of the Pectoral and Pelvic Fins to the Body Length (less Head and Caudal Fin).

Ratio of Position of Pelvic Fin.	Ratio of Position of Pectoral Fin.							
	Winter.				Summer.			
	·032 to ·049	·050 to ·067	·068 to ·085	·086 to ·103	·032 to ·049	·050 to ·067	·068 to ·085	·086 to ·103
	°/o	°/o	°/o	°/o	°/o	°/o	°/o	°/o
·429 to ·450	2·7	3·4	2·4	·4	·8	3·8	1·3	...
·451 to ·472	6·0	22·5	16·7	8·0	12·2	20·6	9·3	·5
·473 to ·494	3·4	7·5	19·4	3·4	6·7	19·6	12·7	2·0
·495 to ·516	·4	1·4	1·7	·7	1·6	3·5	4·9	·5

There is little to be said about these tables. They show how difficult it is to discover any such evident distinction between the various fish composing the winter or summer samples, as could be called racial. It is difficult even to find a clear distinction between the summer and winter fish when we come to class them according to these combinations.

An examination of the localities from which the fish came is distinctly adverse to their being any permanent local varieties. This is seen in one respect from an examination of the position of the dorsal fin—the most strongly marked variable characteristic—on the herrings from each locality. The whole extent of variation is found represented on herrings from each locality—except, of course, those extremes which were found in only a very few examples—but even these were not confined to one single locality. Table XXXVI. shows in what position the dorsal fin was found on each coast, from which it will be perceived that every position recorded was represented on herrings from both the east and west coasts, and in nearly equal proportions of these. In addition to this, however, a more detailed examination showed that each grade, except that indicating the most extreme anterior position, came from every district—from Berwick to Wick on the east, and from Ballintrae to Stornoway on the west coast, as well as from Orkney and Lerwick. Those few herrings which had the fin in the class indicating its most forward position, came from such widely separated localities as Ballantrae on the south-west, and Helmsdale on the north-east coast.

Some interest attaches to Table XXXI., in so far as it reduces the value of the position of these fins as a racial distinction. Although the anal is to a certain extent found in its more backward position, together with a similar condition in the dorsal fin, the table does not strongly corroborate what we might have expected, viz., that on the herrings with the anal fin in its more extreme position, it would always be accompanied by a corresponding extreme in the position of the dorsal fin. The anal in its most anterior position is found in combination—nearly equally distributed—with the dorsal fin in nearly every grade of the latter's variation. So to a less extent with the median and most backward positions of the anal.

TABLE XXXVI., showing Percentages of Mature Herrings caught on the East and West Coasts, arranged according to the relative position of the Dorsal Fin on the Body Length (less Head and Caudal Fin).

Ratio of Dorsal Fin Position.	Winter.		Summer.	
	East Coast.	West Coast.	East Coast.	West Coast.
	%	%	%	%
·448 to ·460	1·0	5·0	...	...
·461 to ·472	5·3	5·0	...	...
·473 to ·484	10·1	11·3	2·7	4·9
·485 to ·496	33·3	32·5	17·0	26·8
·497 to ·508	24·2	28·7	26·3	29·3
·509 to ·520	18·3	11·3	40·0	34·1
·521 to ·532	5·8	5·0	12·2	4·9
·533 to ·545	2·0	1·2	1·8	...

In Table XXXII. each grade of head seems to be combined with a certain position of the dorsal fin in much the same way among both the summer and winter herrings.

Table XXXIII. indicates that there is a tendency towards the pectoral fin holding a more anterior position where the herring has a relatively long head, than in other cases. It should be noted that, so far as the table shows this, it does so correctly; for the ratios in these tables are taken in respect to the body length only, the variable, and therefore disturbing effects of the lengths of the head and caudal fin being eliminated. This variation in the position of the pectoral fin relatively to the back of the head, and the fact that this variation extends to the whole pectoral girdle, is also clearly seen if the more laborious process is employed of taking the girdle from one fish and fitting it on another of exactly the same dimensions as to length and depth of body and position of fin, or inversely of length of head, when more or less—sometimes very considerable—variation is found to exist in the amount of the curvature of the girdle, but more especially the supra-clavicular and post-temporal portions of it.

Table XXXIV. shows similar results in respect to both the winter and summer fish, but the arrangement followed in this table does not of course show that which has been already stated as to the relative lengths of the head and tail in each season.

In respect to the absolute lengths of the head and tail of the winter fish 72 per cent. had their heads longer than their tails, 18 per cent. had the head shorter, and 10 per cent. had the head and tail of equal lengths. Of the summer herrings 53 per cent. had the head longer, 38 per cent. shorter, and 9 per cent. equal to their tail lengths.

I have already stated that the dorsal fin length generally exceeds the length of the anal fin on the same fish. The following table shows this with reference, not to their relative proportions to the body length, but as represented by their actual size in mm.

TABLE XXXVII., of Comparative Absolute Lengths of Dorsal and Anal Fins.

Length of Dorsal Fin.		Percentage of Herrings on which the Anal Fin, in actual length in mm., as compared with the Length of the Dorsal Fin, was :—				
		1 to 5 mm. Longer.	Equal in Length.	1 to 5 mm. Shorter.	5 to 10 mm. Shorter.	10 to 15 mm. Shorter.
Winter.	21 mm. to 25 mm.	·7	1·0	10·0	...	...
	26 mm. to 30 mm.	1·7	4·3	27·0	10·4	...
	31 mm. to 35 mm.	1·4	1·0	23·8	9·7	1·0
	36 mm. to 40 mm.	...	...	3·3	4·7	...
Summer.	21 mm. to 25 mm.	·5	1·6	9·0	...	...
	26 mm. to 30 mm.	1·6	2·8	42·3	18·4	...
	31 mm. to 35 mm.	...	·3	10·1	12·0	...
	36 mm. to 40 mm.	...	·3	·3	·8	...

The circumstance that so much larger a percentage of the summer herrings than of the winter had their dorsal fins of a length of from 26 mm. to 30 mm., as shown by this table, is of no importance; it merely results from there having been a greater percentage of the larger or largest size of fish among the winter herrings measured than occurred among those of summer. The figures must not be taken to indicate any difference between the fish of the two seasons, in respect to the proportion which the dorsal fin bears to the body length, and which appears in Table XXVIII.

TABLE XXXVIII.

Date of Take.	No. of Individuals in Sample.	Dorsal Fin in Extreme Anterior Position.	Dorsal Fin in Median Position.	Dorsal Fin in Extreme Posterior Position.
Jan.	Three herrings from Wick	1	1	1
,,	Six ,, ,, Helmsdale	1	2	3
,,	Six ,, ,, Anstruther	2	3	1
,,	Six ,, ,, Lybster	1	4	1
,,	Four ,, ,, Anstruther	2	1	1
Feb.	Two ,, ,, Banff	1	...	1
,,	Six ,, ,, Ballantrae	2	2	2
,,	Three ,, ,, Buckie	1	1	1
June	Six ,, ,, Stornoway	1	3	2
July	Ten ,, ,, Lybster	2	4	4
,,	Four ,, ,, Inveraray	1	2	1
Aug.	Five ,, ,, ,,	2	2	1
,,	Three ,, ,, Anstruther	...	2	1
,,	Four ,, ,, Orkney	1	1	2
,,	Six ,, ,, Aberdeen	2	2	2
Sept.	Five ,, ,, Berwick	2	2	1

How the opposite extremes of variation are found in herrings of the same shoal—an argument against there being any permanent or well-defined racial distinction among them—is shown by the position of the dorsal fin on the above examples (Table XXVIII.) from various places, and at different seasons. Each comparison—and only a few are adduced —is made between herrings *from the same catch.*

All the variations given in the above tables are deduced from the length of the body only as a standard of measurement, and the total length of the herring in its variations being made up of the three main divisions of head, body, and tail (caudal fin), the body is chosen as the standard, being the main portion of this length. It is, therefore, assumed to be invariable, at least we cannot prove it is not so except by comparison with some other standard which in its turn would appear as invariable—and the head and caudal fin lengths are excluded from this standard so that variations in total length are referred to them, and the examination of the variations in other characters is not affected thereby. In one way, however, a variation in the length of body itself might be thought to be correlated with variation in its segmentation, and that therefore an increased number of vertebræ implied an increased length of vertebral column. The examination of this feature in about an equal number of our east and west coast herrings shows no distinction between them either in respect to locality or season, the percentages being nearly similar. As the vertebræ form round the upturned terminal portion of the notochord,* remaining more or less—often very slightly—visible in the adult, it is necessary to explain that in these numbers are included the first two shorter vertebræ, the remainder of the body vertebræ and the caudal vertebræ, including as the last that which has its anterior end of the normal disc-like form for articulation with the preceding vertebræ, but has its posterior end much contracted, bent upwards, and bearing the so-called urostyle. The succeeding vertebræ—clearly defined and separable in the very young but partly coalesced and aborted in the adult—being discarded from the enumeration. I believe the last vertebra as here adopted has also been often omitted in the enumeration of the herrings vertebræ. Counted in this way it is found that the vertebræ in both the east and west coast herrings number from 55 to 59. Only 1 per cent. was found to have only 55 vertebræ, and only a single example was got with so many as 59; this number may, therefore, be considered as a very abnormal condition. With 58 vertebræ there were counted 8 per cent., and the remainder had 56 or 57, over 35 per cent. having the former, over 55 per cent. the latter number. In all the cases examined the total length of the vertebral column was carefully measured, the result showing conclusively that its total length was unaffected by the number of vertebræ. A tabulation of these results, as found on herrings of various lengths, would simply show 56 to 58 vertebræ, as occurring in every grade of 10 mm. length of vertebral column from 125 mm. upwards.

The conclusion at which I arrive from these observations is that there is no true racial difference between the herrings of the various localities around our coasts; and while the investigation, as mentioned in Part I. of this paper, points towards a distinction between the herrings frequenting our shores in summer and in winter, it is so small, not only in its actual extent, and more especially in the circumstance that there is no sharp line of distinction between the two, but that many of the summer herrings are found to be marked by the same characteristics as those of winter,—that I don't feel justified from the investigation in considering

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* "The Skeleton of the Herring," Fifth Annual Report of the Fishery Board for Scotland, 1887.

this to be a well proved fact. It is probable, I think, that further close examination of herrings during two or three more seasons might produce sufficient examples to obliterate the small distinction. I am the more led towards this view of the matter on account of the considerable amount of what I have called individual variation. In so speaking I don't mean that the variations occur altogether indiscriminately among the fish of the same time and place of development and growth. It seems to me clear, from the specimens examined, that to a certain extent peculiarities in the shape of extreme variations of one or perhaps more characters, are found common to several, perhaps a majority of the fish in one shoal; but this would be due to the circumstances affecting the development and growth of these, and which, from so many other varieties being mixed up with them, are almost sure to be modified in several directions in their descendants.

In going through a prolonged and minute examination of these fish one becomes much struck with the fallacies likely to arise by judging them merely by a superficial or even careful ocular examination, without recourse to actual exact measurement. The slightest difference in the shape or size of some part—especially of the head and mouth parts—sometimes causes such a change of appearance as to give rise to the supposition of quite a racial distinction obtaining between two fish which, on careful measurement, are found to be in all other essential principles so alike as to prevent the acceptance of the theory of their racial difference. This is well seen in the antorbital part of the head, where, in herrings of similar size of head, body, &c., the minute difference of 1 to 2 mm. of length in this part greatly changes the aspect of the head. It is also often very striking where there is a very small difference in length or breadth of the operculum, or even in the angle it holds to the head proper. But there is one further and important cause of error where the general appearance of the herring is taken,—as indeed appears commonly to be done,—as a criterion of variety or race; that is the condition of the reproductive organs. According to the degree of development of these, the herring may be greatly changed in form, and there need be little hesitation in saying that many cases of apparent difference put down to racial distinctions, *e.g.*, between a short thick fish and one longer and more slender in appearance, arises not from the fact that these belonged really to a short and long variety, but that they simply had a more or less deepened and thickened body due to nothing else than the condition of the reproductive organs. These errors would be evident if the fish were subjected to actual measurement in respect to every character. Especially misleading are those varying conditions when present on fish which are of different sizes and probably ages.

This leads further to a reference to the mistake of supposing that herrings are of a different race, because, after a single season's examination, they are seen to be in general size or otherwise, different from those of another locality about the same time, or at different seasons. To decide as to this effectually, continuous observations over several seasons is essential, and I am conscious that in this respect my own observations, although they have now extended over three years, are still insufficient; but at least, as I have shown in Part I., they indicate how changed, in of course a limited degree, the herrings of one and the same locality, but of different years may be. Much safer it is, where the difference between individuals is so slight or so obscurely separated (as has appeared in this investigation), as not to permit of a short examination clearly demonstrating its racial origin, to doubt rather than infer its accuracy. I feel pretty sure that the variations just referred to are not permanent, but are due to the varying conditions of food and temperature affecting the young herring as well as to the probable variability in size and age of its parents. The embryo herrings themselves vary considerably in size on hatching, even among ova from the same fish, and Meyer's observations* show how the matter of food affects their growth ; this would especially affect their ultimate size. In regard to the absolute size of the herrings the largest example I was able to quote in the former part of this paper as having received was 333 mm. ($13\frac{1}{8}''$) in length from tip of the lower jaw to tip of the caudal fin. Mr Brook,† who considers there are two if not more races of herrings in Loch Fyne alone (and if these are not considered to be permanent and established varieties, it seems to me likely to be correct), refers to the size of these—indistinguishable from one another in the early part of the season, later one race is of the moderate size of 10″ while the other increases to an average size of 12″, while some of the latter are 15″ in length. It does not seem clear why the 10″ May herrings should be considered as of a different race from the 12″ August herrings, size alone being, I think, an insufficient proof. What I have, however, specially to refer to is the remarkable size of these August fish—a size I think which must be considered as quite exceptional. The specimens which I have examined from the same locality during the season in question, were few in number, and cannot therefore be considered a fair test, but during other three seasons I have never found the herrings in general so large as to give an average of 12″, the production of which must necessitate a very large number much above that size. In regard again to the huge 15″ herrings recorded by Mr Brook, they are far beyond any specimens measured by me, collected although these have been during three years from every east and west coast district. Since the former part of my paper was written, *i.e.*, during last summer and autumn, I have measured a further large number of herrings, mostly from the west coast, but have only succeeded in finding one—from Campbeltown—which reached as much as 335 mm. ($13\frac{3}{16}''$) in total length. Mr Brook's statement then being taken as correct, my original account of the probable limit of length of our herrings must be modified, but I should still think the size of the large numbers which have been accurately measured by me, is evidence that those of a larger size are rare.

Finally, in considering the variations of the different characters referred to in this paper, it ought to be remembered that these variations, although seeming considerable in regard to the ratio which they bear to the body length, are not in absolute dimensions so very great ; and from occasional measurement and examination of similar features in many other kinds of fish, I believe them not to be at all peculiar either in extent or in kind to the herring—many fish indeed, about the single specific character of which no doubt has been expressed, often showing greater variation. It is from these observations that I would deprecate the not uncommon circumstance of an observer putting down as erroneous the record by previous observers of particular characters which do not agree with his own. This would not occur if due allowance were made for the probable variation which generally obtains. The interest of such differences in statement should wholly lie in the effect which they would have in showing the amount of variation occuring in every species, and by the inclusion of a large number of examples, the more correct ascertainment of their more normal condition. The only proof, where the suspected racial difference is so obscure as in the herring, I think would lie not only in a distinct demarcation between two forms of character, however narrow it might be, but where by prolonged investigation over recurring seasons or in distinct localities the

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* *Jahrsbericht der Com. z. Wissench. Untersuch. der Deutschen Meere,* 1878, 1882.

† Fourth Annual Report of the Fishery Board for Scotland, 1886.

undoubted evidence of its continual reproduction and support at these places or times was distinctly ascertained. In the herrings there is no such distinct evidence, and while continual slight varieties are constantly occurring they do so only to be soon again obliterated in the more normal conditions found to characterise the herrings both of our east and west coasts.*

The variation towards the extremes in all the characters of the herring above dealt with is so gradual, that it is difficult to fix an actual sharp line of distinction between that portion of the whole ground of variation which should be called extreme and that which deserves the term of normal. I append a table, however, showing the frequency of combination of the characters in their normal condition on the herrings. The normal condition is here selected from the tables given above, and is only approximate, but the table shows how small a percentage—about 57 per cent.—of the herrings have in combination two or three characters in their most common form, while only 7 or 8 per cent. have six or seven of these in their normal form represented in common on the same fish.

TABLE XXXIX., showing Percentage of Mature Herrings on which are found in combination various characteristics where these are normal in condition.

Having the following characters in their more normal form on one and the same fish.	Percentage of Herrings.	
	Winter.	Summer.
Position of dorsal and anal fins, ...	57·2	55·2
Position of dorsal, anal, and pectoral fins, . . .	28·5	22·4
Position of dorsal and anal fins, and length of head, .	52·1	51·8
Position of dorsal and anal fins, and length of dorsal fin,	44·6	43·5
Position of dorsal and anal fins, and length of anal fin,	42·8	26·7
Position of dorsal and anal fins, and length of caudal fin,	24·6	40·0
Position of dorsal and anal fins, and lengths of dorsal and anal fins,	35·7	21·0
Position of dorsal, anal, and pectoral fins, and length of head,	27·0	21·6
Position of dorsal, anal, and pectoral fins, and length of caudal fin,	10·0	16·0
Position of dorsal and anal fins, and lengths of head and caudal fin,	21·4	39·0
Position of dorsal, anal, and pectoral fins, and lengths of head and caudal fin,	10·0	16·0
Position of dorsal, anal, and pectoral fins, and lengths of head, dorsal, anal, and caudal fins,	7·5	5·6

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* A similar statement is made by Couch in discarding Leache's herring as a distinct variety.

APPENDIX F.—No. IX.

THE FOOD OF THE WHITING (*Gadus merlangus*).

By J. Duncan Matthews.

In connection with the important subject of the food supply of our useful fishes, less seems to have been done in the way of a systematic examination of the normal food supply of the whiting than of the cod and haddock. This, to some extent, probably arises partly from the whiting not being so common as these other white fish, and partly owing to their being generally sold as fresh fish, the latter circumstance interfering with the ready examination of a large number, and over a continuous period.

The following Table is prepared from the examination of about 400 stomachs procured by the Fishery officers from whitings caught on the East Coast of Scotland, mostly during the autumn and winter months. Though probably giving a fairly accurate statement of the whiting's main food supply, the list is yet scarcely extensive enough either as to numbers examined, or to season and locality, as to be entirely conclusive.

Yarrell states that the whiting is a voracious feeder, seizing indiscriminately any molluscs, worms, small crustacea, or young fishes. Day also refers to its voracity, giving as its food small fish, crustacea, and any animal substances it can obtain.

My examination does not support these accounts of the indiscriminate appetite of the fish. It will be seen from an examination of the following list, that the whiting's food supply seems to be of a much less variable nature than has been stated. It may be said to be almost entirely limited to small fish and crustacea. Of the echinodermata, which form so large a proportion of the haddock's food, not a single example was found in the whitings examined by me, although they were to a large extent caught on the same grounds, and at the same time, as haddocks which were found to be feeding, to a large extent, on brittle stars, and less commonly on worms and molluscs.

In one case there were some small echinoderms mixed up with fish remains in the whiting's stomach and these might have been thought to have been directly consumed by the whiting. The condition in other whitings from the same take showed conclusively that this was not so. In these others were found the same small white fish, but in a less digested condition, and these latter had still their stomachs intact. On examination these small fish stomachs were found packed full of identically the same echinoderms as those found among the fish remnants in the whiting referred to. It was evident, therefore, that this whiting had not been feeding on echinodermata, but that these were in its stomach only from the secondary cause of having escaped from the partially-digested stomach of the whiting's prey.

It seems doubtful whether the pieces of the common mussel occasionally found in the whitings' stomachs, recorded below, may not, to some extent, be accounted for by their having swallowed the bait on the lines on which they were caught, for all the cases in which the mussel occurred were line-caught fish. The fact that they take this bait is not necessarily conclusive evidence that the mussel forms a part of their natural food. It certainly seems not to do so to any considerable extent, but that they occasionally do feed on the mussel seems probable from the contents of stomach No. 268, in which were found eight (or parts of eight) mussels, which were scarcely likely to have been all taken from hooks. In no case, however, was any part of the shell found, so that if they are not eaten as 'bait,' the shells must be completely dissolved before much action on the flesh occurs. It will be noted, too, that, except for the common mussel, molluscs are absent from the food found in the stomachs, and worms are almost wholly so.

The crustacea found were confined almost entirely to shrimps or prawns, these seeming, from their frequent occurrence, to be a favourite food supply of the whiting. Although one or two specimens of the smaller crustacea were found, the fact that they were so in general only as solitary examples, seems to show that in these cases they were present by chance, and not as having formed a real subject of food.

Freely though the whiting takes these shrimps, its principal food (taking into account the amount consumed, as well as the numbers of whitings containing it) evidently consists of small fish. The shoals of sprats in the Moray Firth certainly constitute a large, if not the main, food supply of the whitings in that locality. It is also of interest to observe that the three examples of *Zoarces viviparus* found among the food all came from the Moray Firth. A good many sprats are known to be often present in the sea off Stonehaven, and it is here again that they are found forming part of the whiting's food; but apart from these, the fish consumed by the whitings along the East Coast seem to be almost entirely young cod and haddock, and probably also their own species. The extent to which these had been affected by digestive processes made it difficult or impossible in many cases to decide to which of these species they belonged, or even whether they were these at all, but this was done as far as possible, and in most cases it was quite possible to distinguish these remains from those of herrings or sprats. Where they were ascertained to be certainly not sprats or herrings, but the particular species could not be fixed, they have, in the following Table, been designated as 'white fish.'

From the size of the whiting, nearly all the fish consumed by it must be in their young state, and it would appear that they must be put down as extensive destroyers—evidently more so than the cod and haddock—of much of our own valuable food supply. It is probable that this more restricted, and one might say more refined, dietary of the whiting, as compared with that of the cod and haddock, may account for the considerable difference—its greater delicacy, according to many opinions—of the flesh of the former.

The quality of its food, as given below, points towards the advantage which might accrue to fishermen from more largely using a fish bait for the capture of the whiting, though whether they would take pieces of fish as readily as a complete small one is doubtful.

The list below includes only those cases in which food was found, being little more than two-thirds of those opened; but the proportion of empty to full stomachs is much larger than this, since the Fishery officers often did not send up those which were evidently empty. I have not sufficiently exact data to enable me to speak with certainty, but such as it is, it points towards the fact that much the largest proportion of empty stomachs is found among the line-caught fish in contradistinction to those taken by trawl. This might be expected from the consideration that probably the whitings (as also other fish) would take the line bait most readily when in a state of hunger, and therefore presumably with their stomachs empty; whereas, in many cases the 'full' and 'empty' would be picked up indiscriminately by the trawl.

Of the following examples, fish formed the whole or part of the contents in 57 per cent, crustacea in 53 per cent.; 5 per cent. only contained neither fish nor crustacea. Of the 12 per cent. in which other food as well as fish or crustacea was found, in two-thirds it consisted of only a single mussel.

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other Kinds of Food.	
1	20.7.86	Firth of Forth	Three 3 in. sprats	...	One *Mytilus edulis*	Trawled.
2	〃	〃	...	Two ¾ in. *Portunus* (sp.), one common shrimp	...	〃
3	〃	〃	...	...	One *Mytilus edulis*	〃
4	〃	〃	Four sprats	...	...	〃
5	28.9.86	Off Cromarty	Sprats (full grown)			
6	〃	〃	〃			
7	6.10.86	6 m. off Stonehaven, 40 fath. gravel	Small white fish remains	One common shrimp	...	12 in. to 16 in. whitings, line-caught.
8	〃	〃	〃	〃	...	
9	〃	〃	...	Three 〃		
10	〃	〃	...	Twelve 〃	One *Mytilus edulis*	
11	11.10.86	35 m. S.E. Montrose, 30 fath., sand & gravel	Head of about 6 in. codling			13 in. to 15 in. whitings, trawled.
12	〃	〃	Small white fish remains			
13	〃	〃	〃			
14	〃	〃	Three 〃			
15	〃	〃	One 4½ 〃			
16	〃	〃	Two 4 in. 〃		..	
17	〃	〃	Two 1 in. white fish backbones	Several ½ in. *Portunus* (sp.), one small crustacean		
18	〃	〃	...	One 1¼ in. *Portunus* (sp.)		
19	〃	〃	Head of about 6 in. cod	Two shrimps		
20	〃	8 m. off Buckie, 18 to 20 fath., sand, shells, & mud	Four 3½ in. to 4 in. sprats	...	...	Line-caught.
21	13.10.86	Off Berwick	One 6 in. codling	...	...	16 in. whiting, trawled.
22	15.10.86	3 m. off Burghead, 28 fath.	Remains of very small sprats	...	...	13 in. whiting, line-caught.
23	19.10.86	8 to 10 m. N.E. Fraserburgh, 40 to 60 fs., muddy	Five 3½ in. sprats	Three shrimps		
24	〃	〃	Five 3 in. sprats	One shrimp		
25	〃	〃	...	Shrimp remains		
26	〃	〃	...	...	One *Mytilus edulis*	
27	〃	2 m. S. Peterhead	Small white fish remains			Line-caught.
28	〃	〃	〃			
29	〃	〃	〃	Remnants of shrimps		
30	〃	〃	Do. 3 in. remains	〃		
31	〃	〃	Small sprat or herring	...	One *Mytilus edulis*	
32	〃	〃	Several 〃			
33	〃	〃	...	...	One *Mytilus edulis*	
34	〃	〃	...	Remains of shrimps	〃	
35	〃	〃	...	A few minute crustacea	Small piece *Tubularia*	

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other Kinds of Food.	
36	19.10.86	2 m. S. Peterhead	...	Small *Galathea* (sp.)		Line-caught.
37 to 51	″	″	...	One to four shrimps in each	...	
52	22.10.86	30 to 35 m. S.E. Montrose, 30 to 40 fath., sand and gravel	One 6 in. codling	...	...	13 in. to 15 in. whitings, trawled.
53	″	″	″			
54	″	″	One 4 in. codling			
55	″	″	″			
56	″	″	One 5½ in. and remnants of three smaller codlings			
57	″	″	Two 5 in. codlings			
58	″	″	One 4 in codling or haddock			
59	″	″	″			
60	″	″	Two 6 in. codlings			
61	″	″	One 4½ codling or haddock			
62	″	″	″			
63	″	″	″			
64	″	″	Head of about 5 in. codling			11 in. to 12½ in. whitings, trawled.
65	″	″	Remnants of white fish			
66	″	″	″			
67	″	″	Do. of 4 in. sprat or herring			
68	″	″	Do. white fish			
69	″	″	″			
70	″	″	″			
71	″	″	One small white fish and three 3 in. sprats or herrings	One ⅝ in. *Portunus* (sp.)	...	
72	″	″	...	Five common shrimps		
73	″	″	...	Remains of small crustacean	Small mass of zoophyte	
74	″	″	...	Two ¾ in. *Portunus* (sp.)		
75	22.10.86	2½ m. off Burghead, 25 f., shelly	...	Remains of several shrimps	...	13 in. line-caught whiting
76	″	3 m. off Burghead, 28 fath., shelly	One 6 in. codling and remains of other white fish	...	...	″
77	23.10.86	12 m. E.N.E. Stonehaven, 60 fath., soft gravel	1 in. white fish (? haddock)			9 in. to 15 in. whitings, line-caught.
78	″	″	...	Common shrimp remnants	...	
79	″	″	...	″		
80	″	″	...	Small *Portunus* remnants		
81	26.10.86	10 to 12 m. E.N.E. Fraserburgh, 40 to 60 fs., muddy	...	Remnants of common shrimps		
82	″	″	...	″		
83	″	″	...	″		
84	″	″	Remnants of small sprats or herrings	...		
85	″	″	″			

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other Kinds of Food.	
86	26.10.86	10 to 12m. E.N.E. Fraserburgh, 40 to 60 fs., muddy	Five 3 in. sprats and one 1⅔ in. *Agonus cataphractus*	Three common shrimps		
87	"	"	...	Remnants of common shrimps		
88	"	"	Six or eight 3 in. sprats	Remnants of several shrimps	One *Mytilus edulis*	
89	29.10.86	3 m. off Burghead, 28 fath., shelly	Two 3 in. sprats	...		15 in. whitings, line-caught.
90	"	"	...	Two common shrimps	One *Mytilus edulis*	
91	"	5 m. S.E. Stonehaven, 35 fath., gravel	Small white fish bones			12 in. to 17 in. whitings, line-caught.
92	"	"	Small otolith (not herring or sprat)	A common shrimp		
93	"	"	...	"		
94	"	"	Remnants of two small sprats or herrings			
95	"	½ m. E. Stonehaven, 35 fath., sandy	...	A common shrimp		12 in. to 17 in. whitings, line caught.
96	"	...	Small sprat remnants	...	...	
97	"	...	Two do. or herring	One ¼ in. *Portunus*		
98	30.10.86	3 m. off Burghead, 28 fath., shelly	Three 3½ sprats and one *Zoarces viviparus*	...	One *Mytilus edulis*	Line-caught.
99	4.11.86	10 m. E. S. E. Stonehaven, 40 fath., sand and gravel	One 5-in. codling	One common shrimp		12 in. to 17 in. whitings, line-caught.
100	"	"	Remnants of about 3 in. white fish			
101	"	"	...	Remains of ½ in. *Portunus*	One *Mytilus*	
102	"	"	...	One crustacean (*Ampelisca typica*, Bate)		
103	"	"	...	...	Small piece zoophyte	
104	"	"	One small sprat or herring	One common shrimp		
105	"	"	Remains of small white fish			
106	"	"	"			
107	"	"	"	Remains of shrimps		
108	"	"	Four 4 n. to 4½ in. codlings	One ½ in. *Portunus*		
109	5.11.86	3 m. off Burghead, 20 fath., shelly	...	Remains of common shrimps		11½ in. line-caught whiting
110	"	½ m. E. N. E. Stonehaven, 8 fath., hard	Small fish remains			11 in. to 17 in. whitings.
111	"	"	...	One ½ in. crab	One *Mytilus*	
112	"	5 m. S.E. Stonehaven, 30 fath., hard	Small fish remains			

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other kinds of Food.	
113	5.11.86	5 m. S.E. Stoneh'v'n, 30 f., hard	...	Remnants of shrimps		11 in. to 17 in. whitings.
114	"	"	...	"		
115	17.11.86	20–30 m. off Eyemouth	Small white fish remains	...	...	16 in. whiting Trawled.
116	"	"	One common shrimp	...	...	18 in. "
117	"	"	"	...	...	15 in. "
118	"	"	Two or three do. about 2½ in.			
119	"	"	"	Remnants of shrimps	One 2 in. long and two 4½ in. long pieces of *Nereis* (sp.)	15 in. whiting, trawled.
120	17.11.86	3 m. off Burghead, 25 fath., shelly	Remains of three white fish	...	Two ¼ in. long *Pleurobrachia* one *Mytilus*	13 in. whiting Line caught.
121	"	"	"			
122	"	"	...	Two common shrimps	...	12 in. whiting
123	18.11.86	4 m. E. S. E. Stonehaven, 20 fath., gravel	Remains of white fish	Remnants of shrimps		11 in. to 13 in. whitings, line-caught.
124	"	"	...	Four common shrimps		
125	"	"	...	Two common shrimps	...	
126	"	"	...	"		
127	"	"	Remnants of white fish	"		
128	"	"	...	"	One *Mytilus*	
129	19.11.86	3 m. off Burghead, 25 fath., shelly	Four sprats 3 in. to 4 in. long	...	...	14 in. whiting Line caught.
130	"	"	Three "	Remnants of shrimps	...	12 in. "
131	23.11.86	"	Two 3 in. sprats			
132	"	"	"			
133	25.11.86	3 m. E. S. E. Stonehaven, 22 fath., gravel	Remains of 4½ in. white fish (? Hake)			10 in. to 14 in. whitings.
134	"	"	Small fish remnants			
135	"	"	White fish remnants		...	
136	"	"	...	One common shrimp		
137	"	"	...	Shrimp remains		
138	27.11.86	8–9 m. N. E. by N. Fraserburgh, 43 to 60 fath., muddy	...	Five shrimps		
139	"	"	One 5 in. launce (*Ammodytes Tobianus*), one 4½ in. codling(?)			
140	"	"	One launce (*A. Tobianus*), one 1½ in. sprat or herring, other small fish remnants	Shrimp remnants		
141	"	"	Remnants of small sprat or herring	"		
142	"	"	Remnants of three sprats or herrings	Three shrimps		

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other kinds of Food.	
143	4.12.86	2 m. E. S. E. Stonehaven, 20 fath., sandy	...	One common shrimp	..	10 in. to 16 in. whitings.
144	"	"	...	Two shrimps		
145	"	"	...	Crustacean remnants		
146	"	"	...	Common shrimp remnants		
147	"	"	Part of small white fish	Two prawns, and shrimp remains		
148	"	"	...	Four shrimps		
149	"	"	...	Shrimp remnants		
150	15.12.86	20 m. E. Stonehaven, sandy	...	"	...	12 in. to 16 in. whitings.
151	"	"	...	"		
152	"	"	Half of about 8 in. codling			
153	"	Off coast, Peterhead	...	...	One limpet (*Patella vulgaris*), one *Mytilus*	
154	"	"	...	...	Piece of *Mytilus*	
155	"	"	...	Remnants of shrimps		
156	"	"	...	" " and a small *galathea* (sp.)		
157	"	"	...	One shrimp		
158	"	"	...	...	One *Mytilus*	
159	"	"	Remnants of two or three small white fish			
160	"	"	"			
161	"	"	"			
162	"	"	...	Two common shrimps		
163	"	"	One 5 in. codling			
164	"	"	...	One shrimp, claw of crab (sp.)	One *Mytilus*	
165	"	"	...	Two prawns		
166	"	"	...	...	Small piece of mollusc shell	
167	"	"	...	Three prawns		
168	"	"	One white fish backbone	Six prawns		
169	"	"	Remains of whitefish			
170 to 175	"	...	...	Remnants of shrimps or prawns in each		
176	18.12.86	Largo Bay (F. of Forth)	...	Five shrimps	...	Medium and large whitings, line-caught.
177	"	"	...	...	One *Mytilus*	
178	"	"	Two 4½ in. haddocks			
179	"	"	One 5 in. launce (*A. Tobianus*)			
180	"	"	...	Six shrimps		
181	"	"	Seven 3 in. sprats and one 7 in. codling			
182	"	"	...	Four shrimps		
183	"	"	Eight 3 in. to 4 in. sprats	Three "		
184	"	"	One 5 in. sprat and one 4 in. white fish			

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other kinds of Food.	
185	18.12.86	Largo Bay (Firth of Forth)	Two 4½ in. sprats, one 5 in. white fish, and one 5 in. launce (*A. Tobianus*)	...	...	Medium and large whitings, line-caught.
186	20.12.86	2 m. E. Stonehaven, 20 fath., sandy	One 6 in. codling and remnants of another	One crustacean (*Dexamine spinosa*)	...	13 in. to 16 in. whitings.
187	"	"	...	Shrimp remnants		
188	"	"	...	Three shrimps		
189	"	"	...	Remnants of shrimps		
190	"	"	...	"		
191	"	"	...	"		
192	27.12.86	Off Peterhead	...	One prawn		Line-caught.
193	"	"	...	Shrimp remains		
194	"	"	A 3½ in. sprat and part of a whitefish	Six shrimps		
195	"	"	White fish remnants			
196	"	"	...	...	*Mytilus*	
197	"	"	...	...	"	
198	"	"	...	Shrimp remnants		
199	"	"	White fish remnants			
200	"	"	"		...	
201	"	"	...	Shrimps		
202	"	"	...	"		
203 to 210	"	"	...	Pieces of common shrimps in each		
211 to 214	"	"	...	...	One *Mytilus* in each	
215	"	"	One 6½ in. codling			
216	"	"	One small white fish			
217	28.12.86	Aberdeen	Remnants of two small white fish			
218	"	"	...	Two common shrimps		
219	"	"	One 3 in. white fish (? whiting)	"		
220	"	"	"	"		
221	"	"	...	Shrimp remnants		
222	"	"	White fish remnants	...	Partly-digested 3 in. cuttle fish (? *Loligo*)	
223	"	"	One 5 in. codling	One shrimp		
224	"	"	One small white fish	"		
225	"	"	One 6-in. codling			
226	"	"	One 4 in. white fish			
227	"	"	Remnants of large white fish (? haddock)	One shrimp		
228	"	"	...	One crustacean(?)		
229	"	"	A small white fish			
230	"	"	Two 4½ codlings (?)	One shrimp		
231	"	"	One ¾ in. white fish			
232	"	"	White fish remnants			

No.	Date of Capture.	Locality where caught.	Contents of Stomach.			Remarks.
			Fish.	Crustacea.	Other Kinds of Food.	
233	28.12.86	Aberdeen	White fish, 4 in.	Shrimp		
234	"	"	" 3½ in.			
235	"	"	Two 4 in. white fish			
236	"	"	One small wh. fish			
237	"	"	Remnants of "			
238	"	"	Two 6 in. white fish			
239	"	"	6¼ in. codling			
240	"	"	6½ in "			
241	"	"	...	Two shrimps		
242	"	"	Small white fish	One shrimp		
243	"	"	One 7 in. haddock (?)	Three shrimps		
244	29.12.86	3 m. E.N.E. Stonehaven, 30 fath., sand	...	Two shrimps		11 in. to 15 in. whitings.
245	"	"	...	"	...	
246 to 249	"	"	White fish remnants			
250	15.1.87	1 m. off Lybster, rocky, patches gravel & sand	One 5½ in. blenny (*Zoarces viviparus*)			
251	"	"	One 3½ in. blenny (*Zoarces viviparus*)			
252	"	"	One 5¼ in. sprat			
253	"	"	One 5 in. sprat			
254	"	"	"			
255	"	"	...	One ½ in. crab (*Carcinus*)		
256	26.1.87	¼ m. off Dunnottar Castle (Kincardineshire), 9 fath., rocky	Six 5 in. to 5½ in. sprats	...	...	15 in. whiting.
257		"	Two 6 in. sprats, and remnants of another			
258	"	"	One 6 in. sprat			
259	"	"	One 6 in. sprat and remnants of another	...	One lobworm (*Arenicola*)	
260	28.1.87	3 m. E. Stonehaven, 25 fath., gravel	White fish remnants			
261	"	"	"			
262	"	"	"	One shrimp		
263	"	"	"	"	Cuttle fish jaws, ⅛ in. long	
264	"	"	White fish, 3½ in.	One prawn, berried (*Pandalus*)		
265	"	"	...	...	Small piece zoophyte	
266	6.2.87	Stonehaven	Three 3½ in. white fish	Four shrimps		
267	"	"	One large sprat			
268	8.2.87	20 m. S.E. Wick, 30 fath., hard	One 5 in. white fish	...	Eight mussels (*Mytilus*)	

APPENDIX F.—No. X.

NOTES ON THE FOOD OF YOUNG GADIDÆ.

By George Brook.

During the months of July, August, and September young forms of various species of Gadidæ were plentiful near low water in East Loch Tarbert, in the north bay at Barmore, and in other suitable localities in Loch Fyne. They were most abundant amongst the Zostera beds, just below low-water mark. In August thousands of young cod and saith could be captured with one haul of the seine-net in almost any suitable locality. The cod were usually from 2 to 3 inches in length, and were nearly all banded with reddish brown, the lighter patches appearing as irregular blotches along the lateral line. The saith were usually a little larger, the majority being from 3½ to 4 inches long.

A number of the young cod were sent to Rothesay Aquarium, where many still survive. I also recognised a few lythe and whiting amongst those captured, but they were far from numerous.

I was struck by the great abundance of the young cod and saith amongst the Zostera beds, and their comparative scarcity in other localities, and as it seemed probable that this choice of locality might be dependent on the food devoured by the immature forms, a large number of stomachs were examined, and their contents noted. A few particulars relating to the food of the young cod and saith will, I think, be of interest.

Cod.—On the 14th of August, thirty-seven stomachs of young cod were examined. The fish were obtained at low water in the sandy bay in front of the Tarbert Laboratory. They varied in size from 1¼ to 3 inches in length. All the stomachs were found to be full of food. Those of the smaller fish were filled with Copepods, to the exclusion of almost every other kind of food. The stomachs of the larger specimens contained, in addition to the Copepods, a considerable number of Amphipods (*Gammarus?*) and also a fair quantity of young Mysidæ, probably *Mysis inermis*, young specimens of which abound amongst the Zostera at this season.

The majority of the Copepods belonged to the *Calanidæ;* the *Harpacticidæ* contributed a good many specimens, while the *Cyclopidæ* were also represented.

Amongst the *Calanidæ* the genus *Centropages* appeared to contribute the greatest number of individuals, but others occurred which were not identified.

Amongst the other groups, *Oithona spinifrons, Diosaccus tenuicornis, Ida furcata,* and *Thalestris longimana,* were the only species which were identified.

On the 18th of August, eleven specimens were examined from another locality. These were taken in the north bay at Barmore, and the specimens ranged from 2¼ to 3 inches in length. The food consisted of Copepods, Amphipods, Isopods, and Schizopods. The Copepods formed about half the food (in bulk), and consisted mainly of *Calanidæ.* The Amphipods, Isopods, and Schizopods occurred in about equal quantities, and consisted mainly of *Gammaridæ,* young *Idotea,* and young *Mysis.*

A number of the stomachs were nearly empty.

SAITH.—On the 12th of August, Mr Scott examined eighty-four stomachs of young saith collected in the bay in front of the Tarbert Laboratory. The fish ranged from 2½ to 4¼ inches in length.

The stomachs were all quite full, and the food consisted almost entirely of Cōpepods. In addition to the Copepods, a few of the stomachs contained a number of *Sagittæ* and young Gasteropods (*Rissoa* and *Lacuna*). The Copepods belong mostly to two species, viz., *Centropages typicus* and *Centropages hamatus*, but a few *Dias longiremis* were also recognised.

On the 18th of August, twenty-four stomachs of young saith were examined. The fish were obtained in the north bay at Barmore, and varied from 2¾ to 5 inches in length. The food of the smaller specimens differed little from that of the larger ones. About half the quantity consisted of Copepods, mostly *Calanidæ*, but a few specimens of *Thalestris* were also observed.

Next in importance came the Amphipods, Isopods, and Schizopods, which occurred in about equal proportions. The Amphipods were almost all *Gamarides*, but the species were not identified. The Isopoda were represented by a large number of young Idotea, and the Schizopods by the young of a species of *Mysis*, probably *M. inermis.* The Crustacea, already referred to, supplied almost the entire variety of food. In addition, a small proportion consisted of larval Decapods, *Sagittæ*, and a number of very young Gasteropods (*Rissoa* and *Lacuna*).

A single specimen of *Vaunthomsonia cristata,* one of the *Cumacea* frequent in the district, was also observed.

It is interesting to note in connection with these statistics of the food of young Gadidæ, that the cod, which in the adult state is a bottom feeder, still retains at this age (2 to 3 inches in length) its early habit of feeding solely on pelagic forms, and also to note the absence of young molluscs. The saith, on the other hand, is always more pelagic in its habit than the cod; but in the case of the young here referred to, there appears to be a considerable difference in its food, as compared with the young cod, although the two were taken together on the same ground. The Copepods contained in the stomachs of those taken at Tarbert included a large number of specimens of the less pelagic species, whereas these forms were almost absent in the stomachs of the young cod taken in the same locality. The presence of a number of young Gasteropods in the stomachs of the young saith appears to be a constant feature, and probably indicates the first step towards a change of diet approaching that of the adult.

APPENDIX F.—No. XI.

NOTES ON ENTOMOSTRACA. By G. S. Brady, M.D., F.R.S., F.L.S., with Plate XIX.

The Entomostraca here referred to are only the more interesting and scarcer species from gatherings which have been sent to me at various times by Mr Thomas Scott. Though, as is well known, Entomostraca of various kinds constitute a large part of the food of fishes, it is probable that the Ostracoda—and especially the marine Ostracoda—are less important in this respect than the softer kinds, Copepoda and Cladocera, which, owing to their immense fecundity, occur in prodigious numbers, and on account of their free-swimming habits fall an easy prey to fishes.

OSTRACODA.

Cypris cinerea, Brady. Pools near high water, head of West Loch Tarbert.
Cypris tumefacta, Brady. Tarbert, Loch Fyne.
Cypris virens var. *monilifera*, Brady. Ditches near Loch Ascog and Loch Fadd.
Cypris Jurinei, Zaddach ?
Cypris Browniana, Jones. Pools by the side of Loch Fadd.
Candona Kingsleii, Brady and Robertson. Pools near Loch Fadd and Loch Ascog.
Potamocypris fulva, Brady. Marshy place by the side of Loch Ascog.
Aglaia complanata? Brady and Robertson. East Tarbert ; one specimen.
Cythere semipunctata, Brady. Loch Fyne, near Tarbert ; not uncommon.
Cythere Cluthæ, Brady, Crosskey, and Robertson. Loch Fyne, near Tarbert ; scarce.
Cytheridea subflavescens, Brady. Loch Fyne, near Tarbert; not uncommon.
Cytheropteron angulatum, Brady and Robertson. Rothesay Bay and East Loch Tarbert.
Cytherideis subulata, Brady. Rothesay Bay.
Paradoxostoma obliquum, G. O. Sars. Rothesay Bay.
Asterope teres, Norman. East Loch Tarbert ; not very common.

COPEPODA.

Peltidium purpureum, Philippi. East Loch Tarbert, 3 to 4 fathoms ; not common.

PELTIDIUM PURPUREUM, Philippi.

Up to the present time we have no published information of the occurrence of this species in the British seas. Its occurrence in the Loch Fyne dredgings of the Fishery Board is therefore specially interesting, inasmuch as we are now in a position to define accurately the genus *Peltidium* from an examination of the species to which the name was originally applied. The little creature appears to be very scarce, Mr T. Scott (from whom I received the specimens) never having found more than one or two examples at a time. These were taken in the dredge in a depth of from 3 to 5 fathoms.

Philippi's figures, as far as they go, are characteristic and fairly accurate, agreeing with the Loch Fyne specimens, and with no other British species. I have doubtfully (in the monograph of the British Copepoda vol. ii., *Ray Society*, 1880) quoted Philippi's specific name as a synonym of *Peltidium depressum*, Baird. This is a mistake; the difference between the two forms is of generic importance, and the term *Peltidium* must be held to apply by right of priority to Philippi's species only. The three species referred in my monagraph to the genus *Peltidium* should henceforth take Dr Baird's generic name *Alteutha.**

Genus PELTIDIUM, Philippi.

Body depressed, deeply incised between the segments, ovate, abdomen not distinctly separated from the cephalothorax; caudal segments small; anterior antennæ short, 9-jointed; posterior 4-jointed, and bearing a secondary branch of two small joints. Mandibles slender, bidentate, palp composed of two branches attached separately, one composed of two, the other of one joint, setose at the apex. Maxilla not found. First pair of footjaws 2-jointed, the last joint divided into two elongated setiform segments, one of which ends in two lash-like filaments, the other trifid, with a delicately pectinated subchelate apex, and a rather broad, lateral segment; the large basal joint has two finger-like marginal processes, which end respectively in one and two setæ. Second pair 2-jointed, the second joint armed with a long terminal claw. Inner branch of the first pair of swimming feet short, and composed of two joints only; second, third, and fourth pairs with both branches 3-jointed; fifth pair simple, 2-jointed; last joint elongated and bearing six stout marginal ciliated setæ; first joint with two slender apical setæ.

The most important distinctive characters are those of the first foot jaw and the first swimming foot, together with the abnormal mandible-palp. It is possible, however, that one of the appendages here referred to the palp may be homologous with the maxilla. At any rate, with the most careful dissection, I have not been able to find a maxilla proper.

The carapace has a curiously reticulated appearance, owing to a thickening of the coat in certain definite lines, thus leaving large pellucid areas, which are enclosed by lines of dense darkly-coloured chitine.

OSTRACODA.

Cypris virens, Jurine, var. *monilifera*, nov.

Shell rather tumid, subovate; seen from the side subreniform, greatest height situated in the middle, and equal to rather more than half the length; anterior extremity evenly, posterior somewhat obliquely rounded; dorsal margin well arched, almost angular in the middle; ventral straight, except for a slight bulging near the front: seen from above the outline is ovate, twice as long as broad, widest in the middle, posterior extremity subacuminate, anterior showing a broad keeled median prominence. The surface of the shell is smooth, colour olivaceous, with oblique bands of dark green and orange. Just within the anterior border is a row of about eight polished bead-like tubercles. Length, 8-100th of an inch.

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* Goodsir's species *Carillus oblongus* seems to be identical with *Alteutha depressa*, Baird, and was published in the same year (1845). Which of the two was really first in the field I do not know.

Found in ditches by the side of Loch Ascog, near Rothesay, and in Loch Fadd.

I at first supposed this to be specifically distinct, but further research convinces me that it must be looked upon as a variety of *C. virens*, intermediate forms between it and the type being not uncommon.

Cypris Browniana, Jones.

Jones, *Entomostraca of the Tertiary Formation*, p. 13, pl. i. fig. 1*a*, 1*b*, and fig. 2*a*, 2*b*.

Shell ovate, excessively tumid, height and width equal to two-thirds of the length: seen from the side subreniform, highest in the middle; extremities well rounded, dorsal margin boldly arched, ventral straight; seen from above the outline is elliptical, scarcely narrower in front than behind. Colour ashy grey, clouded, surface smooth. Length, 1-30th of an inch.

Found in pools by the side of Loch Fadd.

Judging simply from the figures given by Professor Rupert Jones in his excellent monograph of the Tertiary Entomostraca, it would seem that the so-called variety *tumida*, may probably be only the young condition of the type *Browniana*. The recent specimens agree in size with the typical form, but in contour are more like the variety. This is one of the most interesting "finds" among the fresh-water Ostracoda.

Explanation of Plate.

Fig. 1. *Cypris virens* var. *monilifera*, seen from left side, × 16.
Fig. 2. The same seen from below, × 16.
Fig. 3. *Cypris Browniana*, seen from left side, × 40.
Fig. 4. ,, ,, seen from below, × 40.
Fig. 5. *Peltidium purpureum*, male, × 80.
Fig. 6. ,, ,, anterior antenna of female.
Fig. 7. Posterior antenna of same.
Fig. 8. Mandible (and palp ?) of same.
Fig. 9. Anterior footjaw ,,
Fig. 10. Posterior footjaw ,,
Fig. 11. Foot of first pair ,,
Fig. 12. Foot of fifth pair ,,
Fig. 13. Tail.

APPENDIX F.—No. XII.

FURTHER REPORT ON THE EXAMINATION OF RIVER WATERS FOR MICRO-ORGANISMS. By W. S. Greenfield, M.D., Professor of General Pathology in the University of Edinburgh, and John Gibson, M.B.

During the past year the investigation supon the subject of the presence and relations of the lower fungi, and especially of bacteria, in the water of large rivers, have been continued without intermission. A very large amount of valuable information has been thus obtained, to which it is hardly possible to do justice in a report, as it is to a large extent pioneer work in a new field.

It has been already pointed out in a previous report by Dr Woodhead and myself (Appendix F, No. XI. p. 176), that the object in view is to determine the nature of the bacteria and other low fungi commonly present in river water, the conditions of their prevalence, and the effects which they may produce in relation to the life or health of fishes. At the outset our inquiries were limited to the question of the conditions under which salmon disease occurred, and we had in view the possibility of readily detecting the Saprolegnia in any sample of river water, and determining the conditions favourable to its occurrence and spread. We have steadily kept this object in view, and although we have not attained the end, we have worked through a large number of complex difficulties which must necessarily present themselves to any one who attempts to solve the problem.

The work done may be divided into four distinct branches—1. The enumeration of the number of organisms in river water in different rivers and under various conditions; 2. The study and identification of the bacteria and closely allied organisms present; 3. The study of higher microscopic fungi; 4. Observations upon the mode of growth, and cultivation of the Saprolegnia, and the manner in which it invades and affects salmon.

In the present report we have been obliged owing to want of time to take up only the first and second of these subjects, and we hope to communicate the others in a further Report.

Section I. *Enumeration of Micro-Organisms.*

We need to inquire what is the proportional abundance of fungoid life in river water under various conditions. The mere enumeration of the actual number of organisms present in a given bulk of water is now regarded as one of the most important elements in any analysis of water, and in recent Health Reports special attention is always given to this point. We have already indicated some of the bearings of this subject. The presence of a large number of bacteria in a sample of water is usually an indication of an excess of organic refuse, which, in the case of drinking water, frequently implies sewage contamination. In relation to fish disease, we have observed that, in like manner, excessive number of bacteria may indicate a favourable condition for the prevalence and spread of salmon disease. It is not, however, necessary to conclude that the presence of a large number of organisms in water is evidence of the special prevalence of bacteria. For the mode of investigation which has already been detailed (see p. 178 of previous Report), determines only the number of fungoid spores and bacteria taken together. Nearly all the lower fungi which we have isolated are capable of growth upon the nutrient jelly employed. The method shows the prevalence of lowly fungoid life in water, and therefore indicates a favourable condition for the propagation of all or most of such organisms, including the Saprolegnia. It must, however, be stated that the bacteria in most cases grow more rapidly, and some of them cause liquefaction of the jelly before the appearance of most other kinds of fungi. Most of the higher fungi which we studied were obtained in the first instance from cultivations in bread-paste flasks.

It has been one of our objects to endeavour to determine separately the number of bacteria (Schizomycetes) and that of the higher orders (Blastomycetes, Myxomycetes, Hyphomycetes). This can only be done by using nutrient media which are incapable of supporting the life of one or other class. Hitherto, no media have been found which will thus serve to separate bacteria from higher forms, but we are not without hope that the careful study of the life conditions of the many forms observed may aid to solve the problem.

The enumerations which have been made of water from the Tweed and Dee respectively are of importance so far as they go. But in order to attain any result of high value, it will be absolutely essential to establish stations of observation at or near the rivers to be examined, and to make continuous observations at various times of the day, conditions of rainfall, temperature, &c. The work can only be done by a skilled observer, and requires the expenditure of a large amount of time and patient laborious observation.

The difficulties attending any accurate enumeration are mainly due to the fact that bacteria multiply with great rapidity in the water. Hence, in a sample of water, which is carefully collected and secured in a bottle, the number may have doubled in a very short space of time. The rapidity of growth can be partly controlled by keeping the water at a low temperature, and the comparative results can be checked by making the plate cultivations at a uniform interval of time after collection. But these checks are also liable to two sources of fallacy, one being that the rate of self-multiplication is not the same for all forms of bacteria, the other that some will grow readily at a much lower temperature than others. Hence it is only in winter, or when the water is artificially kept at a temperature near freezing-point, that the results are to be relied upon. If the plate cultivations could be made on the spot, and then conveyed to the Laboratory, the difficulty would be overcome. But in practice there is the greatest difficulty in transporting them in such a way as to avoid entrance of bacteria during transit, apart from the difficulties in making the cultivation.

This source of error was, however, to a great extent avoided by the following plan. The method, in its general features, has already been described (see p. 178 of Report for 1885). The tubes were inoculated with a definite number of drops of water measured by a graduated pipette, the weight of each drop having been previously accurately estimated. The jelly was not liquefied, but the drops were allowed to remain upon its surface, and the tubes kept upright during transit. On arrival at the Laboratory, the plates having been prepared, the jelly was gently warmed until it was fluid, and then the tube slowly turned round and round until the water containing the organism was thoroughly mixed with the jelly.

The jelly, still liquid, was then poured upon the plates in the usual manner.

In order to avoid the liquefaction of the jelly on the plate by the bacterial growth, which is a great hindrance to proper enumeration, agar-agar jelly might also be used. This jelly is not liquefied by bacteria, but it has the disadvantage of having a high melting-point. In suggesting its use, two methods occurred to us for trial,—one to melt the jelly, and allow it to cool till it became semifluid, the other to pour the water upon a layer of jelly, previously spread upon the plate, and allowed to cool, but not to set completely. In the latter case it is necessary to dilute the water under observation with a sufficient quantity of sterilised distilled water. It was found possible to use the former method, the jelly retaining a syrupy consistence after being allowed to cool to some degrees below its melting-point, but it was not actually employed at the river side.

The enumerations actually made were in water from the Tweed, near Melrose, and the Dee, near Aberdeen. The following summary of the results attained has been drawn up by Dr Woodhead and Dr Gibson. Dr Gibson visited Melrose and Aberdeen specially, and succeeded in making the plate cultivations within about six hours after collecting the water. It need hardly be added that in each case these observations were made subservient to the more important work of direct investigation of the organisms.

With water from the Tweed, taken near Melrose, there were three series of enumerations, the results of which are of considerable interest, and raise questions of very great importance.

First series.—Water taken from the right bank of the Tweed, below the cauld, on the 30th of April 1886. On the 3rd of May, the number of points of growth was 3000 per c.c. of water. A few of these, number not definitely stated, were moist. That the number was not large is evidenced by the fact that the liquefaction of the whole of the gelatine film had not taken place on the 8th of May.

On the same date water was taken from the mill-stream at Melrose, near the sluice. Examined on the 3rd of May, the number of points (of which one was a large liquefying area—there were also several smaller liquefying points) corresponded to 600 per c.c. of the water. Liquefaction was not complete by the 8th of May.

The next specimen of the same date was taken from the left bank of the Tweed, above the cauld, where the stream runs very rapidly. In this there were 3024 points per c.c. on the third day, only one or two of which were liquefying, although there was complete liquefaction by the eighth day. These observations were made when the rainfall had not been great.

Second series—The observations were made after there had been a heavy fall of rain, and when the Tweed was consequently in flood.

The water was taken on the 18th May 1886, from the right bank of the river above the cauld. On the fourth day the points were so numerous and the liquefaction was so extensive, that it was impossible to count the centres of growth with anything like accuracy. It may be stated that the approximate number of bacteria and spores, per c.c., would be about 12,000. The same difficulty was experienced with water taken at the same time at the Chain Bridge below Melrose, on the left bank of the river. In this case the approximate number would be 7500 per c.c.

In water collected from the right bank of the Tweed, near the Hydropathic establishment, there were 4120 per c.c.

On this occasion the fourth specimen of water was taken from the right bank below the cauld, where the water is somewhat stagnant. On the third day the points were so numerous and the liquefaction so far advanced, that it was found absolutely impossible to enumerate at all.

Third series—Made after a spell of fine weather, and when in consequence, the river was low.

From the right bank below the cauld (where the water, though shallow, ran rapidly), there were 2500 points per c.c.

From the left bank, at the Chain Bridge, the results were 4450 points per c.c.

In water from the right bank of the Tweed, near the Hydropathic, there were 4250 per c.c.; and in water taken from the right bank, above the cauld, there were 4200 points per c.c.

Tweed.	1st Series, in fine weather.	2nd Series, after heavy rainfall.	3rd Series, after fine weather.
Right bank, below cauld.	3000 per c.c. A few moist. Stagnant water.	Too numerous to count. Stagnant water.	2500. Taken from shallow running water.
Millstream, near sluice.	600 per c.c. One large, several small moist. Running water.	...	...
Left bank, above cauld,	3024. Rapid liquefaction.	...	...
Right bank, above cauld,	..	12000. Rapid and extensive liquefaction.	4200.
Chain Bridge, left bank,	...	7500. Medium liquefaction.	4450.
Near Hydro., right bank,	...	4120. Medium liquefaction.	4250.

On a glance at the accompanying table, several important facts are observed. In the specimens from the right bank below the cauld, those taken from the stagnant pools contain most bacteria and spores, whilst the number is enormously increased after a heavy rainfall. It is also to be observed that where the water is running, even though the stream be shallow, the number is very much below the general average. During fine weather it is noticeable that the number of points of growth per c.c. is remarkably constant, but that after a rainfall this quality is very rapidly lost. This can be accounted for in one way only, so far as our observation goes. So long as there is little rainfall, and at those points where no streams or rivulets join the main stream, there is practically no fresh supply from the surrounding drainage areas. There are minor local causes of difference, such as stagnant pools, back eddies, deposits of drainage sediment, &c., at certain points, in deep pools, backwaters, and the like; but when the amount of water from tributaries is small, these are the only influencing causes in determining the number of micro-organisms in the river water.

After a heavy rainfall the condition of matters is altered. There is now a drainage into the river from every point. Each little stream takes its share of organic matter and micro-organisms from the area it drains, and these streams, not mixing at once with the general current contain a greater or less number of micro-organisms. This is a point of very great importance indeed, as the quality of the ground water of any area must have some definite relation to that part of the river into which it drains, so that very valuable information may be obtained by a careful comparison of the numbers of micro-organisms present (which correspond very exactly with the proportion of albuminoid ammonia) at any given point in the river.

This holds good only after a rainfall more or less heavy. After a long spell of fine weather, as has been noted, the general results are remarkably constant. The importance of this in relation to the salmon fisheries is very great indeed.

THE RIVER DEE.

In this series of observations, exactly the same precautions were taken as in the previous set of experiments on Tweed water.

The water was obtained from the left bank of the Dee, above the Old Bridge at Aberdeen, above the brackish water of the estuary.

On the 17th July 1886, twelve gelatine tubes were inoculated with the water. The tubes were kept from the light, and as cool as possible. Within seven hours, plate cultivations were made, and these were examined on the 20th July, three days after the water was taken.

1. No. of points per c.c.,	1500
2. ,,	1000
3. ,,	1650
4. ,,	925
5. ,,	1500
6. ,,	1000
7. ,,	1125
8. ,,	500
9. ,,	500
10. ,,	1500
11. ,,	1300
12. ,,	1625

It will be seen that the numbers range from 500 per c.c. to 1650 per c.c., giving an average of 1177 per c.c. These results, as compared with those obtained on the Tweed, are very satisfactory indeed, especially as the conditions are, if anything, in favour of the Tweed water. How these results compare with the prevalence of salmon disease we must leave to experts to decide, but the difference is certainly very remarkable.

SECTION II.—*Study of Special Bacteria and Allied Organisms.*

The next branch of the inquiry relates to the organisms present in the water, what kinds are to be found, what is their life history, and how they may be detected and identified.

We pointed out in the previous report that this question—the separation and special study of the organisms present—was essential to the proper understanding of their relation to diseases affecting fish. From what we know of the vast number and variety of bacteria alone, not to speak of other low forms of fungoid life, we can scarcely hope to discover or determine all the species which may be present in water. But, as in the case of the air, there are certain species which are common, and are found almost universally. Some Sarcinæ and Micrococci amongst bacteria, and some common Hyphomycetæ, such as *Pencillium Glaucum*, and *Mucor Mucedo*, may be found almost everywhere in the air. So in river water we should expect that some would be commonly or almost constantly present; others of rare occurrence.

We should thus hope, by determining the common species, and by describing also those of less frequent occurrence, to establish a sort of chart for the guidance of future observers.

It might be hoped also that we should be able to detect the presence and prevalence of any special forms, either such as are directly connected with disease, as Saprolegnia, or of allied forms which may flourish under special conditions favourable to the development of pathogenic species.

It is not easy to determine, by the method which we have adopted, the relative prevalence of the several forms described. In the enumeration of the points of growth upon the plate, it is only possible to apply very imperfect methods for discriminating the various forms. If, for example, the water under examination be diluted with four times its quantity of sterilised distilled water, the number of points of growth appearing on the plate by the third day may be only 100 or so. Of these a certain number will have liquefied the jelly to some extent, and will be described as 'moist;' others may show traces of colour or peculiarities of form of growth, which may be further particularised. But even with such an enumeration, it is extremely difficult to say subsequently how many points of any individual species were present.

We can only judge of this by meeting the same species frequently, or by making a large number of highly-diluted cultivations, and allowing them to grow for a longer time. This is impeded by the rapidly-spreading liquefaction produced by some bacteria.

We have, however, been able to aid this part of the investigation in another way, viz., by studying very carefully the mode of growth of the individual organisms in the plate at the early periods of their growth. This is done by making fresh plate cultivations after isolation of the species. These fresh plate cultivations are also essential, in order to ensure thorough purity in the cultivation.

We have not, as yet, since the isolation and study of the several organisms described, made any further cultivations of river water, with a view to the determination of the relative frequency of the several forms. This we hope to do shortly.

What we propose at present is to give such an account of those which have been thoroughly studied up to the present as may aid in future observations.

We have not thought it necessary to describe the commonest species, such as *Bacillus subtilis*, which are well known and easily recognised.

Mode of Cultivation.—This has already been fully described in the previous report. It is only necessary to add that, in the case of the bacteria described, in nearly every case the cultivations were derived from plate cultivations; whilst in the case of the higher fungi they were more frequently taken from the bread-paste flasks. As far as possible, every point of growth upon a plate which presented any peculiarities was made the source of a fresh inoculation of a tube. From the growths in these tubes fresh plate cultivations were made, and this process repeated twice or more, in order to secure absolute purity of the organism. Its growth was then studied in bread-paste again and again, and in some cases in a new kind of jelly devised by Mr Edington, made from Irish moss.

Special Organisms Found.

Amongst the various forms of micrococci present in the water, two are of sufficient importance to be separately described.

1. *Magenta Micrococcus.*—We had observed that in many of the flasks a bright red colour was produced mixed with the growth of other fungi. The colour was sometimes a deep lake, at others of a dull flesh tint. This

colour was too frequently mixed with different forms of growth to allow of the supposition it was a secondary result of the growth of such organism as Mucor, &c., with which it occurred. Although occurring so frequently we had at first great difficulty in isolating the organism.

When separated in a tolerably pure condition it was at first thought to be the *Micrococcus prodigiosus.* But further study, especially after thorough purification, shewed that it presents striking differences from that organism, and we have therefore called it provisionally the *Magenta micrococcus,* since in colour and iridescence it so strikingly resembles magenta. Its points of difference from the *Micrococcus prodigiosus* will be more fully stated later. The water from which it was actually isolated was taken from the Tweed near Melrose.

Plate Cultivation.—Growth becomes visible to naked eye on third day, in the form of small greyish points, some of which have already a faint pinkish tinge. On the fourth day, the colour has assumed a bright red or magenta in many of the points, the largest of which are now about the size of a small pin's-head. The individual points of growth slowly enlarge, but do not usually exceed a pin's-head in size, and very speedily those which were grey in colour become of the prevailing magenta hue. The brilliant magenta colour is first seen in those growths nearest the surface of the gelatine, those implanted deeper only acquiring it when they reach the surface. Very soon each magenta point presents a peculiar iridescent appearance by reflected light — similar to the appearance seen when magenta is dropped on to the surface of glass. This iridescence by reflected light also characterises the growth on bread paste and potato. Under a low magnifying lens—about 20 diameters—the points of growth are seen to consist of globular bodies, with well-defined, or in some cases slightly irregular margins, and dark reddish or brown granular-looking contents. The growths do not cause liquefaction of gelatine on plate.

Microscopically.—Organisms mounted on the fourth day from gelatine plate, and stained, were found to consist of micrococci from ·4 to ·75 μ—mostly about ·6 μ. These occurred singly, or in pairs or heaps, or chains. In a few cases groups of four were seen. The micrococci are slightly ovoid, but the average longer diameter is about ·6 μ.

Test Tubes.—A faint pinkish spot is seen at point of inoculation of gelatine on the first day, and a delicate greyish streak along the needle-track. On the second day after inoculation the growth on the surface of the gelatine has increased considerably in size, and is of a bright red or magenta colour. The bright red surface growth rapidly increases, and soon spreads over almost the whole of the surface of the gelatine. Along the needle-track the extension of growth is very slow, being in the form of delicate scolloped processes, which gradually pass into surrounding gelatine. The colour of the growth along needle-track remains grey in appearance. After the lapse of several weeks, liquefaction takes place immediately beneath the surface growth around the upper part of the needle track, and extends downwards, so that in certain cases a film of the magenta growth may be seen floating on the surface of the liquid gelatine, which may be comparatively clear or somewhat opalescent; and at the bottom a greyish sediment may be observed. In other tubes, especially if the gelatine is rather less firm, liquefaction takes place more rapidly, and the liquid jelly has a uniform red tinge, with a copious red sediment at bottom. This appearance may also be observed when a larger quantity of material is inoculated into jelly of ordinary strength, in which case liquefaction takes place around needle-track before the surface growth has had time to make much progress, and so we get a very delicate flocculent film of a pinkish hue on surface, and a reddening of the liquid jelly with a copious deep red sediment. The breaking up of the surface film and the subsidence of the particles thereof give rise to a more or less granular opalescence in the liquid gelatine, which after a time disappears, leaving the jelly quite clear in some cases, but in others of a rosy pink. The liquefaction is so slow, that several weeks may elapse before any sign of its occurrence. In one tube which was carefully watched, no liquefaction was perceptible till the end of three months, and was not complete at the end of six months.

Microscopically.—Same as from Plate Cultivation.

Bread Paste.—Grows at first as a pinkish spot at point of inoculation, which rapidly increases in size and develops its characteristic magenta appearance. In some flasks, after it had made a certain advance around point of inoculation, the growth made its appearance at the margin of the flask, and extending inwards became fused into that growing from the centre. The peculiar greenish iridescence is well seen in some cases after a short time, in others it is not so well developed. In a somewhat moist soil, and at an average summer temperature, the growth of this micrococcus is very rapid, and closely resembles that of the *Micrococcus prodigiosus,* from which it differs in that it does not cause rapid liquefaction of the jelly, and that it develops the peculiar greenish iridescence above described.

After a time a dirty greyish white coating appears over some parts of the growth.

The bright magenta hue becomes darker, and assumes a brownish-red in most of the flasks after the lapse of some weeks.

Microscopically.—The micrococci appear larger than those taken from jelly—some even 1·27 μ in diameter.

Examined unstained, some of these micrococci appear to contain the red pigment in their substance, as they are found bright red under a power of 700 diameters. They seem, however, to hold the colouring matter very loosely. When examined in distilled water, only a very few appear red, the colouring matter being found in small masses scattered here and there throughout the field, these masses having no definite size or shape, and quite free and distinct from the micrococci. If, however, a thin film of the organisms be carefully dried on a coverglass, and mounted unstained in benzol balsam, many of them stand out bright red under the microscope, and these may retain their distinctive colour for a considerable time, probably months, ultimately yielding it up to the surrounding balsam. The older more fully developed micrococci retain the colouring matter longer than those less mature.

Chemical Reactions.—The pigment requires for its production the presence of air, as it is not developed in connection with those organisms which are situated in the deeper parts of gelatine cultures. It is readily soluble in distilled water, slightly so in absolute alcohol and glycerine. Strong nitric acid causes an immediate disappearance of the red colour. Strong hydrochloric acid turns it first dark violet, and afterwards of a pale violet colour. Strong ammonia, and a solution composed of 1 grm. fused caustic potash in 100 c.c. absolute alcohol, change the pigment to a brown, then a yellow, finally making it almost entirely disappear. Strong sulphuric acid, turpentine, benzol, and oil of cloves appear to have no effect on it. Chloroform changes it to a pale pink.

Comparison with Micrococcus prodigiosus.—Striking differences exist between the magenta micrococcus and the *Micrococcus prodigiosus,* which may be briefly summarised. *Micrococcus prodigiosus* liquefies peptonised beef gelatine pretty rapidly, *Magenta micrococcus* does not unless very slowly. Cultivations kept three months at a summer temperature may show no trace of liquefaction. This also serves to distinguish it from *Bacillus indicus.* The iridescence of the *Magenta micrococcus* is also never observed on *Micrococcus prodigiosus.*

Microscopically, when studied side by side, the difference is very striking. *Micrococcus prodigiosus* is much more uniform in size, more spherical, and frequently forms chains of 3 or 4. Its diameter is, on an average, smaller, about ·48 μ, whilst *Magenta micrococcus* is ·4 to ·6 μ. In *Magenta micrococcus* chains were never seen, the cells more oblong or ovoid; Diplococci frequent, often giving the appearance of short rods, 1 μ to 1·1 long.

Other differences, *e.g.*, in the colour spectrum, need not here be described.

2. *White Micrococcus.* From Tweed—Melrose—right bank above the 'Cauld.'

Plate Cultivation.—In summer the growths appear on the second day as minute grey specks. On the third day they are seen as rounded points varying in size, and under a low power have the usual globular form with well-defined margin, and dark granular contents. There is no liquefaction of the gelatine.

Test Tubes.—Growth commences as a small greyish-white spot on the surface around the point of inoculation of jelly. It slowly enlarges, assuming a more or less circular form with somewhat elevated margin and slightly depressed centre. Along the needle-track little or no evidence of growth is seen. In its further progress the growth causes a deep cup-shaped depression of the gelatine, which increases with the increase of the growth, and is lined by a thin film. No liquefaction of gelatine occurs.

Bread Paste.—This growth is almost indistinguishable on bread paste. It grows very slowly as an apparently colourless or slightly greyish film on the surface, and becomes somewhat darker after a time, so as to appear of a faint grey or greyish-yellow.

Microscopically.—Round or slightly ovoid micrococci, having a diameter of about ·89 to 1·15 μ. Some of the dividing cells (Diplococci) have a diameter of ·8 μ broad by 2 μ long.

3. *Violet Bacillus.*—Tweed—Melrose.

This appears to be identical with the *Bacillus violaceus* or *Bacterium Ianthinum,* which is now well known to bacteriologists. In every respect it appears to conform to that organism. It is not at all uncommon in river water, if we may judge from the frequency of the occurrence of its colour in flask cultivations.

Plate Cultivation.—On the third day numerous grey round colonies of growth are seen. Most of these have caused liquefaction of the surrounding jelly. Under a low power the points consist of the usual globular form, with a zone of liquefaction around them. The violet colour is not developed on the plate cultivation, the growth as well as the liquid jelly remaining grey in appearance.

Test Tube Cultivation.—On the second day a funnel-shaped bag of liquefaction occupies the place of the needle-track, the apex being directed downwards. The liquid gelatine is opalescent, and a greyish sediment fills up the apical portion. Extension of liquefaction takes place more rapidly at the surface, and in a few days a layer of liquid gelatine may be seen on the top, and a funnel-shaped sediment beneath, which now is distinctly violet in colour. Liquefaction may take place from above downwards, until all the jelly becomes liquid, with a dark violet sediment at the bottom of the tube. The liquid jelly, at first opalescent, gradually becomes quite clear.

Bread Paste Cultivation.—Growth at first almost colourless, but gradually a pale violet makes its appearance in the depressions of the surface. This deepens in colour until it becomes a very dark purple. Ultimately it covers the greater part of the bread paste.

Microscopically.—Bacilli, for the most part forming very long and extremely delicate twisted threads, composed in many parts of distinct segments. The threads appear hollow, are in many places highly granular. Stain feebly. In some of them rounded spores are seen at irregular intervals. The average diameter is rather less than $\cdot 4\ \mu$. Some isolated rod-shaped bacilli are also seen $1\cdot 5\ \mu$ to $2\ \mu$ long, most with central or terminal spore-formation.

4. *Yellow Bacillus.*—Tweed—Melrose.

Plate Cultivation.—Growth is very slow on the plate. Each point of growth is of a distinct yellow colour, and under a low power consists of a circular well-defined margin, and yellowish granular-looking contents. Some growths near the surface have somewhat irregular margins from slight inspissation of the jelly. No liquefaction of the gelatine occurs.

Test Tube Cultivation.—A yellow film slowly develops on the surface around the point of inoculation, and spreads outwards as a slightly elevated yellow growth, with irregularly serrated margin. Along needle-track little or no progress is seen for a considerable time; but eventually very delicate feathery processes may, in some cases, be seen passing from the needle-track into the surrounding gelatine. In other cases, almost no growth takes place in the needle-track; and in these the surface growth gradually eats into the subjacent jelly, forming a depression which deepens with the advance of the growth until a cup-shaped excavation is produced, the sides and bottom of which are lined with a thin film of the yellow growth. As a rule the sides are in close apposition to the test tube wall. The progress of the growth is extremely slow, and no liquefaction of gelatine occurs. After a time the colour becomes darker, and of a somewhat orange hue.

Bread Paste.—On bread paste this organism does not present such well-marked features as those which characterise its growth on nutrient jelly. It requires a somewhat moist soil, and, if the paste is moist, it slowly tinges the furrows on the surface a faint yellow, but it usually leaves the slight elevations unaffected. On a dry soil, a very faint coloration of the bread paste is the only evidence of its presence.

Microscopically.—Bacilli about $1\cdot 5\ \mu$ in length and about $\cdot 3\ \mu$ in breadth. They occur singly, or in long threads—Leptothrix form. These latter vary in length from $4\cdot 5\ \mu$ up to $100\ \mu$, and from $\cdot 3\ \mu$ to $5\ \mu$ in breadth.

This bacillus appears to agree pretty nearly with a bacillus which has been called *B. luteus* (Flügge, p. 290),* but the descriptions given of that organism are hardly sufficient to permit of absolute identification.

5. *Orange-Brown Bacillus.*—Tweed—Melrose, right bank above the 'Cauld.'

Plate Cultivation.—Small points of growth appear on the second day, having the usual rounded form, and dark granular-looking contents are seen by a low power. On the third day most of the points have caused

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* C. Flügge, *Die Mikro-organismen*, second edition, 1886.

liquefaction in the surrounding jelly, the liquid portions having an orange-yellow colour.

Test Tube Cultivation.—A delicate opalescent film surrounds the point of inoculation of gelatine the first day, along with slight haziness of upper part of needle-track. Liquefaction of gelatine very rapidly takes place, so that on the third day about a quarter of an inch of the surface is liquid. Floating on the liquid jelly a very delicate yellowish film is seen. The liquid portion is opalescent, and a very copious orange sediment falls to the bottom.

Bread Paste Cultivation.—Growth is also rapid on bread paste. It spreads as an orange-yellow moist-looking film, which at first follows the depressions on the surface of the bread paste, subsequently covering the small elevations. The colour becomes much darker after a time, and assumes a dark-brownish or brownish-yellow in the centre, where at first it is deeper than at the circumference.

Microscopically.—Very slender delicate bacilli from 1·6 μ to 2·4 μ, or even 4·5 μ in length, and from ·25 μ to ·3 μ in breath. They occur singly, or in clusters. Many of them are straight, others are slightly curved. Several show a clear, bright, unstained portion, which is not round or ovoid, but which extends for some distance longitudinally within the sheath of the organism. This unstained portion is commonly situated near the centre of the bacillus, and frequently a curve in the organism is seen at the clear portion. It is probably due to commencing segmentation without constriction. No spores were seen.

We have been unable to find any description corresponding to this organism. So far as we can judge, it appears to be of tolerably frequent occurrence.

6. *Fluorescing Bacillus.*—Mill-stream, Melrose.

Plate Cultivation.—The individual colonies have a greyish rounded appearance on the third day, and under a low power the usual globular form with granular-looking contents is seen. There is no liquefaction of the gelatine.

Test-Tube Cultivation.—A greyish growth forms on the surface of the gelatine around the point of inoculation. This slowly advances over the surface, its margin being slightly elevated above the surface, whilst the centre is somewhat umbilicated. It has a glazed appearance when looked at from above. Along the needle-track extension is by means of fine serrated points, which penetrate into the surrounding jelly. The surface growth gradually increases in size until it reaches the side of the test-tube. It then obtains its nutriment from the subjacent jelly, which it causes ultimately, almost entirely to disappear, leaving merely a very thin coating of gelatine on the interior of the test-tube, and a layer of gelatine and bacilli at the bottom.

The peculiar feature of this organism consists in its power of communicating to the gelatine in which it grows a characteristic series of colour changes, when viewed by transmitted and oblique light. After a time—varying, according to the temperature, from about six to ten days—the upper part of the gelatine in the tube assumes a faint greenish-yellow tinge, as seen by transmitted light, changing to a delicate blue on oblique illumination. The intensity of these colour-changes deepens with the development of the growth up to a certain point, when gradually it gets fainter, and the colour changes disappear.

There is no liquefaction of the gelatine.

Bread Paste Cultivation.—At first a very faint whitish film is, with some difficulty, made out on the surface. In the depressions of the bread paste the growth has a slightly glazed appearance. After some weeks a peculiar silver-grey glistening change takes place in the growth, and the bread-paste looks as if covered with an extremely delicate film of oxidised silver.

Microscopically.—Bacilli, about 1·6 μ in length, and from ·4 μ to ·5 μ in breadth. Some bacilli show spore-formation, spores being, as a rule, central.

This bacillus is that commonly known as the fluorescing bacillus. There are said to be two forms, one which liquefies the jelly (*B. fluorescens liquefaciens*), and the other (with which that above described appears to be identical), which does not cause Liquefaction—the so-called *B. putidus.* This appears to be a comparatively common organism. We found it last year in the water from the Tweed, and have found it repeatedly in tubes this year. We have not observed the peculiar odour which is said to be given out by its growth, resembling herring brine.

7. *White Bacillus.*—Tweed—Melrose.

Plate Cultivation.—Growths become visible to naked eye on the second day in the form of small, round, or ovoid points, as seen by a low magnifying power, and with dark brownish granular-looking contents. Next day the colonies have increased in size, and already liquefaction has commenced. The whole of the gelatine very speedily becomes liquid on plate.

Test Tube Cultivation.—On the second day a bag of liquefaction occupies the position of the needle-track. This rapidly extends, and in about a week the greater part of the gelatine has become liquid. A whitish pellicle in some cases remains on the surface for some time, and gradually sinks, forming a copious whitish deposit. The liquid portions are at first opalescent, but soon all particles subside, leaving the supernatant liquid quite clear.

Bread Paste Cultivation.—Growth is so rapid on bread paste that, in some cases, the surface soon becomes quite liquid, resembling thick cream. In cold weather the growth is not so rapid; but even in winter the progress is comparatively quick, the growth appearing as a moist, greyish-white, creamy-looking film on the surface of the bread paste. After a time the colour becomes darker, and in cultivations which have been kept in flasks for a considerable time a dark sooty-brown colour develops around the margin, whilst the centre appears greyish-brown. A strong putrefactive odour is given off from flasks which have been kept for some time.

Microscopically.—Examined in sterilised distilled water, the bacilli are seen to be of various lengths, from 1·5 μ up to 25 μ. The smaller bacilli show exceedingly active movements, so much so that it was quite impossible to measure them with any degree of accuracy. Some of the longer bacilli contained numerous bright spores, others appeared quite homogeneous. They all showed a gliding serpentine movement across the field of the microscope. When dried and stained in the usual manner, the appearance of the organisms varied according to their age and development. Some appeared in the form of single short rods, homogeneous, or with light centre and darkly-stained extremities. These measured on an average about 1 to 1·6 μ in length, and about ·4 to ·5 μ in breadth. Others consisted of long chains, 7 μ to 15 μ or 25 μ in length, and ·7 μ in breadth, and were made up of a series of alternate dark rod-like, deeply-stained bodies, and light unstained spots. The former measured 1·5 μ by ·6 μ, and the latter had a diameter of about ·4 μ to ·5 μ.

This organism appears to correspond with the *Proteus mirabilis* of

Hauser. . It may, indeed, be the *P. vulgaris*, but the liquefaction of the jelly is slower, and spores are present. There can be little doubt that it is one or other of these, or very closely allied to them.

8. *White Bacillus.*—Tweed—Melrose.

Plate Cultivation.—The points of growth are of a greyish appearance, and become visible to the naked eye on the third day. They present the usual rounded appearance under a low power, and do not cause liquefaction of gelatine for a considerable time.

Tube Cultivation.—On the surface of the gelatine the growth is slow, and in the form of a greyish-white film, which does not usually cover the entire surface. Along the needle-track the mode of growth varies according to the consistence of the gelatine. In moderately firm jelly, extension is by fine serrated points into the surrounding medium; whilst in jelly of softer consistence a beautiful dendritic arrangement is seen. In this case the needle-track appears as a greyish central stalk, from which radiate slender greyish branchlets, which in turn give off very fine secondary branchlets after a time. Liquefaction takes place around needle-track, in the case of the moderately firm gelatine, and a slight greyish sediment falls to the bottom of the liquid portion; the greyish-white surface growth remains floating on the liquid gelatine for a long time. In the case of the softer gelatine, the dendritic arrangement persists, and no liquefaction occurs—at any rate for a very long time.

Bread Paste.—A whitish growth, spreading somewhat rapidly over a considerable portion of the surface, and having a well-marked glazed, or varnished appearance. A peculiar resinous, somewhat offensive odour is developed in the bread paste flask after the lapse of some weeks.

Microscopically.—Bacilli from 1·5 μ to 4 μ in length, and about ·4 μ in breadth.

For the most part they form dense masses of rod-shaped bacteria with rounded ends, many showing spore-formation. We have not been able to identify this organism with certainty. It appears to be pretty common.

9. *Bacillus*—Dee, Aberdeen, left bank, Old Bridge.

Plate Cultivation.—On the third day numerous points of liquefaction are seen, the largest being about the size of a pin's-head. Several small greyish colonies are scattered over the jelly, but these have not caused liquefaction. Under a low magnifying lens the larger liquefying points appear circular, and have a double contour and dark granular-looking contents. The colonies next in size have only a single circular outline, which, however, is more dense than the greyish granular contents. The still smaller growths show a dark centre surrounded by a paler granular zone, which again is bounded by a well-defined dark circular margin. The smallest points are seen to consist of granular contents and circular well-defined margins, and, when viewed by transmitted light, have a distinct yellow hue.

On the fifth day all the points of growth have caused liquefaction of the gelatine, and converted it into a single large liquid mass. A slight urinous odour is perceived on removing the bell-jar.

Test Tube Cultivation.—Along the needle-track a bag of liquefaction may be seen on the second day, which rapidly extends outwards and downwards, until on the ninth day, in many of the tubes, complete liquefaction of gelatine has taken place. At first the liquid jelly is opalescent, but speedily a greyish white sediment falls to the bottom, leaving the supernatant liquid quite clear.

Bread Paste.—Grows rapidly as a creamy-looking film on the surface. The colour, after a time, becomes darker and of a faint brownish yellow. A distinct bluish zone surrounds the margin of the growth as it spreads itself over the bread paste. At first the growth has a moist creamy appearance, but after about a fortnight it begins to become dry and somewhat shrivelled-looking, and gradually it takes on a dark slate-grey colour. A peculiar odour is evolved after a time, somewhat resembling that of stale beer.

Microscopically.—Bacilli show active movement. They vary in size from 1·5 μ in length, and ·5 μ in breadth, up to long threads of 50, 60, 70 μ or longer, and from ·5 μ to ·7 μ in breadth. Examined in distilled water, the bacilli show active spore-formation, and both the spores and smaller bacilli appear in very active motion.

In stained preparations the most striking features are the presence of very long straight or slightly curved threads, of very uniform diameter and consistence, averaging ·7 μ in width, and 800 to 1000 μ or more in length, with blunt ends. Most of these threads appear solid, and a very few appear hollow and show traces of spore-formation.

In some respects this organism closely resembles the common 'Hay bacillus,' *B. subtilis*, both in its growth upon gelatine and upon bread paste. But when grown side by side with *B. subtilis*, the growth of the latter is of a much purer white colour. Both have the same peculiar granular or worm-like appearance. The microscopic characters also have a close resemblance to some cultivations of hay bacillus, and we are inclined to consider it a variety or closely allied species.

10. *Bacillus.*—Tweed, Melrose, right bank above the 'Cauld.'

Plate Cultivation.—On third day growths are seen. They consist of a central grey point, radiating from which are numerous fine grey fibrils which interlace with each other, forming a delicate network around the central grey spot. As these fibrils extend outwards they get thicker, and form a circle of short rod-like bodies. From the peripheral extremities of these, small fibrils are given off which run outwards, and appear to interlace with those from other points of growth. The whole surface of gelatine has thus an appearance as if covered by fine threads, and, in the case of plates with very numerous growths, this thready appearance is so very dense as to lead one to suppose the gelatine to be in a state of liquefaction, which, however, is not the case.

Test Tube Cultivation.—From the point of inoculation on the surface of gelatine, delicate grey thread-like processes spread outwards towards the side of test-tubes, and gradually come to cover the whole surface, forming a dense greyish film. After a time the growth extends downwards into the substance of the jelly, and by its downward growth causes a more or less deep cup-shaped depression, the sides and bottom of which are composed of a layer of growth of a dense greyish appearance. No liquefaction of gelatine takes place. The growth along the needle-track is very slow, and takes place chiefly at the upper part. When it occurs, it takes the same form, viz., fine threads like spiders'-web running out towards the periphery of the tube. The resemblance to an insect on the surface of the gelatine is sometimes very striking, and first suggested the nature of the growth.

Bread Paste Cultivation.—The growth on bread paste is very ill-defined. At first almost no trace of it can be observed, because it differs but little in appearance from the surface of the bread paste. Slowly a slight change in colour becomes perceptible, which gradually deepens, until it assumes an ill-defined yellowish grey over the whole surface of the bread paste.

Microscopically.—Mounted in the ordinary manner and examined, the appearance presented affords only an imperfect idea as to the features characteristic of this organism. Masses of rounded bodies resembling micrococci, having a diameter of from ·7 μ to 1 μ, single rounded cocci, and cocci arranged in pairs or chains or sets of four, having the same diameter as the above, are seen scattered over the field.

Bacilli in Leptothrix form, whose transverse diameter corresponds to that of the rounded cocci, and the length of whose individual elements varies from 1·5 μ to 3 μ or more, and homogeneous threads of the same thickness, reaching 25 μ or more in length, may also be observed.

The central grey colonies on the gelatine plate are composed of masses of these rounded spores, from which are developed the long homogeneous threads which give the characteristic thread-like appearance above described. As these threads elongate, they show both longitudinal and transverse division, and a mass of round spores are produced, giving rise to the thickened rod-like bodies described as surrounding the central grey points on the gelatine plate. From these spores long bacilli are again developed, which give rise to the delicate network running between the individual growths. This organism appears closely to correspond with the B. Multipediculus described in Flügge, p. 323.

11. *Pink Torula.*—Tweed, Melrose, right bank above the 'Cauld.'

Plate Cultivation.—On the third day small, rounded, greyish points appear on the gelatine plate, presenting the usual features under a low power, viz., globular bodies with well-defined margins and dark granular contents. Soon a distinct pink colour is observed in each point of growth. No liquefaction of gelatine occurs.

Tube Cultivation.—Growth is slow on surface of gelatine. It forms a pinkish, coral-looking elevated film, which does not liquefy the subjacent jelly, as the salmon-coloured torula does. Almost no extension takes place along needle-track, which remains grey in colour.

Bread Paste Cultivation.—The progress of growth is also slow on bread paste. The pink spot around the point of inoculation gradually increases in size, until it comes to assume a more or less circular shape, with its centre considerably elevated above the surface, and of a red coral-looking appearance. On a moister soil, this marked elevation above the surface does not take place, the growth merely forming a pinkish film, which is more marked along the moist depressions of bread paste.

Microscopically.—Round or ovoid torula, the majority ovoid. The cells vary much in size, the extremes of length being 2 μ to 4·5 μ; average, 3 μ to 4 μ. The breadth ranges from 1·5 μ to 2·5 μ, the average about 2 μ. Preparations from growth on bread paste show a somewhat larger average size of cells, and a more distinct differentiation of the protoplasm of various parts.

12. *Salmon-coloured Torula.*—Tweed, Melrose, right bank above the 'Cauld.'

Plate Cultivation.—Points of growth make their appearance on the third day. They vary in size, the larger already causing liquefaction in surrounding gelatine. At first each point is colourless; but in a day or so all the points become pinkish, and the liquid parts of gelatine are also pink. Under a low magnifying power the usual appearance is seen of rounded bodies, with well-defined margins and dark granular contents; and, in the case of the liquefying points, a double outline.

Tube Cultivations.—A delicate greyish film at first makes its appearance around point of inoculation, which soon develops a pinkish hue. Along needle track very little growth takes place. The pinkish film spreads rapidly over the surface, beneath which liquefaction very soon occurs. The further progress corresponds to that of the yellow torula, except that, in this torula, the surface film speedily sinks into the liquid gelatine, forming a salmon-coloured sediment, and leaving the supernatant liquid opalescent for a considerable time.

Bread Paste Cultivation.—A faint pinkish spot makes its appearance around the point of inoculation on the first day. Growth makes rapid progress, and soon covers the whole surface of bread paste. The colour varies greatly. At first it has a pale pinkish appearance, as it spreads over the surface it often has a mottled look, from small whitish projections of bread paste which have not become entirely covered by the growth. It very frequently assumes somewhat of a salmon-colour. After a time the colour becomes darker and of a reddish brown. Later on, irregular ridges and furrows appear on the surface, giving it a 'wormy' appearance. This results from the drying up of the growth and bread paste. The colour now is usually a dark mahogany, and gives one the idea that a process of charring has been going on over the surface of the bread paste.

Microscopically.—Torulæ varying in size from 2·5 μ to 12 μ in length, and from 1·5 μ to 9 μ in breadth. They vary also in shape, some being ovoid, others fusiform, and others cylindrical. They show active growth and development, very many having buds in various stages of growth. The protoplasm of many of them appears very vesicular, many contained numerous granules. Although presenting such varieties in shape, by far the majority are elongated, and the length is much more variable than the diameter. The average length may be stated at 4 μ to 5·5 μ, though some, as already stated, are 10 μ or even 12 μ. The average diameter is about 1·5 μ, very few measuring more than 2 μ. We cannot find any description of a similar torula in books.

13. *Yellow Torula.*—Mill-stream, Melrose.

Plate Cultivation.—Growths appear on third day in form of small greyish points, which rapidly liquefy the gelatine, giving it a distinct yellow colour. Under a low magnifying power, the individual points are seen to have the usual rounded appearance, with well-defined margins, and dark granular-looking contents. Those with commencing liquefaction of surrounding gelatine present a double outline.

Tube Cultivation.—Around point of inoculation on surface of jelly, a canary-yellow film is seen the first day. This film rapidly spreads itself over a considerable portion of the surface of the jelly. Simultaneously with this surface growth, liquefaction takes place in the subjacent jelly, and extends downwards along needle-track, forming at first a more or less conical bag with the apex downwards. Into this liquid portion particles from the surface growth subside, forming a yellow deposit at the bottom, and giving rise to an opalescent appearance of the liquid jelly. The yellow film continues to float on the surface for a considerable time, but ultimately it sinks to the bottom. As a rule, liquefaction does not extend beyond the extremity of needle track; in many cases it only involves a portion, and in these the liquid gelatine forms a clear layer of varying depth with a copious yellow sediment, beneath which, in the non-liquid jelly, may be seen a greyish streak, the lower portion of needle track, which has not exhibited any marked evidence of growth or development.

Bread Paste Cultivation.—Extension of growth is rapid on the surface of bread paste. On a moderately moist soil it presents a beautiful canary-yellow colour with a somewhat glazed appearance, and slightly elevated above the surface of the bread paste. If the bread paste is more moist the progress of growth is more rapid, but the colour is at first not so well marked. Afterwards, however, it assumes its characteristic canary-yellow appearance.

Microscopically.—Round or ovoid Torulæ, varying in size from ·5 μ to 1·5 μ. The larger ovoid Torulæ measure in their longest diameter 1·5 μ, and 1·1 μ in their narrow.

In a future Report we hope to continue the consideration of this branch of the investigation, and to take up the other branches already mentioned.

APPENDIX F.—No. XIII.

NOTE ON THE SPAWNING OF THE PIKE.

By George Brook.

A number of pike which had been in the tanks of the Rothesay Aquarium for some years, together with some small ones added in the early spring, spawned in the month of May. The earliest ova to be deposited were shed on the 6th of May. The tank in which they were found contained one female and three males. The eggs were strewn all over the rockwork and gravel at one end of the tank, and it was evident from their scattered arrangement that the female had not been resting near the bottom at the time the ova were extruded. On the following day the movements of the pike were watched closely, as I was anxious to observe the spawning process. In the previous year pike ova had been deposited in this and the adjoining tank, but I was not present at the time. When I first saw the eggs, a week or ten days after they had been shed, I found them arranged in clusters at the bottom of the tank, each cluster being overgrown with fungus (*Saprolegnia.*) No eggs could be seen in the tanks which were not surrounded by the fungus, though some may have escaped my notice. I concluded the eggs would all be dead, many being quite opaque, and no further attention was paid to them. Mr Shields, however, informed me that many hatched out some weeks later, and that in one of the tanks a large number of embryos were observed swimming about in the water for some days, but all died before I visited Rothesay again, probably from want of proper food. On another occasion I have observed the ova of the pike to have been deposited in clusters. The clusters were somewhat irregular oval in outline, and from 3 to 5 inches in greatest diameter. In the centre the mounds were several rows of eggs deep. In the present instance, therefore, I was curious to know how the eggs came to be scattered over the bottom of the tank instead of being collected together in heaps. On the 7th of May, and on two or three other occasions afterwards, I had an opportunity of watching the movements of the fish during the spawning process, and then had the satisfaction of solving my difficulty. Commencing at one of the intervals between oviposition, the process as I observed it is somewhat as follows:—During the interval the female rested on the bottom of the tank near one corner, and remained in one position for the greater part of the time which elapsed. The three males, all of which were considerably smaller than the female, swam about during the whole of the interval, usually in company. While swimming together the three often crossed under and over one another with a gyratory movement. Occasionally one or other of them would approach the female, and swim slowly backwards and forwards over her. Next he would settle by her side, or, giving a sharp stroke with his tail, rapidly dart away, rubbing himself against her side in doing so. At length two or even all three males would approach the female, and pushing their snouts under her abdomen, succeeded in driving her from her resting place. After swimming slowly round the tank two or three times accompanied by the males, the female usually came to rest at one end of the tank, poising herself in the water about two feet from the bottom. (So far as I observed, the same end of the tank was always chosen.) The males now arranged themselves one on each side of the female, and the third either under or over her. During this time all the males kept all their fins moving rapidly and excitedly, while with the exception of the pectoral, which had a slow oscillating movement, those of the female were motionless. A signal for oviposition seemed often to be given by one of the males forcing his snout violently, but with a gliding movement against the under surface of the female's head. A batch of eggs are then rapidly shed, and at the same time the male turns with his ventral surface to that of the female, and evidently the milt is expressed at this moment, but it was impossible to see it. At the instant of oviposition the female always gave one or two very vigorous strokes with her tail and darted away followed by the males, and turned at first partly on her side. The rapid strokes of the tail caused the batch of eggs to whirl about in the currents, and as these decreased in intensity the eggs gradually sank to the bottom of the tank. It was thus that the eggs came to lie singly on the bottom. All four fish swam together rapidly round the tank, and returned to the former point from which the eggs had been shed. The process of oviposition was again rapidly gone through, and as the female darted away again another batch of eggs was left whirling in the water as before. The process was again repeated after a little longer interval. The whole three batches of ova were deposited in about a minute. Next followed a longer interval, during which the female took up her former resting place at the bottom of the tank. During these periods of rest the males usually left the female unmolested. After a lapse of five or ten minutes, however, they again drove her from her corner, and two or three more batches of eggs were deposited in the manner already described. Then followed another interval of several minutes' duration, after which the process of oviposition was again commenced. I kept an account of the time occupied by these various active and quiescent periods, the following being three consecutive ones:—

1st period,	1st batch of ova deposited.		
	2nd	,,	10 seconds later.
	3rd	,,	45 seconds after 2nd.
	1st short period of rest of 3¼ minutes' duration.		

2nd period,	4th batch of eggs deposited.	
	5th ,,	15 seconds later.
	2nd short period of rest of $7\frac{3}{4}$ minutes' duration.	
3rd period,	5th batch of eggs deposited.	
	7th ,,	12 seconds later.
	8th ,,	30 ,,
	3rd short period of rest of 9 minutes' duration.	

After five or six such spawning periods, there was always a long period of rest extending over several hours.

The eggs when first extruded are not quite circular, and the egg membrane, not being fully distended, presents a wrinkled appearance. At this time the eggs are slightly adhesive, and when collected in small clusters cling to one another with considerable tenacity. Soon, however, an inception of water takes place through the egg envelope, and the ova gradually become fully distended and the egg envelope tense. The slight adhesiveness of the egg envelope is then lost, and the eggs may be made to roll about on the bottom of the tank by creating a current in the water.

The number of ova extruded at one time appears to vary very considerably, and I have no accurate data to give, as it was impossible to count them. Speaking roughly, I should say the number varied from 30 to 200, with perhaps an average of about 100. Supposing five spawning periods to follow in rapid succession, separated only by a short interval (see preceding table), and that during this time 13 batches of ova were deposited, this would give an aggregate of 1300 ova deposited in about 40 minutes. The large female already referred to continued to shed batches of ova at intervals for a period of eight or ten days.

APPENDIX F.—No. XIV.

ON THE PHYSICAL CONDITIONS OF THE WATER IN THE FIRTH OF FORTH.

By Hugh Robert Mill, D.Sc., F.R.S.E., F.C.S., Chemist and Physicist to the Scottish Marine Station.

The Firth of Forth may be taken as extending from Alloa to the Isle of May. From Grangemouth to near Queensferry it averages $1\frac{1}{2}$ miles in breadth, with a depth of less than 10 fathoms; at Queensferry it contracts to 1 mile, and the depth increases to over 40 fathoms, but diminishes afterwards. From Queensferry the breadth increases to 5 miles at Leith and 16 at Musselburgh. The Firth contracts to 8 miles at North Berwick, and again widens, measuring 18 miles across where it merges with the North Sea at the Isle of May. The deep water at Queensferry is confined to a very small area, and the 10 fathom stream, broken by a few deeper patches, runs along the northern shore to near Kirkcaldy, where it widens out in a funnel shape (Plate XX.). A short tract of over 10 fathoms, known as the Narrow Deep, lies to the south of Inchkeith, and a few miles to the east of that island the 20 fathom area begins as a narrow stream, trending north-eastwards, and spreading out off Largo towards both shores. The Isle of May is connected to the mainland of Fife by a submarine plateau rising to less than 20 fathoms from the surface, and a few miles to the eastward of it depths of over 30 fathoms commence. The mean depth of the whole Firth is 14 fathoms, the greatest extent of shallow water being the range from Leith to North

Berwick along the south shore across Aberlady Bay. The entire volume of water between Alloa and the Isle of May, calculating from the data of the Admiralty charts, is 36,700,000,000 cubic yards at low water, and about 5,000,000,000 cubic yards additional at high tide. The diagram, figure 1, represents by means of shading the distribution of depth in the Firth of Forth, the contours of 5, 10, 20, 30, and 40 fathoms being drawn.

It is unnecessary to enter into detail as to the manner of observing the physical conditions of the water, because the processes are described in sufficient detail in published papers,* and they do not differ materially from those employed on the trip of the 'Garland' to the Moray Firth, reported on in this volume. The vessel employed for the observations, which lasted over two and a half years, was a 30-ton steam yacht, the 'Medusa,' fitted with an extremely convenient derrick and steam winch, by means of which the work was done very rapidly.

Salinity Observations.—The density of water samples collected during periodical trips along the centre of the Firth was determined by a very delicate hydrometer, and the results reduced to their value at 15°·56 C. (60° F.). In Table I. the average density at high tide and low tide ('high' tide being considered between half flood and half ebb; 'low' as between half ebb and half flood) is given, and also the maximum and minimum observed during the whole time of my observations. For convenience in comparing with the results for other regions the percentage of total dissolved salts is calculated and added in a special column. The figures are given for each of twelve stations all situated in mid-channel and five miles apart. Careful comparison of the north and south channels at Inchkeith (Station V.) showed that at all states of the tide the difference between the two was inappreciable, and of the samples from which the average was taken about half were collected on each side of the island. The results given in the table are represented graphically in figure 2 (Plate XXI.).

While the data for Stations III. to X. may be viewed as fairly well established, more observations would be required before implicit confidence could be placed on the figures for Stations I., II., XI. and XII., and on those for the bottom salinity at Stations IV., VI., VIII. Considering the table and curve, one sees the following state of matters to hold for the central line of the Firth. The salinity of surface water increases rapidly from the river to Queensferry (IV.), the difference between high and low tide being considerable. From Queensferry to Inchkeith (VII.), the rate of increase is more gradual, and the tidal difference is less; while from Inchkeith to the Isle of May the rate of increase in salinity is very slight, and the tidal variation almost imperceptible. Two features in the curve for surface salinity at low water attract attention. One, an irregularity at Station VI., is due to the freshening action of the Almond, which at low tide flows north across the Firth. The second anomaly is a dip in the curve beyond the Isle of May. This has been shown to be due to the water of the Tay sweeping through St Andrews Bay with the ebb tide, and carried up the Firth of Forth as far as Anstruther by the first of flood. St Andrews Bay appears, from some observations made in June 1885,† to be a prolongation of the estuary of the Tay, and the salinity off St Andrews to be about equal to that at Station VIII. in the Firth of Forth off

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* 'Salinity of the Firth of Forth,' *Proc. Roy. Soc., Edin.* xiii. pp. 29–64; 'Temperature of Water in the Firth of Forth,' *Ibid.*, xiii. pp. 157–167; 'Tidal Variation of Salinity and Temperature of the Estuary of the Forth,' *Ibid.*, xiii. pp. 790–799.

† 'Note on the Salinity of the Firth of Tay and of St. Andrews Bay,' *Proc. Roy. Soc., Edin.* xiii. pp. 347–350.

Methil. This region deserves to be more fully studied. The curves for bottom salinity show that tidal change extends only from the river to Station IV. (off Blackness), and the rate of change is everywhere similar to that for surface salinity, but more uniform. As far as Station VII. (Inchkeith), surface salinity is always, but decreasingly, less than that at the bottom, and seaward of Inchkeith the surface water is scarcely at all fresher than that beneath, until some little distance beyond the mouth of the Firth, where the freshening action of the Tay appears superficially. Between Inchkeith and Alloa the difference in salinity between bottom and surface water is about equal to that at the same level between stations from 4 to 6 miles apart. For instance, bottom water at Grangemouth is about as salt as surface water at Blackness, and bottom water at Blackness as salt as surface water midway between Queensferry and the Oxcar Rock.

The variations to which the salinity at any one point are subject appear from Table I.; but we may take as a concrete example the state of matters in November 1884, when, after long-continued heavy rains, the Firth was fresher than at any other time during the range of these observations. The figures for the 10th and 11th of that month are given in Table II., along with the average at each station for the particular phase of tide. Figure 4 (Plate XXII.) shows these results graphically. The bottom salinity was entirely unaffected by the flood.

TABLE II.—*Salinity of Surface Water.*

Station,	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Nov. 1884,	0·000	0·475	1·968	2·337	2·652	2·751	3·246	3·318	3·373	3·409
Mean,	0·833	1·532	2·577	2·972	3·142	3·220	3·342	3·373	3·388	3·405
Difference,	0·833	1·057	0·609	0·635	0·490	0·469	0·096	0·055	0·015	0·004

Stations VII. to X. were visited on the 10th, Stations I. to VI. on the 11th, and, although the degree of dilution was probably greater on the second day, its effect certainly extended on the first to ten miles seaward of Inchkeith.

With regard to variation of salinity at different distances from the shore comparatively few observations have been made. The influence of rivers above Queensferry is probably as much felt in the centre as near the margin, because the estuary is narrow there. From Queensferry to the Leven no streams of importance enter on the north shore of the Firth, and the conditions are the same as in the centre. The influence of the Leven is inconsiderable, but east of Anstruther a quite perceptible freshening is met with, due to the Tay brackish water coming round Fife Ness. A number of rivers enter on the south side. The Almond at low water runs out to the west of Cramond Island, and freshens the centre of the Firth on the surface, and may even have some effect on the north shore; at high tide and during the first half of ebb the river passes between Cramond Island and the mainland, carrying fresh water on the surface all along the coast. In fact, at Granton the surface water is fresher at high tide than at low tide for this reason. The Water of Leith appears to have little influence on the salinity, but the Esk, flowing over the extensive sands that lie between Leith and Gullane Ness, produces a very marked effect near shore. There are no data for determining the influence of the rivers entering further to the east. Several trips were made across the widest part of the Firth, from Methil to Morrison's Haven, a distance of 16 miles, in 1885. The mean surface salinities for each 4 miles are given in Table III., and graphically in figure 5 (Plate XXII.).

TABLE III.—*Salinity of Cross-Section.*

Position,	Off Methil.	4 miles south.	8 miles south.	12 miles south.	Off Morrison's Haven.
Salinity,	3·383	3·355	3·352	3·348	3·255

These show clearly the freshening of the water from north to south, which is a marked feature of the Firth of Forth. It is very much less than the freshening from east to west; and of course it is irregular, depending in amount for each cross section on the nature of the shores and the proximity of rivers.

Speaking generally, the action of tide on salinity in the Firth of Forth is as follows:—From the mouth of the Firth to Inchkeith the result is simply a to-and-fro movement of the water without any very apparent consequences, as the salinity differs little from point to point. Above Inchkeith the to-and-fro motion gradually changes into one of shearing. The tidal water, from its superior specific gravity, tends to pass under the lighter brackish water of the estuary, and to push its way below the downward-moving stream of the river. After some time the river current slackens, then stops, and finally turns, mixture with the salt water becoming more complete. In the Forth these effects are observable at Kincardine,* but they are seen to much greater perfection in large rapid rivers flowing directly into the sea, such as the Spey.†

The expeditions of the German gunboat 'Drache' in 1882 and 1884 threw great light on the distribution of salinity in the North Sea, and one of the most interesting results obtained by them is in direct relation to the Firths of Forth and Tay. The line of 3·5 per cent. salinity approaches the coast at Berwick and at Aberdeen, but between these points it is carried far out to the north-east, and this freshening extends even to the bottom. It does not as yet appear whether this freshening is directly due to the Scottish firths, or to some more general cause as the German observers suppose; in the latter case the peculiar conditions of the firths would be largely due to the freshened area of nearly uniform salinity lying beyond them.

All the trawling stations marked on the chart forwarded to me are in water of approximately the same salinity (not varying more than 0·050 from 3·400 per cent.), with the exception of that marked No. IV., which is situated in water of an average salinity of rather less than 3·300 per cent. This line is also that of the greatest variation of temperature, being warmer in summer and colder in winter than any of the others.

Alkalinity Observations.—The alkalinity of sea water is a measure of the amount of dissolved carbonate of lime it contains. It is expressed by the number of milligrams per litre of carbonic acid combined with lime in the form of neutral carbonate. In order to make these figures comparable, they are corrected to the value they would have for a sample with the salinity of 3·50 per cent. That is to say, if alkalinity of 28 were found for a sample of 1·75 per cent. salinity, it was multiplied by 2 to bring it to the standard of water of 3·50 per cent. salinity. The figures obtained are given in Table IV., and shown graphically in figure 3 (Plate XXI.). As in the case of salinity, the numbers for some of the stations appear irregular, on account of the small number of cases from which the averages were calculated.

TABLE IV.—*Mean Alkalinity of Firth of Forth.*

Station,	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Surface,	51·9	49·4	56·2	56·2	54·5	52 9	52·7	52·9	52·8
Bottom,	...	52·1	...	53·0	...	52·7	...	...	...

Omitting Stations II. and III., because the observations were few, the

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* Mill and Morrison, 'Tidal Variations in Estuary of Forth,' *Proc. Roy. Soc. Ed.*, xiii. pp. 790–799.

† Mill and Ritchie, 'Physical Conditions of Rivers entering a Tidal Sea, as shown in the case of the Spey,' *Proc. Roy. Soc. Ed.*, xiii., pp. 460–485.

alkalinity appears to vary inversely as the salinity, and to be greatest on the surface. Other observations have shown that in the neighbourhood of rivers the alkalinity of surface water is greater than that beneath.

Temperature Observations.—The temperature of the water was observed, as well as the salinity, in all cases, and much more numerous experiments were made. The extreme simplicity of the submarine configuration of the Firth of Forth leads one to expect a correspondingly simple distribution of temperature, and this has been found to be the case. All the temperature observations which were made are not yet in a state for discussion, but the general principles are perfectly plain. In spring, about the month of April, the whole river and Firth in its length and breadth and depth are at one temperature, 40° to 43°, the precise degree of warmth apparently varying from year to year. Along the central line of the Firth heating goes on rapidly as the season advances, the surface heating more quickly than the lower strata, and the river more rapidly than the sea. Consequently, a typical summer distribution is arrived at, in which there is a continuous gradient of temperature from river to sea, and from surface to bottom. The temperature at Alloa in August may be about 60°, that at the Isle of May 55°, and the bottom water from 3° to 2° colder. After the autumnal equinox cooling sets in, and this is most rapid in the landward reaches and on the surface, slowest at sea and on the bottom. As a result, a state of uniformity is reached in October or November, with a temperature of about 50° from river to sea and from surface to bottom; then, as cooling goes on, the river becomes coldest, and in January or February the minimum is reached, and the condition then is a uniform rise of temperature from river to sea and from surface to bottom. As spring advances heating ensues, and once again a uniform temperature is attained. Figure 6 (Plate XXII.) illustrates these seasonal changes, but it is drawn rather as a diagram than an expression of observed facts. In figure 7 the annual progress of temperature is shown for each of four divisions of the Forth. The first curve embraces all observations between Alloa and Grangemouth, and shows a minimum in February and maximum in July; the second curve is for the space between Blackness and Oxcar, its minimum is in January, its maximum in August; the third and fourth curves represent the spaces between Inchkeith and a line ten miles west of it, and between Fiddra and the Isle of May respectively. The data are those for the one year, May 1884 to April 1885. All the curves cross in April and October, that with the lowest maximum having the highest minimum, and the range increasing uniformly with distance from the sea. The mean annual surface temperature for all stations is about 47°·5, and this agrees with observations continued for many years at Dunbar, North Berwick, and Trinity. The latter results showed a slight increase in mean annual temperature, not exceeding 0°·5, towards the open sea.

The temperature of water is much influenced by the land that surrounds it. A shallow river responds more rapidly to changes of atmospheric temperature or amount of sunshine than the sea does, and, as a rule, the shallower the water the more quickly and powerfully is it affected. Thus, in summer, the southern margin of the Firth of Forth is very much warmer than the northern, and in winter very much colder. As rivers usually enter the firth where the depth is slight and the bottom shelves very gradually, great variations of temperature are usually associated with the freshest water, and with that most variable in salinity. While there can be no reasonable doubt as to the applicability of the general principles we have stated, much still remains to be done before a thoroughly satisfactory knowledge of the temperature variations of the Firth of Forth can be attained.

Considerations of salinity and also of temperature lead to a distinction being drawn between various parts of the Firth. Between Inchkeith and the sea there is a constancy of salinity and of temperature from point to point, and from surface to bottom, and from high to low tide, that stands sharply in contrast with the region between Inchkeith and the river, where there is rapid change in all conditions from many causes. These two very different parts of the system I have proposed to call the *Firth proper* and the *Estuary*. The upper limit of the estuary cannot be fixed by reference to points on shore. It may be taken as the line to which tidal variations of salinity extend, as distinct from mere variations of level, such as might result from the damming back of fresh water. The state as regards flood of the river and the height of the tides are determining conditions of this limit, and as these vary the limit of salinity will vary also, although, from such observations as have been made, the range along the banks may be comparatively short. Further observations are necessary to give certainty on this point. Inchkeith is obviously the boundary between estuary and firth, and the line dividing firth from sea lies somewhere about or beyond the Isle of May.

In some river entrances, such as that of the Tay, there appears to be no firth, the estuary uniting with the sea; and in others the estuary even is wanting, the river running directly into salt sea water. In the two latter cases the surface water is much freshened in the immediate vicinity of the discharge, but the lower strata are fully salt. Near a firth like the Forth the surface water of the adjacent sea is but little reduced in salinity at the place of contact, but, on the other hand, the whole mass of water to the very bottom is freshened in nearly the same proportion. For example, salinity of 3·50 per cent. is found at the bottom quarter of a mile off the mouth of the Spey, but is not reached until 75 miles off the mouth of the Firth of Forth.

APPENDIX F.—No. XV.

REPORT ON THE ST ANDREWS MARINE LABORATORY, No. IV., from 1st January 1886 to 31st December 1886. By Prof. M'Intosh, F.R.S.

1. *Structural Changes in the Laboratory.*

During the year several gas-jets and stands, a fresh-water pipe and accessories, two additional windows, a few tables and shelves, have considerably increased the conveniences for work. Canvas shades have also been prepared for some of the western windows and the high-level tank. A long leaden pipe, with fifteen nozzles, has also been fitted in the tank-room. Twice during the year, viz., in January and October, the vulcanite pipes in wooden boxes leading down to the beach were damaged by heavy seas. This is due to the fact that the posts which support them are not sufficiently sunk in the hard ground (clay) beneath the sand. A few deeply-placed beams would obviate this risk.

2. *Additional Apparatus and Books.*

An important new feature in the equipment of the Laboratory is the acquisition of a small fishing boat or yawl, 21 feet long. This boat is worked by the laboratory attendant, and has been of great service in

TABLE I.—*Density, Salinity, and Alkalinity of Water in Firth of Forth.*

Station.		" High " Tide. Mean of all observations.				" Low " Tide. Mean of all observations.				All States of Tide.													
										Surface.						Bottom.						Alkalinity.	
		Surface.		Bottom.		Surface.		Bottom.		Mean.		Maximum.		Minimum.		Mean.		Maximum.		Minimum.		Mean.	
No.	Approximate Position.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Density.	Salinity.	Surf.	Bot.
I.	Alloa, . . .	...	..	...	...	...	...	...	...	1·00548	0·833	1·01200	1·682	0·99923	0·000	1·00760	1·112	1·01600	2·202	0·99939	0·000	...	...
II.	Kincardine, . .	1·01505	2·078	1·01928	2·629	1·00763	1·116	1·01307	1·821	1·01080	1·532	1·01981	2·697	0·99978	0·041	1·01458	2·019	1·02020	2·748	1·00916	1·310	51·9	...
III.	Hen & Chickens, .	1·02073	2·816	1·02214	3·000	1·01703	2·336	1·02056	2·795	1·01888	2·577	1·02249	3·046	1·01084	1·618	1·02124	2·883	1·02281	3·087	1·01876	2·561	49·4	52·1
IV.	Blackness, . .	1·02235	3·027	...	...	1·02149	2·916	1·02385	3·222	1·02192	2·972	1·02414	3·260	1·01758	2·408	1·02385	3·222	1·02398	3·240	1·02371	3·204	56·2	...
V.	Queensferry, . .	1·02342	3·167	1·02448	3·305	1·02303	3·116	1·02447	3·303	1·02323	3·142	1·02461	3·321	1·01863	2·544	1·02448	3·304	1·02509	3·383	1·02366	3·198	56·2	53·0
VI.	Oxcar, . . .	1·02406	3·250	...	...	1·02357	3·186	1·02486	3·354	1·02383	3·220	1·02496	3·367	1·01953	2·661	1·02505	3·378	1·02562	3·452	1·02484	3·351	54·5	...
VII.	Inchkeith, . .	1·02485	3·352	1·02497	3·368	1·02471	3·334	1·02494	3·364	1·02477	3·342	1·02528	3·408	1·02380	3·216	1·02496	3·367	1·02533	3·414	1·02419	3·267	52·9	52·7
VIII.	Off Methil, . .	1·02502	3·374	1·02531	3·411	1·02501	3·373	1·02538	3·420	1·02501	3·373	1·02555	3·442	1 02450	3·307	1·02535	3·416	1·02562	3·452	1·02514	3·389	52·7	...
IX.	5 miles east,	1·02515	3·390	1·02533	3·414	1·02512	3·388	...	...	1·02513	3·388	1·02553	3·440	1·02465	3·326	1·02533	3·414	1·02541	3·424	1·02526	3·405	52·9	...
X.	,,	1·02522	3·400	1·02554	3·441	1·02530	3·410	1·02508	3·383	1·02526	3·405	1·02563	3·453	1·02470	3·333	1·02531	3·411	1·02554	3·441	1·02508	3·381	52	...
XI.	,,	1·02542	3·426	...	...	1·02521	3·398	1·02530	3·410	1·02532	3·413	1·02566	3·457	1·02417	3·264	1·02530	3·410	1·02571	3·463	1·02424	3·254	...	...
XII.	Isle of May, . .	1·02552	3·439	1·02549	3·435	1·02534	3·415	1·02554	3·451	1·02546	3·431	1·02570	3·462	1·02443	3·298	1·02551	3·437	1·02562	3·452	1·02460	3·320	...	...
XIII.	Beyond I. of May, .	...	...	...	...	...	...	...	...	1·02530	3·410	1·02547	3·432	1·02502	3·375	1·02560	3·449	1·02570	3·462	1·02551	3·437	...	...

NOTE.—The *density* is that of the water at 15°·56 C. (60° F). *Salinity* is the percentage by weight of dissolved salts in the water. *Alkalinity* is the amount in milligrammes per litre of carbonic acid combined in the form of normal carbonate; the results given are reduced to the value they represent per litre of actual " sea " water (density 1·02600) present in the sample, so they are comparable for all salinities.

investigating the life-histories of the food fishes, especially in connection with the large mid-water net constructed at the Laboratory. This is a huge tow-net of a fine mesh, but yet strong, 24 feet in length, and attached to a triangle composed either of wood or bamboo, 10 feet each way. The net is sunk to the required depth by a heavy leaden 'sinker' attached to the horizontal beam of the triangle, and kept steadily there by a galvanised iron float, such as is used for the ends of herring-nets. By aid of this apparatus, used both in the boat and in the Fishery Board's cruiser 'Garland,' important service has been done in filling up the gaps between the very early stages of the young food-fishes as seen in the Laboratory, or as they are found at the surface, and their appearance off the shore as shoals of young forms, more or less easily recognisable specifically, even by the unscientific eye. The number of interesting and important features in these comparatively unknown stages of the food fishes is considerable.

In regard to apparatus, several microscopes, a rocking microtome, a microtome bath, a micro-spectroscope, and other instruments have been procured.

A nucleus of books useful to workers has also been made. Lord Dalhousie further presented a set of official blue books connected with the fisheries, for the purpose of spreading a knowledge of the subject amongst the fishermen, and this opportunity has been widely taken advantage of. The Trustees of the British Museum have also presented such of their publications as related to marine zoology. Collections of papers have also been forwarded by many zoologists, amongst whom Professor Flower, the late Dr Gwyn Jeffreys, and Professor Alexander Agassiz are conspicuous. Most of the continental and American workers, as well as those of our own country, are indeed represented.

3. *Development of the Food-Fishes.*

The main work of the year has been the development of the food-fishes and the extension of the researches of the previous years.

Before the arrest of trawling in St Andrews Bay one of the local trawlers fortunately procured a large mass of the ova of the catfish, which was found amongst mud on board the boat, having lain several hours in the open air. It was taken to the laboratory by the attendant, who, with the other fishermen, thought it might be the eggs of the salmon. The embryos were well advanced, and their study—for the first time carried out in this or any other country—gave much interest to the earlier months of the year, though the severity of the weather from January to March was disastrous (in the wooden building) to the majority of the young fishes on emergence. The large size of these eggs and embryos permitted a satisfactory comparison to be instituted between them and the salmon, which had formerly been under examination in Perthshire. The young fishes were kept alive till June—in short, till all the characters of the adult had shown themselves.

Mr E. E. Prince again pursued his labours (chiefly by aid of the British Association and Royal Society grants) amongst the pelagic and other fish-ova from March till December; and I cannot speak too highly of his patient industry, skill in microscopic manipulation, and his facile and accurate delineation of structure. Most of the forms examined the previous year were again subjected to investigation, and additional information obtained. Thus a fairly complete commencement has been made in this department. The intense cold during the early months of the year appears to have retarded the spawning period of some of the marine fishes, so that their ova were procured considerably later than last year. Some of the effects of such temperature on the ova were communicated to '*Nature*' in June (1886).

The first pelagic ova, viz., those of the haddock, made their appearance during the very cold weather in the beginning of February, and were followed somewhat later by the ova of the cod and common flounder. Moreover, for the first time, the ova of the ling were examined, and the development studied to a fairly advanced stage in the Laboratory. These ova were procured by a long-line fisherman of Cellardyke (who with others was supplied with suitable earthenware jars, and encouraged by a visit to the Laboratory), fertilised about 100 miles off the Island of May, and received safe at St Andrews after a considerable land-journey. The fertilised ova of the plaice and lemon-dab were similarly brought by Captain Burn, late of the Hussars, from the Moray Firth, for the Laboratory had then no boat suited for securing a supply nearer home. No fish, however, has been more useful this year to the workers than the common or grey gurnard, the spawning season of which seems to have been somewhat later than usual. The first ova were procured about the middle of May, and the embryo of the last series lived till late in August. Further observations were also made on the ova and young of the lumpsucker, Montagu's sucker, shanny, stickleback, sand-eel, *Cottus*, &c.

These researches on the development of the food-fishes will form a considerable Fasciculus (quarto), with about thirty plates, and are now almost ready for publication. The great expenditure of time in preparing the eggs and embryos for section, in making the sections by aid of the Caldwell and the Rocking microtomes, and the mounting of the preparations thereafter, is much greater than at first sight appears. This labour was undertaken and carried out in a most praiseworthy manner by Mr E. E. Prince, who, throughout has specially devoted his energies to Teleostean embryology. Towards the end of the season he was to some extent assisted in the preparations of the catfish and salmon by Dr Scharff and Mr John Wilson, but the brunt of the labour was borne by himself.

From the beginning of June to the end of September Dr Scharff devoted himself to the investigation of the intra-ovarian eggs of a number of Teleosteans—chiefly food-fishes. Amongst those examined were the grey gurnard, green cod, bib, whiting, cat-fish, conger, shanny, frog-fish, and salmon. In this connection it is remarkable, as indeed was mentioned in a former report, how difficult it now is to secure specimens of the shanny at St Andrews. Only after considerable efforts was an adult female procured having ova approaching maturity. Yet the young shannies abound in the rock-pools in autumn and winter. Dr Scharff's examination of the specimen just mentioned, however, showed that the ovarian eggs were of a most interesting type. Most of the specimens reserved for section-cutting by Dr Scharff were treated either with picro-sulphuric or weak chromic acid. Special attention was paid to the structural changes in the growing nucleus, as well as the origin and development of the yolk, and interesting and important results were obtained. These were lately communicated by Dr Scharff to the Royal Society in a paper illustrated by a series of beautiful figures.

During the summer Mr Wilson continued his researches on the development of the common mussel, and these he carried out in the same skilful and persevering manner as formerly. He added considerably to the information gained last year, and the life-history of this form is now nearly complete. His memoir, illustrated by a series of carefully-drawn figures, is now almost ready for publication. A summary of his investigations is appended ;—

ON SOME EXPERIMENTS IN PRESERVING MUSSELS FOR BAIT.

The importance of mussels for bait on the eastern shores of Scotland cannot be over estimated. At St Andrews they are farmed by the Town Council, and are sold to the local fishermen at the rate of 1s. 2d. per basket; about 3d., however, being paid in addition for cartage. As mentioned in last year's Report they are generally prepared and placed on the hooks by members of the fisherman's family, otherwise he has to pay from 6d. to 1s. per basket for this work. As the baited lines during wintry weather have often to be kept for a fortnight or longer, and in summer are more or less injured in twenty-four hours, it would be a boon to the fishermen if a suitable mode of preserving their good qualities as bait could be applied in each case. It must be remembered that the houses of the fishermen in which the lines generally lie after they are baited are also unfitted for the preservation of any animal tissues, yet it is difficult to keep them elsewhere—on the one hand for cats, and on the other for rats and mice. The mussels certainly keep much better in cold weather on board their boats, and the men sometimes prefer to run the risks just mentioned when the lines are long detained.

Mr Stephen Williamson, M.P., then a member of the Fishery Board, and who had long taken a real interest in the welfare of the fishermen, wrote me on the subject, mentioning also boro-glyceride as a substance that might be tried. In former years, it is true, other compounds of boracic acid had been used with considerable success in preserving beef and other animal tissues, though in the case of the former the gustatory results were not always so satisfactory as might have been wished. In the case of the living mussels, however, there was good reason to believe that such compounds would be found advantageous.

The first experiments were made in January 1886, when a basketful of the ordinary mussels were taken from their shells on the 16th, and carefully washed several times with pure sea water. This washing was considered an important feature, and one which the fishermen might follow with advantage, for it occasionally happens that in very cold weather fresh water slightly warmed is used in handling them, which of course at once arrests ciliary action, and kills the mussels. In the same way, impure water, even impure sea water, used in dealing with the mussels after they are removed from the shells, has the same tendency. Scrupulous care in washing the mussels, immediately after removal from their shells, with sea water, would greatly assist in maintaining the bait in a fresh and satisfactory state for fishing. This may easily be understood when it is stated that, by the ordinary method, all the effused fluids of the more or less bruised and lacerated mussels are collected in the vessel around them, so that putrefaction is readily set up, while pure sea water, on the other hand, keeps up the ciliary action of the gills, and promotes respiration and general vitality. Thus it is why such living mussels make the most successful bait.

Immediately after thorough washing with sea water, the mussels were placed in a solution of boro-glyceride, about a tablespoonful to a gallon of fresh water, and kept there for fully a day and a half. They were then placed on the hooks in the usual manner, with 'bent' grass between the layers of the line in the basket, and retained in one of the apartments of the laboratory till 1st February; that is a fortnight, a period generally sufficient under ordinary circumstances to ruin the bait even in winter. The line was given to one of the boats proceeding to the fishing ground (at this time off Boarhills). The fishing that day on board all the boats was very poor, some having no fish, and others only a dozen or two. It was noticed, however, that on a line supplied with the preserved bait were several dabs, fishes considered somewhat particular in regard to the freshness of the bait.

The stormy weather at the end of January was somewhat trying to the bait on shore, and one of the men (J. Gourlay), who had two baskets of mussels—brought from Eden eleven days previously—had them treated with boro-glyceride as above-mentioned on the 28th January. They were fished with on the 3rd February, the hooks being baited alternately with mussels and spout-fishes. Four lines were baited with preserved mussels, and one with fresh mussels, and, so far as could be observed, there was no difference in regard to the capture of fishes. From his five lines he obtained three boxes. Another boat with six lines had four boxes, while a third with the same number (six) had only three boxes.

Besides the mussels, several haddocks and herrings were similarly treated with the boro-glyceride for a period of about twenty-six hours, a slit being made into the abdominal cavity, and, in addition, the fluid was injected into the alimentary canal. The results showed that the herrings could easily be kept about a month in a condition suitable for bait, while the haddocks resisted putrefaction till they dried.

The next experiment with the mussels was performed on 14th July, when they were removed from their shells and treated with boro-glyceride as before. At the end of the fourth day a slight alteration was noticed, and on the fifth some were tried on a fishing line. These were found to be as satisfactory as fresh bait in regard to the capture of fishes. At the end of a week a considerable change had occurred, and when tested on the fishing ground these hooks secured but a third those supplied with fresh bait did. They evidently had been kept too long, or perhaps the solution might have been stronger.

The appearance of the mussels in all these experiments was most satisfactory, and there is no doubt this method will enable fishermen to preserve their bait several weeks in winter, and three or four times as long as formerly in summer, for in warm weather the bait cannot be kept twenty-four hours, generally being out of condition after twelve hours. The only obstacle at present is the cost of the boro-glyceride (2s. 6d. for about 8 oz.), but there is no reason why a very much cheaper preparation should not at once be issued for the purposes just mentioned. Such would be extensively used by the fishermen.

PUBLISHED PAPERS, &c.

During the year various papers besides those named have been communicated to the British Association and the Annals of Natural History, *e.g.*, 'On a Male Tunny,' 'On the British Weevers, the Bib, and the Poor Cod,' 'Additional Remarks on the Internal Aspect of the Tunny, 'On the Paternal Instincts of the Lump-Sucker,' 'On the very young Cod and other Food-Fishes.' Mr E. E. Prince has also published the following :—'Early Stages in the Development of Food-Fishes,' 'On Oleaginous Spheres in the Yolk of Teleostean Ova,' 'On the Development of the Pectoral Fins in Teleosteans.' The main work of the year, however, has been the larger paper on the Development of the Food-Fishes formerly noted, though various interesting additions have also been made to the zoology of invertebrates, such as a remarkable abnormality in a jelly-fish, the occurrence of a pelagic shrimp new to Britain in numbers so vast as to have an important influence on the food of fishes, and various observations on the local fauna, especially in connection with the monograph on the British Annelids for the Ray Society.

Workers and Specimens.

These have been supplied to many zoologists during the year, and it cannot be too widely known that scientific workers have only to apply for specimens. Their wants will be freely supplied either by living or preserved examples as far as time and opportunity will permit. Moreover, any marine zoologist wishing to work up special groups or special subjects will be welcomed at the Laboratory, and every encouragement in regard to books, &c., afforded him.

PLATE I.

20'
15'
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55'
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45'
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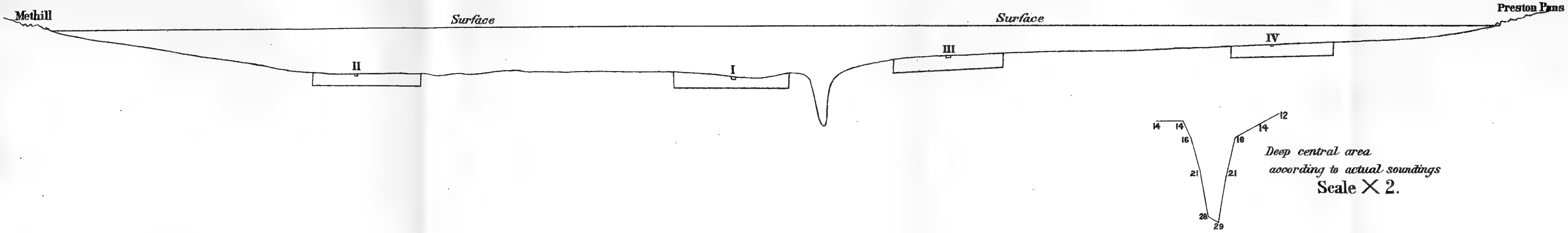
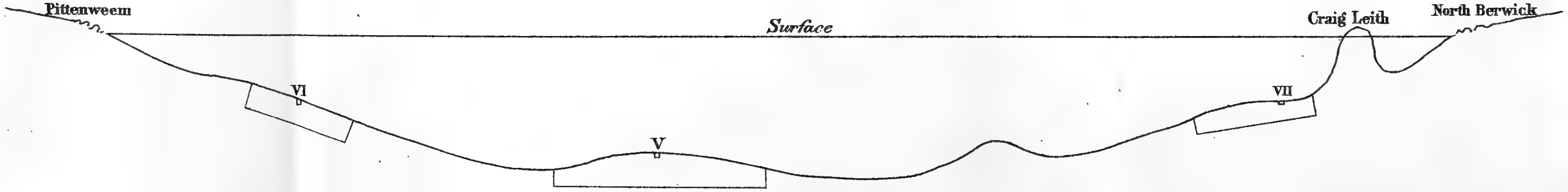
30'
25'
20'
DUNDEE
BROUGHTY FERRY
RIVER TAY
Bell Rock
LIMIT
IV
III
II
I
V
ST ANDREWS
R. Eden
BARBERT NESS
FIFE NESS
CRAIL
KILRENNY
ANSTRUTHER
PITTENWEEM
ST MONANCE
ELIE NESS
LARGO
LEVEN
METHIL
BUCKHAVEN
EAST WEMYSS
WEST WEMYSS
DYSART
KIRKCALDY
BURNTISLAND
Station VI
Station V
Station II
Station I
Station III
Station IV
Station VII
Station VIII
Station IX
May Isle
FIRTH OF FORTH
Bass Rock
NORTH BERWICK
GULLANE NESS
ABERLADY
Inch Keith
I. Colm
GRANTON
LEITH
COCKENZIE
PRESTONPANS
MORRISON'S HAVEN
FISHEROW
56°
55'
Longitude West 45' from Greenwich

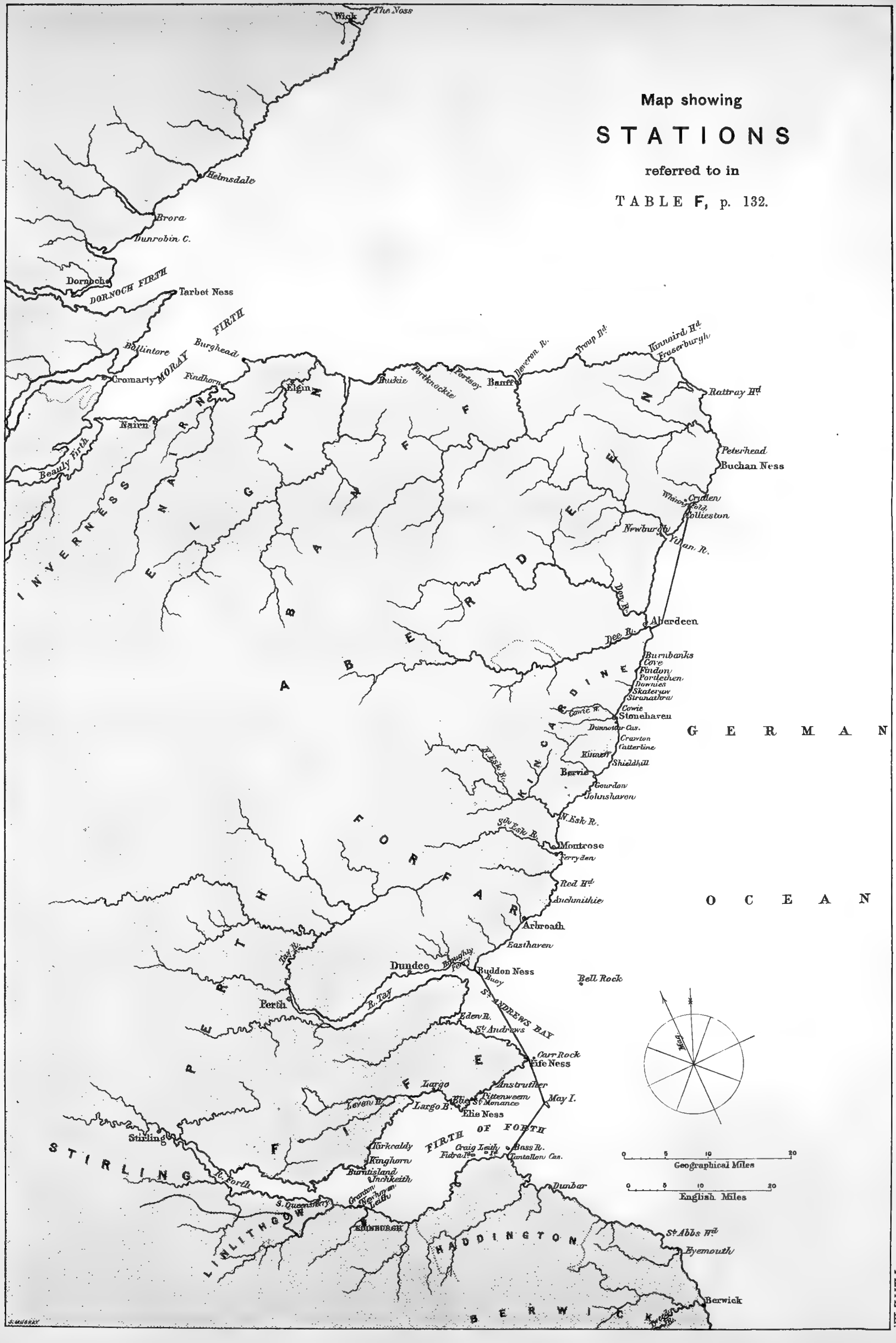
SECTION OF FIRTH OF FORTH FROM METHILL TO PRESTON PANS :— SCALE { *1 inch to the mile horizontal.*
½ inch to eight fathoms vertical.



Deep central area according to actual soundings
Scale × 2.

SECTION of Eastern group of Stations
FIRTH OF FORTH.





Map showing

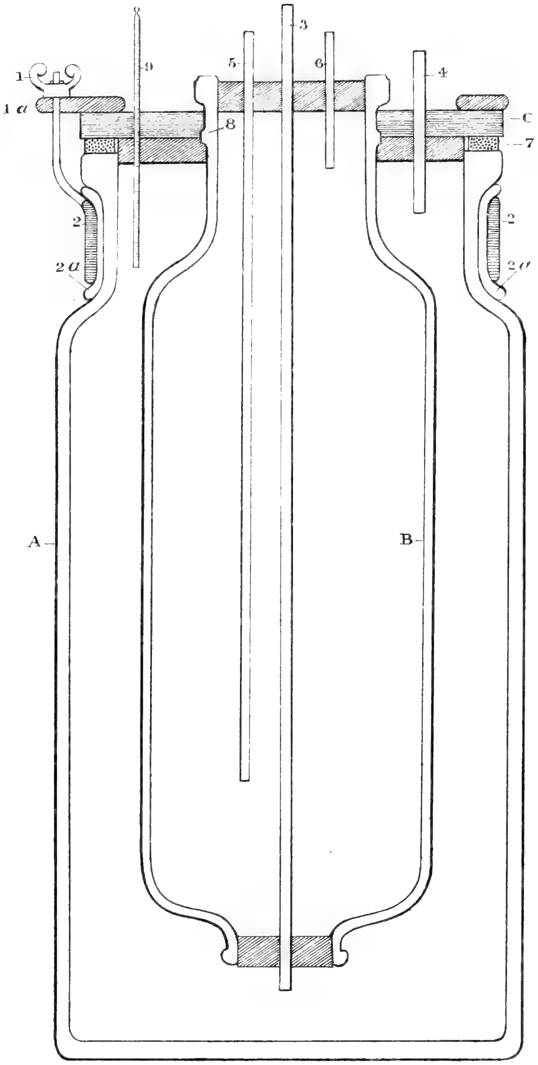
STATIONS

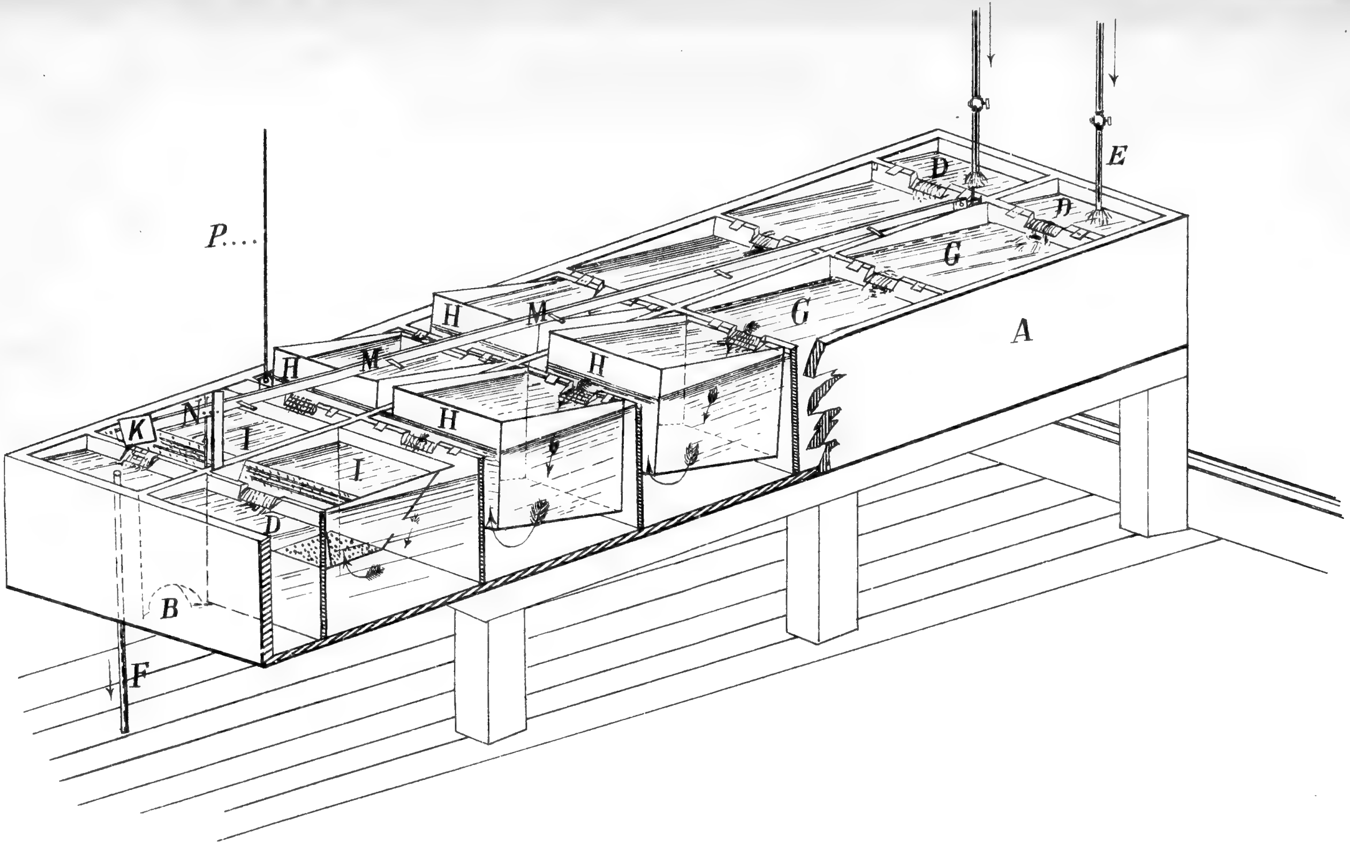
referred to in

TABLE **F**, p. 132.

PLATE III.

PLATE VII.

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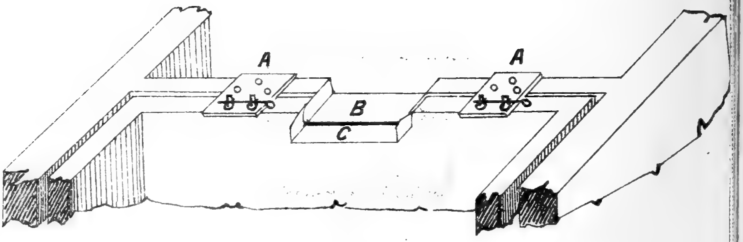


Fig 4

Plate IX.

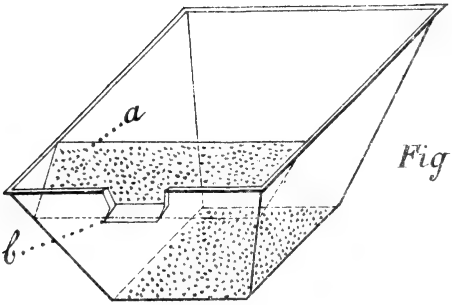
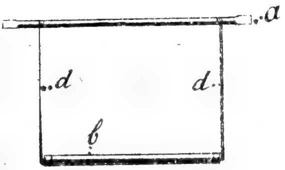


Fig I.



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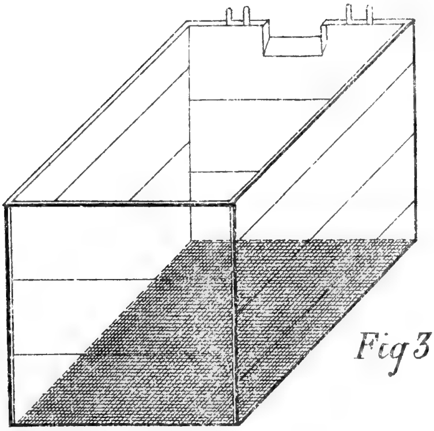
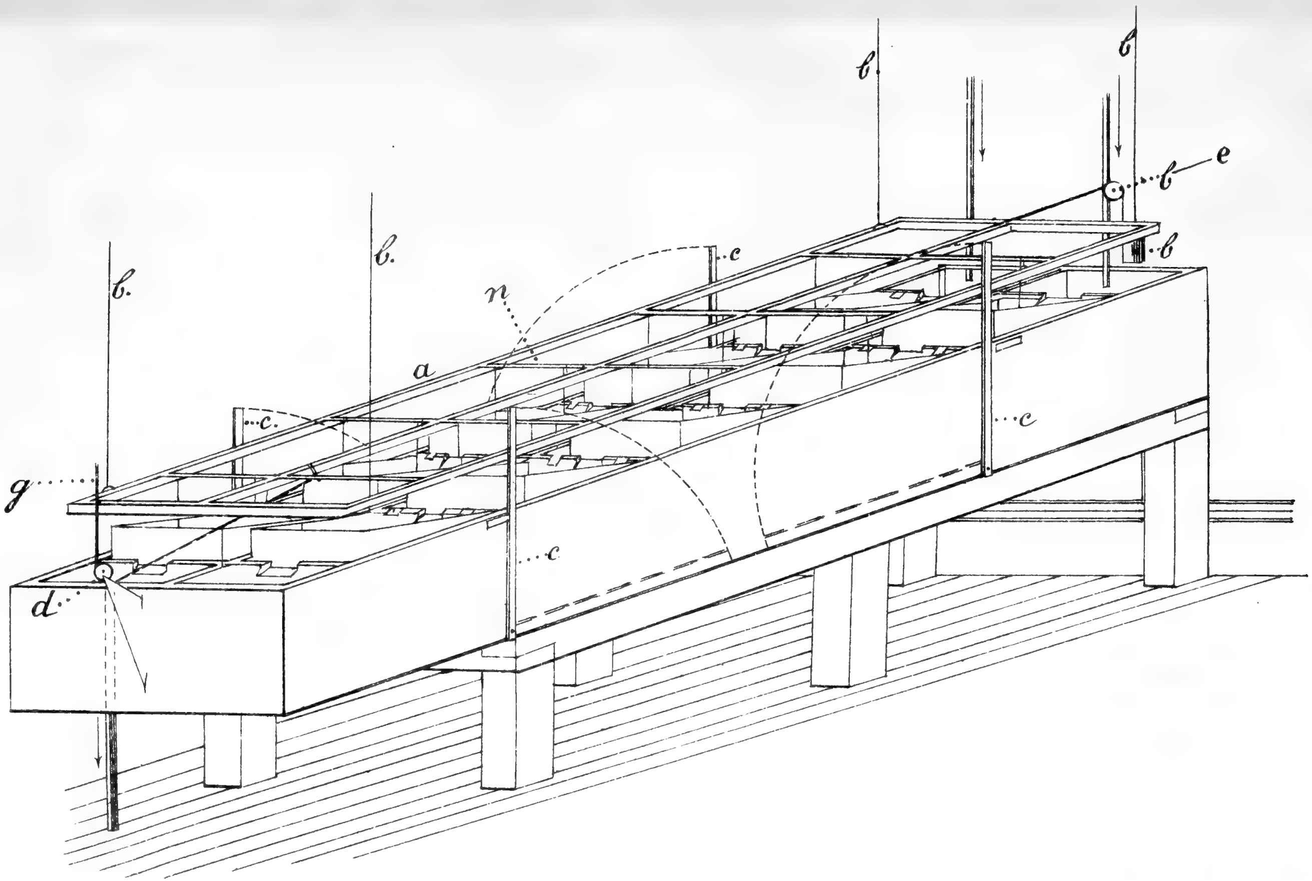


Fig 3.

Plate X.



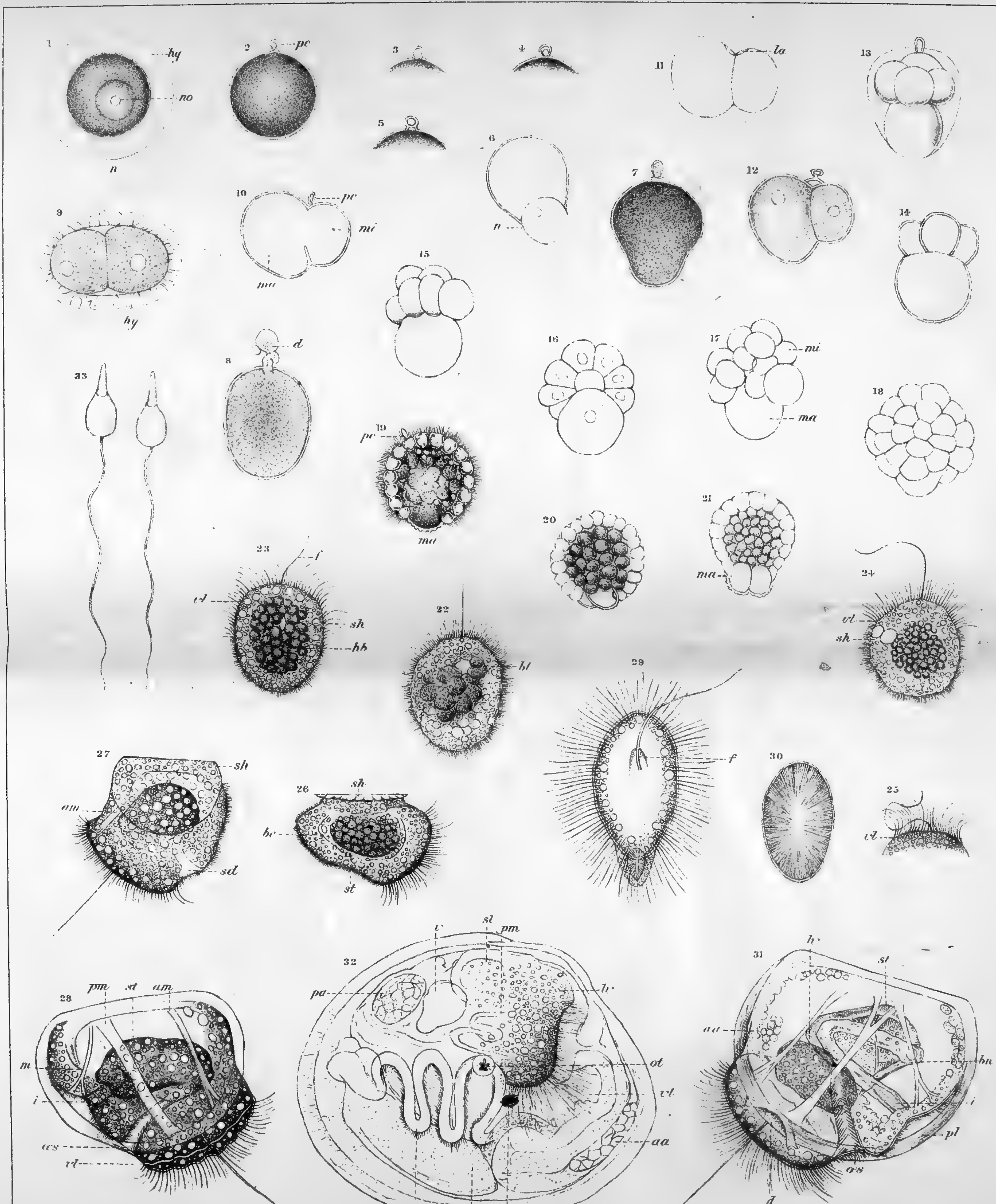


PLATE XII.

J.W. DEL.

MYTILUS EDULIS.

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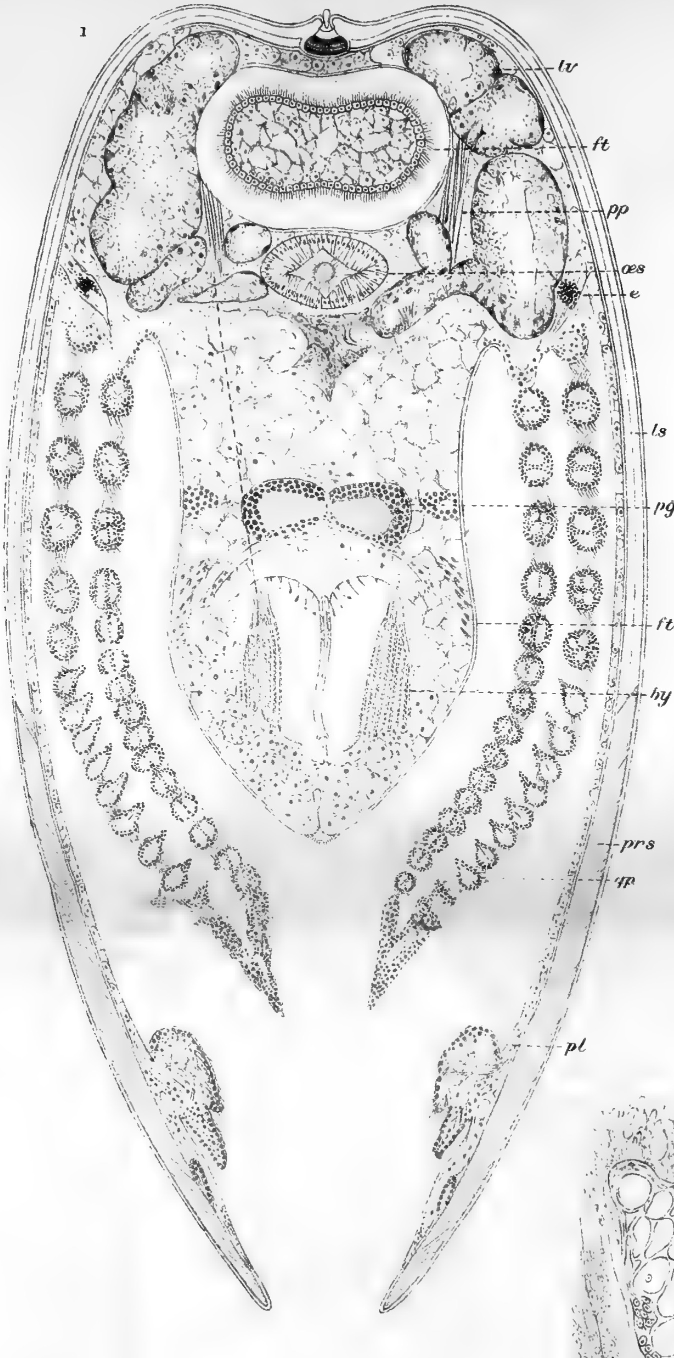

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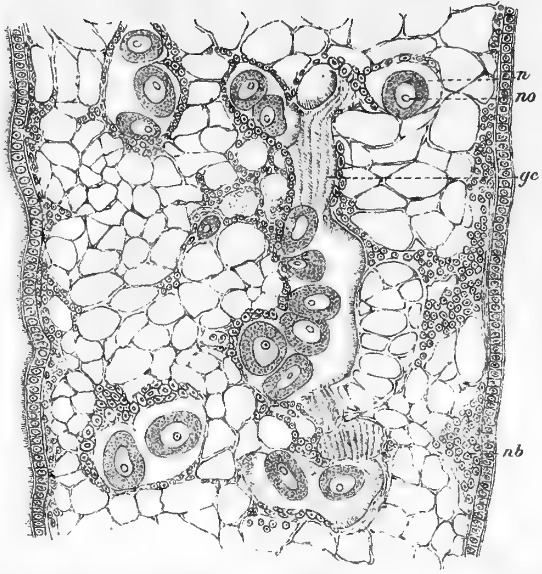

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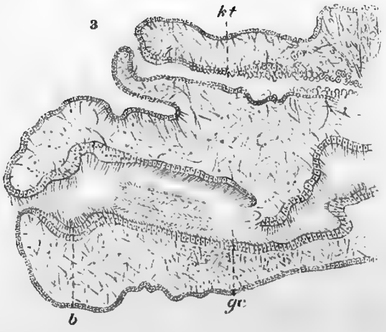

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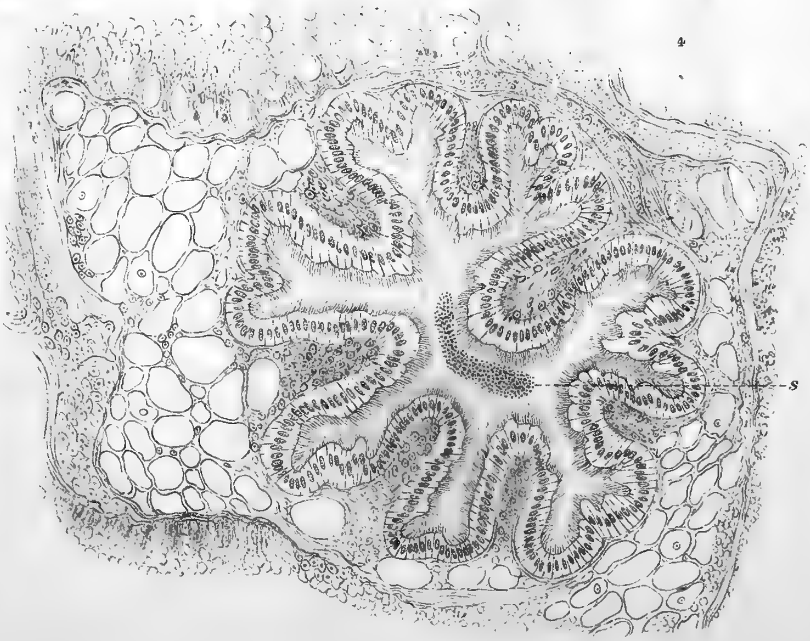

J.W. DEL.

PLATE XIII.

MYTILUS EDULIS.

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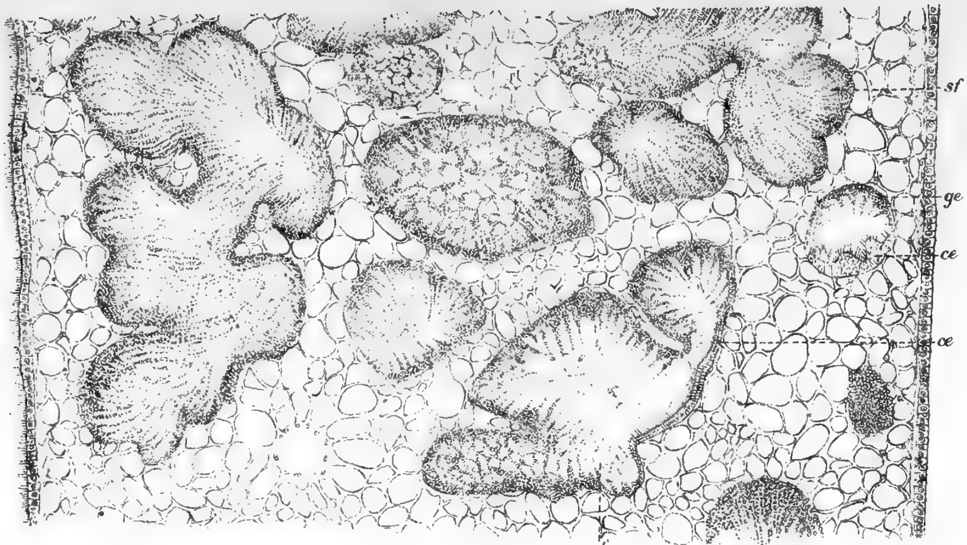

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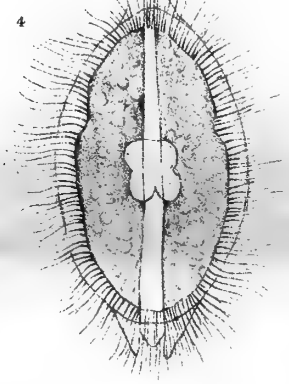

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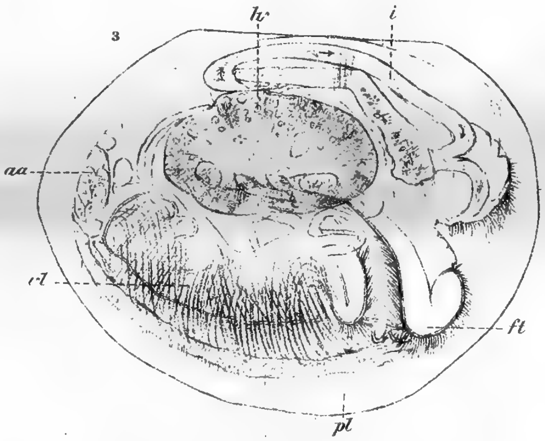

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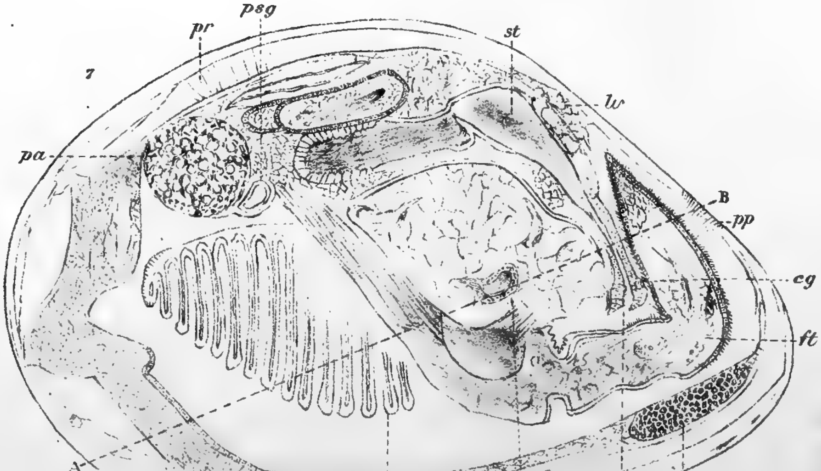

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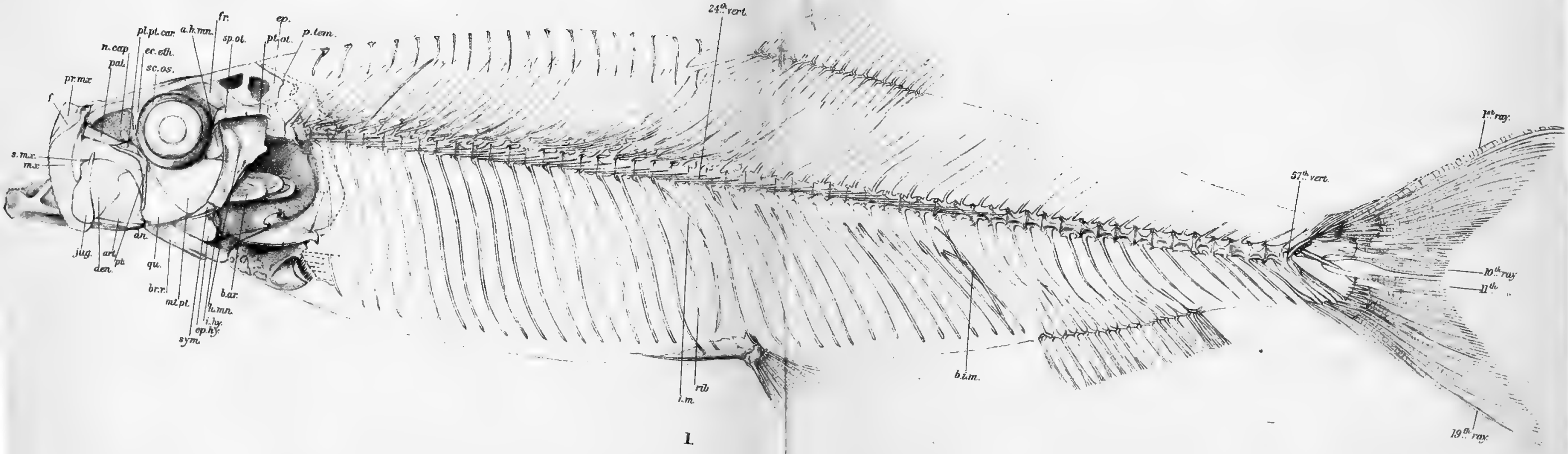
PLATE XIV.

J.W. DEL.

MYTILUS EDULIS.

PLATE XV.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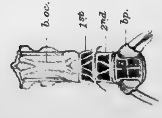

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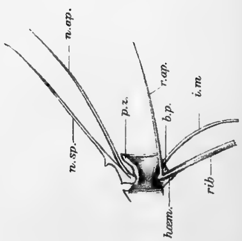

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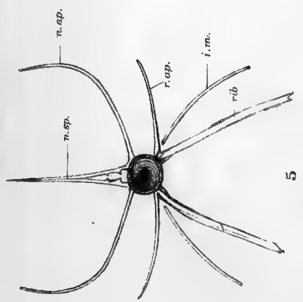

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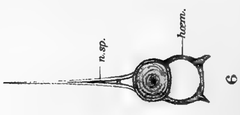

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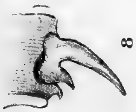

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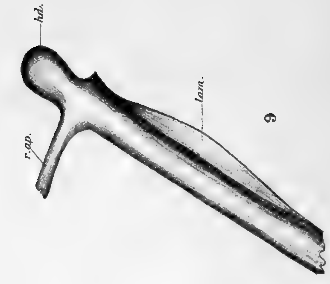

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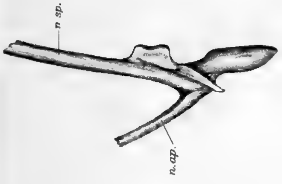

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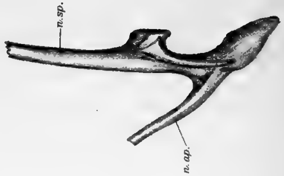

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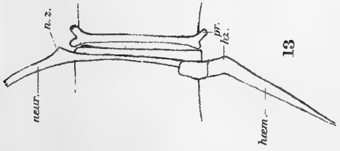

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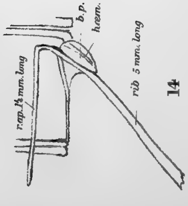

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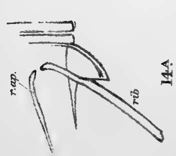

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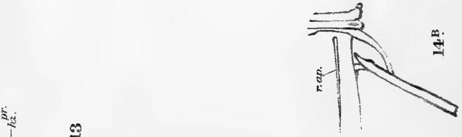

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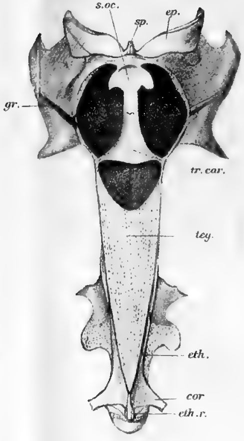
PLATE XVIII.



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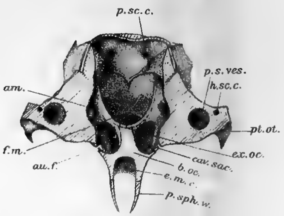

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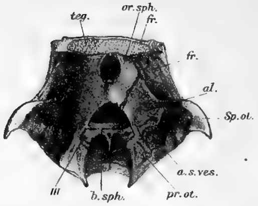

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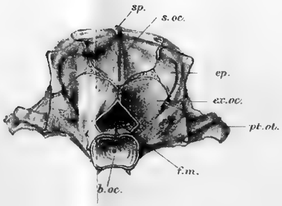

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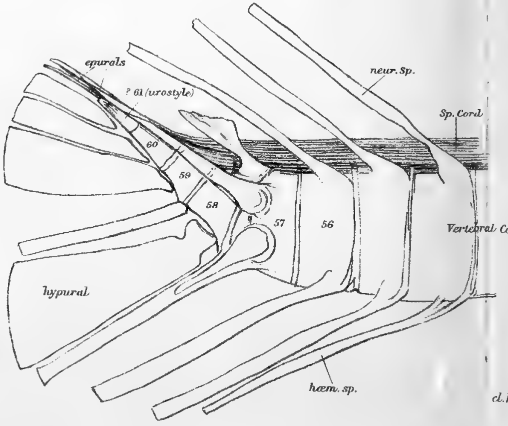

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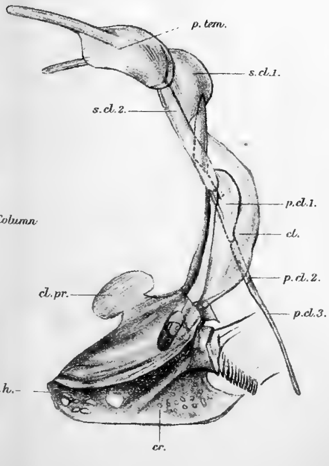

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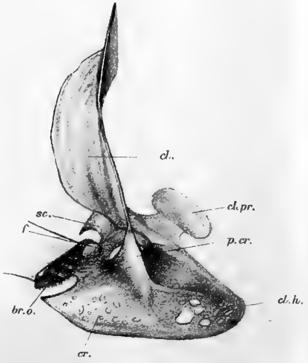

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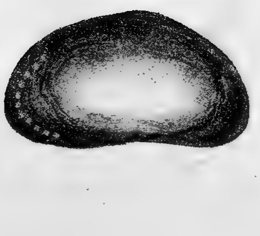
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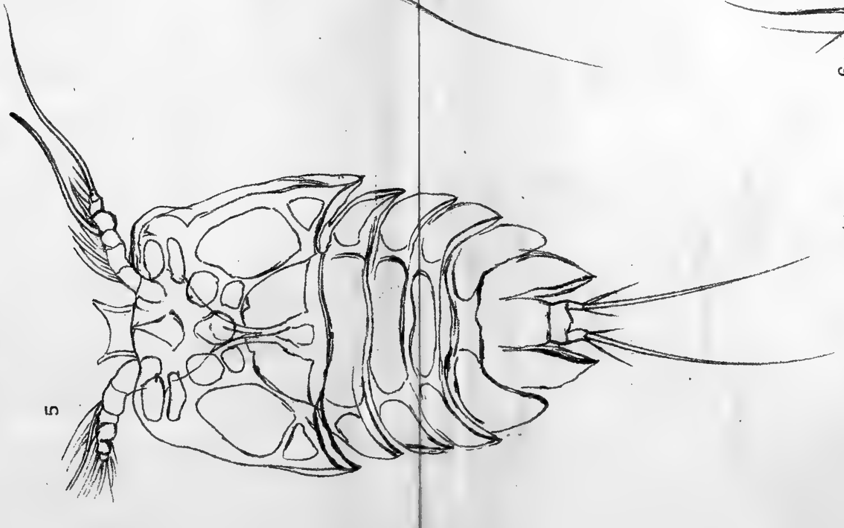
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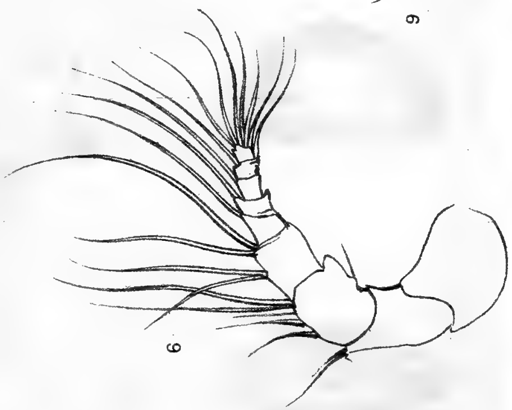
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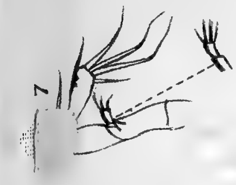
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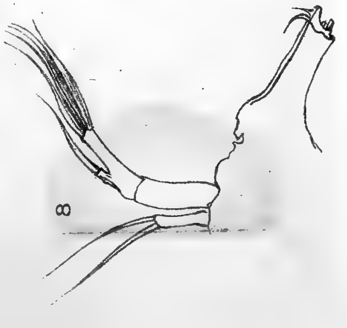
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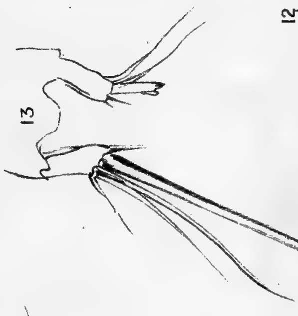
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Figure I.—BATHYMETRICAL CHART OF THE FIRTH OF FORTH, SHOWING THE PRINCIPAL STREAMS ENTERING THE FIRTH.

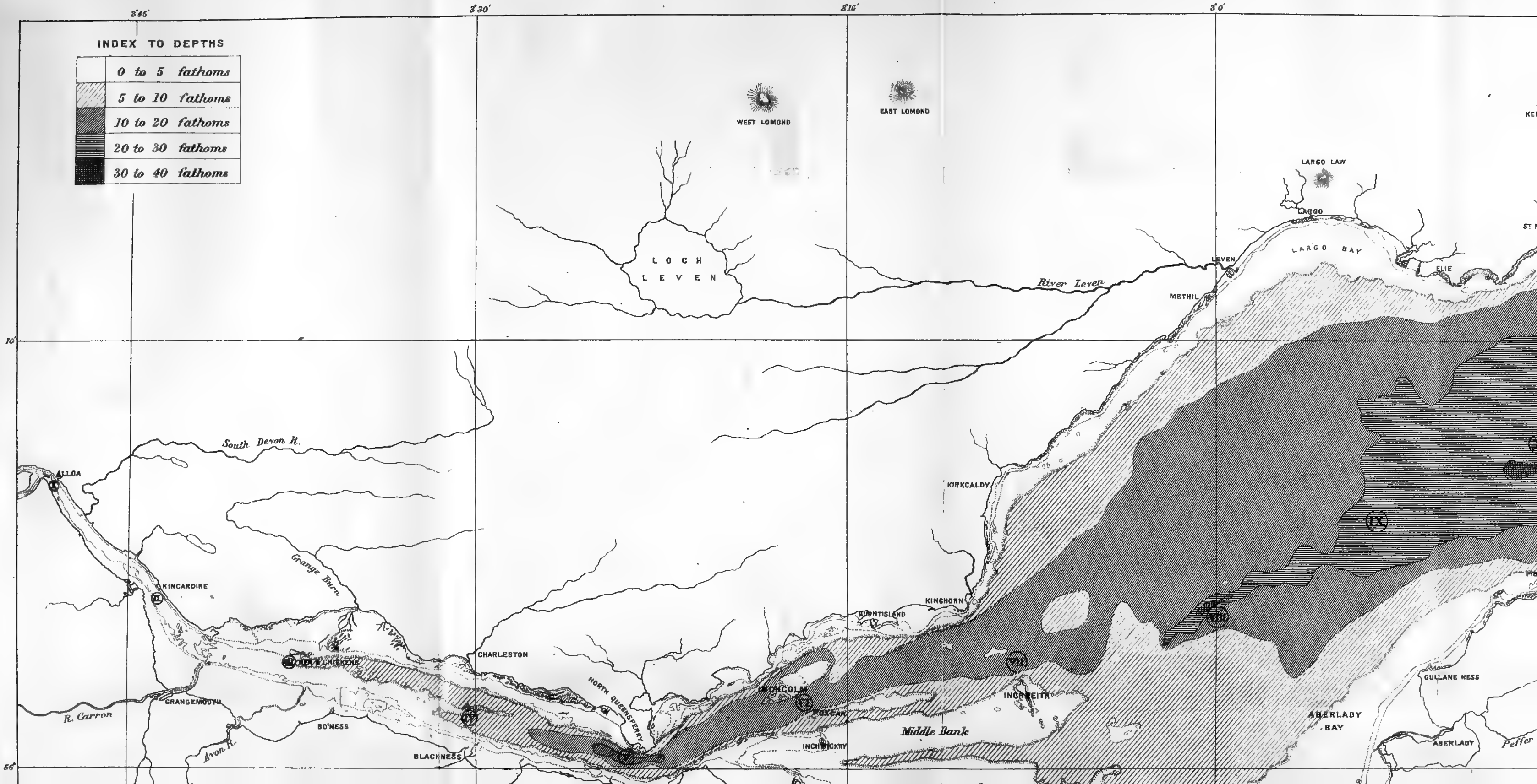


Fig. 2. Average Salinity of Firth of Forth

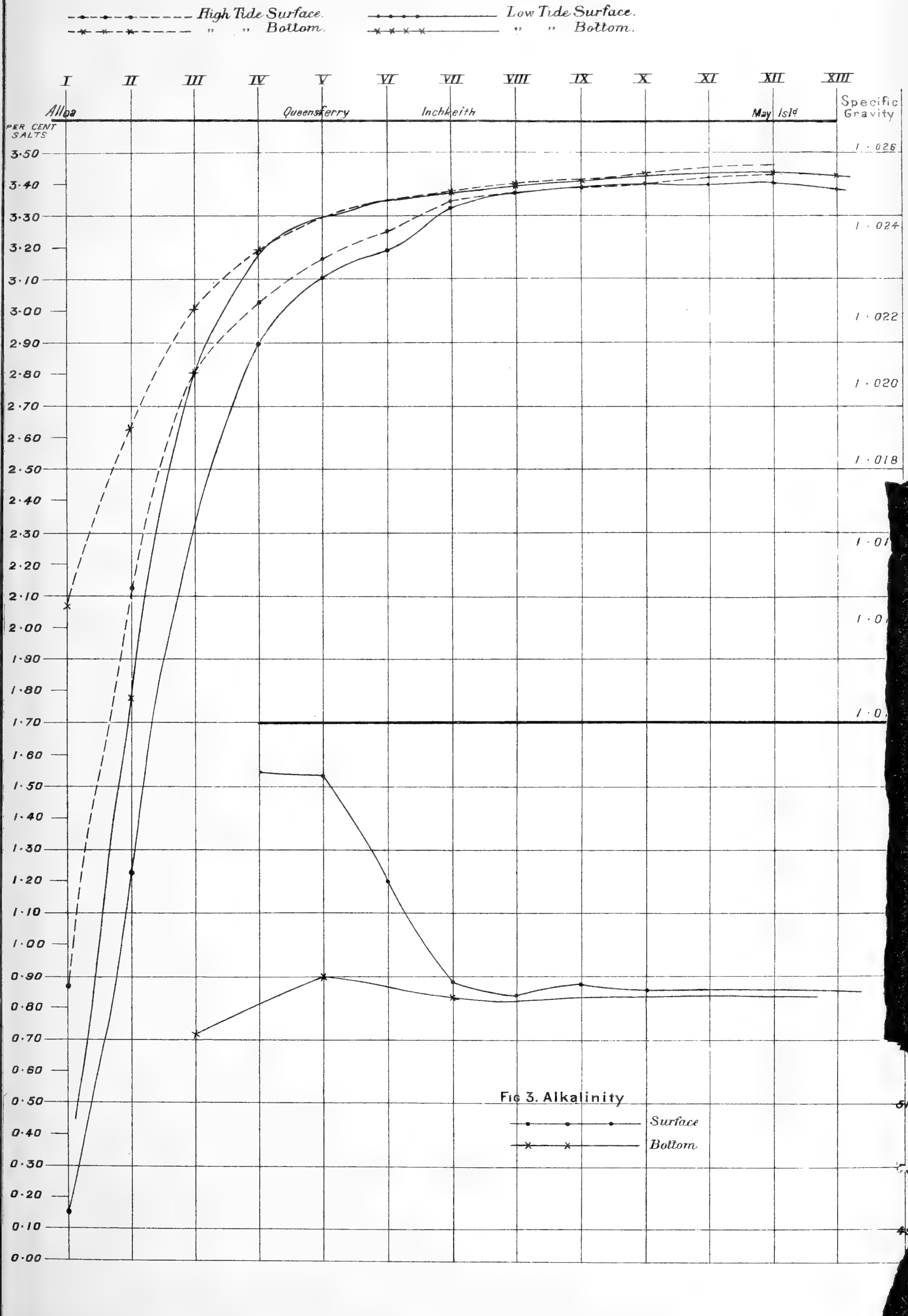


Fig 3. Alkalinity

Fig. 4. Salinity of Firth of Forth, 10th–11th November 1884. *(Surface Water)*

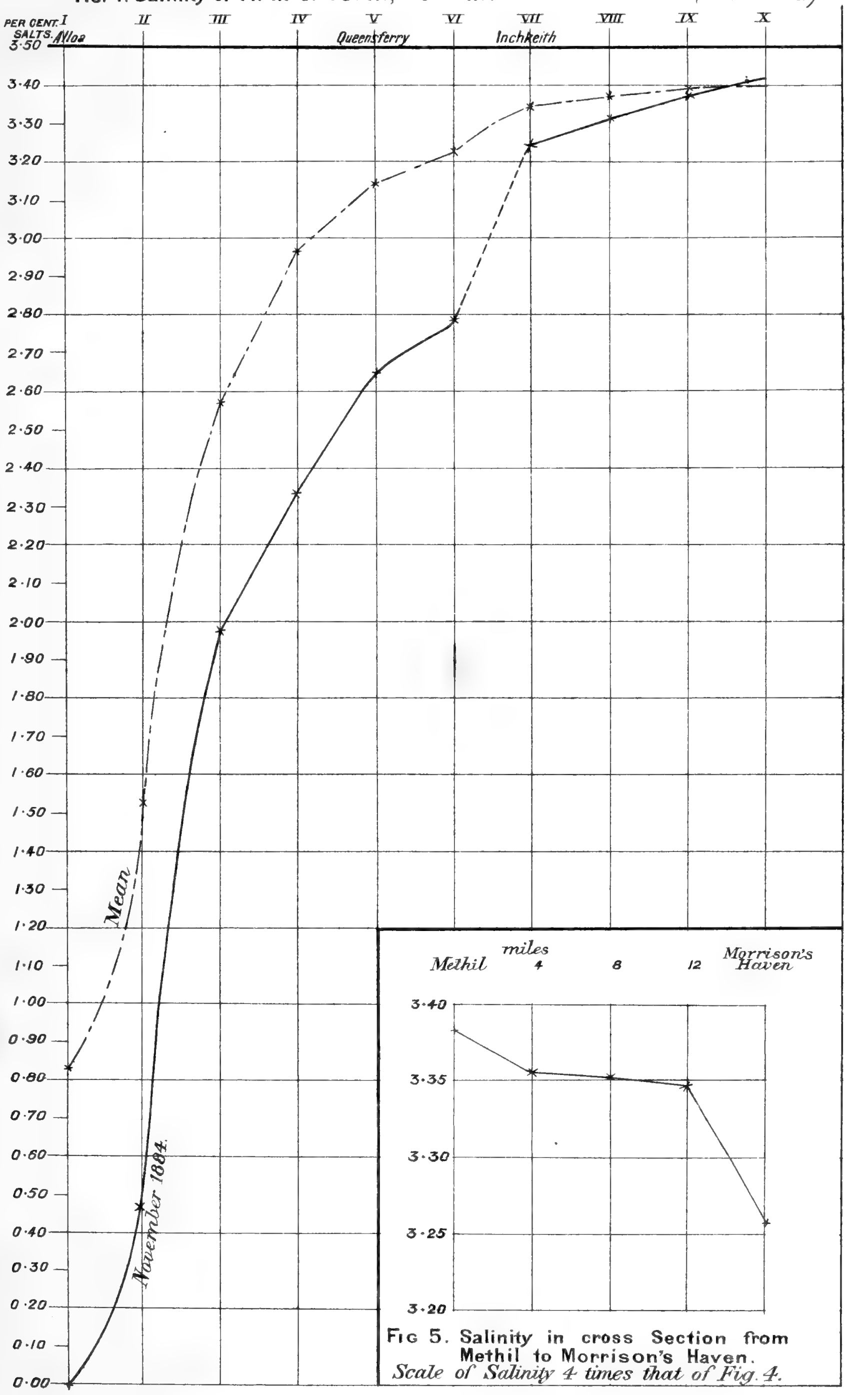


Fig 5. Salinity in cross Section from Methil to Morrison's Haven.
Scale of Salinity 4 times that of Fig. 4.

Fig. 6. Typical Seasonal Temperature curves of Firth of Forth.

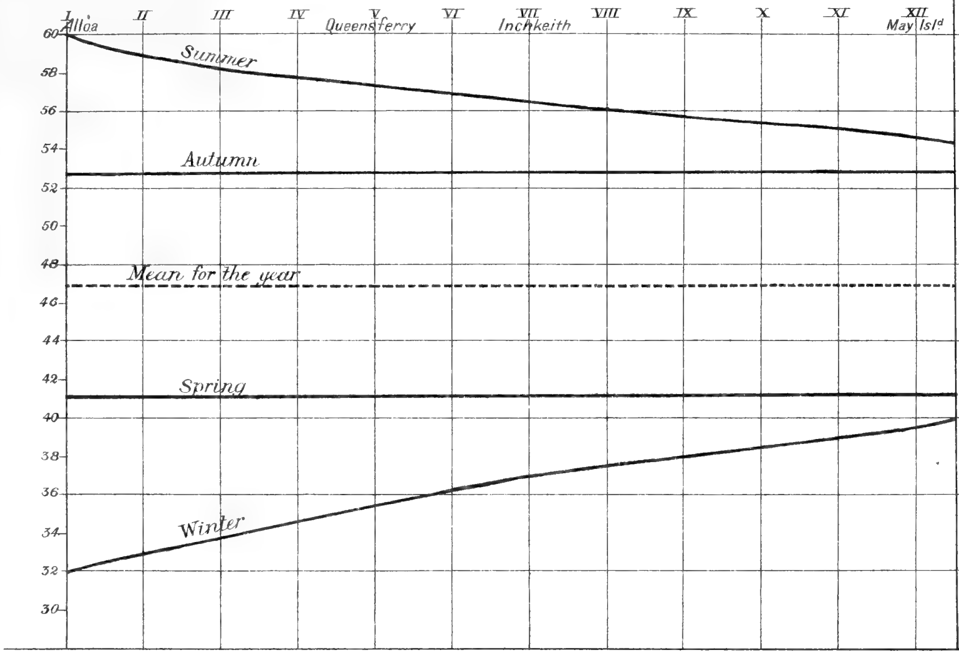
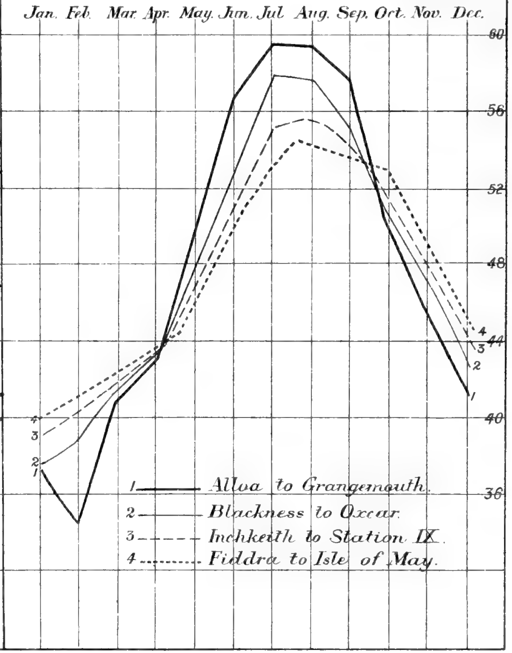


Fig. 7. Temperature of Firth of Forth, 1884–1885.



APPENDIX G.

FIFTH ANNUAL REPORT TO THE FISHERY BOARD FOR SCOTLAND,

CONTAINING AN ACCOUNT OF

THE SALMON, SEA-TROUT, AND OYSTER AND MUSSEL FISHERIES IN THE ORKNEY AND SHETLAND ISLANDS.

By ARCHIBALD YOUNG, Advocate,
Inspector of Salmon Fisheries for Scotland

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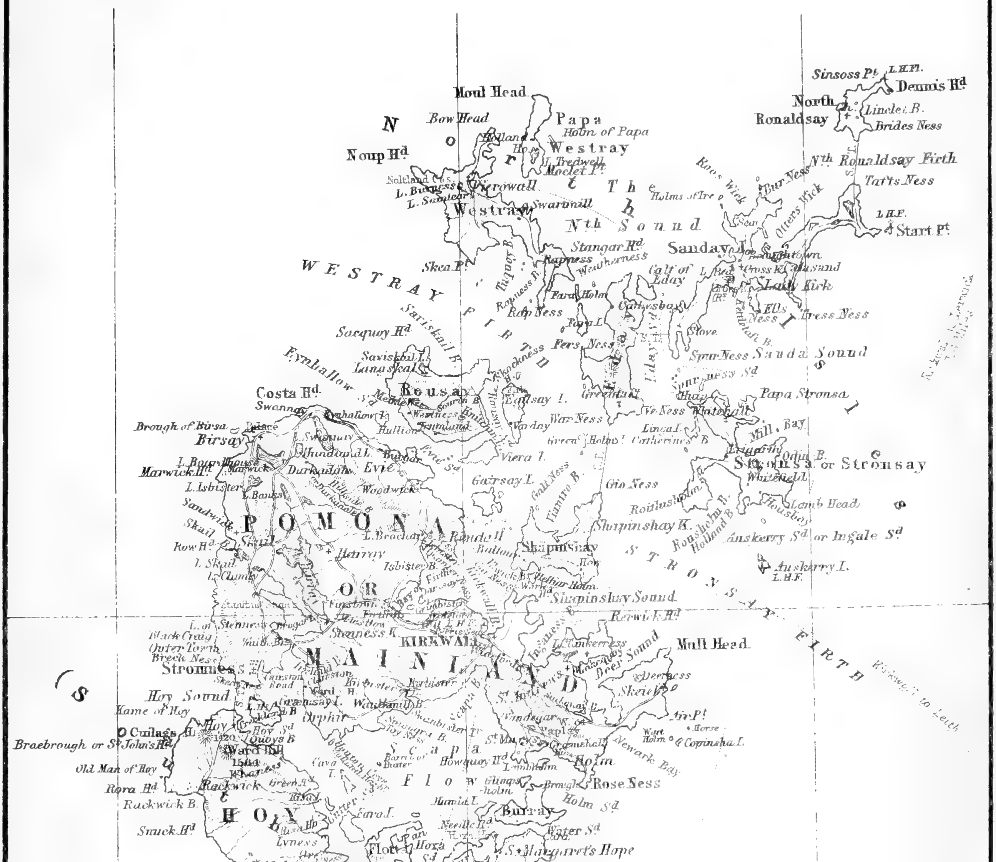



SHETLAND ISLANDS
English Statute Miles.
5 4 3 2 1 0 5 10
Heights in English Feet.
Flugga L.H.F.
Burrafiord Holms
Burra Firth
Hermaness
Saxaford Hill
934
Skaw Holm
Lamba Ness
Norwick B.
Norwick
Haroldswick
Harolds Bay
Baliasta
Balta I.
Swinee Ness
Vaila Sound
Vaila I.
Gruting Voe
Culswick
Skeld
Skelda Ness
Skelda Voe
Foula I. due W. of Hildasay I. 25 Eng. Miles.
Hildasay I.
Oxna I.
Papa
West Burra I.
E. Burra I.
Havra I.
Cunningsburgh
Clift Sound
St. Ninian I.
Colsay I.
Fora Ness
Spiggie L.
Fitful Hd.
929
Quendale B.
Lady Skerry
Scatness
West Voe
Sumburgh Roost
Sumburgh Hd.
L.H.F.
Grutness
Old Kirk
Virkie
Dunrossness
Boddam
Brow L.
Chapel
Scousburgh
Ward of
854
Sandwick
No Ness
Mousa I.
Mousa Sd.
Helli Ness
Aiths Voe
Bard Hd.
Bressay Sound
Wart of Bressa or Bressay
742
Noss I.
Noup of Noss
Holm of Noss
Gradle of Noss
Bullingsburgh
Score Hd.
Lerwick
Fort Charlotte
Tingwall K.
Scalloway
Trondra I.
Quarff
East Quarff Voe
Gulber Wick
Rova Hd.
Dales Voe
Hawks Ness
Lax Firth
Mull of Eswick
Eswick
Little Billian
Nesting Bay
W. Fladdecap
E. Fladdecap
Rumble Holm
W. Linga
Stava Ness
Dury Voe
Scallafield
921
Catfirth
Skellister
Nesting Ch.
Whalsey Sound
Skaw Taing
Out Skerries
Housay I.
Bruray I.
Grunay I.
Little Skerry
Muckle Skerry
Luna Ness
Lunna Holm
Vidlin Voe
Olna Firth
Busta Voe
Muckle Roe
Swarbacks Mn.
Vementry I.
Papa Stour
Papa Sound
Sandness
Sand Ness
Sandness H.
817
Dales Voe
Wats Ness
Walls
Bridge of Walls
Sembister
Gruting
Sandsting
Garder Ho.
Aith Voe
Weisdale Voe
Whiteness Voe
Bixter Voe
Twatt
Housters
West Burrafirth
Vaara L.
Ve Skerries
ST MAGNUS
BAY OF
MAINLAND
Ronas H.
1475
Collafirth
Roe W.
North Roe
Feideland or Fethaland Pt.
Uyea I.
Sand Voe
Ramna Stacks
Grunie
Ronas Voe
The Faither
Ockren Hd.
Ossa Skerry
Hamna Voe
Pt. of the Burr
Grind of the Navir
Esha Ness
Esha Ness Skerry
Dore Holm
Braeswick
Sand Wick
Hillswick
Ura Firth
Gunnister Voe
Mangaster
Mavis Grind
Roe Sd.
Sullom Voe
Yell Sound
Hill of Dale
820
Brother Isle
Lunna Holm
Lamba
Gloup Holm
Gloup Voe
Graveland Ness
Whale Firth
Gossabrough
Cullivoe
Blue Mull Sound
Linga
Sandwick
Basta Voe
Rascosta
Mid Yell
Mid Yell Voe
West Sandwick
Vassetter
Otterswick
Quien Ness
Ollerswick
East Yell
Burravoe
Burra Voe Ness
Hamna Voe
Samphra I.
Bigga I.
Fish Holm
YELL
Fetlar I.
Funzie
Snap Pt.
Strandburgh Ness
Gruting B.
Brough Lo.
Colgrave Sd.
Tresta Bay
Lamba
Rams Ness
Haaf Gruna
Uyea
Urie Linga
Muness Cas.
Balta Sound
Colvadale
UNST
Vanafield
Ordale
Baliasta
Haroldswick
Belmont
Uyea Sd.
Kirkwall to Lerwick 116 Miles
Granton to Lerwick 388
Sub Tel. from Orkney Isles
Longitude West of Greenwich.
Sumburgh Hd. is 50 m. N.N.E. of North Ronaldsha, Orkney Is.

REPORT.

I HAVE the honour to submit my Report on the Salmon, Sea-Trout, and Oyster and Mussel Fisheries in the Orkney and Shetland Islands, which I inspected, by the direction of the Board, during the summer and autumn of 1886.

THE ORKNEY ISLANDS.

Twenty-eight inhabited islands; 39 smaller ones, used for grazing purposes, and locally known as *holms;* and 23 waste rocky islets or skerries combine to form the Orcadian group, which is separated from the coast of Caithness by the fierce tides of the stormy Pentland Firth. The greatest length of the group is 53½ miles, and its greatest breadth 29½. The land area of the islands is 375·7 square miles, or 240,476 acres. The inland lochs, which are numerous, are said to occupy no less than 20,000 acres.

By far the largest and most important island is Pomona or the Mainland, in which are Kirkwall and Stromness, the only towns in Orkney; the great lakes of Stenness and Harray; and the smaller, but still considerable lochs of Boardhouse, Hundland, Swannay, Kirbister, and Tankerness, all of which communicate with the sea. There are also many smaller sheets of water and several large burns or small rivers; the chief of which is the Durkadale Burn, which traverses the lochs of Hundland and Boardhouse, and falls into the sea near the ruined palace of Birsay after a course of 8 miles. All these lochs and streams contain abundance of yellow trout of fine quality; and, in autumn, great numbers of sea-trout of large size frequent the sea-shores and bays, and ascend to the lochs which communicate with the sea. Salmon are rare, but they have been taken in the stream which connects the Loch of Kirbister with the sea in the parish of Orphir, and in some other places.

The island of Pomona has an area of about 150 square miles. It is 25 miles in length, and 15 miles in extreme breath; but it is very irregular in shape, and is so much indented by bays and sounds, that at Kirkwall, the distance across the island from the head of Scapa Bay to the nearest point of Kirkwall Bay, is only about 2 miles. No part of the island is more than 5 miles from the sea. All the islands lying to the south of the Mainland are known as the South Isles, of which Burray, South Ronaldshay, Hoy and Walls, Flotta and Græmsay are the chief. To the east and north of the Mainland lie the island of Shapinshay—the most fertile and best cultivated of the Orkneys—Gairsay, Veira, Egilsay, and Rousay; while beyond the Egilsay and Stronsay Firths lie the group known as the

North Isles, comprehending Stronsay, Sanday, North Ronaldshay, Eday, Westray, and Papa Westray, besides many smaller islands and holms.

The general surface of the Orkneys is somewhat low and flat, and the only island that can be termed mountainous is Hoy, or the high island, in which are the two loftiest summits in the Orcadian group, namely, the Ward Hill 1564 feet, and Cuilags, 1420 feet. Hoy is the second largest of the Orkney Islands, and is by far the most picturesque. It is about 14 miles long by 6 broad, and has the advantage of possessing the finest harbour in the Orkneys, termed the Long Hope. To the south and west, Hoy presents an almost unbroken range of precipices to the stormy seas that sweep round its shores, the highest point being Braebrough, or St John's Head, which towers 1140 feet above the seas that wash its base. These precipices belong to the Old Red Sandstone group, and their colours are magnificent—red and yellow of every hue, with here and there dashes of green. Under sunshine their tints are glorious, and they look bright even in the grey days so common in these northern latitudes.

On the south side of Hoy there is a small stream falling into Rackwick Bay, in the lower part of which are many fine pools that, in autumn, are much frequented by large sea-trout, and where grilse also are occasionally got; while on the north side, facing Hoy Sound, the Bays of Cruckland and Quoys, and Ore Bay are among the best localities in the Orkneys for angling in the sea for sea-trout, which take the worm and the fly freely. The principal lochs in Hoy are Heldale Water and Hoglinns Water, the former of which is upwards of a mile long, and has a communication with the sea by Greenheads Burn. One gentleman, in answering my printed queries, states that the Loch of Helier in Hoy is the only loch in the Orkney Islands which contains char.

There are many other bays in the Orkney Islands besides those mentioned in Hoy, where sea-trout take the worm or the fly as readily in the sea as they do in a fresh water loch or stream; such are, on the Mainland, the bay into which the Græmeshall Burn flows, St Mary's Bay, Kirkwall Bay, Scapa Flow, Inganess Bay, Deer Sound, Bay of Firth, Bay of Isbister, and Waulkmill Bay; in Rousay, the bay into which the Sourin Burn falls, and various other bays and sounds. It has often struck me as a curious fact that, in the Orkney and Shetland Islands and in the Outer Hebrides, sea-trout should take the fly, the worm, the natural sand eel, or other lure in the salt water almost as readily as in the fresh; whereas, on the shores of the mainland of Scotland, it is quite an exceptional thing to take sea-trout by angling in the sea. I know only of the Kyle of Durness and the Kyle of Tongue, the estuary of the Fleet in Sutherlandshire and that of the Ythan in Aberdeenshire where this can be done. But in the island of Lewis, in North and South Harris, in North Uist and South Uist, I have repeatedly taken large sea-trout with fly and minnow in the salt water; and at one spot in South Uist I have captured yellow trout nearly a mile from any fresh water. What can be the cause of this difference between the mainland and the islands adjacent to it? I remember years ago, mentioning it to the late Frank Buckland, my old friend and colleague on many a Fishery Inquiry, and he was as much puzzled to account for it as myself.

In the beginning of July last, I commenced my inspection of the Fisheries in Orkney by driving from Stromness to the Bridge of Waithe, under which the waters of Loch Stenness flow into the sea in a deep strong current, through three arches, and the flood tide from the sea mingles with the waters of the loch.

Loch Stenness is a great sheet of water about 15 miles in circumference, including its upper and lower divisions. The name is sometimes applied to designate both the divisions of the loch, and sometimes it is applied only to the lower loch which communicates with the sea; while the upper loch, which is entirely fresh, is termed the Loch of Harray. The banks of these lakes, like those of all the Orcadian lakes, are bare and treeless; and the upper loch is divided from the lower by two long narrow promontories, that jut out from opposite sides, and so nearly meet in the middle as to be connected by a low bridge, called the Bridge of Brogar, over which the roadway passes.

The area of the Loch of Stenness is 1792 acres, and that of the Loch of Harray 2432 acres; or, together, 4224 acres. A better idea of their great extent will be got when I state that the famous Loch Leven, in Fifeshire, which receives nearly the whole drainage of the county of Kinross; which yields an average of at least 11,000 trout per annum, the mean weight of each trout being nearly a pound; and brings a rental of £1000 a year to its fortunate possessor; has an area of only 3406 acres, or 818 acres less than Stenness and Harray. I am quite convinced that, if these lochs were as well protected as Loch Leven, they would soon become as productive. And it should be kept in mind that their season commences just about the time when that on Loch Leven ends.

A deep margin of sea-weed extends for some distance above the Bridge of Waithe into the Loch of Stenness, and on the seaward side of the Bridge there is also a thick growth of sea weeds. Beyond the margin of sea-weeds only inside the Bridge of Waithe, we find a little farther on sea-weeds mixed with fresh-water plants, and in the Loch of Harray fresh-water plants alone. Stenness is decidedly brackish, while the water in Harray is fresh; the former is nearly 4 miles long, with a maximum breadth of 1½ miles; while the latter is 4¾ miles long, and varying in breadth from 3 furlongs to 1¾ miles. There is no transmutation of the marine vegetation anywhere to be seen into fresh water forms. They are as distinct now as they were thousands of years ago, as is eloquently pointed out in the following passage from Hugh Miller's *Footsteps of the Creator*:—

> Along the green edge of the Lake of Stenness, selvaged by the line of detached weeds with which a recent gale had strewed its shores, I marked that for the first few miles the accumulation consisted of marine algæ, here and there mixed with tufts of stunted reeds or rushes, and that as I receded from the sea, it was the algæ that became stunted and dwarfish, and that the reeds, aquatic grasses, and rushes, grown greatly more bulky in the mass, were also more fully developed individually, till, at length, the marine vegetation altogether disappeared, and the vegetable débris of the shore became purely lacustrine,—I asked myself whether here, if anywhere, a transition flora between loch and sea ought not to be found? For many thousand years ere the tall grey obelisks of Stenness, whose forms I saw this morning reflected in the water, had been torn from the quarry or laid down in mystic circle on their flat promontories, had this lake admitted the waters of the sea, and been salt in its lower reaches and fresh in its higher. And during this protracted period had its quiet, well-sheltered bottom been exposed to no disturbing influences through which the delicate process of transmutation could have been marred or arrested. Here then, if in any circumstances, ought we to have had in the broad permanently brackish reaches, at least indications of a vegetation intermediate in its nature between the monocotyledons of the lake and the algæ of the sea; and yet not a vestige of such an intermediate vegetation could I find among the up-piled débris of the mixed floras, marine and lacustrine. The lake possesses no such intermediate vegetation. As the water freshens in its middle reaches, the algæ become dwarfish and ill-developed; one species after another ceases to appear, as the habitat becomes wholly unfavourable to it; until at length we find, instead of the brown, rootless, flowerless fucoids and confervæ of the ocean, the green, rooted, flower-bearing flags, rushes, and aquatic grasses of the fresh water. Many thousands of years have failed to originate a single intermediate plant.

Besides sea-trout and yellow trout, the lower loch is said to contain flounders, cod, herrings, skate, whitings, eels, lythe, saithe, and grey mullet. There are no salmon now to be found in the Loch of Stenness. But in a book, entitled *Present State of the Orkney Islands,* published in 1775 and reprinted in 1884, we are told that—

> In this loch are abundance of trout, and in all probability there would be a good salmon fishing here, were it not that the mouth of the loch is so much choked up with sea-weed, that the fish cannot get into it. What confirms this opinion is, that in some charters belonging to the gentlemen in the neighbourhood, the salmon fishing in the loch is expressly reserved to the king as his exclusive right.

The yellow trout in Stenness and Harray are equal in quality to any in Scotland. But they are not nearly so plentiful as they ought to be; nor, as a rule, do they rise freely. They have been taken as heavy as 6 lbs. But such a size is very rare, though individuals of 2 and 3 lbs. are not uncommon. I have known one gentleman catch 12 trout in Harray in a few hours, weighing 13 lbs.; and Mr A. Irvine Fortescue of Swanbister, in answer to my printed queries about the trout fishing in the Loch of Harray, writes:—

> Myself and friend once caught 12½ dozen, weighing 40 lbs., with fly, in 4 hours.

Mr Fortescue states that, at times, the trout assemble in dense shoals in some of the small bays of the Loch of Harray, and are, on such occasions, swept out in vast quantities by the net, and he is therefore of opinion that the use of the sweep-net should be prohibited in the Loch of Harray, as he considers it even deadlier than set lines and set nets. Mr Fortescue mentions that, on the occasion when he and his friend caught the 12½ dozen, as above stated, they had come upon one of these shoals of trout, and he says that, with a net

> The entire shoal might have been taken at one sweep, the result possibly a cart-load.

Sea-trout ascend to the Loch of Stenness and the other Orcadian lochs communicating with the sea, beginning in July and continuing throughout the autumn. The best place for sea-trout fishing in connection with the Loch of Stenness is called 'The Bush,' the term applied to the lower part of the stream on the seaward side of the Bridge of Waithe. I have known upwards of fifty sea-trout hooked there in a day by one rod, though, for want of a landing-net, only 20 of them were basketed. 'The Bush' is a favourite resting-place for sea-trout before running up into the loch, and the most favourable time for fishing it is from half-ebb round to half-flood. A westerly wind is said to suit it best.

Before 1881 and 1882, when the Orkneys were constituted a Fishery District, and the usual bye-laws passed fixing estuaries, a close season, the meshes of nets to be used for the capture of fish of the salmon kind, and prohibiting certain methods of fishing, all kinds of destructive and improvident modes of fishing were commonly practised on the Loch of Stenness, and more particularly on the upper part of it, the Loch of Harray. Set lines, set-nets, sweep-nets, and the otter, were in constant operation; and although the use of the otter and fixed nets is now illegal, the 'Harray lairds,' as the small proprietors on the banks of the Loch of Harray are called, cannot be prevented, as the law at present stands, from using the sweep-net or set lines, as they are udallers, and many of their properties have a frontage to the loch. No District Board has been formed for the Orkneys, nor is there any Angling Association for the protection and improvement of the fishings; and from what I saw and heard when in

Orkney, I am by no means convinced that the statutory restrictions intended to prevent wasteful and improvident modes of fishing, are much attended to on the Lochs of Stenness and Harray. Were they fairly fished and properly protected, they ought to be equal to any lochs in the United Kingdom; and this is not merely my own opinion, after a pretty extensive acquaintance with these lochs, but that of every angler who has had much experience of them. In his admirable book on *The Orkneys and Shetland*, published in 1883, Mr Tudor writes as follows of these two great lakes :—

> For years, nets, set lines, and the infernal poaching machine the otter, have been used to such an extent that it is a wonder any trout have been left, but now the Orkneys have been formed into a salmon Fishery District, set lines and otters became illegal, and netting can no longer be carried out with the herring-net mesh, and in the reckless manner hitherto in vogue. In fact, if only the fish can be protected during the spawning season, these two lochs should, for angling, be second to none in Scotland.

To the same effect Mr Sutherland Græme of Græmeshall, who has a large estate on the Mainland of Orkney, writes, in answer to my printed queries :—

> I believe that if the lochs of Stenness and Harray were properly looked after and preserved by an angling association, they would be the finest fishing lochs in Scotland, both for sea and loch trout.

But without a District Board or an Angling Association, what is the use of statutory prohibitions of destructive and unfair modes of fishing? What are laws good for if there is no one to enforce them? They are a mere dead letter, not likely to be respected or observed by those whose interest, or fancied interest, it is to break them.

Mr Heddle, the proprietor of the island of Hoy, an experienced angler, agrees with the views above expressed, and he stated to me when I was in Orkney, that no good has, as yet, resulted from bringing the Orkneys under the operation of the Salmon Fishery Acts of 1862 and 1868. No District Board, no Association of Proprietors has been formed; no prosecutions have been instituted—matters go on just as before. With regard to the Lochs of Stenness and Harray, he believes that nothing short of the killing of the spawning fish and extensive ottering could have so much reduced the fishing on such great expanses of water, with such wonderful natural capabilities. Fair fishing would never do it. Twenty-one years ago, his father and he killed so many fish in Stenness in one day that they did not like to take any more. There were between 100 and 200, all good-sized trout. Four years ago he fished the same loch, and got only about half a dozen fish. One of these, however, was 2½ lbs.

Mr Gold, chamberlain to the Earl of Zetland, corroborates these views. He told me that the Acts had done no good as regarded the great lakes of Stenness and Harray, in which poaching was as rife as before the Acts were made to apply to the islands. A clause should be put into an Act of Parliament absolutely prohibiting ottering. Mr Gold is of opinion that the right of salmon fishing, or rather sea-trout fishing, in the lochs of Stenness and Harray belongs to the Earl of Zetland or to the Crown. He maintains that the Harray lairds are not udallers, and that their riparian rights give them a title to yellow-trout fishing only.

In the autumn of 1880, a public inquiry was held by the Commissioners of Scotch Salmon Fisheries at Kirkwall, Stromness, and the Bridge of Waithe, in connection with the proposal to erect the Orkney Islands into a Fishery District, and some interesting and important evidence was laid before them about the fisheries in Stenness and Harray, and the sea-trout fisheries in the Orkneys generally. With regard to the size attained by the Orcadian sea-trout, one witness stated that he had heard of one caught in a net, 21½ lbs. weight, and had seen one of 12½ lbs.; and another witness stated that he had seen one of 14 lbs. One of the witnesses examined at Kirkwall said, that about six years ago there was a curious epidemic among the trout in the Loch of Harray, when most of the fish died. He went down to the banks of the loch one day and found them lying dead all along the shore. There was no appearance of any fungoid growth on any of the fish. The season had been a very hot and dry one. Next year there were very few fish. The majority of the witnesses examined agreed as to the evil effects of the destructive modes of fishing practised in Lochs Stenness and Harray, such as set lines, sweep-nets and fixed-nets, otters, and the non-observance of any annual close time. In consequence of this the sea-trout and loch-trout are less numerous, and the individual fish are smaller in size than they used to be. In short, the tendency of the evidence taken by the Commissioners clearly proved the evil effects of allowing fishing unrestricted as to season or implements, and the necessity of imposing some restrictions. One witness deponed that he had seen eight or nine otters being used on the Loch of Harray one day, and the next day two on the Loch of Stenness. Another said that, during the last five years, there had been a marked falling off in the fishings, which he imputed to the use of sweep-nets, lines (each with several hooks) set during the night and drawn in the morning, and nets stretched and fixed across the whole breadth of the water above and below the Bridges of Waithe and Brogar, so as to intercept the passing fish. These nets have a small mesh, like herring-nets, and are set, not only in the lochs, but also across the burns running into them, where they do a great deal of mischief, especially during the spawning season. Another witness, who had then (1880) known the Loch of Stenness for 30 years, said, that when he first knew it, there was nothing but fair fishing with rod and line. He also said that he had, long ago, killed 30 sea-trout with rod and line in that loch in three hours. They weighed from 3 lbs. downwards. Such a take would be impossible now, owing to the otters, set lines, and nets; but if a close time were enacted and enforced, and the lochs protected, such are their natural advantages, that the fishings would recover in a few years.

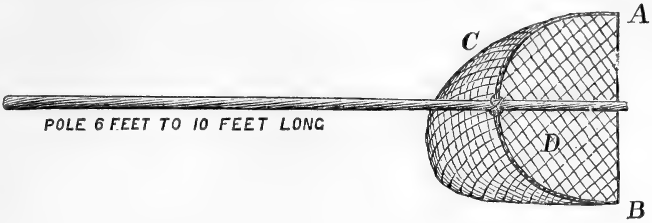
A great number of burns, some of them of considerable size, fall into the Lochs of Stenness and Harray, and in autumn and early winter the sea-trout and loch-trout ascend these burns for the purpose of spawning. But these narrow streams afford peculiar facilities for destroying the spawning fish, and there is no doubt that a number of them are killed while engaged in reproducing their species. This, of course, is the most destructive and improvident of all illegal modes of killing fish, as the death of every ripe female means the destruction of many hundred ova. But the udallers do not like to be subjected to any restriction whatever. As one Orkney proprietor writes me, in answer to the printed queries—

> I fear the native Orcadian is too short-sighted to regard an attempt to preserve the fishings in any other light than that of an attempt of the 'bloated 'aristocrat' to interfere with the 'rights of the people.' An attempt to stop ottering on the Loch of Harray was much resented by some of the smaller proprietors and others.

The most destructive instrument used for killing fish during the spawning season is called a 'haevie.' The following description and drawing of it, sent by a gentleman thoroughly acquainted with the sea and loch-trout fishings in Orkney, will give a good idea of its injurious character:—

> The most deadly instrument used in Orkney during the spawning season is

termed a 'haevie.' It resembles a large landing net, and is poked under the bank of the stream, and swept through the pools.



From A to B, 2 feet to 3 feet; A C B, a hoop lashed to a handle at C; A B, a cord joining ends of hoop; D, bag-net.

It is scarcely necessary to point out what an infernal machine this must be for the destruction of fish in the narrow Orcadian burns during the spawning season.

In the course of my inspection, I rowed round the whole of the Lochs of Stenness and Harray, and was very much impressed with their extraordinary capabilities, if properly managed, and the way in which they have been ruined by wasteful and illegal modes of fishing. At the head of the Loch of Harray there is a stream which flows from a small loch called the Loch of Rango, belonging to Mr Watt of Skaills. It is strictly preserved, and is said to contain very heavy trout. All the chief spawning tributaries of the Loch of Harray flow in on the east side, through the land belonging to, and occupied by, the Harray lairds. It seems to me that no amount of fair fishing would reduce the trout as they have been reduced in the Lochs of Harray and Stenness,—there is such a vast expanse of water, such a good bottom, and such abundance and variety of feeding. Illegal fishing, and more especially the destruction of the fish on the spawning beds, are the only things that will account for the falling off.

When I had finished my inspection of the Loch of Stenness, I drove from Stromness to the Loch of Boardhouse, a distance of about twelve miles. The lower extremity of this loch is situated close to the spacious ruins of the ancient palace of Birsay, which has not been occupied for about two hundred years. There is a comfortable and well-kept inn near the mouth of the stream, which flows from the loch into the bay of Birsay. The loch is a fine sheet of water, two miles long by a mile wide. It contains fair trout, averaging half-a-pound, and some attaining a much larger size. They are not equal in quality to the trout in the Loch of Stenness. It is stated in the Old Statistical Account of the parishes of Birsay and Harray, published about a hundred years ago, that

> There are two or three fine burns, one of which washes the middle of the Barony; and sometimes through the Barony Burn a salmon may chance to run up, but always at an unseasonable time of the year.

There has been a change for the worse since then, for neither salmon nor sea-trout can now ascend through the Barony Burn, though it is the longest stream in Orkney, and contains abundance of water after a flood to permit the passage of salmon. This is owing to a great bar of gravel, washed up by the heavy seas that roll into Birsay Bay, which stretches right across its mouth, over or through which no fish can pass from the bay. A similar bar, though not so bad a one, obstructs the mouth of the river Berriedale, in Caithness, and greatly interferes with the ascent of salmon.

I heard from persons in the neighbourhood that the fishing in the Loch of Boardhouse is very much injured by the use of the otter, in defiance of the provisions of the Fishery Acts. In his book on Orkney and Shetland Mr Tudor says of this loch :—

> It, like the Lochs of Stenness and Harray, has been raked to death with the otter, but, if that can only be stopped, it ought to become a very fair angling water.

The Loch of Boardhouse, or Birsay, is connected with the Loch of Hundland by a broad burn, almost a river, about a mile long, with fine streams and pools. Hundland has a circumference of nearly 3 miles, and its banks are low and fertile for this part of the country. It abounds in trout of good quality, averaging four to the pound. If the gravel bar were removed from the mouth of the Barony Burn, which drains the Loch of Boardhouse, sea-trout could freely ascend in autumn both to that loch and to the Loch of Hundland.

The Loch of Swannay is the largest and—as an angling loch—the best of the three considerable lochs in the north-west mainland of Orkney. It is between 5 and 6 miles in circumference, and is connected with the sea by a short stream which used to wind through a valley, but whose course has been changed, so that it now flows through a straight cutting till close to the sea, into which it falls over a series of rocky ledges belonging to the Orcadian flagstone series. The bay into which it falls is completely exposed to the full force of the sea from the west and north-west, and seems to have been scooped out by the force of the fierce Atlantic waves; as all along the bend of the bay huge masses of the slaty rock of which it it composed—some of them tons in weight—are piled up and strewn about. It would be neither difficult nor expensive to cut a passage through the rocky ledges over which the stream falls into the sea, so as to allow sea-trout to pass into it and up to the Loch of Swannay. But then such a passage would probably be blocked up and rendered useless by the first great storm from the west or north-west; so that it would not only be necessary to cut or blast the passage in the first instance, but also to watch it and clear it out when choked up by blocks torn up and rolled in by the waves. The trouble and expense of this could never be repaid by any probable improvement in the character of the angling in the Loch of Swannay. Large sea-trout have often been seen and caught in the Bay into which the stream from Loch Swannay falls, and one well-informed Orcadian stated to me not only sea-trout but salmon also. With regard to the yellow trout fishing in Swannay, one accomplished angler, who had been fishing the loch for some days previously to my visit, told me that the trout average half a pound, that they are very game fish, firm and well shaped, and cut as red as a sea-trout.

On the 10th July last, I took a boat at Stromness, and sailed over to the island of Hoy, where I had the advantage of meeting Mr Heddle, the proprietor, who was residing at Hoy Lodge. Under his guidance I walked across the island, through a grand mountain valley, in parts of which you might fancy yourself in the heart of the Highlands. The view as you cross the water-shed and gain a glimpse of the Pentland Firth, the opposite shore of Caithness, and the graceful peak of Morven towering over the adjacent hills, is very striking. During part of our walk we had the Ward Hill (1564 feet) on our left, and Cuilags (1450) on our right. Among the smaller glens I noticed a pretty wooded ravine called Armadale—a rare sight in these generally treeless islands. The Rackwick Burn, which falls into the sea about 5 miles from Hoy Lodge, holds more water than any stream on the Mainland, with the exception of that which passes under the Bridge of Waithe; and for some distance from its mouth there is a considerable extent of deep still water flowing between high banks, where heavy yellow trout may be caught when a strong breeze strikes the water, and also, in the autumn, sea-trout, though there is a gravel bar at the mouth of the stream, which impedes, though it does not entirely prevent their ascent. We returned to the boat by the other side of the Ward Hill, passing the Dwarfie Stone, immortalised in the *Pirate*. The boat was lying near the Bays of Quoys and Cruckland, two of the best places in the Orkneys for taking sea-trout in the sea. The most killing fly is said to be one dressed to imitate a sand-hopper, and the sand-eel is at times a deadly bait.

After leaving Stromness, I went to Kirkwall, the Orcadian capital, and had an interview with Mr Macrae, Clerk of Supply, who, like Mr Heddle, stated that as yet the application of the Salmon Fishery laws to Orkney has done but little good to the fishing, as no steps have been taken to enforce them. From Kirkwall I visited Kirbister Loch, which is about 3 miles in circumference, and is connected with Waulkmill Bay by a pretty little stream with good pools and runs. Waulkmill Bay is a famous place for sea-trout, and so is the stream from the Loch of Kirbister. Some persons I examined stated that in this stream salmon had been occasionally, though rarely, killed. Just above the road, and close to the mill, several rocky shelves stretch across the bed of the stream, constituting a series of small falls, which must seriously interfere with the passage of sea-trout. There are no hecks at the intake or tail-lades connected with the mill, and no heck below the wheel. In fact, throughout the whole of Orkney, the provisions of the Bye-law (Schedule G), regulating the construction and alteration of mill-dams, or lades, or water-wheels, are systematically ignored.* This is the more inexcusable, because the validity of the provisions of that Bye-law were recognised and decided in the case of Kennedy *v.* Murray, 8th July 1869, in which it was held—

> 1. That the Salmon Fishery Commissioners, acting under the Act of 1862, have power to make Bye-laws applicable to lades, dams, &c., whether in process of being constructed or repaired or not. 2. By a majority of the consulted Judges, that the Commissioners have also power to impose an obligation on the owners or occupiers of mills to execute at their own cost the works embraced in the Bye-laws so made.

As both the Salmon Fishery Acts of 1862 and 1868 contain a provision that—

> All offences under this Act may be prosecuted, and all penalties under this Act may be recovered, before any Sheriff, or any two or more Justices acting together, and having jurisdiction in the place where the offence was committed, at the instance of the Clerk of any District Board, or of any other person—

it seems somewhat strange that the Orcadian proprietors have never as yet taken any steps to enforce the provisions of the above-mentioned Bye-law. The Loch of Kirbister seems at one time to have been well stocked with sea-trout, as in Sir John Sinclair's *Statistical Account of Scotland*, published nearly 100 years ago, it is stated that it 'is well 'stored with sea-trout of an excellent quality.' At present, it contains plenty of yellow trout, running about four to the pound.

Græmeshall House and Loch lie rather more than 6 miles to the south-east of Kirkwall. A considerable stream, which rises about 3 miles from Kirkwall, and in which there is good spawning ground, runs into and through the loch and discharges itself into the sea not far from the mansion-house. Sea-trout ascend into this loch and burn in November. There is another loch on the Kirkwall road about a mile from the house. It is connected with the sea, and contains excellent trout, which occasionally attain a weight of 2 lbs. In a small bay near the mouth of this burn, the best day's rod-fishing for sea-trout that I ever heard of in the Orkneys

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* This Bye-law will be found printed in full in Note III.

took place. I state it on the authority of Mr Gold, Chamberlain to the Earl of Zetland, the largest proprietor in the Orkneys. It occurred about thirty years ago, when a Mr Pottinger, then staying at Græmeshall, caught in four hours in one forenoon, towards the end of October, 70 sea-trout, ranging from 3 to 9 lbs—unquestionably a most remarkable and exceptional take. Mr Sutherland Græme of Græmeshall has favoured me with answers to my printed queries. With regard to the number of fish taken in Orkney, he writes as follows :—

> I can give no idea of the number of fish taken in all Orkney. At Græmeshall, when I used to net the bays, I have got large numbers of fine fish; there were 40 fish in one haul at St Mary's Bay. Another time at Græmeshall 34, weighing 149 lbs. I think the biggest fish in the net was 11 lbs.; biggest fish to rod and fly, 7¼ lbs.

With regard to the increase or diminution of fish on his property, he writes :—

> I should say the numbers of fish have not altered in the last 15 or 16 years. The numbers vary, of course—good seasons and bad—but are not diminishing about my bays.

About 7 miles from Kirkwall, there is a wide and deep Bay called Deersound, with many minor bays branching off from it. Tankerness Hall, an old seat of the Baikies, an ancient Orcadian family, is on the west side of it, and can show—a rare thing in Orkney—a pretty extensive grove of trees and a pleasant garden. In Kirkwall Bay, in Inganess Bay, and in certain localities in Deersound, there is occasionally capital sea-trout fishing, as also in the Wideford Burn flowing into Inganess Bay, in which the sport in the season, after a flood, is sometimes excellent. In various parts, too, of the extensive Bay of Firth—known in the old Norse days as Aurridafiörd (Salmon Trout Firth)—there is still fair fishing to be had for sea-trout in the salt water in the proper season. A good many years ago a friend of mine, fishing on a fine moonlight night in the Bay of Kirkwall, near the spot where the stream from the Peerie Sea flows into it, hooked a large sea-trout at 11 o'clock, and landed him just as the clock of St Magnus Cathedral struck 12. The fish was fully 10 lbs. weight.

While staying at Kirkwall, I drove out to the Bay of Isbister, which is just beyond the Bay of Firth, to visit Loch Brochan and the stream that runs out of it into the head of the Bay. The loch is a considerable sheet of water, with an area of from 50 to 60 acres. A large burn flows into it and issues from it. But there is a mill at the point where the latter joins the sea; and, as usual in such cases, sea-trout are never able to ascend the stream to the loch. The yellow trout in the loch are said to be of good quality, and to grow to a considerable size. The distance from the loch to the sea is about a mile. The mill-lade, which is supplied from the loch, is covered in throughout its whole course. There is a sluice, but no heck or grating at the intake or tail-lade. The lade turns an overshot wheel and falls in a shoot from the top of it, so that no fish could possibly reach the loch by the lade. I am rather surprised, however, that no sea-trout manage to ascend to the loch by the burn during the autumn floods.

Next to Hoy, the island of Rousay, which is circular in shape, and from 5 to 6 miles in diameter, is the most picturesque and varied in surface of the Orcadian group, containing three considerable hills—Blotchinfield (811 feet), Kierfea (762), and Knitchenfield (732 feet); while hemmed in by peaks and ridges, on all sides, except towards the sea, is the spacious valley, near the head of which are the two lakes, termed the Meikle Water and the Peerie (that is, the Little) Water, through both of which flows the Sourin Burn, which probably contains a greater number of yellow trout—most of them of a small size—than any other burn in the Orkneys.

The Sourin Burn drains these two lochs, and has a course of 3 miles from the foot of the Meikle Water to where it falls into the sea opposite the Holm of Scockness. There are several lochs in Rousay, covering altogether 242·8 acres, divided as follows:—

	Acres.
Meikle Water,	124·8
Peerie „	42·1
Saviskail,	52·6
Scockness (fresh),	12·2
„ (salt),	4·3
Limingen,	4·5
Knitchen,	2·3
Total,	242·8

The lochs in Rousay all belong to General Burroughs, the proprietor of nearly the whole of the island, and are strictly preserved, none of the destructive modes of fishing, that have proved so detrimental to the fishings in Stenness, being allowed. There is nothing but fair fishing with rod and line. The consequence is that the yellow trout fishing is as good as it ever was; and if the mills at Saviskail and at the mouth of the Sourin Burn were properly regulated and obliged to observe the provisions of the bye-law (Schedule G), sea-trout also would have access to both lochs. As I shall presently show, they had, at one time, free access to the Loch of Saviskail, and were caught there in considerable numbers and of large size. I walked along the whole course of the Sourin Burn from the Meikle Water to the sea. Good hauls of sea-trout are sometimes got with the net in the bay into which the burn falls; and they occasionally, but rarely, take the worm or the fly. There is a mill close to the mouth of the Sourin Burn, and, as usual, in Orkney, that mill acts as an obstruction to the ascent of migratory fish from the sea; although a capital salmon-ladder has been made by General Burroughs, just above the junction of the burn with the sea, which has an easy gradient and pools of ample depth. At low water, there is a fine pool at the bottom of this ladder. Yet, though the burn is of sufficient size after a flood to allow of the ascent of sea-trout, or even of salmon, none of these fish seem ever to reach either the Meikle or the Peerie Water. One disadvantage of this ladder is, that it is very easily poached, when fish are running, by putting a net above and across the highest pool. It is quite close to the mill and the public road. The ladder is a pretty long one, and it might possibly be improved by having the central pool enlarged, so as to form a resting place for ascending fish.

The Free Church and manse are situated a little way above the mill; and almost opposite the manse there is an impassable fall on the burn, round which General Burroughs has made a very ingenious salmon-ladder. He also had several sea-trout put into the Meikle Water. But none of them have since been caught or seen by anglers on the loch. Yet a friend of mine, an excellent and experienced angler, assures me that about twelve years ago, nearly opposite the Free Church manse, he landed a sea-trout from the Sourin Burn 3 lbs. weight, and also hooked and lost another heavy fish. The yellow trout, both in the Meikle and Peerie Waters, are very handsome and game fish, running about two to the pound.

Another day, whilst in Rousay, I visited the Loch of Saviskail and inspected the burn which connects it with the sea and the mill and mill-lade close to where the burn joins the sea. The trout in Saviskail are of first-rate quality, and take freely on a good fishing day. They average three-quarters of a pound each, and are equal as edible fish to those of Stenness or Harray. In fact, I know no yellow trout, either in Orkney or Shetland, that surpass them either for sport or food. The stream which connects the loch with the sea is quite short, perhaps 300 yards in length. It passes under the road, through two comparatively narrow, square-shaped openings, on to the sea-beach, over which it trickles in a somewhat shallow straggling current. The mill-lade issues from the corner of the dam across the foot of the loch. It is pretty deep and rapid, and there is a sluice, but no heck at the intake. According to the terms of the bye-law (Schedule G), that sluice should be shut when the mill is not going, and all the water should be passed down the natural bed of the burn. But, at present, the intention evidently is to admit sea-trout into the loch by means of the bye-wash sluice which runs from the lade into the burn. In order to give effect to this intention, however, the sluice at the head of the bye-wash, where it issues from the lade, would require to be enlarged, and the opening which it regulates should be deepened. At the time of my visit, a rivulet of water was flowing out of the loch from the corner of the dam opposite to that from which the lade issues. The opening from which it flowed was in a great measure stopped up with turfs. But it seems possible that, if this obstruction were removed, sea-trout might occasionally find their way into the loch through this channel.

The skipper of General Burroughs' yacht, whose remembrance of Saviskail Loch goes back between thirty and forty years, told me that when he first knew it sea-trout had easy access to it, and that it contained plenty of them at the proper season of the year up to 5 lbs. weight. At that time he was once out in a boat with some one who used an otter on Loch Saviskail. The result of the first trial of the otter was the capture of six or seven sea-trout, one of them weighing 5 lbs. ; another trial was made, and the take of fish was so great that the tackle was broken, and the otter dragged down to the bottom of the lake.

From Rousay I have two answers to my printed queries. General Burroughs writes :—

> I would approve of a close time in Orkney for the sale of trout. Sea-trout are caught by net when required for consumption in my house. Some days none are caught, sometimes three or four dozen fish are landed. We fish with the net, perhaps once a fortnight, during the season. I would strongly recommend a Fishery Association being formed for the Loch of Stenness, in the interests as well of the proprietors as of fishermen.

General Burroughs' gamekeeper writes :—

> I would approve of a close time for trout in Orkney—say, from 31st October to 1st April. The sea-trout take the fly at the mouths of the burns in the sea, but not readily. They have not been tried with bait or minnow. Thinks 100 sea-trout might be got any season in Rousay with net and rod. General Burroughs has done a great deal in the way of removing obstacles to the passage of sea-trout in the island of Rousay.

Beside the lochs above-mentioned, there are a good many others in the islands of Westray, Sanday, Eday, and others of the Orcadian group. Near Pierrowall Bay in Westray there are two—the Loch of Burness and the Loch of Sanctear—which are said to hold very heavy trout. Mr Tudor states that he saw five trout taken from the latter which weighed 8 lbs.

Oysters in Orkney.

There may be some doubt whether the sea-trout fisheries of Orkney, even if carefully protected against destructive and improvident modes of fishing, will ever attain any considerable commercial importance by supplying food for the market. But there can be no doubt that Orkney once contained oyster beds which yielded a regular supply of excellent oysters; and that these beds, though now for the most part either wholly or partially dredged out, might once again be made productive if they were scientifically cultivated and properly protected. This is a matter of great importance to the islands, especially when we remember that the oyster industry of Scotland is steadily falling off, and, indeed, may be said to be almost extinct; the total value of Scottish oysters in 1885 being only £809, as against £2174 in 1884. In 1885, the once famous and productive oyster beds of the Firth of Forth yielded only £273, and, in 1884, £500. In 1885, only three of the Fishery Districts yielded oysters, namely, Leith, Stornoway, and Ballantrae.

Yet in Orkney, more than 300 years ago, oysters were both good and plentiful, and in certain places formed part of the rent paid by the tenant to the lord of the soil. Low tells us, in his *Tour*, that in the inner basin of the Long Hope there were formerly oyster scalps which produced oysters so large that they had to be cut into four pieces before being eaten; and in Earl Patrick's rental of 1595, Aith *inter alia* paid '40 oistris for ilk 1d. terræ'; Manclett, 80; and Binns, 40. The Bays of Firth and Deersound used to be the principal localities for oysters in Orkney, and so late as 1845 the former was fairly productive. The Old Statistical Account of Scotland published about 100 years ago tells us that

> In this Bay [the Bay of Firth] excellent oysters, and of a large size, are found in tolerable plenty. They are sold at a shilling the hundred.

As much as £2000 worth of oysters have been sold out of the Bay of Firth in a single season. But a fleet of boats came and dredged them all out; since which time the oyster scalps have remained almost entirely unproductive. Yet in the vicinity of the islands of Damsay and the Holm of Grimbister, and in other parts of the Bay of Firth, and also in certain localities in the Bay of Isbister, which is close to the Bay of Firth, there are places admirably suited for oyster culture, and likewise in Deersound, especially on the west side of the bay between Lakequoy and Suckquoy, if only the oyster culturist could be secured in the enjoyment of the results arising from the money expended in restoring these dredged-out bays to their former condition of productiveness. Other countries recognise the necessity of protecting the oyster culturist, and adopt stringent means to do so. In the United States of America, for example—where the annual production of oysters is between 5000 and 6000 millions—they have recently appointed a salaried Oyster Protector for the State of New York, whose duty it is to supervise the oyster beds.

Perhaps there is no place in Orkney that would be more suitable for oyster culture than the Peerie Sea, which runs into the Bay of Kirkwall under the high road to Finstown. The tide flows into and ebbs from this shallow salt-water lake, which is about a mile and a half in circumference, and which, from its position, could be easily and cheaply overlooked and protected. I noticed various parts of the Peerie Sea where the bottom is suitable for oysters. But in other parts it might require to be cultched, and star fish, dog whelks, and other enemies of the oyster destroyed. Of course, it would be necessary to prevent the discharge into it of town sewage, gas refuse, and other deleterious matters. The Peerie Sea belongs, I understand, to the town of Kirkwall.

The lower reaches of the Loch of Stenness would probably be found excellent for the laying down and fattening of oysters, as the presence of a certain amount of fresh water and a current—such as exist for some distance above the Bridge of Waithe—are favourable for the fattening of oysters, though they would be unfavourable for breeding and spatting purposes; pure sea-water and a clean bottom being most suitable in such circumstances.

In the island of Rousay, the salt water loch of Scockness covering somewhat more than 4 acres, is a place well fitted for oyster culture. It is separated from the sea beach by a ridge of rocks, but every flood-tide pours salt water into it through an opening in the rocks; and at low water a narrow stream flows from the loch into the sea. A small burn of fresh water runs into the head of the loch. It should be a place well fitted for the laying down and fattening of oysters, though the bottom is perhaps somewhat too sandy. From Rousay, I went to the Island of Egilshay to inspect the Bay of Varday, which, I had been told, was a place well suited for breeding oysters. I found it a long narrow bay, with a naturally fine bottom of shingle. But, unfortunately, the opening from the sea into it is straight and short; and with certain winds, a very heavy sea rolls in and fills the bay with sea-weed, which decomposes and covers the bottom of the bay with a coating of viscous, green, bad-smelling mud, which would, I fear, be very unfavourable to oyster culture.

The following questions in the printed queries circulated by me in Orkney, previously to my personal inspection, had reference to

*Oysters and Mussels.**

1. Are there any oyster beds or mussel scalps in Orkney at present which are regularly worked and yield a profit to their owners ; if so, mention the localities where they occur ?
2. Has the number of oysters and mussels in Orkney increased or diminished during the last twenty years ?
3. Do you know of any cases in which formerly productive oyster and mussel beds have been dredged out and so destroyed ?
4. Are any steps being taken to restore such beds by scientific oyster or mussel culture ?
5. Do you think that it is essential to successful oyster or mussel culture that the oyster or mussel culturist, having a legal right to oyster or mussel beds, should be enabled to claim the protection of the police, or the coast-guard, or some other effectual form of protection, in order to prevent strangers from dredging out his oysters and mussels when they come to maturity ?
6. Mention the localities in Orkney which you think best fitted for oyster and mussel culture, and state any other points regarding the oyster and mussel fisheries which you think worthy of attention.

I subjoin some of the answers received. Mr Harper, fishery officer, St Margaret's Hope, writes as follows :—

1. Oysters are got in the Bay of Firth, Mainland, and at no other place in Orkney. Fishing for them is free to all; they are now nearly fished up. A few years ago fishing for them paid well, but now it is only with low spring ebbs that a few hundreds are occasionally got. There are no mussel scalps in Orkney. Large coarse mussels are got in considerable quantities, in water from 14 to 25 fathoms deep in various places in amongst the islands ; they are fished by grapnels, and used as bait for cod.
2. Diminished.
3. Considerable quantities of oysters were lately got in Deer Sound, but are now fished up.
4. None.
5. Yes. Unless protected, they would soon be fished up.

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* With regard to mussels, it is notorious that, both in Orkney and Shetland, there is not a sufficiency of mussels to supply the demand of the hook and line fishermen for bait, and that, owing to this circumstance, they are not unfrequently unable to prosecute their calling to the best advantage.

6. The Bay of Firth, Deer Sound, and several bays in Scapa Flow, mussels and oysters might, if protected for a time, be profitably cultivated. Oysters were several times laid down in Widewall and St Margaret's Hope Bays, thinking they would increase, but all died out. The cause attributed thereto was too much loose sea-weeds drifting about these bays.

General Burroughs writes as follows :—

Oysters and Mussels.

1. Oyster beds and mussel scalps are being destroyed in Orkney. They yield no profit to whoever own them.
2. Their number has diminished.
3. I do.
4. No. Steps as indicated are much needed.
5. I do. No successful oyster or mussel culture can otherwise be carried out.
6. I have no map of Orkney by me to refer to, but there are localities favourable for oyster culture in very many places around the islands. Mussel culture could also be successfully carried out in many spots which formerly produced them, if properly protected.

Rd. Murison, gamekeeper to General Burroughs, gives the following answers to the queries :—

Oysters and Mussels.

1. None regularly worked. Oysters are found in Deerness and Firth.
2. Diminished.
3. A mussel bed in Veira Sound was dredged out and destroyed.
4. No steps in a scientific way have been taken to restore this bed ; but young mussels are growing on it again.
5. It would certainly be essential to one having a legal right to claim the protection of the police, &c.
6. There is a small loch in Rousay suitable for oyster culture.

Mr Heddle of Hoy writes :—

Oysters and Mussels.

1. There are practically no oysters in Orkney, save at Firth, and a few at Longhope, where they were laid down by my ancestors, and again by myself.
2. Diminished.
3. Yes, at Firth, where they have been nearly fished out. Thousands were laid down too high on beach at Kirkwall, to ship later, and perished by frost. These beds would have been valuable if under any regulation, but no one seemed to have claim on them, and they were destroyed in a few seasons, when people found they could get 7s. 6d. to 8s. 6d. per hundred for them.
4. Not so far as I know.
5. Yes. A south country boat came and dredged over ground at Longhope, where I had recently laid down oysters ; they having been extinct there previously, owing, it is said, to peat mould washed down over the beds.
6. Firth Bay. Parts of Kirkwall Roads. About Linga Sound, Stronsay ; and parts of Longhope and some bays near.

Mr A. Irvine Fortescue of Swanbister writes :—

Oysters and Mussels.

1. The Bay of Firth. Formerly at Deer Sound, but almost if not quite exterminated there. Also formerly at Melsetter.
2. Oysters have become scarce, formerly plentiful.
3. At Firth and Deer Sound.
4. No.
5. Yes.
6. Bay of Firth, Deer Sound, Longhope, and Bay of Melsetter.

Mr W. G. T. Watt of Skaill House, near Stromness, writes as follows on 12th June last:—

Oysters.

The oysters should have attention, for within the last 15 years even they have sadly diminished, as they have been almost dredged out in the Bay of Firth and Sound of Deerness. When some oyster beds were discovered in 1869 or 1870, I think, boats came from all parts to fish in the Bay of Firth for them, and also Deer Sound, and they almost made a clean sweep of them. None of the proprietors along the shores of Firth or Rendall, I expect, can instruct by their charters a right to the oyster beds, otherwise they would have done so at that time I should think, and protected the beds. Some few years ago we had the matter up before the Commissioners of Supply, but for want of funds the matter dropped.

Some steps should be taken to restore the beds in Firth Bay, at any rate to begin with . . . . and the right conveyed to the Commissioners for the good of the county general assessments.

The Orcadian proprietors seem to admit and recognise the importance and necessity of taking some steps to restore the almost extinct oyster fisheries in Orkney; and, at a meeting of the Commissioners of Supply, held at Kirkwall on the 29th September last, a motion was made by Mr Watt of Breckness—'That the Commissioners, in their corporate capacity, 'or otherwise, take steps for acquiring, developing and utilising for the 'benefit of the county the oyster fisheries in Orkney.' Mr Watt supported this motion in a clever and exhaustive speech, which so ably sums up all that can be said on the subject that I cannot more appropriately close my account of the Oyster Fisheries in Orkney than by quoting the report of that speech and the subsequent proceedings, given in *The Orcadian* of 2nd October last:—

As a preamble to the motion which you have before you, I should like to make, with your permission, a few observations regarding the oyster in this county. As far back as the year 1502 we find the first written authority, so far as I am aware, that the oyster was known, as in a copy of Lord Sinclair's rental at that date it makes mention *inter alia* 'there was paid for the lands of Cur-'sitter, in the parish of Firth, 400 oysters.' John Bellenden, *alias* Jo. Ben, in 1529, in his *Description of the Orkney Islands*, says:—'*Firth alia est parochia*, '*ubi Ostrea abunde Capiuntur*.' Again from the rental of 1595, known as Earl Patrick's rental, we can assume that the successors to my Lord Sinclair inherited a liking for the famous mollusc, for we find that the number of oysters payable from the lands of Cursitter at that date was 500, an additional 100 to what was paid in 1502; and over and above this the 4d. land of Firth had to pay 350 oysters, and the lands of Grymbuster 250 oysters. The two last-named lands had not apparently paid any hitherto, for, it is said in the rental, 'lately 'augmented by my Lord.' It appears also from the same rental (1595), that in the parish of Walls the 18d. terra of Aith paid *inter alia* '40 oistaris for ilk 1d. terra. The 2d. terra of Manclett paid '80 oistaris.' The 4 penny land of Brims was augmented *inter alia* with '40 oistaris for ilk pennyland yearly,' which were specially to be reserved to my Lord. The last augmentation was never paid, as shown by a note on the margin of the rental. The likelihood is that Adam Moodie thought that his Lordship had enough of oysters exacted from him, particularly considering that the Walls oysters were four times the size of the ordinary oyster, so retained the last lot to whet his own appetite. Oysters in those days must have been difficult to get, except at very low tides, as it is not likely the islanders had many boats, and suitable appliances, such as tongs, water glasses, &c., for picking them from deep water. The oyster is mentioned by Wallace, in his *Description of Orkney*, 1693, as follows:—'The largest 'oysters ever I see anywhere are got in some places of this county, and the 'fittest for pickling. I have seen them so large that they must be cut in two or 'three pieces before they can be eaten. But the people are so careless that they 'have in few places dregs to take them up, as they do elsewhere, but for the most 'part at a great ebb go in amongst the rocks and cut them off with a knife.' Low, in a letter dated 4th June 1773, states that 'oysters are found very large in 'Walls, but in no great quantity.' He further adds, in page 11 of his *Tour*, that about Walls they are to be got 'so very large that they must be cut in four 'before they can be eaten.' 'They are,' he says, 'found in more plenty in Deer 'Sound, Bay of Quanterness, &c., through the Orkneys.' Barry, in his *History of Orkney*, says that 'the oyster is found in several places, but especially in the 'Bay of Firth and of Deer Sound, and is inferior to none even in Britain, which 'for many centuries past has been justly famed for the excellence of this produc-'tion. If our oysters, or their spat or spawn, were raised from their native 'beds, in places for the purpose, and treated as they are at the mouth of 'the Thames, or at Colchester there is little doubt of their increasing in 'numbers and improving in quality so much that they would not only furnish a 'delicious repast to the epicure, but prove a lucrative article of commerce.' I trust that the day is not far distant when Barry's suggestions will be carried into effect. From what I have above stated it is clear that the oyster was known in the county at a very early date and appreciated; but beyond this, I think, that with safety I may assert that the oyster is indigenous to these islands, as I have found in the underground dwellings of the ancient Scots, and in the broughs, among their kitchen-middens in the county, numerous oyster shells. Herewith I produce for your inspection a pre-historic oyster, found at Skara, Sandwick, and which possibly was taken from the Bay of Firth more than 1800 years ago. The Bay of Firth appears to be the most suitable and natural in the county for the upholding of the oyster, as from what I can gather, it has all the necessary advantages. In Walls they do not, for some reason, seem to have flourished, notwithstanding, I believe, that Mr Heddle of Melsetter some years ago planted a good number. Oysters are still to be found in Deer Sound, which was severely dredged in late years, but they have never been come upon in such quantities as in the Bay of Firth. I am not aware of any other places than those named in which the oysters have been found, though from the old writers one would infer that they were to be got elsewhere in Orkney. At any rate, I have no doubt that there are many places where oyster beds could be formed. One of the most suitable places in Orkney for rearing oysters would be the lower Loch of Stenness—and a place even superior to that is the Peerie Sea at Kirkwall, about which there could be no difficulty, as it is the property of the municipality of the burgh. If oyster culture were tried there, I am sure the burgh would get a huge revenue. The matter, at any rate, is worthy of the attention of the authorities of Kirkwall. It may be well to mention that the oyster has many enemies, and among the most formidable are the star fish, such as I now produce—gentry of epicurean taste. The larger kind, when the oyster opens, grabs, and pulls it out; the smaller species with the five arms or feelers, it is said, gets into the oyster when he gapes, and sucks it out at his leisure. The Firth and Deer Sound oyster fishermen, for their own interest, as well as for the good of the public, should destroy such whenever they meet in with them; also crabs. The oyster from the earliest times has been considered worthy of being cultivated, not only for the sake of indulging the appetite, but also from the great profit derived from the culture of them. Oyster culture at the present day is carried on to a great extent in France and the south of England, and is found to be a most lucrative undertaking. It may be interesting to state that in the time of Lowe, 1773, oysters sold in Orkney from 1s. to 1s. 4d. per 100, and considered dear at that. Within twenty years they could be bought at 2s. 6d. per 100. Since then the demand for them has become so great that they bring in no less a sum at Firth than 12s. per 100. I may mention also that in Russia oysters cost 12s. per dozen, 1s. each. The Russ enjoys a dear mouthful. In England the British oyster costs from 1s. 6d. to 3s., and even more, per dozen sometimes. The Orkney oysters are much prized in the south, and command a high price. About the year 1870 boats came from all quarters, hearing that a find had been made, which, by the way, should have been kept quiet by the Firth boys, and fished in the Bay of Firth to such an extent that they are now scarce—having been over-dredged—in fact, 'the goose that laid the golden egg' has been almost destroyed. She with care will still survive, and will prove as fruitful as in days of yore. Thousands of pounds' value of oysters must have gone out of Orkney, for in one season it is said that no less than £2000 worth of oysters were taken from the oyster beds of Firth, and a great part of this was earned by fishermen not belonging to Orkney. Notwithstanding that these valuable beds have been sadly harried, I feel confident that if the right to the oyster fisheries of Orkney, particularly Firth, could be obtained on favourable terms, and the oysters protected for a few years, they would rapidly increase, and a considerable revenue flow therefrom, and the public benefited thereby. Now, to come to what may be termed the practical part and the business before us, I would propose that the Commissioners of Supply should endeavour to acquire the full right to the oyster fishing in the Bay of Firth, and should it be found not competent to do this in their corporate capacity, I would suggest that the Commissioners personally should interest themselves, and take, say £1 shares, and work the fisheries up until they had recouped themselves, the principal and interest on the shares, with the distinct understanding that immediately this is done—and I think under proper management it could be accomplished in the course of a very few years—that they shall become bound to hold the oyster beds in trust for the benefit of the county, by using the profits derived from the fisheries towards the reduction of the country assessments. I may state that if you apply to the Scotch Fishery Board, you would find that you could possess these oyster beds on very favourable terms. In No. 4 of the Fishery Board regulations, it is stated that powers would be granted for regulating or restricting the unlimited fishing of oyster or mussel beds, 'in a case where it is proved that such fishing 'is carried on in so wasteful a manner as to have an effect upon existing beds, 'and diminishing the supply without any corresponding advantage to the public.' In another clause it is stated that 'the only ground for the concession of 'exclusive fishery rights or restrictive powers over any portion of the sea shore 'is in the expectation that by this means the supply of oysters or mussels will be 'materially increased, and the public thereby benefited. Such expectation must 'consequently be shown to exist in all cases of orders under this Act, and espe'cially in the case of an order affecting an already productive dredging ground.' I think we could have no difficulty in satisfying the Fishery Board on these points. I should like if you would appoint a committee to consider the whole matter, and to get particulars from the Fishery Board. There would be little or no working expenses at the outstart. The chief thing is to protect the oyster beds, because an oyster takes three years to come to maturity. The oyster increases at an enormous rate—one of them throwing off annually one to two million spats; and though all these do not come to maturity, still if they are well cultured a good percentage of them can be got. I hope a committee will be appointed to consider the whole subject.

The result of this speech was that, after some discussion, Mr Watt's motion was agreed to, and General Burroughs, Mr W. D. Baikie, Mr Fortescue, Provost Reid, Bailie Peace, and Mr Watt were appointed a committee to consider the whole question—Mr Watt to be Convener.*

SHETLAND ISLANDS.

There are 29 inhabited islands in the Shetland group; 71 islets used for grazing purposes; and a large number of waste rocky holms and skerries. The area of the islands is 551·4 miles, or 352,876 acres, while that of the Orkneys is only 240,476 acres. All the islands, except Fair Isle and Foula, form a pretty compact group, the most southern part of which is 50 miles from the Point of Sinsoss, the most northerly extremity of North Ronaldshay, in Orkney. Fair Isle is about midway between Orkney and Shetland, being 27 miles northwards from the Point of Sinsoss, and 24 miles southwards from Sumburgh Head, the southernmost extremity of Shet-

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* Mr Watt, as Convener of the Committee thus appointed, put himself in communication with the Fishery Board for Scotland in November last, and a copy of the Board's printed regulations, under 'The Sea Fisheries (Scotland) Amendment 'Act, 1885,' with regard to oysters and mussels was afterwards sent him, and it is to be hoped that some decisive action will shortly be taken to restore these valuable but now almost exhausted fisheries.

land. The island of Foula, whose precipices rival those of Hoy Head in Orkney, lies far out in the western sea, distant 16 miles from the nearest point of the Mainland of Shetland.

The Shetland group extends 70 miles in length in a straight line from the northern extremity of the island of Unst to Sumburgh Head; and the breadth from Bound Skerry to Fogla Skerry is 35¾ miles. The average breadth, however, is very much less. The principal island is called the Mainland. It comprises more than one half of the area of Shetland and two-thirds of the population. It is 54 miles long from north to south, and has an extreme breadth of 21½ miles. Yet so indented is it by voes and bays and firths, that no part of it is more than 3 miles from the sea; and it is probable that no equal land area on the face of the globe has such an extensive coast line. On the west side of the Mainland, opposite Sulem Voe, is the deep, wide, and picturesque bay of St Magnus, 12 miles by 7. In some places the island is almost cut in two by the voes; and at Mavis Grind, at the head of Sulem Voe, I found myself on a neck of land so narrow that, standing in the centre of it, I could cast one stone into the North Sea and another into the Atlantic. I heard a story when in Shetland, illustrative of the extreme sinuosity and indentation of the coast, to the effect that a Shetlander had undertaken the task of going round all the voes and bays in the islands. He persevered for many years and lived to a good old age; yet he died before his task was accomplished. In autumn, most of the voes are frequented by sea-trout of large size and fine quality, which take the worm or the fly freely. Many of the bays and voes used formerly to produce excellent oysters, but, in most cases, these have been dredged out.

The surface of the Shetland Islands is irregular, and the land, in general, rises higher than in Orkney, about half of the whole area being more than 250 feet above the sea level. In only a few places, however, does it rise above 500 feet. The highest points are Rona's Hill, in the centre of the parish of Delting in the Mainland, which attains the height of 1475 feet, and the Sneug 1372 feet, in the island of Foula.

Shetland abounds in fresh-water lochs, many of which communicate with the sea. The single parish of Northmaven contains more lochs than the whole of the Orkney Islands; and the Shetland group has certainly not fewer than 400 fresh-water lochs. Almost all these contain yellow trout, in many cases of large size; while in the season sea-trout ascend to those that communicate with the sea. There are, however, no lochs in Shetland to compare, in point of size, with the Lochs of Stenness and Harray in Orkney. Among the largest and best are the Lochs of Spiggie, Tingwall, Girlsta, Strom, Sand Water, Gossa Water, Vaara, Clousta, Voxterby, Eela Water, Punds Water, Mangaster Lochs, and Roer Water, on the Mainland; the Lochs of Cliff, Watley, Snarravoe, and Belmont, in Unst; the Lochs of Kettlester, Vadsetter, Gossa Water, Muscra Water, Colvister, and Lumbister, in the island of Yell. In the islands of Bressay, Whalsey, Fetlar, and Muckle Rooe there are also some good lochs. In short, Shetland would be an angler's paradise if only it was properly opened up by good roads, and fair accommodation provided for travellers. In Lerwick the accommodation is excellent, and it is good likewise in Scalloway. But from Lerwick you have to drive southwards between 20 and 30 miles to the Lochs of Spiggie and Brow; and northwards—to Ollaberry or Hillswick —40 miles; and the fine fishing in the parishes of Walls and Sandsting, though not so distant, still necessitates a long drive from Lerwick—much too far to go and return in a day.

The streams in Shetland, though numerous, are in general small, about the largest being that which flows through Petta Water and Sand

Water into the head of the Loch of Strom, which is a brackish loch into which the tide flows, like the Loch of Stenness in Orkney. As will be afterwards shown, there is capital sea-trout fishing in the lower part of this stream between Sand Water and the Loch of Strom. The stream in Unst, which falls into the Loch of Cliff; some streams in Yell; the stream that runs into the head of Weisdale Voe; and several streams in the parish of Northmaven, north of Colla Firth; also the burn that flows into the head of Dales Voe near Lerwick; and many others too tedious to enumerate; all afford good sea-trout fishing when the waters are clearing after a flood in autumn. One of the most experienced and successful anglers who ever fished in Shetland states that a dozen good sea-trout, from 5 lbs. downwards, have been taken by the rod from the stream that runs into the head of Loch Strom in a single hour. The same gentleman also states that he has landed a sea-trout of 6 lbs. in the burn running into Weisdale Voe, and that he has been informed that they have been taken as heavy as 14 lbs. The common trout in this burn are small and worthless.

Both in number and size the sea-trout in the Shetland streams, lochs, and voes surpass those in Orkney; and while in Orkney, the run of sea-trout is in autumn, in Shetland there is a spring run as well as an autumn one. Salmon and grilse, too, though not numerous, are much more common than in Orkney. Indeed, a good while ago, the salmon fishing in Lerwick Bay was let for several years; and it is stated in the *Statistical Account of Scotland* that no fewer than 21 salmon were caught at one sweep of the net on the sands at Vatsetter, in the island of Yell. In Dr Edmondston's *View of the Zetland Islands*, published in 1809, he writes as follows:—

> There are several bays or voes which have the word *lax* prefixed to them, and I have already alluded to the probability that they received this name in consequence of having been frequented by salmon. But although the word *lax* be expressive of a salmon, it is also used as a general appellation by Pontoppidan for the whole fish of this genus, and may, therefore, apply as well to the sea-trout as to the real salmon. From the information of those, however, whom I conceive to be competent judges, I am led to believe that salmon of a large size have been actually taken in nets in Laxfirth Voe, in the parish of Tingwall.

As to sea-trout, the minister of North Yell and Fetlar, in his account of these parishes, in Sir John Sinclair's *Statistical Account of Scotland*, writes as follows in 1794:—

> We have no rivers here, nor is it possible in nature that there can be any upon this island, nor indeed in the county; we have some burns in the head of our many bays, into which the salmon-trout enter about the 29th September in their going up to our lochs, where they deposit their spawn during the winter; some of these are exceedingly large, and weigh no less than 25 lbs. a piece; if they are caught in the month of July, they are nothing inferior to the richest salmon caught in the kingdom.

There can be no doubt whatever that sea-trout in Shetland are very much more numerous than in Orkney. In Basta Voe, in the island of Yell, 100 of good size have been taken in a single haul of a sweep-net; and in Hamna Voe, in the same island, 200 were captured, about thirty years ago, in the same way; and I think it quite possible that they might come to be of considerable commercial value, if only the spawning fish were preserved from the poacher, and the provisions of the Salmon Fishery Acts against unfair and improvident modes of fishing, were strictly enforced. No District Board has been formed for Shetland; but there is an Angling Association in Lerwick, which has several lochs in the neighbourhood taken, and which has done a good deal to protect the fisheries in the vicinity. Still, however, as I was informed by two experienced and influential residents in Lerwick, both members of the angling club, it has hitherto been found impossible to enforce the provisions of the Salmon Fishery Acts. Sufficient money has not been collected to maintain a staff of watchers. The sea-trout are still netted in the spawning season while ascending the burns; and so extensive and winding is the coast line, and so deep and numerous are the voes, that anything like thorough watching is almost impossible. But sea-trout, they state, are still numerous in many of the voes, streams, and lochs, though by no means so numerous as they were thirty years ago.

The following notes, taken from the fishing diary of an enthusiastic and successful Shetland angler, may be found interesting:—In 1871–72 he killed, with the rod, 113 sea-trout and 1 grilse in spring, and 43 sea-trout in autumn; and in the spring of 1881, 155 sea-trout, weighing 170 lbs. Altogether, he appears to have killed with the rod, in the sixteen years, from 1867 to 1882, both inclusive, 1097 sea-trout and 3 grilse. The heaviest sea-trout weighed 8 lbs., and the next heaviest 6 lbs.

In the little Loch of Strand, which communicates with the head of Laxfirth Voe, about 6 miles from Lerwick, a single rod has captured a hundredweight and a half of sea-trout, largest 9½ lbs., in 10 days' fishing; and in one day's fishing a single rod took from the same loch 50 lbs. weight of sea-trout.

A gentleman in Kirkwall, whose father has a large property on the Mainland of Shetland, said to me that he believes that many of the best lochs in Shetland yet remain to be discovered, and that some of the most productive were found out by mere accident; and he instanced Loch Gossa Water, which no one had thought of fishing, and whose excellence was found out by himself and his brother when boys. Soon afterwards 2 sea-trout of 8 lbs. weight each were taken out of it, and he himself has captured them 6 lbs. weight.

It is easy to account for the scarcity of salmon and grilse in the Orkney and Shetland Islands. The streams are all small, and the area of spawning ground limited; while, on the opposite side of the Pentland Firth, there is a long succession of excellent salmon rivers, nine in number, beginning with the Thurso on the east and ending with the Grudie on the west, and to their ample waters salmon naturally resort in preference to the short and shallow streams of the Orkney and Shetland Islands. But it is by no means so easy to understand why there should be a run of sea-trout in Orkney in autumn only; while in Shetland there is a run in early spring and a second run in autumn. It adds another to the 'Salmon Problems,' so pleasantly discussed in Mr Willis Bund's interesting little volume.*

THE MAINLAND.—After finishing my inspection of the fisheries in the Orkney Islands, I started for Lerwick, the capital of the Shetland group, which I reached on the 14th of July. About 3 miles from Lerwick there is a fine voe called Dale's Voe, a capital place for sea-trout. A stream, which has a course of 5 or 6 miles, falls into the head of it. This stream has many nice pools, and after a flood often affords good sea-trout fishing in autumn. In the middle of July last year, after a heavy flood, a sea-trout of 5 lbs. weight was taken out of it by the rod—one of the earliest ever captured in Shetland. The extensive property about Dale's Voe belongs to Mr Hay of Hayfield, whose charter gives him, in the fullest and most specific terms, rights of salmon fishing, also rights to oyster scalps, mussel beds, &c.

Near Fitful Head, and about 24 miles from Lerwick, there is a very

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* *Salmon Problems*, by J. W. Willis Bund, Chairman, Severn Fishery Board. London, 1885.

good loch called the Loch of Spiggie, communicating with the sea by a short stream, and connected with a smaller loch above called the Loch of Brow. The road from Lerwick to these lochs is a very rough and hilly one, and when you get to them the accommodation to be had is of the very poorest description. On the road I passed a large burn, which falls into East Quarff Voe. Both the voe and the burn are said to yield good sea-trout fishing in autumn.

Between the 10th and 12th milestones from Lerwick, going south, there are two promising-looking streams. The northernmost and largest is termed Laxdale Burn, and the southernmost Mail Burn, which falls into the sea not far from Aiths Voe. It has a fine clean entrance from the sea. There is good spawning ground on both burns, and many deep pools, which must be well frequented by sea-trout in autumn after a flood. Both of them are said to be dreadfully poached. Aiths Voe is a sheltered winding arm of the sea, which forms a safe anchorage for fishing boats. Both Aiths Voe and Mail Voe afford good sea-trout fishing in the season. About 14 miles from Lerwick I came abreast of the island of Mousa and its famous tower or brough. On the Mainland, opposite Mousa, are abandoned works for copper mining, in which a good deal of money is said to have been lost. Between the Sound of Mousa and Boddam are two pretty sheltered fishing villages, called Sandwick and Levenwick. Boddam is the nearest village to the Loch of Spiggie, and it possesses a schoolhouse, post office, telegraph office, &c.

On my arrival I had much difficulty in finding any place where I could put up; but at last, after a great deal of inquiry, I got two rooms at a place called Skelberry, about a mile from the Loch of Spiggie.

In the evening I walked down to the Loch of Spiggie, with the view of ascertaining whether there is any obstruction to the ascent of sea-trout into it from the narrow rock-bound bay into which its waters are discharged. The stream connecting the loch and the bay has but a short run, not exceeding 100 yards; and there is no obstruction in its course, and a sufficient amount of water. But, just above where it issues from the loch, there is a perfect forest of weeds—much like that which blocks up the foot of Loch Guirm in Islay—which must most seriously impede the free entrance of sea-trout into the loch; and that it does so there is but little doubt, as I could not hear of any instance of sea-trout having been captured in Spiggie. Yet it would not be at all difficult or expensive to cut these weeds down by means of a long-handled sickle, and so open up the loch. In the bay into which the stream from Loch Spiggie flows there are plenty of sea-trout; and an angler, fishing from the rocks that hem it in, on the week previous to my visit took 2 on one day and 5 on another.

Next day I started to fish Loch Spiggie, as my living would very much depend upon the fishing I got in the loch. From a point on the road just before you commence the descent towards the Loch of Spiggie, there is a splendid view of the foot of the loch; the rock-bound bay into which it falls; the headland separating it from the Bay of Spiggie; and, in the far distance, divided from the mainland by 18 miles of blue sea, the dark grey peaks of the lofty island of Foula. I made a careful inspection of the loch in a boat, in the course of which I captured a dozen trout with the fly, averaging three quarters of a pound each, quite equal in appearance and delicacy of flavour to the trout in Loch Leven. Spiggie is a shallow loch, scarcely anywhere exceeding 10 feet in depth. The bottom is composed of sand and shingle. The bottom of the smaller Loch of Brow, which is above Spiggie, and connected with it by a stream, is peaty, and the trout in it, though numerous, are inferior both in size and quality to those of Spiggie.

It is remarkable how many streams and voes there are along the coasts of the mainland of Shetland distinguished by the word 'lax,' the Norwegian for salmon; the Norwegians probably deeming the large sea-trout —which, as already mentioned, have been caught in Shetland 25 lbs. in weight—to be salmon. To take the east coast alone, beginning at the southmost extremity, we have the Laxdale Burn, about half-way between Boddam and Lerwick; then we have Lax Firth, Laxo Voe and Laxo Burn, also a loch called Laxo Water. On Garths Voe there is a stream called Loxobigging; and on the east of Yell there is Laxo Burn running into Mid Yell Voe.

Skelberry, where I stayed whilst inspecting Loch Spiggie, is only 4 miles distant from Fitful Head and 6 from Sumburgh Head, which figure so prominently in Sir Walter Scott's *Pirate*. These two headlands, the southernmost buttresses of the mainland, are only 3 miles distant from each other. Viewed from the sea, Fitful Head presents a somewhat rounded and bluff outline, terminating in an almost perpendicular cliff, from which there is a gradual slope inland to the low ground that surrounds Quendale Bay. Beyond this the land rises again till it culminates in Sumburgh Head, which presents to the sea a sheer wall of rock, on the highest point of which gleam the white walls and tower of a lighthouse to warn the mariner against the dangers of the stormy Roost. Roost or Roust, a word of frequent occurrence among the Orkney and Shetland islands, is a term of Scandinavian origin, meaning a strong tumultuous current caused by the meeting of rapid tides. Sumburgh Roost, even in calm weather, has the appearance of a turbulent tide stream, 2 or 3 miles wide, extending a short distance from the headland which gives it its name, and then gradually diminishing to a long dark line stretching away towards Fair Isle. At the commencement of the flood in the Roost, the tide flows to the eastward until it passes the head; it there meets a southern tide, which causes a divergence first to the south-east and then to the south. At high water there is a short cessation called the 'still,' after which the ebb begins, setting first north-west and then north until the recommencement of the flood.

After returning to Lerwick, I inspected the lochs of Tingwall and Asta. A short stream connects Tingwall Loch with the Loch of Asta; and when it is full there does not seem any reason why sea-trout should not ascend it. The stream which connects the Loch of Asta with the sea is much longer—about $\frac{3}{4}$ of a mile. It is narrow and straight for the greater part of the distance, and in many places has scarcely any current. It might, perhaps, be advisable to pool this part of it, with the view of creating a stronger current. The lower portion of the burn, down to where it joins the sea, has a swifter flow and a more winding course. A turf dam, with a sluice, at the exit from Loch Asta, which would enable an artificial flood to be sent down when the sea-trout were in the bay waiting to ascend, might greatly facilitate their entrance into the lochs. I think too that it might be an experiment worth trying, in the end of autumn, to make some hauls with the sweep-net in Scalloway Bay, with the view of obtaining some pairs of sea-trout ready to spawn, and when these were got to carry them up and place them in the burn between Asta and Tingwall. If they spawned there, the smolts that went down to the sea would probably try to find their way back again to the lochs. There is good yellow trout fishing both in Tingwall and Asta. The fishing in the former is free; but leave must be obtained from the proprietor, Mr Hay, to fish in the latter.

There is a remarkable lake on the Mainland of Shetland called the Loch of Strom. It is brackish, like the Loch of Stenness in Orkney, and, like it, the flood tide enters by openings under the high road, and the ebb-tide rushes out. The largest, and probably the best, sea-trout stream in Shetland, termed the Sandwater River, flows into the head of it. The Loch of Strom is 2 miles in length, and rather narrow. I drove to it from Lerwick, from which it is about 7 miles distant. When I reached it the flood tide was pouring into it, in a strong, rapid stream, through three square openings under the high road. The lower part of the loch was full of sea-weeds. When I was standing on the bridge the sea-trout were leaping in the salt water, on their way up to Strom. Sillocks, cod, saithe, and flounders are found in the Loch of Strom, as well as trout. At the head, where the Sandwater River flows in, the water is said to be quite fresh.

On the way back from the Loch of Strom I stopped to inspect the little Loch of Strand, which is, for its size, the best sea-trout loch in Scotland. It communicates with the head of Lax Firth, by a short, broad stream, up which the tide flows for a considerable distance. Loch Strand itself is scarcely so large as Duddingston Loch, near Edinburgh. It is a shallow loch, most of which may be waded, with boulders of stone sticking out here and there over the surface. A number of small burns, most of them with good spawning ground, unite some distance above the head of the Loch of Strand, and form a considerable stream which flows into it; and the lower part of this stream forms a long, deep, wide pool, a capital lie for sea-trout. In the salt water, at the head of Lax Firth, and in the stream flowing from the Loch of Strand, there is excellent fishing for sea-trout. The upper part of Lax Firth is narrow and winding, more like a broad river than an arm of the sea. One gentleman, in his answers to the printed queries, writes:—

> I have known 50 lbs. weight of sea-trout taken out of the Loch of Strand by one rod in the course of a day.

The Loch of Strand is only 6 miles from Lerwick, and it was for some years rented by the Lerwick Angling Club. But when I was in Shetland it was to let, the rent asked being £15 a year.

About nine miles from Lerwick is the Loch of Girlsta, one of the best lochs for yellow trout in Shetland. The name (Geirhilda vatn) is said to be derived from Geirhilda, the daughter of a famous viking, who was drowned in it about the end of the ninth century. Girlsta is about 1½ miles long, and, unlike most of the Shetland lochs, it is of considerable depth, being 87 feet in the middle. It has a shingly bottom. It is connected with Wadbister Voe by a large burn, about a third of a mile long. But, unfortunately, in the course of this stream, there is a waterfall at least 15 feet in perpendicular height, with precipitous banks on both sides for some distance below the fall, which entirely bars the ascent of sea-trout into the loch. There is a dam on the pool below the fall, and from this an intake lade with a sluice but no heck, leads to a mill below, where it drives an overshot wheel. The height of the dam at the foot of the pool is at least 7 feet, nearly perpendicular, so that a ladder would require to be placed on it, even if the fall above was blasted, or had a Macdonald fish-way placed upon it, as without such artificial assistance no sea-trout would be able to surmount it. I doubt very much whether it would ever pay to make the fall and the dam below passable for sea-trout. Instead of attempting to do this, I think it would be much better to have a small hatching-house somewhere on the banks of the stream issuing from the Loch of Girlsta, or on the burn that runs into the right bank of the loch, so as to increase the number of the excellent yellow trout in the loch, which have been captured by trolling 5 lbs. in weight. Some years ago, in a few hours, I took 10 trout, with the fly, weighing altogether 8 lbs. There is a small house at the foot of Loch Girlsta, where there is a comfortable sitting-room and two bed-rooms, which is a very convenient anglers' resort. Both in Loch Girlsta and in Loch Spiggie the trout are shy risers; and I believe this to be the case in a good many other Shetland lochs.

The 4th of August was the first fine day I had in Shetland, after a stay of nearly a fortnight; and, early in the morning, I started from Lerwick, accompanied by Mr James Grierson, younger of Quendale, to drive to Bixter Voe. On our way we passed Dale's Voe, Whiteness Voe, the Loch of Strom, Stromness Voe, and Weisdale Voe. About 2 miles beyond the Loch of Strom there is a loch called Hellister Loch, about the size of the Loch of Asta, which communicates by a channel passing under the high road, directly with the salt water of Weisdale Voe. It is full of sea-weed, and in some places the sea-weed seems to have become decomposed, as in Varday Bay, in the island of Egilshay in Orkney. There is a large burn, twice the size of that falling into the head of Dale's Voe, running into the head of Weisdale Voe. It has a number of fine pools, which abound with sea-trout in the proper season—the best time being from the middle of August to the end of October. There is a mill about a quarter of a mile from the mouth of this burn, and there is a capital pool close to the mill, out of which Mr Grierson told me he saw a friend of his take 18 sea-trout in a forenoon. The dam in connection with the mill is impassable, except on the left bank, where there is a sluice and a sort of salmon ladder leading up to it. This sluice should be kept open in the spawning season, as there is capital spawning ground above it, which is quite inaccessible unless the sluice is lifted.

An Edinburgh gentleman, an enthusiastic and successful angler, who has had a long experience of fishing for sea-trout and yellow trout in the western peninsula of the Mainland, comprising the Weisdale division and that accessible from Walls, gives some interesting information respecting the angling in these districts.* The Loch of Strom, he states, contains numbers both of yellow trout and of sea-trout, and the stream at its head affords excellent fishing, as many as a dozen sea-trout from 5 lbs. downwards having been taken from it, under favourable circumstances, in an hour. The Lochs of Sandwater and Pettawater, through which this stream passes, both contain numbers of loch-trout, and are said, in the season, to yield sea-trout also. There are no obstructions in the course of the stream between them and the sea. As to the burn at the head of Weisdale Voe, he states that he has caught sea-trout in it 6 lbs. weight, and that he has heard of their being captured as heavy as 14 lbs. Houster Water, at the head of Aith Voe, contains very fine yellow trout, and sea-trout also in the season. The Brouster enters the sea at the Bridge of Walls, forming a small salt water pond above the road at high water. Occasionally this pond contains numbers of sea-trout at high water. But during the open season both it and the head of the Voe are a good deal netted. The Brouster, with its chain of lochs, offers a splendid run for sea-trout, and ought to contain far more fish than it does. In Loch Voxterby, above Loch Brouster, the loch-trout average 3 to the lb.; and in one day, the gentleman from whom I am quoting, saw 4 trout of over 5 lbs. each brought to Walls from this loch. In Voxterby Loch, he once took with the fly and worm, in two hours, 101 loch-trout weighing 30 lbs., the largest being 1½ lbs.

On the 5th August I left Lerwick to drive to Hillswick, in the parish of Northmaven, about 42 miles to the northward of Lerwick, in order to

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* See articles in *Fishing Gazette* of 29th January and 5th February 1881.

inspect several lochs and voes, and to see Mr Anderson, a well-known and experienced fish-curer, who resides at Hillswick. Shortly after passing the Loch of Girlsta I came to Sandwater Inn, placed in a capital position for an angling resort, on the banks of the loch of the same name, and only a short distance from the Loch of Girlsta and the Loch of Strom. Three miles farther up the course of the Sandwater River, which here flows through a very dreary, desolate, and swampy peat-moss, I passed Petta Water, a small loch, which, I should think, must hold sea-trout late in the season. But I did not hear of any one having made a successful fishing in it.

After getting out of the Sandwater Valley and crossing the watershed, a burn runs down towards Olna Firth from a circular loch close to the high road. But there are falls in its course that would effectually prevent any sea-trout from ascending. At the head of Olna Firth there is a very pretty village and curing station called Voe. After leaving Voe the road passes along the north side of Olna Firth, and thence along the side of Busta Voe to a place called Brae, 12 miles from Hillswick. Between Brae and Hillswick the road is, in many places, very steep and hilly, and at Mavis Grind the whole breadth of the neck of land separating the eastern and the western seas does not exceed 150 yards. Between Mavis Grind and Hillswick the road passes close to, or in sight of, a great number of fresh-water lochs, the chief of which, as an angler's loch, is called Pundswater, a favourite resort of the late Sheriff Aytoun, who christened it 'Loch Sheriff's Delight.' It is a shallow loch, with very clear water and a rocky bottom. The trout are of fine quality and rich colour, and average nearly a pound weight each. The fishing is very variable, depending almost entirely on the weather. But, under favourable circumstances, good baskets may be obtained.

Hillswick stands at the head of a little sheltered bay on the west side of the main voe. There is a considerable fishing and curing station here belonging to Mr Anderson, who has several vessels engaged in the herring fishing and also in the cod and ling fishing. There are no fewer than ten curers' stations in the parish of Northmaven, including Mr Anderson's, yet there is no telegraph; the nearest telegraph station to Hillswick being, at Voe, 18 miles distant. For the sake of ascertaining prices and obtaining salt, in the case of a sudden and heavy take of fish, Mr Anderson states that it would be of great benefit to have a telegraph station established at the head of the voe on which Hillswick stands. He also mentioned that it would be most advantageous, both for fishing boats and passing vessels, if a light were placed on the Ve Skerries, dangerous rocks which lie outside and to the westward of St Magnus Bay, about half-way between Stenness and the island of Foula. He likewise stated that the Roer Water and the lochs connected with it and Colla Firth, into which the Roer Water flows, afford excellent sea-trout fishing. Colla Firth is about 10 miles north-west from Hillswick, and the three lochs—Tonga Water, Clubbie Shins, and Roer Water—through which the stream that runs into Colla Firth flows, are about 3 miles farther off. At Ollaberry, 3 miles south of Colla Firth, there is a lodging-house where good accommodation can be obtained; and about 2 miles west of Ollaberry there is a large circular loch called Eela Water, where the fishing is said to be good. The trout are smaller and not so rich in colour as those in Pundswater, but a larger average basket can be depended on. Around Sandwick Bay, near Hillswick, there are grand cliffs nearly 500 feet high, and splendid in colour. There are also some remarkable upright rocks called the 'Drongs.' Three miles north of Hillswick is Rona's Voe, a deep spacious inlet of the sea, 7 miles long, above which rises Rona's Hill (1475 feet), the highest summit in Shetland. Mr Tudor* thus sums up the attractions of Hillswick:—

> When, as must come sooner or later, proper accommodation shall have been erected throughout the length and breadth of Shetland for the travellers in search of the beautiful, who will flock northwards as soon as the county shall be better known, there will be no spot in all Hjatland, which, in its manifold attractions, will be so popular as 'Grey Hillswick.'

ISLAND OF YELL.—In Yell, the second largest island of the Shetland group, and the most northerly with the exception of Unst, there is excellent fishing in stream, loch, and voe, but there is no adequate accommodation to be had for anglers and tourists. It is an extensive island 17 miles from north to south, with a breadth varying from 6½ to only half-a-mile at the point where Mid Yell Voe and Whalfirth Voe cut it nearly in two. The surface of the island presents a cheerless aspect, being chiefly composed of peat moss. The Arisdale Burn, which runs into Hamna Voe in South Yell, is by far the largest stream in the island, and there are upwards of sixty lochs, great and small, most of which contain trout; and Muskra Water, near Cullivoe in North Yell, is said to contain yellow trout of extraordinary size.

A gentleman of Mid Yell, who is thoroughly acquainted with the fishings in the island, writes me as follows with regard to them, in answer to the printed queries:—

> The bye-laws are apparently a farce. Illegal netting is systematically practised at Hamna Voe, South Yell, and to a less extent at West Sandwick, Whalfirth Voe, Mid Yell, and Vatsetter. I have seen (and destroyed) fixed nets in the following places:—the burn running from the Loch of Gossawater into Basta Voe, North Yell; the burn running from Bowsetter into Whalfirth Voe. There is no burn in Shetland so much abused by illegal netting as the Arisdale, the largest and best burn in the island. It is a common thing to find a wooden gate or door on any burn running from a fresh water loch to the sea, especially if such a burn is utilised to turn the wheel of a corn mill. I should approve of a close time for trout, say from 1st October to 1st February. The period at which sea-trout run up into the fresh-water lochs communicating with the sea depends on the weather, *i.e.*, heavy rain. Last year, in this district, the majority had run up by the 10th of August. I believe the take of sea-trout has diminished owing to persistent illegal netting. I would fix 1st September as the beginning of the close time instead of 10th September.

THE ISLAND OF UNST.—This is the third largest and the most northerly of the Shetland group. Its name is said to mean Eagles' Nest (Örnen nyst). It is between 12 and 13 miles long, and from 5¾ to 2¾ miles in breadth. Its highest hill is Valla Field, 703 feet; and it contains the largest loch in Shetland—the Loch of Cliff, 2½ miles long—besides a number of smaller lochs. The Loch of Cliff is the most northerly loch in the United Kingdom. It fills up a narrow valley between rocks of gneiss and serpentine. The largest stream in the island, called the Mailand Burn, runs into it. This burn rises in the Loch of Watley, the most considerable expanse of fresh water in Unst next to the Loch of Cliff. There is good fishing in both lochs.

A good many years ago I walked across the island of Unst, from Uyea to Balta Sound. At that time there were scarcely any houses on the latter. But of late years, so rapid and remarkable has been the development of the herring fishery, that there is now, during the fishing season, a wooden town a mile long, with curing yards, lodging houses, church accommodation, &c.

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* *The Orkneys and Shetland*, by J. R. Tudor, 1883, Cap. 42.

A proprietor in Unst writes as follows, in answer to the printed queries :—

> I approve of the present close time. I would approve of an annual close time for trout (yellow trout) from 2nd October to 1st February. Great destruction was and is still caused by nets and other means used to take trout as they ascend the streams when spawning. The streams in Shetland are in all cases so small that fish have little chance of escaping. I do not consider that the bye-law prohibiting standing or fixed nets within estuaries has been strictly observed.

Another Unst proprietor, who has had forty years' acquaintance with the fishings in Unst and the Mainland, writes as follows regarding them :—

> The bye-laws are not in the slightest degree observed, and never will be so long as proprietors of fishings will not prosecute for penalties for infringing the same. The quantity of sea-trout illegally taken by nets is very great, and their number has decreased. The causes of this decrease are—1st, Fish-curers from the mainland of Scotland, having got right from the Crown to fish for *salmon* off the Shetland coasts, enter our estuaries, and by sweep-nets clear out the last trout ; 2nd, The illegal use of fixed nets in the voes ; 3rd, The illegal catching of fish going up the burns, even up to Martinmas, and during or throughout the close time.

The same gentleman, in answer to the printed query which inquiries whether the bye-law forbidding the use of fixed nets within estuaries is duly observed, writes :—

> Fixed nets are used in every voe in Shetland, notably at Laxo in Dourie Voe, Nesting, whence salted sea-trout, and even salmon in barrels, are yearly carried away by the screw-steamer 'Earl of Zetland.' Nets are known to sweep pools in burns when fish are working upwards to lochs, &c.

It seems impossible to doubt, in the face of such testimony as the above—which might easily be added to from the answers to the printed queries—that, as yet, the Salmon Fishing Acts of 1862 and 1868 have been productive of scarcely any benefit to the Shetland fisheries, and that, until there is some authority to enforce their provisions, they will continue to be inoperative and useless.

Sea-trout take the fly in the salt water of Balta Sound, Uyea Sound, and various other parts of the seas that encircle the island of Unst. A splendid sea-trout of 9 lbs. weight was taken in Unst last autumn by Mr Hamilton of Halligarth. The yellow trout fishing in many of the Unst lochs is very good. One angler took 100, running from 6 or 7 to the pound up to a pound, in the Loch of Watley in the course of a short day's fishing ; and in the Black Loch, a small sheet of clear water connected with the Loch of Watley, he caught 28 trout, weighing 16 lbs. The Loch of Belmont, in the south of Unst, is, however, reported to be the best angling loch in the island. In two days' fishing last September, one gentleman had 28 trout weighing 16 lbs, and 15 weighing 11 lbs. The trout in this loch are lively game fish, and of excellent edible quality. Some of the fresh water lochs communicating with Uyea Sound afford excellent sea-trout fishing in autumn.

Fetlar, though one of the most fertile and picturesque islands in the Shetland group, contains no accommodation for angler or tourist. The area of the island is 5500 acres, of which 1200 acres are under cultivation. The Loch of Tresta is not only one of the most beautiful but also one of the best angling lochs in Shetland. It is less than a mile long, and not above a quarter of a mile wide in the widest part. But the trout average half a pound, and are quite equal to those previously described in the Loch of Spiggie.

Several Shetland gentlemen, who have favoured me with answers to my printed queries, complain that the Procurator-Fiscal declines to prosecute offences under the Salmon Fisheries Acts, even when his expenses are guaranteed; and one gentleman suggests 'that any one interested, 'over and above or other than a proprietor, should have the power to 'prosecute for penalties.' But it humbly seems to me that such a power is already conferred both by the Salmon Fishery Act of 1862 and by that of 1868; and that any one who chooses to run the risk of failure and expense, is entitled to prosecute for the penalties provided for the infringement of the said Acts. The words of the 28th section of the Act of 1860 and of the 30th section of the Act of 1868 are explicit upon this point; both of them declaring that

> All offences under this Act may be prosecuted, and all penalties incurred under this Act may be recovered, before any Sheriff, or any two or more Justices of the Peace acting together, and having jurisdiction in the place where the offence was committed, at the instance of the clerk of any District Board, *or of any other person.*

Oysters and Mussels in the Shetland Islands.

Mr Tudor, in his *Orkneys and Shetland,* published in 1883, writes as follows:—

> The Shetlanders are said to have nearly exhausted the large whelks known as *buckies,* and to be fast destroying the mussel scalps, as they have already done the oyster-beds, which previously existed in Cliff Sound and other places.

My recent visit to Shetland enables me to corroborate the truth of this statement, especially as regards oysters. Yet there can be no doubt that oysters were once plentiful and cheap, even within the memory of living man, and might again be so if judiciously cultivated and adequately protected. Mr Anderson of Hillswick, a fish-curer and general merchant in Shetland, whose acquaintance with the fisheries ranges over a long series of years, sends me the following list of localities in Shetland which, he thinks, would be suitable for oyster culture, specifying those in which oysters are still found:—

1. Bressay Sound, on the east side, near the kirk; west side, docks to Grimesta.
2. Dales Voe; oyster spat was sown here by proprietor, Mr Hay.
3. Laxfirth Voe should be an excellent place, also good trout fishing.
4. Wadbister Voe.
5. Catfirth Voe.
6. Dourye Voe.
7. Vidlin Voe.
8. Swining Voe.
9. Collafirth Voe (Delting).
10. Dales Voe (do.)
11. Firths Voe.
12. Tofts Voe, near Mossbank.
13. Hamna Voe (Yell). Fine trout taken here.
14. Burravoe (do.)
15. Reafirth Voe (do.), or Mid Yell.
16. Basta Voe (do.). Here oysters are found.
17. Balta Sound (Unst).
18. Whalfirth Voe (Yell).
19. Lady Voe (do.). West Sandwick.
20. Collafirth Voe, Northmaven.
21. Quayfirth Voe (do.)
22. Gluss Voe (do.)
23. Garths Voe (Delting).
24. Voxter Voe (do.), and all round to Northmaven.
25. Hubens, near Foula Ness.

26. Ronas Voe.
27. Hamna Voe, Northmaven ; trout or salmon caught here some years ago, 14 lb. weight.
28. Urafirth Voe, Northmaven, near Hillswick. Oysters found.
29. Hammers Voe.
30. Gunnister Voe.
31. Mangester Voe.
32. Roe Sound (Delting). Here oysters have been found.
33. Burravoe, in Busta Voe. Here also oysters are found.
34. Olnafirth Voe.
35. Gonfirth Voe.
36. Aiths Voe and East Burrafirth Voe.
37. Vementry, Clousta Voe, and Unifirth Voe.
38. West Burrafirth Voe.
39. Vaila Sound.
40. Gruting Voe.
41. Bixter Voe. Here oysters are found.
42. Weisdale Voe.
43. Stromness Voe.
44. Whiteness Voe.
45. Burra Isles. Here oysters are found.
46. Trondra and Scalloway.

In his letter to me enclosing the above list, Mr Anderson writes as follows :—

> I hope one possessed of capital may see the way to prosecute the oyster culture here ; it might become of immense importance to our country.

Of the localities mentioned by Mr Anderson, I have personally visited Dales Voe, Aith Voe, Laxo Voe, Catfirth Voe, Wadbister Voe, Bixter Voe, Busta Voe, Balta Sound, Stromness Voe, and some others, and I quite agree with him in thinking them well fitted for oyster cultivation.

I have received a good many communications in answer to the printed queries on the subject of oysters and mussels in Shetland. One gentleman writes :—

> I consider it most essential that the oyster-culturist should have a legal right to the beds, and also that he should be enabled to claim protection. Almost every voe in Shetland would be suitable for oyster culture, especially Basta Voe, Garths Voe, and Arna Voe.

Another states that—

> The number of oysters has greatly decreased. I remember, as a boy, the women used to bring them to the houses and sold them for 1s. the 100. That would be in the early part of 1870. The Voe of Bixter has been completely dredged up. One of the neighbouring tenants made £500 one winter by dredging and exporting.

One of the principal proprietors in Shetland writes :—

> The Burra Islands, near Scalloway, is the only place where a few oysters are now got. Oysters formerly were abundant in Basta Voe, North Yell, and sold at 1s. the barrel. But they were dredged up to the very last one.

The fishery officer at Lerwick states that there are no oyster beds or mussel scalps at present in Shetland which are regularly worked and yield a profit to their owners :—

> Oysters have decreased, but the supply of mussels is about the same. Oysters were at one time got in considerable numbers near Burra Isle, but have been dredged out. It would be essential to have the protection of the law in some form.

He gives the following places as best suited for oyster or mussel culture:—Basta Voe, Olnafirth Voe, Vaila Sound, Weisdale Voe, Burra Isle, &c., &c. A Lerwick merchant, thoroughly well informed in all matters relating to the fisheries, writes:—

> Any oysters or mussels got in Shetland are taken up without any leave being asked from any one. But very few oysters remain. The number of oysters and mussels has diminished very considerably. There are a great many cases in which formerly productive oyster and mussel beds have been dredged out and destroyed. No steps are being taken to restore such beds. Protection is essential. I should say that all round Shetland there are places suitable for the culture of both oysters and mussels. But nothing will be done by proprietors or others to improve the present state of matters until the law assists them.

I have the honour to be,

Your obedient servant,

ARCHD. YOUNG,

Inspector of Salmon Fisheries for Scotland.

THE FISHERY BOARD FOR SCOTLAND,
EDINBURGH, *March* 30, 1887.

NOTE I.—APPENDIX G.

PRINTED QUERIES.

Fishery Board for Scotland,
101 *George Street, Edinburgh, May* 1886.

SIR,—I beg to inform you that I have been directed by the Fishery Board for Scotland to make an inspection of the sea-trout and salmon fisheries in Orkney and Shetland, and afterwards to prepare a Report for the Board. I have thought it advisable, before commencing my personal inspection, to draw up a list of queries with the view of eliciting as much information as possible from those interested in, or acquainted with, the fisheries in these localities. I now beg to enclose you a copy of these queries, and to request an answer at your earliest convenience.—I have the honour to be, your obedient servant, ACHD. YOUNG,

Inspector of Salmon Fisheries for Scotland.

N.B.—A stamped envelope is enclosed, in which the queries, when answered, may be returned to Mr Young,

QUERIES.

Annual Close Time.

1. Do you approve of the period of 168 days' annual close time which at present applies to all migratory fish of the salmon kind in the Orkney and Shetland Islands? If you do not approve, state what alteration you would suggest.
2. Is the period fixed for the commencement and termination of the annual close time in your district satisfactory? If not, what change would you wish?

3. In England, there is an annual close time for trout and char, and no trout or char can be sold in England and Wales between the 2nd of October and the 1st of February. In Ireland, there is also a close time for trout. Would you approve of having a close time for trout in Orkney and Shetland? and if so, over what period should it extend?

Weekly Close Time.

4. Are you satisfied with the present period of weekly close time—from 6 P.M. on Saturday to 6 A.M. on Monday? If not, state what length of time you would prefer, and give your reasons?
5. Are the bye-laws regulating the observance of the weekly close time by net and coble, and by fixed nets, strictly observed in Orkney and Shetland? If not, can you suggest any means which would conduce to a stricter observance of the weekly close time?

Take of Fish.

6. Are salmon and grilse taken in the seas around those parts of the Orkney and Shetland Islands with which you are acquainted, or only sea-trout?
7. At what period of the year is the main take of salmon, or grilse, or sea-trout?
8. At what period of the year do sea-trout run up into the fresh-water lochs communicating with the sea?
9. Do sea-trout take the fly, worm, or other lure only in the fresh waters to which they ascend from the sea, or likewise in the salt water of the bays, firths, and voes? If they take the fly or bait in the salt water, mention the localities where the best fishing is got.
10. Can you give any idea of the number of sea-trout or salmon caught in those parts of Orkney and Shetland with which you are acquainted by nets and rods?
11. Has the take of such fish increased or diminished during the last ten or fifteen years?
12. State what are, in your opinion, the causes of such increase or diminution, as the case may be?

Estuaries.

13. In the end of 1881 Orkney was constituted a Fishery District, and brought under the operation of the Salmon Fishery Acts of 1862 and 1868, and, in 1883, so was Shetland; and certain estuary lines were fixed by the Commissioners of Scotch Salmon Fisheries, approved by the Secretary of State, and published in the *Edinburgh Gazette.* Since the publication of that bye-law, the use of all fixed nets or fixed engines for the capture of fish of the salmon kind within the estuary lines so fixed is illegal and punishable. Can you state whether the bye-law is strictly observed in Orkney and Shetland; or if not, can you state the places where it is infringed by the use of fixed nets?
14. Are fixed nets used during the spawning season, or at any other season of the year, for the capture of sea-trout or other fish of the salmon kind, in any of the fresh-water lochs in Orkney or Shetland, or in any of the streams running into or flowing out of the same? If so, mention the names of such lochs or streams?

District Boards.

15. Is there a District Board in Orkney or Shetland? If so, is it working satisfactorily?

16. If there is no District Board, are any steps being taken to constitute one?
17. Is there any association of proprietors for the purpose of protecting the fishings, and seeing that the provisions of the Salmon Fishery Acts of 1862 and 1868 are duly observed?

Obstructions to the Passage of Salmon or Sea-Trout.

18. Are there any dams, cruives, or other obstructions to the passage of salmon or sea-trout on any of the streams in Orkney and Shetland?

Pollutions.

19. Are any of the lochs or streams in Orkney and Shetland contaminated by pollutions? If so, mention them, state the nature of the pollution, whether it is increasing or diminishing, and also whether any steps have been taken by the polluters to neutralise the pollution before returning the water used by them into any loch or river?

Otters, Spears, Leisters, &c.

20. Are any otters, spears, leisters, or such like instruments of the description of those prohibited by the 17th section of The Salmon Fisheries (Scotland) Act, 1868, used for the capture of sea-trout, or other fish of the salmon kind, in any of the inland lochs in Orkney and Shetland which communicate with the sea, or in any of the streams flowing into or issuing from the said lochs?
21. Are there any other points relating to the salmon or sea-trout fisheries in Orkney and Shetland, to which you would wish to direct attention in addition to those suggested by the preceding queries?

Oysters and Mussels.

1. Are there any oyster beds or mussel scalps in Orkney and Shetland at present which are regularly worked and yield a profit to their owners; if so, mention the localities where they occur?
2. Has the number of oysters and mussels in Orkney and Shetland increased or diminished during the last twenty years?
3. Do you know of any cases in which formerly productive oyster and mussel beds have been dredged out and so destroyed?
4 Are any steps being taken to restore such beds by scientific oyster or mussel culture?
5. Do you think that it is essential to successful oyster or mussel culture that the oyster or mussel culturist, having a legal right to oyster or mussel-beds, should be enabled to claim the protection of the police, or the coast guard, or some other effectual form of protection, in order to prevent strangers from dredging out his oysters and mussels when they come to maturity?
6. Mention the localities in Orkney and Shetland which you think best fitted for oyster and mussel culture, and state any other points regarding the oyster and mussel fisheries which you think worthy of attention.

NOTE II.—APPENDIX G.

MINUTES OF EVIDENCE given before Mr Young, at a Meeting held at Lerwick on 19th June 1882, with the view of ascertaining whether Shetland should be erected into a Fishery District under the Salmon Fishery Acts of 1862 and 1868.

Major Thomas Mouat Cameron, Annsbrae, Lerwick, examined.—I produce excerpt from the Minutes of the Lerwick Angling Club, appointing Dr Skae and myself a committee to give evidence before this Inquiry, and also the Resolutions of the Club. I have also in my hand memoranda of my fishing since 1864. In 1881, for eight days' fishing in the Loch of Strand, I caught 155 sea-trout, weighing 177 lbs. ; in the year 1871, I had 113 sea-trout and 2 grilse; in 1870, 72 sea-trout and 2 grilse, &c. A singular thing occurred at Cullivoe, my own property, which shows that it does not always do to interfere with nature. In the burn there were some large stones which interfered a little with the getting in of the net. I took away these stones, and I got no more trout there. There is a loch in Unst in which very fine trout are caught, almost as good as Loch Leven trout. There is a burn from it which falls into the sea, and it was thought that if this burn were cleared out the fishing would be improved. Next year my nephew got 60 trout from it in one day, but afterwards the fish went out of the loch, and I got no more fish. The fishing, however, by allowing the burn again to fill up, is now improving. I consider that, owing to the non-observance of a close time, the fishing has decreased very much during the last fifty years. No close time whatever has ever been observed. I attribute the falling off to that cause, and also to the extensive poaching practices I have already referred to. One of the most destructive of these is the stretching of nets across the mouths of burns when the fish come up to spawn. This practice is very frequently adopted. I have known of nets being stretched across the mouth of Laxfirth Voe, in which, of course, the trout were caught when coming up. The net was fastened with a chain, and they had some means of raising the net and letting it down. It just formed a wall of netting right across the mouth of the voe. As the Salmon Fisheries Acts would put a stop to these practices, it is of the greatest importance that the islands should be brought under them, and if a close time were observed the sea-trout fishing would be greatly improved. The most suitable close time would be —for nets, from 1st September to 15th March; for rods, from 15th November to 1st February. The sea-trout come up with one tide, and sometimes go down with the next. We have a spring run and an autumn run. The former takes place in March, and the latter in September and October. I have never caught salmon, but I have caught grilse. I caught one grilse of 5 lbs., and others from 3½ lbs. to 4 lbs. I have caught one sea-trout of 8 lbs., and one of 6 lbs., and several of 5, 6, and 7 lbs. Sea-trout are not often caught round the shores, the cause of that being that the space being so much greater the fish don't rise, whereas in a confined loch like Strand they come up at once. With regard to the defining of estuaries, I consider that stake-nets set across the mouth of a small voe, like the Voe of Laxfirth, would be very destructive, but across the wider places would not do so much harm. The beds of most of the burns are of peat, but a few of them, such as the burn running into Dale's Voe, Tingwall, and at Hamnavoe, near Burravoe, in Yell, could be very easily made into first-rate spawning grounds. The propagation of sea-trout would decidedly improve the fishing of the islands.

Dr Skae examined.—I have fished regularly in Shetland for a number of years, and can testify as to the destruction of the fishing by those engines to which Major Cameron has referred. I know that these practices are carried on to a much greater extent in the northern parts of the islands than hereabout. I know for a fact that the fishermen come up to one loch about 18 miles from Lerwick, when the fish have spawned, and carry away cartfuls of them. A cart would hold about half-a-ton. In fact, the greatest destruction takes place when the fish should be preserved. Another great means of destruction I have noticed is that, in a dry season like last year, the trout have to wait a long time in the voes before they can run up into the lochs, and lying there in shallow water the people put out drag-nets, and capture as many as from 40 to 80 to each drag, and thus the lochs are spoiled. That is the reason why the close time for nets should be earlier than for the rod. I agree with the close time suggested by Major Cameron. As regards stake-nets, I think it would serve the purpose better if these were made illegal at nearer than three miles from either side of the mouth of any burn running into a voe. There are very few voes into which there is not a burn running, and some voes have several burns running into them. I think there are many lochs which are not accessible to sea-trout at present that could be made so by means of ladders. The Loch of Girlsta, for instance, is a splendid loch, and in the burn that runs out of it there are two small falls which the trout cannot get over. The people say that the fish used to run up. The proprietor would not take the trouble of constructing ladders. There are several lochs in Shetland in the same position; the Loch of Glen, near Brae, for instance, which could easily be made accessible.

Mr Galloway examined.—I think the size of the mesh of these stake-nets should be made much larger. $1\frac{3}{4}$ inches from knot to knot would be large enough. In a dry season the fish lie for a long time in the voes, and are caught in large numbers. I know of one man who took last year in a small voe 103 fish with a net. About the estuaries, I think they should be so regulated that some restrictions would be placed on the stake-nets. I would not have these nets in a small voe, but they should not be altogether abolished. About twenty or thirty years ago salmon set into Lerwick harbour, and a man who came here from Aberdeen caught a great number of them with the stake-net. He came the following year, and did not catch sufficient to pay expenses. I approve of the close time suggested by Major Cameron. As showing the value of having a close time here, I may state that I fished the Loch of Strand ten years ago, and caught 18 trout in one hour, and five years ago I fished it day after day, and could not get a single trout out of it. Three years ago the Angling Club got it, and it has improved greatly. I fished it one day last year, and filled a 50 lbs. basket. This year I took 12 fish, two of which were 4 and 5 lbs. respectively. Nothing like that fishing would have been made five years ago. The removal of these nets which are set across the voes would improve the fishing.

Mr David Edmondston.—A wholesale destruction of fish goes on in almost every place in the islands. At a burn in Unst a large number of trout had got in and could not get out, and the people carried them away in cwts. The way they captured them was by dragging the burn, or by killing the fish with sticks.

Mr Grierson.—There is a splendid loch at Dunrossness (Spiggie), where a small proprietor keeps long lines set upon the banks, and the fish caught are just cut up and used for bait by the fishermen.

Mr Edmondston.—The fishermen in Unst do the same. They catch the trout either with long lines or otters, and cut them up for bait.

Mr Andrew Sandison.—The bag-nets I have spoken of were generally used by young men in November or December, when, more for amusement than anything else, a number of them would go out to the burns, and by poking the nets under the banks of the burns would catch large numbers of trout.

Major CAMERON.—We are all agreed that the falling off of sea-trout is due to the non-observance of a close time, and that the constituting of Shetland into a Fishery District would be of very great benefit to the fishing.

Mr EDMONDSTON.—Salmon could easily be introduced into the islands. About 1864, the people engaged in the building of the Flugga lighthouse caught one weighing no less than 28 lbs.

Mr GALLOWAY pointed out the following burns which, being gravelly, were suitable for breeding purposes:—

1. Burn running into Weisdale Voe.
2. Burn running into Hamna Voe.
3. Loch of Cliff, running into Burrafirth Voe.
4. Loch Brouster.
5. Burn of Dale, running into Dales Voe, Tingwall.
6. Parish of Aithsting—Burns running into the Vaddles of Unifirth.

NOTE III.—APPENDIX G.

I have stated repeatedly, in the preceding Report, that the provisions of the bye-law (Schedule G) are systematically infringed in the mills in Orkney and Shetland, and I was told that, in many cases, this arises from want of knowledge of the existence of such a bye-law. I, therefore, now print the bye-law, with the view of dispelling, to some extent at least, the prevailing ignorance on the subject.

BYE-LAW (Schedule G).

25 and 26 Vict. c. 97.
26 and 27 Vict. c. 50.
27 and 28 Vict. c. 118.

'Acts to regulate and amend the Law respecting the Salmon Fisheries of Scotland.'

We, the Commissioners appointed under the said Acts, and empowered thereby 'to make general regulations with respect to the construction and 'alteration of mill-dams or lades, or water-wheels, so as to afford a reasonable 'means for the passage of salmon,' do hereby make the following general regulations with respect to the construction and use of mill-dams or lades, or water-wheels:—

1. Every new dam, and every portion of any dam that may require to be renewed or repaired after this time, shall be made and maintained water-tight, or as nearly so as possible, so that no water that can reasonably be prevented shall run through the dam; but all water not taken into the lade for the use of the mills, or other lawful purpose, shall be made to flow over the dam as fully as may be practicable.

2. There shall be a sluice or sluices at the intake of every mill-lade. No water shall, with the exception hereinafter stated, be allowed to enter any mill-lade beyond the quantity required for the use of the water-wheel or wheels of any one fall on that lade, or for other lawful purpose in the lade; that is to say, no water shall be allowed to escape from any lade into the river by means of any byewash or overflow, but all water not required for the uses aforesaid shall be made to flow over the dam into the river as far as may be practicable.

At the option of the millers or manufacturers, this provision may be carried out either by shutting the sluice or sluices at the intake of the lade, or by raising the banks of the lade to a height that will prevent an overflow of water from the lade, when the sluice at the wheel and the byewash sluice hereinafter mentioned are both kept shut. Provided always, that the said bye-law shall not apply to millers or manufacturers when taking measures necessary for the protection of their premises during heavy floods, or when rivers are cumbered with ice, or while necessary repairs are being executed on any emergency, provided that nothing be omitted or done unnecessarily to defeat the objects of this bye-law. Furthermore, in all cases when the intake sluice is more than 300 yards from the water-wheel, it shall not be imperative to shut the intake sluice, or to keep the byewash sluice shut, during ordinary meal hours, or during any stoppage of the wheel not exceeding an hour at a time.

3. At the intake of every lade there shall be placed and constantly kept a heck or grating for each opening, or one embracing the whole openings, the bars to be not more than 3 inches apart, if horizontal; and not more than 2 inches, if vertical.

4. A similar heck or grating shall be placed and constantly kept across the lade or troughs immediately above the entrance to each mill wheel.

5. A similar heck or grating shall be placed and constantly kept across the lower end of each tail lade at its entrance into the main river.

Note.—To prevent any obstruction to the flow of the water by the hecks or gratings in the lades, it is recommended that the lade should be increased in width where the hecks are placed, and that the heck, instead of being in a straight line across, should be curved or pointed up or down stream, and thereby increased in length, so that the aggregate of the openings between the bars shall exceed the sectional area (or waterway) of the lade, and thus compensate for the space occupied by the bars.

6. There shall be a byewash sluice placed as near as practicable above each water-wheel in the embankment of the lade, of not less than 3 feet in width, with its sill as low as the bottom of the lade, and the said sluice shall be raised to a height sufficient to allow the smolts to descend for at least five, but not exceeding eight hours each week, from the 15th March to the 1st July, not more than six days intervening between each time of opening. There shall be a salmon pass or ladder on the down-stream face of every dam, weir, or cauld capable of affording a free passage for the ascending fish at all times when there is water enough in the river to supply the ladder. The width shall not be less than 4 feet in the clear in rivers of less than 100 feet in breadth at the site of the dam, nor less than 5 feet in breadth in rivers of less than 200 feet and more than 100 feet in breadth as aforesaid, nor less than 6 feet in breadth in rivers of more than 200 feet in breadth as aforesaid. The upper sill shall be not less than 6 inches below the lowest part of the crest of the dam for the whole width of the ladder. The inclination shall in no case be steeper than 5 horizontal to 1 perpendicular, but wherever practicable, shall be 7 or 8 horizontal to 1 perpendicular, and in all cases shall be provided with breaks or stops placed at suitable intervals, so as to lessen the velocity of the current sufficiently to allow the fish to ascend without difficulty.

The foot of the ladder shall be placed where there is most running water, and with the best lead for the fish to approach it; and if the ladder should project beyond the toe of the dam, there shall be an apron of stone formed to the dam, extending as far down the river as the entrance to the pass or ladder, and extending throughout the whole length of the dam at either side of the ladder, and on a high enough level to prevent there being any pool in the river, or sufficient depth of water farther up than the entrance to the said pass or ladder, by which the fish might be induced to remain there obstructed in their ascent, and not be led to the ladder.

Note.—The Commissioners would recommend the following details to be adopted in the construction of salmon-ladders, in addition to those given in the foregoing bye-law, but do not insist on them, provided some other perfectly efficient arrangement be substituted, viz., the side walls to be not less than 22 inches in height; the breaks to be not less than 18 inches in height, with openings of 10 inches in breadth at the alternate ends of each break, and 5 feet apart in cases where the gradient of the ladder is 1 in 5 and of a greater distance, but the same proportions being maintained where the gradient is easier than 1 in 5.

7. No dam shall be so altered as to create a greater obstruction to the free passage of fish than at present exists.

(Signed) Wm. J. Ffennell,
Fred. Eden,
James Leslie, } *Commissioners.*

Fisheries Department,
Home Office, 29th day of April 1865.

Approved.
G. Grey.

Whitehall, 19th July 1865.

(This bye-law to take effect from the 28th July 1865.)

NOTE IV.—APPENDIX G.

Two cases involving questions of great importance connected with the Salmon Fisheries in Scotland have been decided in the Court of Session since my last Report, namely, the case of the Duke of Buccleuch and Others *v.* Lord Herries and Others, 10th December 1886, and the case of Bowie *v.* the Marquis of Ailsa, 18th March 1877;—the former declaring Paidle-Nets to be illegal in the River Nith and its estuary; and the latter declaring the Doon to be a private, and not a public river, even in that part of it which is tidal. The reports of these Cases are given below.

Duke of Buccleuch and Others *v.* Lord Herries and Others.

In this case the Duke of Buccleuch and Queensberry, K.G., General Johnston of Carnsalloch, and William Francis Hunter Arundell of Barjarg, were the pursuers, and Lord Herries of Terregles, and six of his fishing tenants, the defenders. The conclusions of the summons were that it 'ought 'and should be found and declared, by decree of the Lords of our Council and 'Session, that the defenders are not entitled to erect and use stake-nets, paidle-'nets, or other fixed engines on the River Nith, or estuary thereof, or upon 'the sands and shores between high and low water mark within the limits 'of the district of the River Nith fixed and defined by the Commissioners act-'ing under The Salmon Fisheries (Scotland) Act, 1862; and that the stake-'nets, paidle-nets, or other fixed engines, erected and used by the defenders 'between Kenneth Bank, in the parish of Carlaverock, and a line drawn due 'east from Carsethorn, in the stewartry of Kirkcudbright, and upon the 'Blackshaw Bank, are upon the said river or estuary, or on the said sands 'and shores between high and low water mark within the foresaid limits: 'and the defenders ought and should be decerned and ordained, by decree 'foresaid, to remove the stake-nets, paidle-nets, or other fixed engines erected 'and used by them as aforesaid: and ought and should be interdicted, pro-

'hibited, and discharged from erecting or using stake-nets, paidle-nets, or 'other fixed engines on the River Nith or estuary thereof, or on the sands 'and shores between high and low water mark within the limits of the River 'Nith fixed and defined by the Commissioners acting under the Salmon 'Fisheries (Scotland) Act, 1862: and in the event of its being held that the 'defenders are entitled to erect and use the stake-nets, paidle-nets, or other 'fixed engines erected and used by them as aforesaid, or one or more of said 'stake-nets, paidle-nets, or other fixed engines, for the purpose of catching 'white fish, it ought and should be found and declared, by decree foresaid, 'that the defenders have erected and used the said stake-nets, paidle-nets, 'or other fixed engines for the purpose of catching salmon, or fish of the 'salmon kind, or of such size and construction, or in such situations, or used 'in such manner and at such times as to prejudice, interfere with, or injure 'the pursuers' rights of salmon fishing; and that the defenders are not entitled so to erect and use the said stake-nets, paidle-nets, or other fixed 'engines: and the defenders, in the event foresaid, ought and should be 'interdicted, prohibited, and discharged, by decree foresaid, from erecting and 'using the said stake-nets, paidle-nets, or other fixed engines for the purpose 'of catching salmon, or fish of the salmon kind, or of such size and construction, or in such situations, or used in such manner and at such times as to prejudice, interfere with, or injure the pursuers' right of salmon fishing: and 'the defenders, in the event foresaid, ought and should be decerned and 'ordained, by decree foresaid, either to remove the said stake-nets, paidlenets, or other fixed engines, or to substitute therefor stake-nets, paidle-nets, 'or other fixed engines, of such size and construction, and in such situations, 'and to use the same in such manner and at such times as not to prejudice, 'interfere with, or injure the pursuers' rights of salmon fishing; and the 'defenders, or such of them as shall appear and oppose the conclusions before 'written, ought and should be decerned and ordained, by decree foresaid, to 'make payment to the pursuers of the sum of £500 sterling, or such other 'sum as our said Lords shall modify, as the expenses of the process to follow 'hereon, conform to the laws and daily practice of Scotland used and observed in the like cases, as is alleged.' The pleas in law for the pursuers were—'1. The stake-nets of the defenders being within the bounds of the 'River Nith and estuary thereof, are illegal, and should be removed. 2. *Esto*, 'that the said stake-nets are upon the water of Solway, they are illegal in 'respect that there has been no use or custom to take white fish by means 'of stake-nets at the places where they are situated. 3. In any view, the 'defenders are not entitled to use the said nets, or any of them, for the purpose of capturing salmon or fish of the salmon kind, or to use stake-nets or 'other fixed engines of such a construction and in such situations or manner 'as to prejudice or injure the pursuers' rights of salmon fishing. 4. The 'nets in question being injurious to the pursuers' salmon fishing, the defenders are bound either to remove the said nets, or at all points to substitute therefor nets of such size and construction, and in such situations, 'and to use the same in such manner and at such times as not to injure or 'interfere with the pursuers' rights. 5. The stake nets in question being 'used for catching salmon within the district of the River Nith, as defined by 'the Commissioners acting under the Salmon Fisheries (Scotland) Act, 1862, 'by the defenders, as proprietors or occupiers of a fishery within said district, 'the pursuers, as proprietors of fisheries also within said district, have by 'statute a good title and interest to object thereto as illegal. 6. Generally, 'in the circumstances condescended on, the pursuers are entitled to decree as 'concluded for.' The pleas in law for the defenders were—1. 'The defenders, 'in erecting and using or sanctioning the erection and use of the nets in question, having acted in pursuance of their just and legal rights, are entitled to be 'assoilzied from the leading conclusions of declarator, removing, and interdict. '2. The defenders are entitled to be assoilzied from the remaining conclusions 'of the summons in respect that (1) they have not erected or used the nets in 'question for the purpose of catching salmon or fish of the salmon kind; (2) 'and the said nets are not of such size or construction, or so situated or used, 'as to injure the pursuers' rights of salmon fishing to any substantial or 'material extent, 3. In any case the pursuers have neither title nor interest 'to object to the erection or use of such nets as are situated further up 'the Solway Firth than the line taken by salmon and fish of the salmon kind 'in entering or leaving the River Nith. 4. The nets in question being situated 'within the water of the Solway, where the sea ebbs and flows, are privileged 'by the Act of Queen Mary, 1563, c. 68. 5. Generally, the defenders are 'entitled to absolvitor with expenses.'

The Lord Ordinary, Lord Trayner, in giving judgment, read the following opinion:—The pursuers complain that the nets licensed by the defender Lord Herries, and used by the other defenders under such license, are stake-nets, and being placed on the River Nith, or estuary thereof, are illegal; and, at all events, that said nets are erected and used by the defenders for the purpose and with the effect of capturing salmon and fish of the salmon kind, to the prejudice and injury of their (the pursuers') rights of salmon fishing in the River Nith. The defenders, on the other hand, maintain that the nets in question are in the waters of the Solway, and are not illegal; that they are erected and used for the capture of white fish, and that the capture of salmon, or fish of the salmon kind, is only occasional and accidental; and that in any view no injury is done to the pursuers' fishings, because any salmon captured by said nets are not fish which would go up the Nith. The proof led by the parties is conflicting to some extent, at least on every one of the points on which there is any controversy, but notwithstanding that conflict I have come to hold a very distinct opinion as to what is the truth of the matter regarding each of these points. 1. *As to the character of the nets.*—They are certainly not so large as the ordinary salmon stake-nets, but they are constructed on the same principle, and are, when covered by less than three or four feet of water, just as deadly. The evidence of Mr Young (an authority of great weight on such a matter) is to my mind conclusive, even were it not corroborated by other evidence. Mr Young says:—'They are practically miniature stake-nets, not having such great killing power as ordinary 'stake-nets, from the stakes being lower, but so far as they go they are nets 'on precisely the same principle, and calculated to take salmon, and must inevitably take salmon, until they have three or four feet of water over them.' This evidence proceeds upon an examination of the nets themselves, and not merely upon an examination of the model produced by the pursuers. It is, therefore, not affected by any observations which may be made on the correctness or incorrectness of the model, although on that point I am of opinion that the correctness, generally speaking, of the model is quite sufficiently established. 2. *The position of the nets.*—This is shown on plan No. 22 of process; and on that plan and the evidence adduced in relation thereto I have no difficulty in coming to the conclusion that the defenders' nets are placed on the River Nith and estuary thereof, and within the limits of the district of the River Nith as fixed and defined by the Commissioners acting under the Salmon Fisheries (Scotland) Act, 1862. 3. *The purpose and effect of the nets.*—There can be no doubt whatever as to the effect of the nets, as it is proved by the defenders themselves that they capture salmon and fish of the salmon kind. The extent to which such capture is made is perhaps the part of the case on which any serious difficulty arises, for on this the evidence is most conflicting. The evidence for the pursuers shows that a very large number of salmon and fish of the salmon kind are captured by the nets in question every season, and that the white fish captured by the same nets is very trifling both in extent and value. The defenders, on the other hand, give and lead evidence to the effect that the white fish is plentiful, is captured in comparatively large quantities, and that the salmon and fish of the salmon kind captured are comparatively few in number. I accept the evidence for the pursuers as the more correct view of the matter. The evidence adduced by them is that of persons, chiefly police constables, who speak from personal knowledge and observation, fortified by notes made at the time of their observations, and at the time reported to their superiors. They have no interest, so far as I can discover (and none was suggested by the defenders), to mis-state or exaggerate the result of their examination of the nets in question. That there may have been a mistake made either in their observation or in the writing out of their reports is, of course, possible. But I take their statement as to the number of salmon and fish of the salmon kind caught in these nets to be substantially correct. The defenders and their witnesses (fishers like themselves) are interested, and have an obvious motive for minimising the number of salmon caught, for on that (in one view of the case) depends whether they are to be allowed to continue the use of the nets. Further, they all speak from memory, having kept no note which can now be produced of the salmon, or fish of the salmon kind, captured by their nets. They also, in my opinion, undoubtedly exaggerate the quantity and value of the white fish taken by their nets, their motive for that being again obvious. The evidence given as to the capture of white fish by the defender Ferguson struck me as being very unsatisfactory, and any value to be put on his evidence is seriously damaged when that evidence is compared with his returns to the Fishery Board. I am prepared to accept it as proved that the Blackshaw Bank is fairly good feeding ground for flounders and other white fish, and that such fish, especially flounders, are to be found there. But I am satisfied that if nothing was captured on that bank except the white fish to be found there the whole nets would soon be discontinued, indeed would have been discontinued some time ago. I think also that the purpose for which the nets are erected and used is to catch salmon, and not white fish. Mr Young says:—'They (the nets) can and do take flounders, but that does not suggest itself to 'me as the reason of their existence. I think it is the ostensible reason of 'their existence; but the real reason is to take salmon. That is a thing of 'which I am convinced from my examination of them. If I were putting 'down salmon stake-nets on Blackshaw Bank, and close to the channel of the 'Nith, I should place them precisely in the same position as that occupied by 'the paidle-nets.' This view is corroborated by the fishermen themselves. It appears that the site for the nets of the respective fishermen is obtained by their drawing lots for the choice. And it is clear that the choice is influenced by the fitness of the locality for the capture of salmon, and not white fish. Thus the witness Fleming (at one time a fisherman, and now a police constable), says:—'In choosing the sites of our nets, my neighbours and I drew 'lots for the best places. We were anxious to get a nice clean bank and a 'gutter from the foreshore, so that there would be something to gather the fish 'into the net. Our anxiety was not affected by the white fish we could get.' A statement so frank and explicit as that could hardly be expected from any of the present fishermen. But it is practically admitted by the defender Ferguson and by James Curran. Nor is it a matter for surprise that this should be so, because the white fish captured on Blackshaw Bank would never repay the fisherman for his expense and labour. He could not make a livelihood out of the white fish. I am of opinion, therefore—(1) that the nets in question are placed on the River Nith and estuary thereof, and not in the waters of the Solway; (2) that being stake-nets they are illegal in the position in which they are placed; (3) that the nets are erected and used for the capture of salmon and fish of the salmon kind, and are not *bona-fide* erected or used for the capture of white fish; and (4) that the capture of salmon and fish of the salmon kind in said nets is to the injury and prejudice of the rights of the pursuers as proprietors of salmon fishings in the River Nith. With regard to this last finding, I would add that the defenders have failed to show that the salmon captured by them would not in any case go up the Nith. The evidence in this matter is not very great on either side, but the preponderance of it is in favour of the pursuers. It was urged upon me that to order the removal of the nets in question, or to subject them to other restrictions than those already imposed by their licenses, would inflict great injury on the defenders, and deprive them of their means of livelihood by diminishing the take of white fish. I should be very sorry if this were so. As I have already said, I do not think the white fishing alone, even as the nets now exist, affords a livelihood for the fishermen; but, however that may be, if the nets are illegal, as I think they are, I have no alternative but to order their removal. Nor am I entitled to allow the fishermen to continue what they have been doing improperly to the detriment of the rights of others. The white fishing may still be carried on by nets of proper construction, and probably with more success, if the best places for white fishing are chosen instead of the best places for salmon. I was anxious to make a remit to some man of skill, in order to see if, and how, the white fishing could be carried on by fixed nets without injury to the pursuers' rights, and I would have done so had I seen my way to help the defenders effectually thereby. But, on consideration, I have thought it better to dispose of the case as presented on the evidence by both parties, as that decision does not in the least affect the defenders in the legitimate exercise of their right to fish for white fish. I wish to add, in conclusion, that the defender, Lord Herries, by the licenses issued by him from time to time, seems to have adopted any restrictive measures which appeared to him available to protect the rights of the pursuers from encroachment or injury by the fishermen. His restrictions and conditions, however, I fear, have been largely disregarded, and it is open to doubt whether those who were charged with the duty of seeing those conditions and restrictions enforced have been as careful and energetic in the performance of that duty as they might have been. His Lordship then pronounced the following interlocutor:—Edinburgh, 10th December 1886.—The Lord Ordinary having considered the cause with the proof adduced, and heard parties, Finds that the nets in question belonging to the defenders respectively are fixed stake-nets or paidle-nets, and are fixed and erected on the River Nith or estuary thereof, and upon the sands and shores between high and low water mark within the limits of the district of the River Nith, as defined by the Commissioners acting under the Salmon Fisheries (Scotland) Act, 1862: Finds, therefore, that the said nets are illegal: Finds further, and *separatim*, that the said nets have been erected and used by the defenders (except the defender, Lord Herries) for the purpose of capturing salmon and fish of the salmon kind; and that the capture of salmon and fish of the salmon kind by the said nets is injurious to the rights of the pursuers; therefore ordains the defenders forthwith to remove the said nets erected and used by them as aforesaid; interdicts, prohibits, and discharges the defenders, and each of them, from erecting and using stake-nets, paidle-nets, or other fixed engines fitted to capture salmon or fish of the salmon kind on the River Nith or estuary thereof, or on the sands and shores between high and low water mark within the limits aforesaid, and decerns. Finds the defenders liable in expenses.

Counsel for Pursuers—The Dean of Faculty, Mr Dickson, and Mr Forsyth. Agents—J. K. & W. P. Lindsay, W.S.

Counsel for Defenders—Mr R. Johnston and Mr Rankine. Agent—M'Kenzie & Kermack, W.S.

SECOND DIVISION.

(Before the Lord Justice-Clerk and Lords Young, Craighill, and Rutherfurd-Clark.)

THE DOON FISHING CASE.

R.N.—THE MARQUIS OF AILSA *v.* JAMES BOWIE.

APPEAL—JAMES BOWIE *v.* THE MARQUIS OF AILSA.*

Judgment was to-day (18*th March* 1887) given in this reclaiming note and appeal in the actions brought by James Bowie, upholsterer, Ayr, against the Marquis of Ailsa, to have it declared that the pursuer, as a member of the public, had a right to fish with single rod and line for trout, flounders, eels, and other floating fish, which are not salmon, sea-trout or whitling, or fish of the salmon kind, in that part of the River Doon within tidal influence of the sea; and that the defender had no right to interfere with that right. He stated that the Doon was a tidal river at least as far as the lower dam dyke, which was distant several hundred yards from the mouth of the river; and that up to that point it was public and navigable. He founded his claim on the common law right, and also by virtue of the Acts of Queen Anne, and 29 George II., cap. 23. The defender maintained that, by virtue of his title and immemorial possession following, he had the exclusive right to the fishings in the lower portion of the river; and that the Acts quoted did not apply to the defender's fishings. Lord Trayner gave decree as concluded for, with expenses, holding that the statute in question conferred upon the pursuer and the public the right to catch in the tidal portion of the river fish which were inhabitants of the sea; and that the pursuer's right to fish extended up to the dam dyke, which was the point reached by ordinary spring tides.

Against this judgment the defender reclaimed, and to-day their Lordships recalled that judgment, sustained the defences, and granted absolvitor to the defender with expenses; and in the Sheriff Court action, which was before the Court on appeal, their Lordships dismissed the appeal, and affirmed the judgment of Sheriff Brand.

The Lord Justice-Clerk said that in this case there had been a good deal of procedure, and more than one judgment, by the Judges before whom the case had come. It commenced with a petition in the Sheriff Court of Ayr, that it should be found and declared that the pursuer had a right of white fishing anywhere on the coast, and particularly in the River Doon. 'The 'pursuer, as a member of the public, has the undoubted right of fishing with 'single rod and line for trout, flounders, eels, and other floating fish, which 'are not salmon, sea-trout, or whitling, or fish of the salmon kind, in that part 'of the River Doon within tidal influence of the sea.' That was at proof in the Sheriff Court, and the Sheriff-Substitute decided in favour of the pursuer. That judgment was recalled by Sheriff-Principal Brand, and it came to the Inner House on appeal. Having some difficulty as to the competency of deciding such an application in the Sheriff Court, their Lordships thought it desirable that declarator should be brought in the Court of Session. Accordingly, that was done, and the conclusion of the summons in this case was substantially the same as in the Sheriff Court action. It was contended on the part of the pursuer, that as long as he fished for white fish, he had a right to fish in the River Doon wherever white fish could be found; and he founded his case on the Acts referred to; on the common law right of the public; and that the part of the river referred to was a public river. It was said that the tide ebbed and flowed within these limits, and that the solum belonged not to the Marquis of

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* Since the above was printed intimation of an appeal to the House of Lords has been made to Lord Ailsa's agents.

Ailsa but to the Crown, and that therefore the Marquis of Ailsa had no right to exercise proprietary rights over it. The Marquis of Ailsa said that his title gave him not only the territory along the banks of the stream, considerably further down than it was at present, but that his title gave him also sole and exclusive right to the fishing of all kinds, both white fishing and salmon, and that to a point which must necessarily exclude the right of the pursuer. He said, besides, that the real object of the proceeding on the part of the fishermen was to entitle them to fish for sea-trout, and fish of that kind, on the pretext that they were fishing for white fish. He said there were no white fish there, and to go to that particular part of the river was a mere device to obtain leave, under colour of which illegal fishing might be carried on. Further, he said there were no means of reaching the fishing in question without trespassing on his private property. It was said on the part of the pursuer that the water might be gained by the public footpath, and that a public road ran upon the south side. Lord Ailsa denied that. Now, these were the questions which the Court had to consider, and undoubtedly they trenched upon some very important principles of law in regard to property in sea and river. In the first place, his Lordship was quite clear that the Acts of Parliament referred to did not affect this case at all, and were not meant to affect any question about private property and title in a stream. They were meant to secure fishermen, and provide protection for the public in carrying on a large article of commerce without interruption. In the second place, the question was whether the river was tidal. But, before stating his view upon that subject, his Lordship thought it not immaterial to state how this question arose, because a good deal of light might be thrown on it by considering the real object of the action as well as the right of parties. The defender's title gave him the bank of the river on each side, as well as the fishing, and his possession had been exclusive, because, although it was quite true that some of the public had been in the habit of fishing in part of the stream at the mouth so far, that was uniformly done by permission, either of Lord Ailsa or of the tacksmen, and the pursuer himself had a written permission in 1879 under which he fished, which was clearly an acknowledgment of Lord Ailsa's possession. Therefore, his Lordship held that Lord Ailsa had a right to the whole fishings, and that the public only exercised that right either by tolerance or rather by direct permission. The pursuer maintained that he had a right to fish as far inland as the ordinary high-water mark of the stream—that was, above Doonfoot Dam close by Hutchison's garden, and thirty yards above that. He was found there fishing, and endeavoured to escape. In the first place, it turned out that he had some fish in his bag, and he threw them out. One was got, and it was found to be a whitling, not a white fish. He was taken to the police office and gave a false name, but at last he gave his real name when he was examined, and his Lordship saw that even then he fenced with the question whether it was not a whitling which was taken by the police, and whether these were not the fish which in reality he meant to take. The whole conduct on the part of the pursuer showed that he was quite aware that he was so far trespassing and that he equivocated about the fish he caught, and that, his Lordship thought, indicated pretty clearly that the real object to obtain this decree to fish for white fish was not for that fish, but for fish of the salmon kind, sea-trout, and whitling. That was the object which the pursuer had in view when he brought this action. Now, the first question therefore was, was this a tidal river? His Lordship was of opinion that it was not a tidal river. It was quite true that the influence of the tide extended towards the point contended for by Lord Ailsa; but that must take place in every case where fresh water meets salt water, and salt water is liable to the tide. The evidence, he thought, sufficiently bore that the salt water ceased at a point considerably below Doonfoot Dam. He thought it had been held in every case—mainly cases about river estuaries—that it was a fair jury question where the sea ends and where the river begins, or where the river ends and the sea begins; and the dicta, which had been stated in cases relating to sea margin entirely, had no real bearing upon the question they had here, and, therefore, his opinion was in this case the high-water mark of ordinary spring tides was to be found as marked upon the Ordnance Survey, and as reduced to plans which Mr Stevenson had put into process, and that the tide did not extend any further; that at the portion of the river at the point he had mentioned, Doonfoot, there was no salt water, or substantially none, and consequently the rising of the fresh water by the operation of the tide was not a test of where the right in the river ended. If he was right in that, and there was no doubt of it, both in principle and on the evidence, there was substantially an end of this case, because it would follow that the river above the point was private property, and not public. His Lordship did not think there was any pretext for saying that it was a navigable river; and further he was of opinion that the banks of the river were the property of Lord Ailsa, that the public had no right to private footpath, and that there was no means of getting at the water from the public road except by trespassing on the bank. His Lordship proposed to recall the Lord Ordinary's interlocutor, and substantially revert to that of the Sheriff-Principal.

Lord Young said he was of the same opinion. Indeed, he agreed exactly with all that his Lordship had said, and he agreed generally with the Sheriff-Principal's opinion as expressed by him in the Sheriff Court action. It was quite clear, and he had no doubt about it, that the public had the right to fish for white fish in the sea, and he should say that they had that right irrespective of the statute of Queen Anne and of the statute of George II., which were passed to protect the fishing industry in Scotland. With his Lordship, he also agreed that the River Doon was no part of the sea. Nor did he think that it was a river of the kind or class to which the statutes he had noticed referred. It was a river with a distinct and narrow channel very much like a creek, only that there the water flows from bank to bank, leaving no shore on either side which is ever dry at any stage of the tide. Then this was not a public river, but a private river as distinct from a public navigable river, and the fishing industry of Scotland was not to be prosecuted there. That fishing industry, according to the statutes, applied to the taking of herrings, cod, ling, or any other sort of white fish, and fishing for these in the sea, and taking measures upon the sea coast for curing them. There was no doubt about the fact that the pursuer was detected poaching in the River Doon; possibly he was a representative poacher, who, with others at his back, appealed to these statutes, and to what his Lordship assumed to be a common law and public right to fish in the sea, and brought this action. His Lordship called attention to the conclusion of the action, and to the terms in which the Lord Ordinary had pronounced decree that the pursuer had a right to fish with single rod and line for these fish. Was that the way that herring, cod, and ling were fished for? Why limit it to that method of fishing? He was entitled to fish with a net, and to fish in every way that might be practised in order to take herrings, cod, ling, and other fish which are inhabitants of the sea. Why was it limited to single rod and line? Single rod and line was very well for such poaching as the pursuer was detected in, and which he intended to continue to practise if he had a right declared to it. Single rod and line were an odd idea in herring fishing. Therefore this judgment of declarator of a right on the pursuer's part to fish with single rod and line was rather singular when contrasted with the Act of Parliament upon which the Lord Ordinary founded. His (Lord Young's) opinion was that the defences ought to be sustained, and absolvitor pronounced with expenses, and that the appeal from the Sheriff Court by the pursuer ought to be dismissed, and the judgment of the Sheriff-Principal affirmed, and also with expenses.

Lord Craighill said he concurred entirely with their Lordships.

Lord Rutherfurd-Clark concurred. He was of opinion that the River Doon between Doonfoot Bridge and the ordinary high-water mark was a private river in all essential respects, and in no sense was a navigable river, and that, therefore, the Acts of Parliament founded on did not apply.

Counsel for the Defender and Reclaimer—Mr Muirhead, Mr Blair, and Mr Darling. Agents—Hunter, Blair, & Cowan, W.S.

Counsel for the Pursuer and Respondent—The Dean of Faculty, Mr Salvesen, and Mr Gardner. Agents—Sturrock & Graham, W.S.

NOTE V.—APPENDIX G.

REPORT ON SALMON DISEASE IN THE SOUTH ESK.

Superintendent's Report anent the Destruction of Salmon by Fungus.

Brechin, 23rd February 1887.

To Messrs Shiell & Don,
Clerks to the South Esk Fishery Board.

Gentlemen,—I beg to lay before you this Report concerning the fungus which has been so detrimental to the salmon in the river South Esk during the past close season.

The first appearance of this deadly disease that I noticed was in the month of August 1886, when I found one dead sea-trout in the Kinnaird water, to all appearance killed by fungus. The disease made little progress until about the end of the month of September. At that time I noticed lots of the fish slightly marked with it on the back and tail fins. Towards the end of October great numbers of the salmon lying in the pools below Brechin were terribly marked with fungus, some of them almost covered with it.

On the 17th October the river was in flood, and I saw some fungoid fish going over the dykes on their way to the upper waters; but although diseased fish proceeded to the upper reaches of the river, very few diseased ones were found there, as only 6 fungoid dead fish were found above Brechin.

But the fish in the lower waters, viz., below Brechin, were in a lamentable condition, some of them being completely blind. In some of the pools, where hundreds of fish were lying, scarcely one being free from fungus. By the end of December 1886 I considered the disease was at its height in the South Esk, only about that time the frost set in, and most of the river being covered with ice, the fish could not be seen so well. On the 22nd January 1887 the ice broke up, and great numbers of the diseased fish were carried down with the floods which occurred at that time, but a good few are in the river still, especially between Brechin and the Bridge of Dun, and although some of the fish are very bad with fungus, they are very lively, and the fungus coming off them. I am of the opinion that fish begin to get better of that disease towards the end of January (I noticed the same improvement in the South Esk towards the end of January 1884); at all events, the disease is not so infectious at that time as it is in the fall of the year, because, during the months of January and February, when clean spring salmon proceed into the river it is seldom that any of them are touched with fungus; whereas, in the months of October and November, fish are not in the river many days until they are infected.

I am not prepared to say what is the cause of this disease, but I am of opinion that in small rivers, such as the South Esk, that sniggering* is to blame to a certain extent, because, when the river becomes low, fish are confined into small space below dam dykes, &c., then sniggers, plying among the fish, cut and destroy their skin, and I consider that fish so cut become more easily the victims of disease than fish which are entirely whole and free from cuts. This season I have noticed several of the fungoid fish, which I have found with cuts upon them similar to what I have mentioned with the fungus inserted into those cuts.

Between the 20th November 1886 and the 16th February 1887, 407 fungoid fish were taken out of the river South Esk ; 148 were males, 259 were females ; of the males 105 were spawned and 43 were unspawned, and of the females 92 were spawned and 167 unspawned ; with the exception of 6, all those were found below Brechin.

I may mention that in November 1886 part of the river below Brechin was fished with net and coble with the view of killing all the diseased fish ; only a few of those severely marked were killed, and those that were slightly marked were scraped and returned to the river. I cannot say that the scraping process is of much benefit, as most of the fish died afterwards. I found some of them dead next day.—I am, &c.,

(Signed) JOSEPH FRASER, *Superintendent.*

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* This mode of fishing practised on the North and South Esks is described as follows on page 17 of my first Report to the Fishery Board :—The North Esk has attained an unenviable notoriety from the prevalence of a practice among many anglers on the river locally known as 'sniggling,' 'raking,' or 'dragging.' When fish are collected in a pool when the water is low and will not rise to the fly, the hook is allowed to sink and is then dragged about the pool. All the fish taken by this method are foul-hooked. Sometimes the fly is leaded so as to make it sink more readily. But the more skilful practitioners can do without this. The District Board of the North Esk are unanimously of opinion that in any new Act steps should be taken to put down this unsportsmanlike practice. It is the same mode of fishing that is known in England as 'strokehalling' or 'snatching,' and which is prohibited by the English Act of 1873. That Act provides that '"strokehall or 'snatch" shall mean and include any instrument or device, whether used with a rod 'and line or otherwise for the purpose of foul-hooking any fish,' and it prohibits any person to 'use or have in his possession any strokehall, snatch, or other like instrument or device, whether used with a rod or line, or otherwise, for the purpose of 'foul-hooking any salmon.' The penalty for using or having in possession any of these instruments is for the first offence any sum not exceeding £5 ; for the second, any sum not less than £2, 10s. nor more than £5 ; and for a third, not less than £5, or at the discretion of the Court imprisonment for any term not less than one nor more than six months. Substitute the words 'rake-hook' or 'drag-hook' for 'strokehall' or 'snatch,' and the clause might have the effect of putting down this objectionable practice in the North Esk and other rivers in Scotland.

NOTE VI.—APPENDIX G.

The following Table contains a statement of the number of boxes of Scotch Salmon sent to Billingsgate Market, in each year, from 1834 to 1886, both years inclusive. Average weight of each box, 112 lbs.

Year.	Boxes of Scotch Salmon.	Year.	Boxes of Scotch Salmon.
1834	30,650	1861	12,337
1835	42,330	1862	22,796
1836	24,570	1863	24,297
1837	32,300	1864	22,603
1838	21,400	1865	19,009
1839	16,340	1866	21,725
1840	15,160	1867	23,006
1841	28,500	1868	28,020
1842	39,417	1869	20,474
1843	30,300	1870	20,648
1844	28,178	1871	23,390
1845	31,062	1872	24,404
1846	25,510	1873	30,181
1847	20,112	1874	32,180
1848	22,525	1875	20,375
1849	23,690	1876	34,655
1850	13,940	1877	28,189
1851	11,593	1878	26,465
1852	13,044	1879	13,929
1853	19,485	1880	17,457
1854	23,194	1881	23,905
1855	18,197	1882	22,968
1856	15,438	1883	35,506
1857	18,654	1884	27,219
1858	21,564	1885	30,362
1859	15,823	1886	23,407
1860	15,870		

During the first seven years, in the above Table, the average number of boxes of salmon sent from Scotland to London was 26,107; during the second period, 29,011; during the third period, ending in 1854, 18,210; during the period from 1869 to 1875, 24,478; and during the last period of seven years—1876 to 1882, both inclusive—22,509 boxes. During the four years that have since elapsed, the average has been 29,127 boxes. The best year in the Table was 1835, when 42,330 boxes were sent to London; and the worst was 1851, when only 11,593 boxes were sent.

NOTE VII.—APPENDIX G.

THE ISLAND OF RUM.

During my inspection of the Salmon Fisheries in the Inner and Outer Hebrides, on which I had the honour to report to the Fishery Board in the course of last year, I did not visit the picturesque and interesting island of Rum, because it does not contain any salmon river. I have recently, however, received some notes on that island through the kindness of a well-known naturalist, Mr Harvie Brown, F.R.S.E., F.Z.S., &c., which show that its waters yield good sea-trout and yellow-trout fishing, and also that it presents an example, on a gigantic scale, of an attempt—unfortunately unsuccessful—to form an artificial fish-pond and increase the volume of a river. No less than £11,000, Mr Harvie Brown writes, were expended about forty years ago on these works by a former proprietor of the island; and he also states, that 'whilst much ill-considered work has been expended, yet, I believe, a very 'great improvement can now be effected by any interested person or future 'proprietor at a very small cost. My own private opinion is that all that is 'necessary now could be done at a cost of from £400 to £500, or possibly 'much less.' The yellow-trout fishing in some of the lochs seems to be excellent, as Mr Brown saw two trout in the gamekeeper's hands, who was fishing the 'Lochs of the large trout,' one a beauty of 3 lbs., and another 1½ lbs. Of the fishings, generally, Mr Brown writes as follows:—'The lochs 'are fairly numerous and good; all, or nearly so, are somewhat inaccessible. 'I visited most of the best; some, where trout have been introduced recently 'by Livingstone, contain and yield very fine trout indeed, but, as usual with 'fine trout, they are shy. Sea-trout run (so I was assured) up to 6 and even '12 lbs. At present, salmon are scarce in the rivers, though they do incline 'to enter the lower reaches, especially of the Kilmory Burn. But salmon are 'abundant and large in Kilmory Bay, where 20 to 30 lbs. fish are frequently 'taken by net, legally or illegally.'

APPENDIX H.

RETURN OF COMPLAINTS made to the Officers of the FISHERY BOARD FOR SCOTLAND of Damage done by Trawlers or other Fishing Boats to the Boats, Nets, Lines, or Gear of Fishermen, in the Year 1886.

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
	EYEMOUTH DISTRICT.				
1886. July 23	Lowestoft herring fishing boat L.T. 126, hauled and retained part of a line and damaged another belonging to boat 'New Enterprise' of Eyemouth. Damage claimed, £2.	29 miles E. from Eyemouth.	Outside.	Officer communicated with owner and master of Lowestoft boat.	Compromised by complainant accepting £1 in settlement of claim.
Oct. 25	Cutting away of 2 buoys and flagstaffs belonging Leith steam line boat 'Effort' by Eyemouth or Burnmouth boat. Damage, £1, 10s.	About 4 miles S.E. of St Abb's Head.	Outside.	Officer found that boat 'Emulator' of Eyemouth picked up one of the buoys with flagstaff drifting off St Abb's Head.	Buoy and flagstaff restored to the 'Effort,' master of 'Emulator' receiving 2s. 6d. from owner of 'Effort' as salvage. No trace of other buoy and flagstaff found.
Dec. 11	Breaking of spanker of boat 'White Star' of Eyemouth by boat 'Conquest' of same place while hauling lines. Damage, £1.	About 15 miles E. from Eyemouth.	Outside.	Officer investigated complaint.	Complainer found chiefly at fault, as he admitted he could have drawn in the spanker when boats were approaching each other. Case dropped.
	ANSTRUTHER DISTRICT.				
Jan. 20	Damage to herring nets by trawler 'Livingstone' L.H. 1004.	1 mile W. from May Island.	Inside.	Investigation by officer, who estimated damage at £2, 10s., and found defender at fault.	Trawler remitted full amount of estimated damage to officer, who paid it to complainant.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
1886. Jan. 23	Damage to herring nets by one boat fouling with another.	½ mile S. from May Island.	Inside.	Investigation by officer, who estimated damage at £1, 10s.	Damage unavoidable—neither party to blame.
Feb. 17	Damage to haddock lines by trawler 'Buccleuch,' G.N. 6.	2 to 3 miles E. from May Island.	Inside.	Investigation and report by officer, who estimated damage at £10, 9s. 6d. Prosecution by Fiscal.	Libel deserted *simpliciter*, it having been ascertained that captain and not mate was in charge.
Feb. 17	Damage to haddock lines by trawler 'Buccleuch,' G.N. 6.	2 to 3 miles E. from May Island.	Inside.	Investigation and report by officer, who estimated damage at £5, 16s. Prosecution by Fiscal.	Libel deserted *simpliciter*, it having been ascertained that captain and not mate was in charge.
Feb. 17	Damage to haddock lines by trawler 'Buccleuch,' G.N. 6.	2 to 3 miles E. from May Island.	Inside.	Investigation and report by officer, who estimated damage at £4, 7s. 6d. Prosecution by Fiscal.	Libel deserted *simpliciter*, it having been ascertained that captain and not mate was in charge.
Feb. 24	Damage to great lines by trawler 'Bruce,' G.N. 10.	1 mile S.W. from May Island.	Inside.	Investigation and report by officer, who estimated damage at £7, 5s. Prosecution by Fiscal.	Master of trawler fined 20s. and full amount of damage as assessed awarded. Case appealed and judgment reversed.
Feb. 24	Damage to great lines by trawler 'Douglas,' G.N. 14.	1 mile S.W. from May Island.	Inside.	Investigation and report by officer, who estimated damage at £3, 2s. Prosecution by Fiscal.	Case withdrawn, evidence being insufficient.
Feb. 25	Rudder of boat at anchor broken by another boat.	Close to the north side of the May Island.	Inside.	Investigation by officer, and damage estimated at 20s.	Found that complainer could have avoided damage by removing rudder. Damage not allowed.
Feb. 26	Damage to haddock lines by trawler 'William Scott,' S.N. 1100.	½ mile W. from May Island.	Inside.	Officer investigated case, who estimated damage at £1, 15s.	Trawler remitted full amount of damage, which was paid to fishermen.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
1886. Mar. 8	Damage to great lines by trawler 'William Fenwick,' L.H. 975.	2 miles S.W. from May Island.	Inside.	Officer investigated and reported case, and estimated damage at £10, 8s. 3d. Prosecution by Fiscal.	Trawler found not guilty.
	STONEHAVEN DISTRICT.				
Mar. 11	Cutting and destroying fishing gear by fishing boat.	4 miles E.	Outside.	Investigation and report by officer, who found defender at fault, and estimated damage at 7s.	Damage as estimated paid to complainer.
April 23	Collision, and boat run down by fishing boat 383 A.	2 miles E.	Inside.	Inquiry by officer, who awarded 8s. damages.	Damage as estimated paid to complainer.
June 22	Interference with and breaking lines by fishing boat K.Y. 310.	60 miles E.	Outside.	Inquiry by correspondence.	Apology tendered, and accepted by complainer.
Aug. 3	Cutting buoys of herring nets by fishing boat I.N.S. 131.	13 miles E. by N.	Outside.	Investigation and report by officer, who awarded 18s. damages to complainer.	Apology tendered, and accepted by complainer.
Aug. 5	Cutting or destroying nets by fishing boat A. 160.	12 miles S.E.	Outside.	Inquiry by officer.	No proof of allegation against defender.
Aug. 21	Cutting adrift 24 nets and loss of same.	31 miles S.E.	Outside.	Inquiry by correspondence at Montrose, Leith, Eyemouth, &c.	Failed to discover the perpetrator.
Nov. 25	Cutting buoy rope in pieces.	3½ miles S.E.	Outside.	Investigation and report, award of 4s. to complainer.	Estimated award paid to complainer.
Dec. 10	Anchoring great line buoys on herring fishing drifting ground.	½ mile S.E.	Inside.	Inquiry by officer.	Offender cautioned.
Dec. 15	Collision between two fishing boats.	In harbour channel.	Inside.	Inquiry and report by officer.	Each party to pay their own damage.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
	ABERDEEN DISTRICT.				
1886. June 2	Damage to haddock lines by trawler 'Ben Ledi' A. 353.	3½ miles E.S.E. from Girdleness.	Outside.	Officer investigated case, and estimated damage at £4.	Estimated amount paid by trawler.
Dec. 14	Damage to lines by another line boat.	3 to 4 miles off the Black Dog.	Inside.	Officer investigated the case.	Charge found not proven.
	BUCKIE DISTRICT.				
Jan. 15	One fishing boat tearing the nets of another.	4 miles off Berriedale.	Outside.	Officer investigated case.	Charge found not proven.
Feb. 23	The lines of one boat cut by the crew of another boat.	16 miles off Nosshead.	Outside.	Officer investigated case.	Charge found not proven.
Mar. 9	6 lines carried away from a fishing boat by the trawler 'Southesk' M.E. 696.	'Smith Bank,' 30 miles N.E. off Buckie.	Outside.	Officer investigated case, who estimated damage at £6, 10s., and found defender at fault.	Settled by complainer accepting £3, 10s.
Mar. 25	16 lines and 7 buoys carried away from a fishing boat by the trawler 'Dauntless,' S.N. 1381.	'Smith Bank,' 30 miles N.E. off Buckie.	Outside.	Officer communicated with agent and master of 'Dauntless,' and estimated damage at £17, 12s.	Defender offered £5 in full of all claim, which the complainer refused to accept, and gave the case to a law agent. Not yet settled.
Mar. 31	3 lines carried away from a fishing boat by the trawler 'Bennachie,' L.O. 333.	6 miles off Clythhead.	Outside.	Officer investigated the case, who estimated damage at £2, 5s., and found defender at fault.	Case settled by complainer accepting £2.
Dec. 7	One fishing boat taking away a line with buoy and flag belonging to another fishing boat.	25 miles N.N.E. off Logiehead.	Outside.	Officer investigated the case, and found defender at fault.	Settled by defender supplying new lines and flag.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
	FINDHORN DISTRICT.				
1886. Mar. 9	Lines of fishing boat 'Isabella,' I.N.S. 471, carried away by trawler 'Lamberton.' B.K. 1110.	3 miles off Burghead.	Inside.	Officer investigated case, estimated the damage at £2, and found the trawler at fault.	Settled by complainer accepting £1.
	LYBSTER DISTRICT.				
Mar. 4	Loss of 3 cod fishing lines carried away by trawler 'Tyne,' of Scarborough, S.H. 93.	About 3 miles off Clythness.	Inside.	Officer investigated case, who estimated loss at £5, 11s. 6d., and found defender at fault.	Settled by complainer accepting £2, 7s. 6d.
	WICK DISTRICT.				
Feb. 5	Carrying away of lines by trawler 'Mure,' M.E. 659.	5 miles off Wick.	Outside.	Officer investigated case, who estimated damage at £5, 10s., and found defender at fault.	Estimated amount paid by trawler.
Feb. 6	Carrying away of lines by trawler 'Bonito,' A. 93.	3 miles off Sandside.	Inside.	Officer investigated case, who estimated damage at £11, and found defender at fault.	Case not yet settled.
Feb. 6	Carrying away of lines by trawler 'Bonito,' A. 93.	2½ miles off Sandside.	Inside.	Officer investigated case, who estimated damage at £12, and found defender at fault.	Case not yet settled.
Feb. 6	Carrying away of lines by trawler 'Bonito,' A. 93.	2½ miles off Sandside.	Inside.	Officer investigated case, who estimated damage at £18, and found defender at fault.	Case not yet settled.
Feb. 11	Carrying away of lines by trawler 'Rosa,' M.E. 660.	3 miles off Nosshead.	Inside.	Officer investigated case, who estimated damage at £2, 10s. 6d., and found defender at fault.	Settled by owner of trawler paying £2.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
1886. Feb. 11	Destroying nets by fishing boat W.K. 398.	2½ miles off Wick.	Inside.	Officer investigated case, who estimated damage at £2, 10s., and found defender at fault.	Owner of boat paid £1. £1, 10s. still owing.
Feb. 11	Destroying nets by fishing boat W.K. 411.	2 miles off Lybster.	Inside.	Officer wrote owner of boat, and estimated damage at £7, 14s. 6d.	Claim departed from.
Feb. 18	Carrying away of lines by trawler 'Bennachie,' L.O. 333.	5 miles off Wick.	Outside.	Officer wrote owner of trawler, and estimated damage at £4, 10s.	Case settled by trawler paying £3.
Feb. 23	Carrying away of lines by fishing boat B.F. 53.	7 miles off Wick.	Outside.	Officer wrote owner of boat, and estimated damage at £1.	Case settled by line being returned.
Feb. 24	Carrying away of lines by trawler 'Palmerston,' A. 328.	4 miles off Wick.	Outside.	Officer wrote owner of trawler, and estimated damage at £3.	Case settled by trawler paying £1, 10s.
Mar. 5	Carrying away of lines by trawler 'Sarah Smart,' S.S.S. 271.	4 miles off Wick.	Outside.	Officer wrote owner of trawler, and estimated damage at £2.	Case settled by trawler paying £1, 10s.
Aug. 9	Collision, boat S.Y. 738 running down boat W.K. 1734.	In Wick Bay.	Inside.	Officer investigated case, and estimated damage at £8, 15s.	Case settled by owner of boat S.Y. 738, paying £4, 7s. 6d.
	CAMPBELTOWN DISTRICT.				
July 7	Damage to circle or seine net by 'Argyll' s.s., trader between Glasgow and Campbeltown, *vice versa.*	600 yards off Machry Bay, Arran.	Inside.	Officer ascertained that it was beyond Board's jurisdiction. Prosecution by Fiscal.	Defenders found not liable, at the same time the Sheriff recommended that they pay the pursuers £5.
	BALLANTRAE DISTRICT.				
Feb. 5	Lines of boat A.R. 333 cut by beam trawler 59 C.K. (Colchester).	3 miles off Girvan.	Inside.	Officer inquired into the matter, estimated damage at £3, and reported case to commander of 'Jackal.'	Trawler not identified.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
1886. Feb. 12	Cod nets of boat A.R. 309 cut by trawler L.L. 42 (Liverpool).	5 miles off Girvan.	Outside.	Officer inquired into the matter, estimated the damage at £1, and reported case to commander of 'Jackal.'	Trawler not found.
Feb. 12	Cod nets of boat A.R. 101 cut by trawler L.L. 42 (Liverpool).	5 miles off Girvan.	Outside.	Officer inquired into the matter, estimated the damage at £1, 10s., and reported case to commander of 'Jackal.'	Trawler not found.
July 7	Damage to 3 settings of turbot nets by trawler 'Go-ahead,' T.N. 31 (Troon).	5 miles off Ballantrae.	Outside.	Officer inquired into matter, estimated damage at £4, 10s., and reported case to commander of 'Daisy' cutter.	Case departed from, trawler supposed to have done the damage having left for south of England.
	'VIGILANT' CRUISER.				
Jan. 25	Damage to nets. K.Y. 286 *v.* George Hughes, Pittenweem.	2 miles E. of May Island.	Inside.	Complaint investigated by commander.	Complainer himself at fault.
Jan. 26	Damage to nets. L.H. 1044 *v.* A. Peebles, Pittenweem.	1 mile E. of May Island.	Inside.	Complaint investigated by commander.	Complaint withdrawn, no evidence against accused.
May 27	Collision. W.K. 929 *v.* s.s. 'Albatross.'	Entrance to Vatersay.	Inside.	Complaint investigated by commander.	Master of steamer agreed to make good the damage, assessed at £7.
May 27	Collision. B.F. 1024 *v.* W.K. 132.	Entrance to Vatersay.	Inside.	Complaint investigated by commander.	Damage assessed at £1, 15s. Paid to complainer.
May 28	Collision. S.Y. 707 *v.* B.F. 1179.	Off Muldronach.	Inside.	Complaint investigated by commander.	Damage assessed at £1, 12s. Paid to complainer.
May 28	Collision. P.D. 202 *v.* I.N.S. 215.	Off Barra Head.	Outside.	Complaint investigated by commander.	Master of I.N.S. agreed to compensate complainer.
June 5	Damage to nets. S.Y. 695 *v.* B.F. 657.	5 miles S.E. of Cellar Head.	Outside.	Complaint investigated by commander.	No evidence against accused. Complainer decided to prosecute. Result not known.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Results.
1886. June 5	Collision. B.F. 1035 *v.* B.F. (number unknown).	Off Stornoway.	Inside.	Complaint investigated by commander.	Damage assessed at £1, 3s. Paid.
June 7	Collision. B.F. 781 *v.* s.s. 'Lochiel.'	Stornoway Harbour.	Inside.	Complainer directed to communicate with master of steamer.	Result not known.
June 12	Collision. G.N. 20 *v.* G.W. 184.	Stornoway Harbour.	Inside.	Complaint investigated by commander.	Liability admitted. Case settled privately.
June 21	Collision. S.W. 166 *v.* S.W. 979.	5 miles E. Butt of Lewis.	Outside	Complaint investigated by commander.	Both found to blame. Each pay half cost of repair.
June 21	Collision. I.N.S. 949 *v.* I.N.S. 3041.	1 mile S. Chicken Head.	Inside.	Complaint investigated by commander, who estimated damage at £2, 5s.	Accused found in fault.
June 25	Collision. S.Y. 464 *v.* B.F. 845.	Off Stornoway.	Inside.	Complaint investigated by commander, who estimated damage at £2.	Accused found in fault.
Aug. 6	Damage to nets. W.K. 912 *v.* P.D. 1066.	10 miles S.E. of Peterhead.	Outside.	Complaint received from fishery officer, but complainer did not appear.	
Aug. 6	Damage to nets. P.D. 94 *v.* P.D. 449.	5 miles S.E. of Buchanness.	Outside.	Complaint of too trivial a nature to be entertained.	
Aug. 7	Damage to nets. A.H. 59 *v.* G.N. 19.	20 miles S.E. of Girdleness.	Outside.	Complaint investigated by commander.	Estimated damage at £2, paid to complainer.
Aug. 7	Collision. A.H. 10 *v.* S.S. 604.	Entrance of Aberdeen Harbour.	Inside.	Complaint investigated by commander.	Estimated damage £1, 18s., paid to complainer.
Aug. 16	Damage to nets. S.Y. 235 *v.* A.H. 147.	15 miles S. of Aberdeen.	Outside.	Complaint investigated by commander.	No evidence against accused.
Aug. 18	Damage to nets. S.Y. 565 *v.* L.H. 1067.	12 miles E.S.E. of Peterhead.	Outside.	Complaint investigated by commander.	Latter boat not found.
Aug. 18	Collision. B.F. 424 *v.* D.E. (number unknown).	Off Peterhead.	Outside.	Commander made inquiry.	Latter boat not identified.
Aug. 18	Collision. B.F. 796 *v.* B.F. 193.	10 miles off Buchanness.	Outside.	Commander made inquiry.	Complainer did not again appear.

APPENDIX H.—*continued.*

Date of Offence.	Nature of Complaint.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Steps taken.	Result.
1886. Aug. 19	Damage to nets. A. 107 *v.* M.E. 31.	24 miles S.E. of Montrose.	Outside.	Complaint investigated by commander.	Accused found at fault, damage assessed at £1, 5s.
Aug. 20	Damage to nets. A. 371 *v.* A. 501.	Off Stonehaven.	Outside.	Complaint investigated by commander.	No evidence against accused.
Aug. 23	Damage to nets. L.H. 1023 *v.* K.Y. 2066, and K.Y. 1169.	Off Aberdeen.	Outside.	Complaint investigated by commander.	Damage found to be unavoidable.
Aug. 26	Collision. W.K. 912 *v.* G.Y. 47.	25 miles S.E. of Peterhead.	Outside.	Commander wrote to Collector of Customs, Grimsby, who obtained a declaration from master of G.Y. 47, copy of which was forwarded to complainer.	Complainer has not yet furnished the necessary information, which delays settlement.
Aug. 30	Damage to lines. A. 237 *v.* S.S.S. 346.	6 miles S.E. of Findon.	Outside.	Complaint investigated by commander.	Accused not proved to have caused damage.
Sept. 1	Collision. I.N.S. 2113 *v.* S.Y. 287.	10 miles E. of Kinnaird Head.	Outside.	Complaint investigated by commander.	Latter boat in fault. Damage assessed at £2, 5s.
Sept. 6	Collision. P.L. 93 *v.* P.D. 64.	Entrance to Aberdeen Harbour.	Inside.	Complainer referred to harbour master for settlement.	Result not known.
Sept. 23	Damage to nets. D.E. 447 *v.* D.E. 510.	35 miles S. by W. of Aberdeen.	Outside.	Complaint investigated by commander, and report sent to Board.	Complainer intended to prosecute. Result not known.
	H.M.S. 'JACKAL.'				
June 19	Small boat belonging fishing boat W.K. 41, run into by C.K. 3871.	Castlebay, Hebrides.	Inside.	Case investigated by commander, who estimated damage at £1.	Damage as assessed paid.

APPENDIX H.—*continued.*

Complaints other than the foregoing reported to Procurators Fiscal and dealt with by them.

Date of Offence.	Nature of Charge.	Locality, and Distance from Shore.	Whether Inside or Outside Territorial Waters.	Mode of Trial.	Result of Trial.
	STORNOWAY.				
1886. May 5	Destruction of fishing lines, and theft of buoys.	8 miles E. of Butt of Lewis, Ross-shire.	Outside.	Tried summarily before the Sheriff-Substitute.	Convicted; fined £3, or 14 days' imprisonment.
June 4	Cutting and destroying herring fishing nets.	7 miles E. of Cellarhead, Lewis, Ross-shire.	Outside.	Civil action in the Sheriff-Court.	Defender assoilzied from action.

FISHERY BOARD FOR SCOTLAND, EDINBURGH, *2nd May* 1887.

DUGALD GRAHAM, *Secretary.*

APPENDIX I.

OYSTER, CRAB, LOBSTER, AND MUSSEL FISHERIES, AND CLAM AND BAIT BEDS.—Regulations for the Instruction and Guidance of Persons applying for Fishery Orders under Part III. of The Sea Fisheries Act, 1868 (31 and 32 Vict. cap. 45); The Fisheries (Oyster, Crab, and Lobster) Act, 1877 (40 and 41 Vict. cap. 42); The Sea Fisheries (Clam and Bait Beds) Act, 1881 (44 Vict. cap. 11); and The Sea Fisheries (Scotland) Amendment Act, 1885 (48 and 49 Vict. cap. 70, § 11).

The Fishery Board for Scotland, to whom the administration of the above Acts has been transferred from the Board of Trade by the Sea Fisheries (Scotland) Amendment Act, 1885 (48 and 49 Vict. cap. 70, § 11), have made the following Regulations for the purpose of facilitating and systematising applications under their provisions.

Part I.—*General Principles on which exclusive Rights of Fishery or Regulative Powers over Oyster and Mussel Fisheries will be granted.*

The following comprise grants or concessions which appear to the Fishery Board to fall within the scope and intention of the above-named Acts, and for which they will be prepared to consider applications:—

1. Appropriations of moderate areas of unproductive sea bed or foreshore for the establishment of new fisheries or local depôts.
2. Appropriations of areas of already productive ground for layings or depôts.
3. Concessions of exclusive fishery rights to owners or occupiers of existing fisheries, but within such limits and conditions only as may make such concessions beneficial to the public.
4. Powers for regulating or restricting unlimited fishing on beds in cases where it is proved that such fishing is carried on in so wasteful a manner as to have the effect of exhausting the beds and diminishing the supply, without corresponding advantage to the public.

The only ground for the concession of exclusive fishery rights or restrictive powers over any portion of the sea shore is the expectation that by these means the supply of oysters and mussels will be materially increased, and the public thereby benefited. Such expectation must consequently be shown to exist in all cases of Orders under these Acts, and especially in the case of an Order affecting an already productive dredging ground.

Part II.—*Title to Solum.*

This in every case will require to be instructed, so as to prevent invasion of the rights of others.

By the Crown Lands Act, 1866 (29 and 30 Vict. c. 62, §§ 7 to 25), the administration of the Crown rights over the foreshore and bed of the sea, where such rights exist, are, with certain exceptions, transferred to the Board of Trade. The Crown is also the conservator of rights of navigation.

The Board of Trade have intimated, that in cases where an application for a fishery grant includes foreshore or sea bed under their management, that Board will carefully abstain from throwing obstacles in the way of improvements of oyster and mussel fishings which will benefit the public, and will be averse to imposing any such terms as may, especially in the infancy of an undertaking, impede or delay its progress.

They will be prepared to consider favourably proposals founded on the basis of determining rent or royalty according to the profits actually made or the quantity of oysters or mussels produced or sold by the promoters.

PART III.—*Form of Procedure in applying for an Order under Part III. of The Sea Fisheries Act*, 1868.

1. The first step on the part of the promoters is to transmit a memorial to the Fishery Board for Scotland, as directed by section 29 of the Act. The memorial should be transmitted in duplicate, written on common foolscap paper on one side of the paper only, with a wide margin, and should contain the following information :—

(*a*) A description of the existing conditions of the proposed fishery —whether it is barren or cultivated, and to what extent; and whether it contains any public or private beds, and in what condition.

(*b*) A statement of the manner in which it is intended to cultivate the ground applied for.

(*c*) In the case of an Order for a concession of or for regulating a fishery, a precise statement of the nature of the proposed regulations; of the proposed tolls (if any); of the manner in which they are to be levied and expended; and of the constitution of the corporation or other body by whom the powers in question are to be exercised.

(*d*) A statement of the means in the shape of income or capital possessed or anticipated by the promoters for this purpose.

(*e*) The names of the owners or reputed owners, lessees or reputed lessees, and occupiers of the soil included in the proposed fishery; and the nature of their title.

(*f*) Whether any, and if so what, arrangements have been or are proposed to be made with them.

The memorial should be also accompanied by the following documents :—

(i.) Where the promoters are a company registered under The Companies Act, 1862, by a printed copy of the memorandum of association, articles of association, and any registered special resolution of the company.

(ii.) When they are a company formed in any other manner, by a copy of every deed or instrument of settlement, partnership, or incorporation, or Act of Parliament, relating to the company.

(iii.) Where the promoter or promoters is or are the proprietor or proprietors by his or their title.

(iv.) In every instance by a plan in duplicate upon an Ordnance map or other chart of the locality, defining *accurately* the position, area, and boundaries of the ground proposed to be taken, showing what part is above and what below low-water mark, and what part, if any, is above high-water mark. In this map or chart all portions of the sea bed or estuary below low-water mark not comprised in the proposed fishery are to be coloured blue, and the proposed fishery itself pink, and the area should be stated either in acres or by other measurement.

(v.) In cases where the construction of works, such as piers, jetties, &c., is contemplated, by a plan and sections, and estimate for such works, signed by the persons making the same.

(vi.) If the construction of tanks or other similar works of a permanent nature is contemplated, they should be described in the memorial; their dimensions should be given and their sites should be shown on the plan of the fishery.

2. The whole of the foregoing information should be *classified under separate headings in the manner above shown;* and the attention of promoters is called to the fact that statements contained in the memorial may, at a subsequent stage of the Order, become the subject of local investigation.

3. If after receiving the memorial the Fishery Board for Scotland decide to proceed with the case, the promoters will be required, in accordance with the Act (section 30), to transmit, in duplicate, a draft of the proposed Order, printed on foolscap paper on one side of each page only, and with a wide margin. Specimen forms of Orders are annexed hereto. Further assistance may be derived from a perusal of Orders already confirmed.

An Order made by the Fishery Board for Scotland may include, if desirable, provisions for the constitution of a board or body corporate for the purpose of such Order (*see* section 29 of the Sea Fisheries Act, 1868).

4. The promoters will be required to make satisfactory arrangements for the expenses of the Order, the amount of which will depend on the nature of the application and the travelling and personal expenses of the Inspector when making the inquiry directed in the 32nd section of the above Act. The Fishery Board for Scotland will make these expenses as light as possible.

5. The draft Order, with such modifications as the Fishery Board for Scotland may require, must be circulated as follows, viz :—

(*a*) Twelve copies must be deposited at the office of the Board.

(*b*) One copy must be deposited, and lie for public inspection free of charge during the month following the date of the first advertisement mentioned below, at the custom-house of the port, and also of the sub-port or creek, if any, within or adjacent to which the proposed fishery is situate; together with one copy of the plan or Ordnance map or chart of the locality showing the limits of the proposed fishery; and two copies of the plan and of the book of reference thereto deposited (if any).

(*c*) A sufficient number of copies of the draft Order must also be deposited at a local office to be named in that behalf in the advertisement mentioned below; such copies to be sold at a charge not exceeding 1s. each; and facilities must be given at such office for the inspection of the plans.

6. The promoters must also give notice of the application by public advertisement, to be inserted twice at least in a county or other local newspaper. The advertisement must contain a statement, *in an abridged form*, of all the principal objects of the Order. It must also give the address of the local office where the draft Order can be seen and obtained, and an intimation that written objections will be received by the Fishery Board for Scotland during the month following the date of its publication.

7. The promoters must also cause copies of such advertisement to be posted up in conspicuous type, in the form of notices or placards, in at least six places in the neighbourhood of the proposed fishery, where they may be seen by fishermen and others interested in the undertaking; and, if the Fishery Board for Scotland so require, at other places.

8. Copies of the advertisement must also be forwarded by post to or left at the residences of the owners or reputed owners, lessees or reputed lessees, and occupiers (if any) of the portion of the sea shore to which the draft Order relates, and of the lands adjoining thereto.

9. During the month following the date of the first advertisement of the draft Order the Fishery Board for Scotland will receive any objections or representations made to them respecting the same. All such objections must be transmitted in *duplicate*, written on common foolscap paper on one side of the page only, and with a wide margin. A copy of such objections must also, at the same time, be sent to the promoters; and in sending the objections to the Fishery Board for Scotland the objectors or their agents should state that this has been done. A copy of this rule must be printed at the foot of each draft Order.

10. No Order, when granted, will entitle the promoters to interfere with any lawful purpose of navigation or anchorage (*see* section 53 of the Act of 1868). Nor will the Fishery Board for Scotland be disposed to entertain any application which interferes sensibly or materially with the enjoyment and use of the shore for purposes of walking, bathing, boating, beaching, or landing.

11. As soon as conveniently may be, after the expiration of the said month, the Fishery Board for Scotland will arrange for a sitting or sittings being held in some suitable place in the neighbourhood of the proposed fishery, and to take and receive evidence, on oath or otherwise, and information offered, as provided for in the 32nd section of the Act. Notice of such sitting or sittings will be published in one or more local newspapers at least fourteen days before the holding thereof.

12. On the report of the Inspector, the Fishery Board of Scotland will either refuse the application, or make the Order in such form and manner as they think expedient; and, in the latter case, the Order, so approved, is to be advertised and circulated in the manner already pointed out with regard to the draft Order.

13. The Fishery Board for Scotland will arrange that Orders thus made, advertised, and circulated will afterwards be submitted for the sanction of Parliament, as directed in sections 37 and 38 of the Act of 1868, or of Her Majesty in Council for confirmation under the Act of 1877, § 7.

14. In the Order the Fishery Board for Scotland may insert provisions repealing or amending all or any of the provision of a temporary Order for the protection of Bait Beds, under the Act of 1881 aftermentioned, 44 Vict. c. 11, § 6.

PART IV.—*Temporary Orders to restrict or prohibit dredging for and taking Oysters under Sections* 5 *and* 6 *of the Act of* 1877.

Such Orders are not competent as regards a several right of fishery in any oyster bed or bank, or as regards any bed or bank of oysters which has been or shall be the subject of a grant or regulation by the Fishery Board of Scotland under the Act of 1868, or any Acts amending the same.

The applicants are defined by the Act of 1877, and it is only after such public inquiry and notice as the Fishery Board for Scotland think expedient that an Order can be issued. Such inquiry and notice will proceed very much on the lines above laid down as regards grants or regulations under the Act of 1868; but, as the Orders are merely temporary, they need not be so detailed or exhaustive.

The expenses of such Orders will have to be provided for as mentioned above, Part III. § 4.

PART V.—*Temporary Orders to restrict or prohibit fishing for and taking of Crabs and Lobsters under Section* 10 *of the Act of* 1877.

Such Orders are, like those treated of in Part IV., not competent as regards a several right of fishery.

The applicants are not defined, and therefore are not restricted as in the case of oysters.

The expenses of such Orders will have to be provided for as mentioned above, Part III. § 4.

PART VI.—*Temporary Orders to protect Clam or other Bait Beds from injury by any Beam Trawl not being a dredge for Oysters.*

For the purposes of such an Order, the local inquiry, confirmation, and other details enacted as regards Oyster and Mussel Fisheries under §§ 30 to 39, both inclusive, §§ 42 and 43, § 46, and §§ 48 to 50 both inclusive, of the Act of 1868, are made to apply with the necessary modifications.

Accordingly it is only necessary to refer to these details as above set out in Part I. hereof.

DUGALD GRAHAM, *Secretary.*

FISHERY BOARD FOR SCOTLAND,
EDINBURGH, *January* 1887.

SPECIMEN FORMS OF ORDERS.

1. *Order for the Establishment and Maintenance of an Oyster* or *Mussel* or *Oyster and Mussel Fishery.*
2. *Order for the Regulation of an Oyster* or *Mussel* or *Oyster and Mussel Fishery.*

Note.—By the 29th section of the Sea Fisheries Act, 1868, and the 11th section of the Sea Fisheries (Scotland) Amendment Act, 1885, an Order made by the Fishery Board for Scotland may include, if desirable, provisions for the constitution of a Board or Body Corporate for the purposes of the Order.

1. *Order for the Establishment and Maintenance by the Company* [*Limited*] *of a Several Oyster* [or *Mussel* or *Oyster and Mussel*] *Fishery at in the Estuary of in the County of*

(1) The Oyster Company, Limited (in this Order called the Company), shall be the undertakers of the fishery mentioned in this Order.

(2) For the purposes of the fishery and works authorised by this Order, the Company may from time to time enter on, take, and use all or any part of the lands described in the plans and book of reference deposited for the purposes of this Order.

(3) The Lands Clauses Consolidation Act, 1845, and The Lands Clauses Consolidation Acts Amendment Act, 1860, are hereby incorporated with this Order.

(*If the land belongs to the Crown, Clauses* 2 *and* 3 *will be omitted.*)

(4) The following are the Company's fishery grounds under this Order (as shown on plans deposited at the Fishery Board for Scotland), namely, all those parts of the foreshore and bed of the , situate within the several parishes of , in the county of , containing an area of or thereabouts, and bounded as follows—that is to say:—

(*Here insert an accurate description of the locality, position, and boundary lines of the Fishery.*)

(5) This Order confers on the Company a right of several oyster [*or* mussel *or* oyster and mussel] fishery within the limits above mentioned.

(6) The limits of the said several fishery shall be marked out as follows—that is to say:—

(7) In the event of the marks by the last foregoing article prescribed being obliterated by storm or otherwise, they shall be replaced by the Company, and notice of the said limits may be given to fishermen, dredgermen, and other persons as follows—that is to say:—

(8) No buildings, erections, embankments, or other works, other than the marks mentioned in Article [6] of this Order, shall at any time be commenced or executed within the limits above described without the previous sanction and approval in writing of the Fishery Board for Scotland.

(9) The Company shall render to the Fishery Board for Scotland such accounts of their capital, expenditure, and income, and of all oysters [*or* mussels *or* oysters and mussels] sold by the Company, in such form and at such times as the Board may require, and shall allow the Board or any person appointed by them to inspect the fishery and all books and documents in their possession relating thereto, and shall give to such Board or person all such information relating thereto as they or he may require.

(10) This Order shall continue in operation for years from its confirmation by Act of Parliament (or by Order of Her Majesty in Council), and no longer.

(11) This Order shall not be taken as a consent to the surrender of any rights, interests, powers, authorities, or privileges transferred to the management of the Board of Trade by 'The Crown Lands Act, 1866.'

(12) This Order may be cited as The Fishery Order, 18 .

Notice to Objectors.—During the month following the date of the first advertisement of the draft Order, the Fishery Board for Scotland will receive any objections or representations made to them respecting the same. All such objections must be transmitted in *duplicate*, written on common foolscap paper on one side of the paper only, and with a wide margin. A copy of such objections must also, at the same time, be sent to the promoters; and in sending the objections to the Board, the objectors or their agent should state that this has been done.

2. *Order for the Regulation by the Corporation of* *of an Oyster* [or *Mussel* or *Oyster and Mussel*] *Fishery at* *in the Estuary of the* *in the County of* .

(1) The Municipal Corporation of (in this Order called the Corporation) shall be the undertakers of this Order.

(2) For the purposes of the fishery and works authorised by this Order, the Corporation may from time to time enter on, take, and use all or any part of the lands described in the plans and book of reference deposited for the purposes of this Order.

(3) The Lands Clauses Consolidation Act, 1845, and the Lands Clauses Consolidation Acts Amendment Act, 1860, are hereby corporated with this Order.

(*If the land belongs to the Crown, Clauses* 2 *and* 3 *will be omitted.*)

(4) The following are the description and limits of the fishery comprised in this Order (as shown on plans deposited at the Fishery Board for Scotland), namely, all those parts of the foreshore and bed of the , situate within the several parishes of , in the county of , containing an area of or thereabouts, and bounded as follows—that is to say:—

(*Here insert an accurate description of the locality, position, and boundary lines of the fishery.*)

(5) This Order confers on the Corporation the following powers—that is to say:—

(6) The limits of the said fishery shall be marked out as follows—that is to say:—

(7) In the event of the marks by the last foregoing article prescribed being obliterated by storm or otherwise, they shall be replaced by the Corporation, and notice of the said limits may be given to fishermen, dredgermen, and other persons as follows—that is to say:—

(8) No buildings, erections, embankments, or other works, other than the marks mentioned in Article [6] of this Order, shall at any time be commenced or executed within the limits above described without the previous sanction and approval in writing of the Fishery Board for Scotland.

(9) The Corporation shall render to the Fishery Board for Scotland such accounts of their proceedings under this Order, and of their income and expenditure thereunder, in such form and at such times as the Board may require, and shall allow the Board, or any person appointed by them, to inspect the fishery and all books and documents in their possession relating thereto, and shall give to such Board or person all such information relating thereto as they or he may require.

(10) This Order shall continue in operation for years from its confirmation by Act of Parliament (or by Order of Her Majesty in Council), and no longer.

(11) This Order shall not be taken as a consent to the surrender of any rights, interests, powers, authorities, or privileges transferred to the management of the Board of Trade by 'The Crown Lands Act, 1866.'

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APPENDIX J.

THE HERRING FISHING IN BALLANTRAE DISTRICT.

By PETER WILSON, Fishery Officer, Girvan.

Antiquity of the Fishing.—The village of Ballantrae, at the mouth of the Stinchar, or 'the town by the shore,' as its Celtic name implies, like many others of our ancient burghs, may owe its origin to the river. It is essentially, and probably ever has been, a community of fishermen. The natural shelter of the creek or the river bar for their cobbles against storms, and the rich fishing sea coast, was all that was needed by the early prospecting settlers to attract them to the spot to prosecute their infant trade. The 'spawney' fishing at Ballantrae has a history of at least two hundred years. In a description of Carrick by Mr William Abercrombie, minister of Maybole, written about 1686, appended to the *History of the Kennedies*, it is stated, that 'at the mouth of this water of 'Stinchar stands the town of Ballantrae on the north side, on a pleasant 'foreland, which some years ago has been much resorted to by reason of 'a herring fishing about Christmas time.' In a description of Carrick, taken from a *Collection of the several Shires*, by Sir James Balfour, Lyon-king-at-arms, written about the same time, and published as an appendix to the *History of the Kennedies*, it is mentioned, that 'at the mouth of the 'river is the castle of Stinchar, with a small village called Ballantrae, 'where there is a great take of salmon, and in the month of February a 'great take of herring, cod, and skate.'

Fishing Banks in the face of the Gulf Stream.—The banks of Ballantrae, in the entrance to the Firth of Clyde, lie in the face of the Gulf Stream. A series of concurrent tides meet on them, and probably have caused their formation. The sea temperature in winter and spring is higher than the land; the sea bottom covered with rough sand, gravel, and stones, is favourable for receiving the herring spawn, and a plentiful crop of sea-fir and other seaweed affords cover for the hatching eggs. The banks are about midway between the shore and the island of Ailsa Craig, and extend along the coast for about three miles, and are covered with a depth of water of from 7 to 13 fathoms.

Fluctuations in the Fishing.—The fishing has had its fluctuations, as there are years of scarcity and plenty in the sea as on the land, besides weather and other conditions which interfere with its prosecution. It is stated by Abercrombie, when he wrote of Ballantrae as being greatly resorted to by reason of a herring fishing at Christmas, 'but that has 'ceased some thirty years past.'

Recent Progress of the Fishing.—The winter herring fishing, though carried on for so many generations, may be said to have recommenced after the relaxation, in 1868, of the Sea Fisheries Act of 1865, which fixed a close time for herrings on the West Coast from 1st January to 31st May. From 1868, when fishing for herrings was freely permitted by seine or circle net, it was steadily progressive, and reached its greatest dimensions in 1883–1884. From 1870 to 1875 the total catch of herrings in the Ballantrae district was 19,458 crans. The following table shows the catch and value of the herrings landed from the winter fishing alone for each of the past eleven years:—

Year.	Boats Fishing.	Crans.	Average Price per Cran.	Total Value.
1876.	123	6,071	45/	£13,610
1877.	175	10,254	45/	23,625
1878.	191	17,830	50/	44,575
1879.	304	20,092	50/	50,230
1880.	364	31,292	47/	73,536
1881.	407	24,294	52/	65,100
1882.	422	8,708	50/	22,770
1883.	408	31,374	50/	78,435
1884.	443	14,564	50/	43,692
1885.	411	27,671	40/	46,673
1886.	296	4,760	21/	5,168

For a long time the Ballantrae winter herring fishing was the principal one in Scotland, and a mine of wealth to the fishermen, who came from all parts of the coast to engage in it; but during the last three years a successful winter fishing has been carried on over the East Coast, from the Firth of Forth to Wick, and large importations coming into the home markets of partially preserved herrings from Norway. Prices have come down to one-third of those of previous years, and in consequence the fishing has not been so extensively or energetically prosecuted as formerly. This year only 296 boats were fishing in the district, and not more than a third even of these were at any time at sea. The catch was therefore only 4760 crans, valued at £5168.

Migration of the Herrings towards the Banks.—The Ballantrae banks are regarded as the spawning ground of the Loch Fyne and Kilbrannan Sound herrings, and a desire has for years been entertained by the Argyleshire fishermen to have them closed during the months of February and March, when the herrings are on the banks spawning. That the banks are visited by migratory herrings for the purpose of spawning is unquestionable, and there are apparently two races of herrings which come to them. The one leaving Loch Fyne in September can be traced along the Ayrshire coast till they reach the banks in February. The other comes either from the Atlantic or Kilbrannan Sound, approaching the banks from the west sea. This latter fish are larger and more uniform in size than the former. Herrings usually make their appearance on the Ayrshire coast, off Dunure, in January, and as the season advances come gradually higher up, and forming into large bodies, arrive on the banks about the middle of February, where they remain until they spawn, when they immediately leave the ground without indicating any determinate track,—a wise arrangement of nature to preserve the herrings from devouring their own spawn. Herrings come on the banks year after year with the certainty of a saint's day in the calendar, and depart with equal regularity. The spawn left on the banks speedily quickens, the embryo herring exhibiting in the egg a lively action. The progress of development is rapid, and in the end of March the banks are swarming with young herring fry.

As soon as they are hatched the fry begin to ascend and come to the surface, where their food is to be got. When the sun shines on the water hundreds may be caught in a gauze-net or bucket, but die with the slightest touch. The plash of an oar, or the revolving screw of a passing steamer, may at such a time destroy immense numbers.

Modes of Fishing.—Three modes of fishing are practised at the Ballantrae fishing, the drift-net, set-trammel-net, and seine or circle net in turn coming into use. The drift-net is employed in the open sea when the herrings are migrating to the banks, and when they settle down on the banks to spawn, the trammel and seine nets are used. The fishermen of Britanny use the tramel or tremail-net, a combination of three nets, and from this source probably the present trammel-net derives its name. The trammel-net is about 60 yards in length and 2 yards deep, with a rope at each side, the lower weighted, the upper buoyed with corks, which keep it in an upright position. It is set on the sea bottom, and when the herrings seek the ground to spawn, they get meshed in the trammel. The nets remain in the water, and are fished daily when weather permits. It was for a long time the recognised method of fishing on the banks, but has been in a great measure superseded in later years by the seine or circle net. The banks of Ballantrae are exposed to the full fury of the westerly gales, which in spring prevail on the coast, and at times sad havoc is made with the trammel-nets. Some years whole trains are driven from the banks into deep water, or cast in heaps upon the shore, polluting the ground with dead herrings, and causing the shoal to seek for clean spawning ground, and delaying the spawning until late in the season. On the 1st of March 1876, a gale, which continued for eighteen consecutive days, brought the fishing to a close, and caused a loss of netting estimated at £400.

On the 14th March 1867 a gale came on which lasted for seven days, and the fishermen, fearing that their nets would be useless, and the herrings driven from the banks, a hundred crews left Ballantrae for their homes, leaving all their nets on the spawning beds. Local crews continued the fishing after their departure for three weeks beyond the usual time of closing, and made a most successful catch. On the 19th March 1884, a north-west gale with heavy sea came on, and most of the trammel-nets were driven from the banks and cast in heaps upon the shore. Of 700 nets set more than one half were lost or rendered useless. Local crews afterwards found the herrings off Ardmillan Head, about four miles north of the banks, and continued the fishing successfully up to the 10th April. Though driven from the banks in this manner, herrings seldom fail to return in the following year; but in such circumstances it is conceivable that late spawning may produce small herrings in succeeding seasons. The seine-net was first used by the Loch Fyne fishermen in 1838, in the face of much opposition, legislative and personal, and only in 1867 were all restrictions removed and the seine-net freely permitted to be used. Since then it has held the field, and come into universal use with the Argyleshire fishermen, and by them first employed at the Ballantrae fishing nine years ago. The seine or circle net is from two to three hundred yards in length and forty yards deep, is corked on the upper side, and weighted with lead sinkers in the lower, and is worked by two boats with four men in each. In working the net on the fishing ground the one boat carries the net and pays it out, the other keeps hold of the 'sweep' ropes; the paying out boat makes a wide circuit, the rows of cork on the surface indicating the course of the net. This is called ringing' the herrings. When the circuit is completed, both the bottom, and the upper ropes are pulled by the crews, when the two ends overlap each other, and the herrings, if any are within the circuit, are enclosed and captured. They are then scooped into the boats, and being caught alive, and more tenacious of life in winter than in summer, are sometimes brought living in the boats into the harbour. Though the net is frequently hauled empty, at times larger prizes have been drawn from the Ballantrae banks, the seine-net being one of the most successful, though by some regarded as the most destructive, agencies in the capture of the herring. In one year eight men with two skiffs grossed in five weeks £900, and catches realising £100 to £200 were not infrequent.

The herrings caught by the seine-net at the Ballantrae fishing from 1878 downwards to 1884 were the largest, and commanded the highest price. Since 1884 the herrings have deteriorated in size, and this year nearly half of the catch landed by the seine-net fishermen was composed of small unmarketable herrings, a large proportion of which were used for manure.

Enemies of the Herring.—But there are other reapers of the sea besides fishermen. Cod, saith, and other fishes which follow the herring shoal consume immense numbers. From 10 to 20 herrings, more or less complete, are frequently taken from the stomach of the cod when caught on the herring ground; but a still greater destruction takes place when the cod and saith feed on the herring spawn. In March 1886 one cod stomach, taken from amongst others, contained no less than 24 ounces of herring spawn.

Whales and Porpoises on the Banks.—The banks are at times the scene of lively interest when visited by a shoal of whales. On a recent occasion, as the sun was setting, a shoal of at least forty whales in pairs and a number of porpoises began to play, and went circling round the margin of the bank displaying their huge fins and arched backs, gracefully plunging and again reappearing a short distance off. The porpoises, in wild leaps went several feet sheer out of the water, and then dived apparently in search of their prey. In this manner the flock of whales and porpoises went circling round for at least a distance of ten miles. Their presence was accounted for when next morning a number of the seine boats entered Girvan and Lochryan with catches of one to two hundred baskets of herrings each.

The Winged Fishers of the Banks—Gannets and others.—About 10 miles from the shore the island of Ailsa Craig rises out of the water, a solitary 'fragment of an earlier world.' It is the abode of innumerable sea birds, which rear their clamorous brood on the shelving rocks, and find abundant food on the rich banks of Ballantrae. Chief amongst these is the stately gannet or solan goose. Overhead the air is often clouded with them. Gathering their wings to their sides, they drop from the height of 200 to 300 yards like meteor showers, jets of spray rising on the surface, and indicating the spots where they have pierced the water. Sometimes they descend to a depth of several fathoms, and fish the herrings from the trammel-nets at the sea bottom, and occasionally get caught themselves in the meshes. On rising they skim the surface of the water, and take their places in the rear of the other birds, and repeat the operation. All authorities agree in the opinion that the quantity of herrings consumed by the gannets exceeds that captured by man. The puffin, or peatie, make their nests in burrows on the Craig, and, descending from the rock, find dainty meat for their young in the teeming waters. The puffin has the rare capacity of carrying on both sides of its broad bill a string of small fish, and when their young are in the nests may be seen rising from the sea, their bills loaded with herring fry, which in July and August are from 1 to 1½ inches in length. At this season of the year the quantity of herring fry consumed by the puffins on Ailsa Craig is perhaps the greatest of all. With so many agencies of destruction, the marvel is that so many herrings remain to become the food of man, who, with all his ingenuity and skill, cannot compete with the sea birds, cod, and other fishes.

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FIFTH

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OF THE

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