Plates 4, 5, 6. missing

TWENTIETH
ANNUAL REPORT

OF THE

FISHERY BOARD FOR SCOTLAND,

Being for the Year 1901.

IN THREE PARTS.

PART I.—GENERAL REPORT.
PART II.—REPORT ON SALMON FISHERIES.
PART III.—SCIENTIFIC INVESTIGATIONS.

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Presented to both Houses of Parliament by Command of His Majesty.

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TWENTIETH ANNUAL REPORT

TO THE RIGHT HONOURABLE
LORD BALFOUR OF BURLEIGH,
His Majesty's Secretary for Scotland.

OFFICE OF THE FISHERY BOARD
FOR SCOTLAND,
EDINBURGH, *7th August*, 1902.

MY LORD,

In continuation of our Twentieth Annual Report, we have the honour to submit—

PART III.—SCIENTIFIC INVESTIGATIONS.

GENERAL STATEMENT.

This part of the Twentieth Annual Report contains an account of the principal scientific investigations conducted by the Board in 1901, in connection with the sea fisheries of Scotland, so far as they have been completed. In the course of the year the researches on the life-history and habits of the food-fishes were prosecuted on the same general lines as in previous years, partly at the Marine Laboratory, Bay of Nigg, Aberdeen, partly by means of the *Garland*, the small steam-yacht which was provided for the trawling experiments, and partly by the utilisation of steam-trawlers fishing from the port of Aberdeen.

As explained in previous Reports, the small size of the *Garland* has hampered and curtailed the investigations, not only on the fishing grounds offshore, from which the greater part of the fish supply is drawn, but also in the Moray Firth and territorial waters. This disadvantage has been met, as far as circumstances permitted, by making use of steam-trawlers on various occasions throughout the year. Scientific work on board vessels engaged in commercial fishing can, however, be conducted only under great disadvantages, and with results much less complete than when done by an efficient vessel properly equipped for the purpose. When the British part of the international scientific investigation of the North Sea has been begun, it will be possible to carry on the work referred to in a thorough and satisfactory manner.

The hatching operations at the Sea Fish Hatchery, Bay of Nigg, were continued as in previous years, 65,377,000 fertilised eggs of the plaice being collected from the spawning pond, and 51,800,000 fry produced. In this connection it may be stated that the Government of New South Wales has decided to erect a similar Marine Hatchery for Colonial and European fishes at Port Hacking, near Sydney, and that, with the co-operation of the Department, the experiment of introducing European food-fishes and crustacea to the waters of the Colony is now being made, the first shipment of living plaice, soles, turbot, brill, lobsters, and crabs having been despatched under suitable arrangements.

As stated in last year's Report, the Technical Education Committee of the County Council of Aberdeen made a grant of £200 to assist in providing tanks at the Marine Laboratory on condition that facilities were granted for the instruction of fishermen from the county. The first series of demonstrations to selected fishermen from various parts of the coast has now been given, and it is satisfactory to state that the fishermen showed an intelligent interest in the instruction they received.

The Influence of Trawling.

The results of the trawling experiments of the *Garland*, together with the various Tables embodying the observations in detail, and the statistics of line-fishing in the Moray Firth, are given in a separate Report (p. 17). The experiments were made mostly in the Firth of Clyde and Firth of Forth. The work was considerably interrupted by stormy weather and the necessity of taking the vessel into harbour for repairs.

The hauls made in the Moray Firth were too few to enable a comparison of the results to be made with those in previous years, but the statistics showing the catches by line-fishermen within the Moray Firth indicate a considerable fall in the gross quantity of fish caught, and a slight decrease in the average catch per shot of the line. The quantity is the lowest since these statistics began to be collected in 1894, as one might expect from the gradual decadence of line-fishing on the Scottish coast generally, which is referred to in Part I. of the Annual Report (p. xxi.).

The quantities and the average catch per shot are given in the following Table for each of the seven districts during the last six years:—

District.	1896.		1897.		1898.		1899.		1900.		1901.	
	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.
Wick	31,556	5·40	44,258	6·16	31,383	6·49	26,116	5·106	23,927	4·535	28,649	4·339
Lybster	4,241	2·87	7,118	4·22	4,438	3·26	4,309	1·398	3,468	1·506	3,043	1·955
Helmsdale	18,360	4·71	17,148	4·93	13,143	3·84	12,752	3·85	10,330	3·606	8,927	3·185
Cromarty	15,317	2·51	14,736	2·48	12,428	2·065	11,183	1·815	11,070	1·839	9,378	1·653
Findhorn	63,521	4·46	46,694	2·66	30,770	2·088	31,825	1·957	21,724	2·31	14,286	2·016
Buckie	57,450	5·05	50,067	4·77	41,102	4·24	34,915	3·357	22,855	3·209	16,252	2·690
Banff	66,471	3·82	61,329	3·70	36,057	2·13	26,675	2·406	18,471	1·834	11,918	1·853
Total	256,916	4·26	241,350	3·83	169,321	3·244	147,775	2·666	111,845	2·600	92,453	2·554

These figures show how great has been the progressive decline in recent years in the quantities of fish taken by line within the closed waters of the Moray Firth, notwithstanding the benefits accruing from the closure. The quantity landed last year was the lowest throughout the period of eight years during which these statistics have been collected, and 19,392 cwts. less than in 1900.

In three of the districts—namely, Lybster, Helmsdale, and Banff—all the line-caught fish landed were caught within the closed waters. In the other cases a varying proportion of the line fish landed was derived from other areas.

The decrease in the quantity was shared by each of the seven districts except one—viz., Wick—where there was a slight increase in the total. The greatest decline in quantity was exhibited in the three districts on the south coast—Banff, Buckie, and Findhorn.

With respect to the various kinds of fish taken by line within the closed area, the quantities and averages for last year and the preceding four years are as follow :—

FISH.	1897.		1898.		1899.		1900.		1901.	
	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.
Cod - -	79,731	1·26	56,208	1·07	52,753	0·95	33,572	0·779	32,859	0·907
Ling - -	3,544	0·056	2,567	0·049	2,883	0·052	2,392	0·055	3,247	0·09
Torsk - -	25	—	43	—	82	—	18	—	147	0·004
Saithe - -	11,761	0·18	14,881	0·28	9,383	0·169	9,126	0·212	4,228	0·12
Haddock -	126,031	2·004	81,098	1·554	68,075	1·229	54,887	1·275	39,273	1·08
Whiting -	3,319	0·052	1,535	0·029	1,323	0·023	1,736	0·04	1,940	0·05
Turbot - -	16	—	13	—	60	—	4	—	9	—
Halibut -	707	0·011	730	0·013	762	0·013	253	0·005	675	0·02
Lemon Sole -	14	—	1	—	6	—	4	—	11	—
"Flounder, Plaice, and Brill" - -	3,978	0·063	3,425	0·065	5,005	0·09	4,242	0·098	3,639	0·10
Conger - -	1,533	0·024	826	0·015	741	0·013	333	0·007	519	0·01
Skate - -	3,999	0·063	3,273	0·062	3,584	0·064	2,509	0·058	3,737	0·10
Other kinds of White Fish -	6,663	0·105	4,574	0·087	3,116	0·056	2,769	0·064	2,169	0·06

The decline in the quantity of haddocks was very great, the decrease amounting last year to 15,614 cwts.; and each year has shown a corresponding fall compared with the preceding year. In 1895, the quantity caught by line in the closed area was 178,370 cwts. The decrease of the annual catch in the seven years is thus equal to 139,097 cwts. The catch of cod was much more steady, the decline being small, viz. 713 cwts., but in previous years the quantity was very much greater. Ling showed an increase from 2392 to 3247 cwts., and the quantity of whiting was also somewhat greater than in the preceding year, and there was also an increase in halibut and skate. The quantity of "flounder, plaice, and brill" was rather less, viz. 3639 cwts., as against 4242 cwts. The quantity of turbot returned as caught by line in the Moray Firth last year was 9 cwts., as against 4 cwts. in the preceding year, and 60 cwts. in 1899; and there were 11 cwts. of lemon soles as compared with 4 cwts.

The statistics dealing with the number of "shots" of the line-fishing boats in the Moray Firth, or the number of trips to the fishing grounds, show that the decrease noted last year has continued. The number of shots both of the large and of the small boats diminished in 1901 compared with 1900, the decrease being marked in the large or great-line boats. The figures for the past eight years are as follows:—

	1894	1895	1896	1897	1898	1899	1900	1901
Large Boats,	7,082	7,710	11,915	14,039	10,330	12,665	5,595	4,197
Small Boats,	54,866	50,643	48,346	48,836	41,853	42,808	33,572	31,992
	61,948	58,353	60,261	62,875	52,183	55,473	39,167	36,189

In both cases the numbers are much less than in any previous year. As already indicated, the cause of this decay in line-fishing is to be sought in the general conditions of the fishing industry, rather than in any special conditions in the Moray Firth, since the same change is manifested on other parts of the coast.

The stations within the closed waters of the Firth of Forth were examined in September 1900, and in the following March, April, and July. The results are of interest owing to the interval which has elapsed since this area was closed to trawlers, and since the stations were last examined. It is desirable therefore to compare the hauls recently made with those made in corresponding periods of previous years, and which were specially dealt with in the Fourteenth Annual Report. In that Report the catches taken in the ten years 1886-1895 were described, the ten years being grouped into two periods of five years each for comparison, viz., 1886-1890 and 1891-1895.

The particulars regarding the gross catches and the proportions of round-fishes and flat-fishes in the three periods are as follow, the totals including skates and "other fishes," mostly inedible.

PERIOD.	Hauls.	Flat-fishes.			Round Fishes.			Total.	
		No.	Average	°/₀	No.	Average.	°/₀	No.	Average.
1st—1886-1890.	65	8,647	133·0	55·2	6,608	101·7	42·2	15,659	240·9
2nd—1891-1895.	106	16,005	151·0	54·4	12,702	119 8	43·2	29,404	277·4
3rd—1900-1901.	26	4,078	156·8	65·3	1,919	73·8	30·7	6,241	240·0

These figures indicate that the average abundance of all kinds of fish, taken together, in the closed waters, in the months named, was much the same in the period 1886-1890, as in 1900-1901, while there was an increase in the second period. The average for flat-fishes is greater in each successive period, and greater in each month of the successive periods, with the exception of September in the last. There is not the same uniformity in the average catch of round fishes, a circumstance due for the most part to the great fluctuations in the numbers of haddocks captured.

The statistics relating to the flat-fishes show a general uniformity in the variations, indicating a relative falling off in the abundance of plaice within the closed waters, and an increase in the number of dabs. The average number of plaice caught per haul of the net in the corresponding months of the three periods was 56·4 for the first period, 51·8 for the second, and 46·3 for the third. The percentage proportions of plaice among the total flat-fishes in the three periods were respectively 42·4, 34·3, and 29·5. Both the averages and the percentages therefore show a progressive decline in the abundance of plaice within the closed waters. The averages and percentages of lemon soles are less uniform. The average in the first period was 22, in the second period 19, and in the third 20; showing therefore a decrease from the first to the second, and a slight increase from the second to the third. The respective percentages were 16·5, 12·6, and 12·7.

The corresponding figures referring to common dabs show an increase from one period to another, but the increase from the second to the third period is comparatively slight. The respective averages for the three periods are 36·5, 52·3, and 53·8, and the percentages 27·5, 34·6, and 34·3. The averages and percentages of long rough dabs show a progressive increase from one period to another. In the first period the average number per haul of the net was 16·2, in the second period it was 25·2, and in the third period 33·5; the corresponding percentages being 12·2, 16·7, and 21·3

The total number of other flat-fishes taken was too small to make their averages of any value, viz., 174 witches, 13 turbot, 8 brill, and 283 flounders; the averages for the witches in the three periods were 0·6, 0·9, and 1·5, and for the flounders 0·8, 1·0 and 1·0.

The renewed investigation concerning the change in abundance of the various species within the closed waters confirms the conclusions reached in 1896 on this subject. It was then stated that "it appears to be fairly well proved that there has been a diminution of the more important flat-fishes in the closed waters, instead of an increase, as was anticipated," and that, on the other hand, the numbers of common dabs and long rough dabs had increased, and had to a certain extent taken the place of the more valuable kinds. The above figures, while they show these changes between the first and the second periods, also indicate that a balance has not yet been obtained, but that the decrease in plaice and the increase in long rough dabs still appear to continue within the closed waters. The increase in common dabs, as indicated by the recent hauls, is less marked, while lemon soles appear to have rather increased; and it may be that in the case of these species a balance has been, or is being established.

With regard to round fishes the averages do not allow any certain conclusion to be drawn. The abundance of these fishes, as tested by experimental fishing, while subject to the same vicissitudes as the flat-fishes, is subject to others in addition, due to their shoaling habits and more erratic movements. The diminution of haddocks, for example, from an average of 74·3 and a percentage of 62·0 in the period 1890-95, to an average of 3·9 and a percentage of 5·3 in the hauls in 1900-1, is obviously unassociated with the closure. The only round fish which shows a progressive increase in both the average and the percentage from one period to another is the gurnard, which spawns very largely indeed in the Firth of Forth, and enters it in summer for that purpose; but there is no satisfactory evidence that the closure has increased the number of round fishes generally within the closed area.

Experience shows that the satisfactory determination of the question in regard to round fishes would require more ample means of investigation than were available, because the separation of the fluctuations due to natural causes from any variation that might arise from the closure of the waters to trawling, is, for the reasons above stated, much more difficult than in the case of flat-fishes. Not only did the small size of the "Garland," and its comparative unseaworthiness, interfere with the completeness of the observations, but the small trawl used has proved a most inefficient instrument for the work, compared with the trawls used by ordinary trawlers. This inefficiency of the "Garland" in these respects has been pointed out in each of the Annual Reports since 1889.

North Sea Investigations.

In connection with the question of the impoverishment of the fishing grounds in the North Sea and the relative abundance of the food-fishes in the Moray Firth and territorial waters, an enquiry has been made by means of steam-trawlers fishing from the port of Aberdeen, the results of which are embodied in a paper in the present Report by Dr T. Wemyss Fulton, the Scientific Superintendent. Part of the investigation consisted in the employment of trawlers, as a rule once a month, for the most part in the Moray Firth, Aberdeen Bay and neighbourhood, and occasionally offshore, the results of 155 hauls of the otter-trawl being recorded. A number of experiments were also made with special nets and large collections of young fishes obtained.

In addition to the investigations referred to, detailed statistics were obtained regarding the fish landed at Aberdeen by a considerable number of trawlers. One series shows the quantities of the various kinds of fish landed on each trip, or voyage, by six steam-trawlers over a period of years; in two instances the period comprises sixteen years, from 1885 to 1900 inclusive, and in the other four cases it comprises ten years, from 1890 to 1900. The quantities of fish landed in each month and year by these vessels, and the number of voyages, are given in a series of Tables appended. It is shown that in recent years, especially since the use of the otter-trawl instead of the beam-trawl, the aggregate catch has in nearly all cases been increased. In the four years 1891-94, the four steam-trawlers referred to landed 72,409 cwts. of fish, while in the four years 1897-1900 they landed 86,837 cwts., or 14,428 cwts.

more. The increase was entirely in round fishes, the quantity of flat-fishes landed having diminished. The reduction in plaice and lemon soles was especially great; but, on the other hand, witches and megrims were landed in increased quantities, indicating that the fishing had been carried on on very different grounds in the earlier and later years, and that without information as to the places where the fish were caught, such statistics are of little value in connection with the question of the impoverishment of fishing grounds.

The second series of statistics were designed to remedy this defect, the places where the fish were caught being recorded as well as the quantities and the duration of the fishing operations. It is shown that the area of trawling has been greatly extended since 1891, and that new grounds, comprising in the North Sea the region between the fifty-fathom and the one hundred-fathom line, or about 30,000 square miles, have been opened up by the introduction of the otter-trawl. Most of the fish landed by trawlers in the corresponding period in 1901 were obtained from these new grounds, a circumstance which to a large extent accounts for the diminution of the quantity of plaice landed in recent years. Charts and Tables are appended showing the areas in which the fish were caught by the trawlers about which particulars were obtained in the first three months of 1891 and 1901, and during the whole of 1901.

The Hatching and Rearing of Food Fishes.

During the hatching season last year operations were confined to the plaice, of which, as already mentioned, 65,377,000 fertilised eggs were collected, and 51,800,000 plaice fry were obtained. In October the stock of breeding fishes in the pond numbered 625, and it was found that most of the females had well-developed eggs, showing that their condition in confinement from the previous season had been satisfactory. In December this stock was supplemented by other 581 fishes, obtained from trawlers, of which a number, as usual, subsequently died. On 8th January, when all the fishes were examined, there were 1071 in the pond, and of the females 560 were considered as likely to spawn normally, the other 240 females being uncertain and mostly immature. The first fertilised eggs were collected on 12th January, although spawning did not become general until more than a week later; it continued to increase for about a month and a half, and was maintained at a high level for other five weeks, most eggs being obtained between the end of the first week and the end of the third week in April. The last eggs were collected on 2nd May. Owing to cold weather with frost and snow in January and February, the temperature of the water was much reduced, and spawning on one or two occasions was interrupted.

The conditions for the hatching of so large a number of eggs were satisfactory, the salinity of the water falling below 1027 only on fourteen out of 110 days, and the filtration caused little trouble.

Observations on the Food of Fishes.

The observations contained in this paper by Mr. T. Scott refer chiefly to the food of small and immature fishes, but the food of several of the larger species is also described. The number of fishes specially dealt with is over 2000, and represents 56 different kinds, belonging to 37 genera. In the examination of these fishes special care was taken that it should be as exhaustive as possible, and the general results brought out tend to show that the food of small and immature fishes of all kinds consists largely of minute and young crustacea, and that though young shell-fishes and other invertebrates are also sometimes met with in the stomachs examined, they are usually much less frequently observed, and therefore, as a food supply for small fishes, they are not so important. It is also shown that minute crustacea form the chief constituent in the food of the young of many species, which when adult live mostly on other organisms.

In the preliminary part of the paper reference is made to the difficulty sometimes experienced in identifying the contents of fishes' stomachs, especially if these should consist of the remains of soft-bodied animals; and in connection with this it is pointed out that where the contents consist of fish remains, the earstones, if present, from their peculiar form or structure may sometimes be of use in assisting to identify the species to which the remains belong.

The Cod, Saithe, and Lythe.

The paper contributed to the Report by Dr. Williamson covers an investigation into the structure of these three species of the cod family, and is part of a research on the specific differences of the members of the group.

A revision of the species of this family is much to be desired; and as a basis for a stable classification, and for the fixing or elimination of certain doubtful species, the work detailed in the present Report was taken up. Three forms, viz., the cod, saithe, and lythe, are treated very fully. They are compared with one another as to their external characters, and also as to the shape of the bones which go to form the skeleton of the head.

The various external characters which distinguish the species from one another are very fully described, a series of measurements being given; while the differences and resemblances in the bones of the head are compared. The paper, which is illustrated by a series of plates, will, when completed, form a valuable memoir of the group.

The Parasites of Fishes.

The study of fish parasites is intimately associated with fishery investigations, and has, therefore, for the past few years had special attention devoted to it. Mr. T. Scott contributes an additional paper on the subject to the present Report. There is still considerable divergence of opinion as to whether these so-called parasites are really injurious to fishes or not. Weakly fish are occasionally captured, which on examination are seen to be infested with parasites, but it is not generally clear whether the emaciated condition of the fish is owing to their presence or has resulted from another cause, the parasites merely taking advantage of the reduced vitality of the fish. There are certainly instances in which parasites appear to be injurious ; flat-fishes for example, have been found to have had their gills partially destroyed by the swarms of young Caligidæ and *Lernœa* adhering to them. On the other hand there are numerous fishes such as cod, salmon, halibut, turbot, etc., seldom free from parasites of one kind or another, though apparently healthy.

Eighteen species of fish parasites are recorded in this paper, sixteen of which belong to the Copepoda and two to the Trematoda. Five of the copepods and one trematode are apparently new to science, the other trematode is new to Britain.

The Rate of Growth of Fishes.

The results of continued investigations on this subject are contained in a paper by Dr. Wemyss Fulton in the present Report, the fishes dealt with being the plaice, common dab, long rough dab, haddock, and whiting. It is shown that the growth of flat-fishes is very much slower than the growth of round-fishes. While a young haddock for example, at the end of its first summer's growth averages in length about six-and-three-quarter inches and weighs nearly an ounce-an-a-half, a young plaice of corresponding age measures about two-and-a-half inches and weighs about one-twelfth of an ounce. After the second summer's growth the haddock averages nearly eleven inches in length and about six-and-three-quarter ounces in weight, while a plaice of corresponding age averages five-and-three-quarter inches and weighs a little over one ounce. The differences in rate of growth are correlated with the change in conformation which the flat-fishes undergo.

Growth is also shown to be closely related to the temperature of the water, being accelerated in summer and retarded or arrested in winter in inshore waters; it is slower but more continuous in the deeper water where the range of seasonal temperature is much more restricted. Partly for this reason, and partly because of the later period of spawning, young haddocks taken in autumn in the deep water off the Shetland Isles are about two inches smaller, on an average, than in the inshore water at Aberdeen, but during the winter months they make up leeway considerably. In areas like the Firth of Forth, where the seasonal change of temperature is marked, the rate of growth varies accordingly, being rapid in summer and very slow in winter, while young plaice on the beaches, subjected to the greatest extremes of temperature, show the greatest variation, growth ceasing in winter.

The rate of growth of one and the same species may vary also according to the locality and independently of the temperature. Thus both the plaice, the common dab, and the long-rough dab grow more slowly on the West Coast than on the East Coast, and the same is true of the plaice in the south-eastern part of the North Sea, where the water is derived from the Channel. The long rough dab grows more rapidly in the Firth of Forth than off Aberdeen; still more slowly off the Shetlands, and slowest of all in the Clyde, where a dwarf race exists.

The size and age at maturity of the species mentioned were determined, the flat-fishes, in relation to their size, reaching maturity at a later age than the round fishes, and the males becoming mature earlier than the females. The paper is illustrated by a series of plates.

THE INVERTEBRATE FAUNA.

The collections of crustacea made in connection with the fishery investigations carried on during the past year have in a number of instances proved to be of considerable interest, and are described in a paper by Mr T. Scott. Several apparently undescribed species have been obtained in these collections, while others though recorded elsewhere have not previously been obtained in Scottish waters. The number of the former recorded in this paper is ten, and it has been found necessary to institute new genera for five of them, all belonging to the Copepoda. Two rare parasitic forms are described—one parasitic on an Amphipod crustacean and the other on a starfish.

Mr F. G. Pearcey also contributes a paper on the echinoderms of the Moray Firth, with Tables showing their distribution at various parts of the area.

We have the honour to be,

Your Lordship's most obedient servants,

ANGUS SUTHERLAND, *Chairman.*
D. CRAWFORD, *Deputy-Chairman.*
D'ARCY W. THOMPSON.
J. RITCHIE WELCH.
W. R. DUGUID.
L. MILLOY.
D. MEARNS.

WM. C. ROBERTSON, *Secretary.*

SCIENTIFIC REPORTS.

I. REPORT ON THE TRAWLING EXPERIMENTS OF THE "GARLAND," AND ON THE FISHERY STATISTICS RELATING THERETO.

INTRODUCTORY.

During last year the trawling investigations of the "Garland" were conducted in the Moray Firth, the Firth of Forth, and the Firth of Clyde, and a number of special hauls were made with the shrimp-net and with small-meshed nets. The work at each station consists in—(1) trawling along a selected line for a specified distance, determined usually by cross-bearings, all the fish caught being enumerated, measured, and recorded; (2) observations on the temperature, density, and transparency of the water, on the condition of the weather, &c.; (3) collections of the pelagic organisms floating in the water. The Tables relating to the chief of these investigations will be found appended to this Report.

The fishery statistics which have been collected in the districts of the Moray Firth in connection with the trawling experiments there, and which show the quantities of the various kinds of fish caught by line fishermen within the closed waters in each month of the year, and for the whole year, with the respective averages per "shot" of the lines, are also appended, and are discussed below. These statistics were collected under the supervision of the Fishery Officers of the various districts concerned. The trawling records were made by Mr. F. G. Pearcey, the naturalist on board the "Garland."

As in former years, the work of the "Garland" was frequently interrupted by stormy weather, especially during the winter and autumn months, her small size requiring her to lie up for considerable periods in port. To the detentions from this cause were added those arising from the necessity of repairs and the annual overhaul, after which she was ordered to proceed to the West Coast.

The insufficiency of the vessel for the work she was intended to perform has been referred to in previous Reports, with respect not only to her unseaworthiness, but to the ineffectiveness of her small trawl in catching fish. In this particular the hauls of the commercial trawlers (p. 92) form a striking contrast.

The Moray Firth.

A number of hauls were made in the Cromarty Firth in January, as recorded in the Tables, but they were insufficient to enable a comparison to be made with former years. The statistics showing the catches by line fishermen within the Moray Firth, given in the appended Tables, indicate a considerable fall in the gross quantity of fish caught, and a slight decrease in the average catch per shot of the line. The quantity is the lowest since these statistics began to be collected in 1894, as one might expect from the gradual decadence of line-fishing on the Scottish coast generally, which is referred to in Part I. of the present Annual Report (p. xxi.).

The quantities and the average catch per shot are given in the following Table for each of the seven districts during the last six years :—

District.	1896.		1897.		1898.		1899.		1900.		1901.	
	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.
Wick, - -	31,556	5·40	44,258	6·16	31,383	6·49	26,116	5·106	23,927	4·535	28,649	4·339
Lybster, - -	4,241	2·87	7,118	4·22	4,438	3·26	4,309	1·398	3,468	1·506	3,043	1·955
Helmsdale, -	18,360	4·71	17,148	4·93	13,143	3·84	12,752	3·85	10,330	3·606	8,927	3·185
Cromarty, -	15,317	2·51	14,736	2·48	12,428	2·065	11,183	1·815	11,070	1·839	9,378	1·653
Findhorn, -	63,521	4·46	46,694	2·66	30,770	2·088	31,825	1·957	21,724	2·31	14,286	2·016
Buckie, - -	57,450	5·05	50,067	4·77	41,102	4·24	34,915	3·357	22,855	3·209	16,252	2·690
Banff, - -	66,471	3·82	61,329	3·70	36,057	2·13	26,675	2·406	18,471	1·834	11,918	1·853
Total, -	256,916	4·26	241,350	3·83	169,321	3·244	147,775	2·666	111,845	2·600	92,453	2·554

These figures show how great has been the progressive decline in recent years in the quantities of fish taken by line within the closed waters of the Moray Firth, notwithstanding the benefits accruing from the closure. The quantity landed last year was the lowest throughout the period of eight years during which these statistics have been collected, and 19,392 cwts. less than in 1890. The average take per "shot" has also diminished as well as the totals, as the following figures show :—

Total.	1894	1895	1896	1897	1898	1899	1900	1901
Quantity, -	218,494	258,589	256,916	241,350	169,321	147,775	111,845	92,453
Average, -	3·05	4·43	4·26	3·83	3·25	2·66	2·60	2·55

In three of the districts—namely, Lybster, Helmsdale, and Banff—all the line-caught fish landed were caught within the closed waters. In the other cases a varying proportion of the line fish landed was derived from other areas.

The decrease in the quantity was shared by each of the seven districts except one—viz., Wick—where there was a slight increase in the total—from 23,927 cwts. to 28,649 cwts. The average per shot was, however, a little less, 4·34, compared with 4·53 in 1900. The greatest decline in quantity was exhibited in the three districts on the South Coast—Banff, Buckie, and Findhorn. The quantity of fish caught by line in the Moray Firth and landed in the Banff district last year was 11,918 cwts., as against 18,471 cwts. in 1900, and 26,675 cwts. in 1899; in 1895 the corresponding quantity was 76,491 cwts. In Buckie district the total fell from 22,855 cwts. in 1900 to 16,252 cwts. in 1901; in 1899 it was 34,915 cwts. and in 1896 57,450 cwts. In Findhorn district the quantity in 1891 was 14,286 cwts., as against 21,724 cwts. in the previous year, and 68,761 cwts. in 1895. The average catch per "shot" increased slightly in Lybster and Banff districts, and diminished in the other districts.

In connection with this rapid decline in the quantity of fish caught by line in the closed waters of the Moray Firth—amounting to 164,463 cwts. in the course of six years—it would be of interest to determine the quantity caught by foreign trawlers frequenting the Firth. On this point, however, information is defective. In the course of the year twenty-six different foreign trawlers were observed by the cruisers fishing at one time or another within the Moray Firth—viz., 13 under the Norwegian flag, 3 Danish, 3 Icelandic, 2 Dutch, 3 Belgian, and 2 German. Many of these, as, for example, the German vessels, were there for a few days only, but most of the Norwegian trawlers appear to fish in the Moray Firth with regularity. According to the returns, the quantity of fish landed by the foreign trawlers at Grimsby and Hull, after they had been observed fishing in the Moray Firth, amounted to a little over 7,000 cwts. No doubt fish caught there were also landed sometimes at foreign ports, but, on the other hand, a proportion of the fish landed at Grimsby and Hull may have been taken elsewhere than in the Moray Firth. The quantity, it will be observed, bears a very small proportion to the shortage in line-caught fish.

With respect to the various kinds of fish taken by line within the closed area, the quantities and averages for last year and the preceding four years are as follow:—

FISH.	1897.		1898.		1899.		1900.		1901.	
	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.	Cwts.	Average.
Cod	79,731	1·26	56,208	1·07	52,753	0·95	33,572	0·779	32,859	0·907
Ling	3,544	0·056	2,567	0·049	2,883	0·052	2,392	0·055	3,247	0·09
Torsk	25	—	43	—	82	—	18	—	147	0·004
Saithe	11,761	0·18	14,881	0·28	9,383	0·169	9,126	0·212	4,228	0·12
Haddock	126,031	2·004	81,098	1·554	68,075	1·229	54,887	1·275	39,273	1·08
Whiting	3,319	0·052	1,535	0·029	1,323	0·023	1,736	0·04	1,940	0·05
Turbot	16	—	13	—	60	—	4	—	9	—
Halibut	707	0·011	730	0·013	762	0·013	253	0·005	675	0·02
Lemon Sole	14	—	1	—	6	—	4	—	11	—
"Flounder, Plaice, and Brill"	3,978	0·063	3,425	0·065	5,005	0·09	4,242	0·098	3,639	0·10
Conger	1,533	0·024	826	0·015	741	0·013	333	0·007	519	0·014
Skate	3,999	0·063	3,273	0·062	3,584	0·064	2,509	0·058	3,737	0·10
Other kinds	6,663	0·105	4,574	0·087	3,116	0·056	2,769	0·064	2,169	0·06

The decline in the quantity of haddocks is very great, the decrease amounting last year to 15,614 cwts.; and each year has shown a corresponding fall compared with the preceding year. In 1895, the quantity caught by line in the closed area was 178,370 cwts., in 1894 it was 156,703 cwts., and in 1897 126,031 cwts. The decrease of the annual catch in the seven years is thus equal to 139,097 cwts. The catch of cod was much more steady, the decline being small, viz. 713 cwts., but in previous years the quantity was very much greater, *e.g.* 79,731 cwts. in 1897. Ling showed an increase from 2392 to 3247 cwts., and the quantity of whiting was also somewhat greater than in the preceding year, and there was also an increase in halibut and skate. The quantity of "flounder, plaice, and brill" was rather less, viz. 3639 cwts., as against 4242 cwts., but the average catch per shot was somewhat higher, viz., 0·1, compared with 0·09. The average per shot was also rather higher for cod, ling, and whiting, and less for haddock and saithe. The quantity of turbot returned as caught by line in the Moray Firth last year was 9 cwts., as against 4 cwts. in the preceding year, and 60 cwts. in 1899; and there were 11 cwts. of lemon soles as compared with 4 cwts.

The statistics dealing with the number of "shots" of the line-fishing boats in the Moray Firth, or the number of trips to the fishing grounds, show that the decrease noted last year has continued. The number of shots both of the large and the small boats diminished in 1901 compared with 1900, the decrease being marked in the large or great-line boats. The figures for the past eight years are as follows :—

	1894	1895	1896	1897	1898	1899	1900	1901
Large Boats,	7,082	7,710	11,915	14,039	10,330	12,665	5,595	4,197
Small Boats,	54,866	50,643	48,346	48, 36	41,853	42,808	33,572	31,992
	61,948	58,353	60,261	62,875	52,183	55,473	39,167	36,189

In both cases the numbers are much less than in any previous year. As already indicated, the cause of this decay in line-fishing is to be sought in the general conditions of the fishing industry, raiher than in any special conditions in the Moray Firth, since the same change is manifested on other parts of the coast.

The detailed statistics for each of the districts are as follows :—

Year.	Wick.		Lybster.		Helmsdale.		Cromarty.		Findhorn.		Buckie.		Banff.	
	Large.	Small.	Large.	Small.	Large.	Small.	Large.	Small.	Large.	Small.	Large.	Small.	Large.	Small.
1894	396	7,295	22	876	199	4,288	83	6,871	3,132	10,544	2,422	9,104	828	15,888
1895	1,553	4,155	90	965	366	3,614	12	6,561	2,653	11,481	1,929	8,907	1,107	14,930
1896	2,774	3,063	208	1,266	363	3,535	13	6,078	3,772	10,450	2,935	8,420	1,850	15,534
1897	3,911	3,266	264	1,440	466	3,010	3	5,918	4,738	12,810	2,537	7,943	2,120	14,449
1898	1,918	2,846	148	1,211	448	2,971	2	6,015	4,148	10,577	1,958	7,727	1,708	10,506
1899	1,865	3,249	1,932	1,149	382	2,930	61	6,146	5,377	10,883	1,940	8,476	1,108	9,975
1900	1,524	3,751	1,563	766	246	2,563	—	6,019	1,123	8,279	707	6,441	432	9,628
1901	1,192	5,410	673	883	357	2,445	1	5,672	546	6,538	1,096	4,945	332	6,099

In all the districts, except Helmsdale, Cromarty, and Buckie, the number of shots of the large boats decreased, the decrease being greatest in Findhorn district. The number of shots of the small boats declined in the districts of Helmsdale, Cromarty, Findhorn, Buckie, and Banff, especially in the three latter, and increased in the districts of Wick and Lybster.

Firth of Forth.

The stations within the closed waters of the Firth of Forth were examined in September 1900, and in the following March, April, and July. The results are of interest owing to the interval which has elapsed since this area was closed to trawlers, and since the stations were last examined. It is desirable therefore to compare the hauls recently made with those made in corresponding periods of previous years, and which were specially dealt with in the Fourteenth Annual Report.* In that Report the catches taken in the ten years 1886-1895 were described, the ten years being grouped into two periods of five years each for comparison, viz. 1886-1890 and 1891-1895.

* Part III., p. 128.

The hauls in September 1900 were made at Stations I.—V., and the total number of fishes of all kinds caught was 1220, the average per haul being thus 244. The number of flat-fishes taken was 654, with an average of 130·8, and the number of round fishes 544, with an average per haul of 108·8. In September of the first period—1886-1890—fifteen hauls were made at these stations and 5452 fishes were caught, the average per haul being 363·5. The number of flat-fishes was 3178, with an average of 211·9, and the number of round fishes 2172, the average being 144·8. In the second period—1891-1895—the number of hauls at the same stations was twenty-four, 9272 fishes being taken, or an average of 386·3 per haul. The flat-fishes numbered 5181, the average being 215·9, and the round fishes 3948, with an average of 164·5. In the hauls in September 1900, 1220 fishes were taken, the average being 244. Flat-fishes numbered 654, with an average of 130·8 per haul, and round fishes 544, with an average of 108·8.

In March, in the first period, 1362 fishes were taken in the fourteen hauls, the average being 97·3. Flat-fishes numbered 906, the average per haul being 64·7, and round fishes 378, with an average of 27. In the twenty-six hauls in the second period 3456 fishes were taken, the general average being 132·9. The number of flat-fishes was 2331, and the average 89·6, the number of round fishes being 963 and the average 37. In the seven hauls in 1901 the number of fishes taken was 970, flat-fishes numbering 694 and round fishes 217, the respective averages per haul being 138·6, 99·1, and 31·0.

PERIOD.	Hauls.	Flat-fishes.			Round Fishes.			Total.*	
		No.	Average	°/₀	No.	Average	°/₀	No.	Average
1st—1886-1890.									
Septemoer	15	3,178	211·9	58·3	2,172	144·8	39·8	5,452	363·5
March	14	906	64·7	66·5	378	27·0	27·8	1,362	97·3
April	21	2,054	97·8	66·6	931	44·3	30·2	3,082	146·8
July	15	2,509	167·3	43·5	3,127	208·5	54·3	5,763	384·2
Total	65	8,647	133·0	55·2	6,608	101·7	42·2	15,659	240·9
2nd—1891-1895.									
September	24	5,181	215·9	55·9	3,948	164·5	42·6	9,272	386·3
March	26	2,331	89·6	67·4	963	37·0	27·9	3,456	132·9
April	28	3,073	109·7	61·4	1,740	62·1	34·7	5,006	178·8
July	28	5,420	193·6	46·4	6,051	216·1	51·9	11,670	416·8
Total	106	16,005	151·0	54·4	12,702	119·8	43·2	29,404	277·4
3rd—1900-1901.									
September	5	654	130·8	53·6	544	108·8	44·6	1,220	244
March	7	694	99·1	71·5	217	31·0	22·4	970	138·6
April	7	1,199	171·3	65·7	543	77·6	29·7	1,826	260·9
July	7	1,531	218·7	68·8	615	87·9	27·6	2,225	317·9
Total	26	4,078	156·8	65·3	1,919	73·8	30·7	6,241	240·0

* Including skates and "other fish."

In April in the first period twenty-one hauls yielded 3082 fishes, the average per haul being 146·8. The number of flat-fishes was 2054, and the average 97·8; the number of round fishes was 931, and the average 44·3. In the twenty-eight hauls in the second period 5006 fishes were caught, giving an average of 178·8. Flat-fishes, numbering 3073, gave an average of 109·7, and round fishes, numbering 1740, averaged 62·1 per haul. In the seven hauls in 1901, 1826 fishes were secured, with an average of 260·9 per haul. The number of flat-fishes was 1199, and the average 171·3, and the number of round fishes 543, the average being 77·6.

In July in the first period 5763 fishes were captured in the fifteen hauls, the average being 384·2. The flat-fishes numbered 2509, the average per haul being 167·3; round fishes numbered 3127, with an average of 208·5. In the twenty-eight hauls in the second period 11,670 fishes were taken, and the average per haul was 416·8. Flat-fishes, numbering 5420, gave an average of 193·6, and round fishes, which numbered 6051, showed an average per haul of 216·1. In the seven hauls in 1901 the number of fishes caught was 2225, the average being 317·9. The number of flat-fishes was 1531, with an average of 218·7, and the number of round fishes 615, with an average of 87·9.

Taking all the corresponding months in the three periods, the number of fishes taken in the 65 hauls in the first period was 15,659, the average being 240·7. In the 106 hauls in the second period the number captured was 29,404, and the average 277·4. In the 26 hauls in the third period the total was 6,241, and the average per haul 240·0. In the first period 8647 flat-fishes, with an average of 133·0, and 6608 round fishes, with an average of 101·7, were taken. In the second period the flat-fishes numbered 16,005, the average per haul being 151·0, and the round fishes numbered 12,702, with an average of 119·8. In the third period 4078 flat-fishes were taken, the average being 156·8, and 1919 round fishes, with an average of 73·8.

These figures indicate that the average abundance of all kinds of fish, taken together, in the closed waters, in the months named, was much the same in the period 1886-1890, as in 1900-1901, while there was an increase in the second period. The average for flat-fishes is greater in each successive period, and greater in each month of the successive periods, with the exception of September in the last. There is not the same uniformity in the average catch of round fishes, a circumstance due, as we shall see, for the most part to the great fluctuations in the numbers of haddocks captured.

Flat-fishes.

Turning to the consideration of the various species of flat-fishes in the three periods, it will be found that the averages in certain cases show considerable uniformity of variation, indicating a general falling-off in the abundance of plaice and lemon soles within the closed waters, and an increase in the number of dabs. The particulars are set forth in the accompanying Table. In September in the first period the average for plaice was 85·7 per haul; in the second period it was 63·2; and in 1890, 38·6. In March in the first period it was 32·6; in the second, 36·8; and in the third, 28·1. In April in the first period it was 44·0; in the second, 41·9; and in the third, 46·7. In July in the first period it was 66·4; in the second, 65·9; and in the third, 69·4. The averages for all the months combined in each of the three periods are, respectively, 56·4 for the first, 51·8 for the second, and 46·3 for the third, thus showing a progressive decline. In the first period no hauls were made in March and July of the most productive year, viz. 1887, or in 1888, which was less productive. In 1887 the average for June was 88·9, and for August, 100·1; in 1888 the averages were, 33·6 for June, and 111·3 for August. If the mean of these were taken as representing an approximate average in the intermediate month, July, such averages would be 94·5 for 1887, and 72·4 for 1888, and the average of the 43 hauls for the month would be 77·5.

The percentage of plaice among the total flat-fishes taken in each month shows the same change, with more uniformity, as might be expected. In the three periods the respective percentages are—for September, 40·5, 29·5, and 29·5; for March, 50·4, 41·1, and 28·4; for April, 45·0, 38·2, and 27·3; and for July, 39·7, 34·1, and 31·7. In each case, without any exception, the later period furnished the lower percentage, and the earliest period the highest. The percentage proportion of plaice among the total flat-fishes for the various months combined in each of the periods is 42·4, 34·3, and 29·5, showing the same variation—viz., successive diminution—as with the average per haul. The average indicates a decrease from the first to the last of 10·1 plaice per haul, and the percentage, in the same interval, a decrease of 12·9 plaice per cent. of the total flat-fishes. A diminished percentage of one species might, of course, exist along with an actual increase in its numbers (or average per haul), provided other species in the group are present in larger ratio—and *vice versa*; but when it exists along with a decreased average, it is evidence that the species has actually, as well as relatively, become reduced in numbers.

The averages and percentages of lemon soles are much less uniform. The averages in the three periods are—for September, 44·6, 27·1, 10; for March, 4·6, 6·1, 5·1; for April, 18·5, 14·6, 21·3; for July, 20·7,

Period.	Hauls.		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Flndrs.	Turbot.	Brill.	Total.
September, 1st.— 1886-90	15	No.	1,286	669	21	884	318	—	—	—	3,178
		Avg.	85·7	44·6	1·4	58·9	21·2	.	.	.	211·9
		°/o	*40·5*	*21·0*	*0·7*	*27·8*	*10·0*	.	.	.	.
2nd— 1891-95.	24	No.	1,518	651	16	2,146	844	4	1	1	5,181
		Avg.	63·2	27·1	0·7	89·5	35·2	0·2	.	.	215·9
		°/o	*29·5*	*12·6*	*0·3*	*41·4*	*16·2*	.	.	.	.
1890.	5	No.	193	50	.	219	191	1	.	.	654
		Avg.	38·6	10	.	43·8	38·2	0 2	.	.	130·8
		°/o	*29·5*	*7·7*	.	*33·5*	*29·2*	.	.	.	.

Period.	Hauls.		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Flndrs.	Turbot.	Brill.	Total.
March, 1st.— 1886-90.	14	No.	457	62	13	155	188	28	3	.	906
		Avg.	32·6	4·6	1·0	11·1	13·4	2·0	0·2	.	64.7
		°/₀	*50·4*	*6·8*	*1·4*	*17·1*	*20·7*	*3·1*	*0·3*	.	.
2nd.— 1890-95.	26	No.	957	159	38	505	583	85	.	4	2,331
		Avg.	36·8	6·1	1·5	19·4	22·4	3·3	.	0·2	89·6
		°/₀	*41·1*	*6·8*	*1·6*	*21·7*	*25·0*	*3·6*	.	.	.
1901.	7	No.	197	36	28	275	134	24	.	.	694
		Avg.	28·1	5·1	4·0	39·3	19·1	3·4	.	.	99·1
		°/₀	*28·4*	*5·2*	*4·0*	*39·6*	*19·3*	*3·6*	.	.	.
April, 1st.— 1886-90.	21	No.	925	389	9	428	260	41	2	.	2,054
		Avg.	44·0	18·5	0·4	20·4	12·4	1·9	0·1	.	97·8
		°/₀	*45·0*	*18·9*	*0·4*	*20·8*	*12·6*	*0·2*	.	.	.
2nd.— 1891-95.	28	No.	1,174	408	20	856	536	78	1	.	3,073
		Avg.	41·9	14·6	0·7	30·6	19·1	2·8	.	.	109·7
		°/₀	*38·2*	*13·3*	*0·7*	*27·8*	*17·4*	*2·5*	.	.	.
1901.	7	No.	327	149	6	428	278	10	.	1	1,199
		Avg.	46·7	21·3	0·9	61·1	39·7	1·4	.	0·1	171·3
		°/₀	*27·3*	*12·4*	*0·5*	*36·5*	*23·2*	*0·9*	.	.	.
July, 1st.— 1886-90.	15	No.	996	311	.	911	287	3	1	.	2,509
		Avg.	66·4	20·7	.	60·7	19·1	0·2	0·1	.	167·3
		°/₀	*39·7*	*12·4*	.	*36·3*	*11·4*	.	.	.	.

Period.	Hauls.		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Flndrs.	Turbot.	Brill.	Total.
2nd,— 1891-95.	28	No.	1,846	801	17	2,035	713	3	3	2	5,420
		Avg.	65·9	28·6	0·6	72·7	25·5	0·1	0·1	0·1	193·6
		°/o	*34·1*	*14·8*	*0·3*	*37·5*	*13·1*	.	.	.	.
1901.	7	No.	486	286	6	478	267	6	2	.	1,531
		Avg.	69·4	40·9	0·9	68·3	38·1	0·9	0·3	.	218·7
		°/o	*31·7*	*18·7*	*0·4*	*31·2*	*17·4*	*0·4*	.	.	.

28·6, 40·9. The averages for all the months combined in each of the periods are: 22·0 for the first, 19·0 for the second, and 20·0 for the third. The percentages for the various months in the three periods are: for September, 21·0, 12·6, 7·7; for March, 6·8, 6·8, 5·2; for April, 18·9, 13·3, 12·4; for July, 12·4, 14·8, 18·7. The percentages for all the months combined in each of the periods are, 16·5, 12·6, and 12·7, respectively. The general average and percentage for the periods agree in showing an actual decline between the first and the second periods, and between the first and the third; but the average for the third is slightly higher than the average for the second, while the percentage is practically the same. The evidence from these figures, therefore, while showing that an actual decrease occurred from the first to the second periods, indicates an apparent increase from the second to the third. As stated above, no hauls were made in the first period in March or July in 1887 and 1888. The average for June, 1887, was 62·0, and for August, 61·6; for June, 1888, it was 25·7, and for August 30·0, indicating an approximate average for the intermediate month of 61·8 and 27·9, respectively. If these averages were combined with those actually made in July in other years, the indicated average would be 36·4 instead of 20·7.

The averages and percentages for common dabs show a general increase from one period to another.

The increase from the first to the second period is shown in each of the months, both in the averages and the percentages. In March and April there is a similar increase in both from the second to the third period, and in September and July a decrease. The averages for the various months in the three periods are as follow:—September, 58·9, 89·5, 43·8; March, 11·1, 19·4, 39·3; April, 20·4, 30·6, 61·1; July, 60·7, 72·7, 68·3. The averages for all the months combined, in each period, are successively, 36·5, 52·3, 53·8. The percentages for the various months are—for September, 27·8, 41·4, 33·5; for March, 17·1, 21·7, 39·6; for April, 20·8, 27·8, 36·5; for July, 36·3, 37·5, 31·2. The percentages for the three periods, with the months combined in each, are, 27·5, 34·6, 34·3. It will thus be observed that the increase from the second to the third period is much smaller than from the first to the second. In the first period no hauls were made in March or July in the most productive year, 1887, nor in 1888. The averages for June and August in 1887 were, respectively, 49·3 and 38·4; in 1888 the corresponding averages were 26·7 and 45·7, the indicated approximate averages for the intermediate month being 43·9 and 36·2, respectively. If these are combined with the average for the hauls actually made in July in the other years, the indicated average would be 47·2 instead of 60·7.

In the case of long rough dabs the figures show an increase in all the months, from one period to another, both in the averages and percentages, except for March, 1901. The averages for the various months in the three periods are these:—September, 21·2, 35·2, 38·2; March, 13·4, 22·4, 19·1; April, 12·4, 19·1, 39·7; July, 19·1, 25·5, 38·1. The averages for the various months combined, in each period, are, 16·2, 25·2, 33·5. The percentages for the various months in the three periods are, for September, 10·0, 16·2, and 29·2; for March, 20·7, 25·0, 19·3; for April, 12·6, 17·4, 23·2; and for July, 11·4, 13·1, 17·4; and the percentages for the months combined in each period are, 12·2, 16·7, 21·3. These figures show that the long rough dabs have increased in abundance since the closure, both absolutely and relatively, and that the increase apparently continues. As stated, no hauls were made in March and July in 1887 and 1888. In 1887 the June average was 22·7, and the August average 25·9; in 1888 the corresponding averages were 11·6 and 21·7, the mean being 24·3 and 16·6. If combined with the July hauls in other years, the indicated average would be 20·0 instead of 19·1.

The numbers of the other flat-fishes taken are comparatively small. In the first period 43 witch soles were caught, the average being 0·6, and the percentage 0·5; in the second period the number was 91, the average being 0·9, and the percentage 0·6; in the third period the number was 40, the average 1·5, and the percentage 1·0. The number of flounders taken in the first period was 72, with an average of 1·1 and a percentage of 0·8; in the second period the number caught was 170, the average being 1·6, and the percentage 1·0; in the third period the number was 41, the average 1·6, and the percentage 1·0. So far as the very scanty evidence goes, therefore, these two species appear to have increased. Thirteen turbot were taken, six in the first period, five in the second, and two in the third; and eight brill, viz., seven in the second period and one in the third. The total flat-fishes for each period are as follow:—

	Hauls.		Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	Long Rough Dab.	Fldrs.	Turbot.	Brill.	Total.
I.	65	No.	3,664	1,431	43	2,378	1,053	72	6	.	8,647
		Avg.	56·4	22·0	0·6	36·5	16·2	1·1	0·1	.	133·0
		°/o	*42·4*	*16·5*	*0·5*	*27·5*	*12·2*	*0·8*	.	.	.
II.	106	No.	5,494	2,019	91	5,542	2,676	170	5	7	16,005
		Avg.	51·8	19·0	0·9	52·3	25·2	1·6	·05	·07	151
		°/o	*34·3*	*12·6*	*0·6*	*34·6*	*16·7*	*1·0*	.	.	.
III.	26	No.	1,203	521	40	1,400	870	41	2	1	4,078
		Avg.	46·3	20·0	1·5	53·8	33·5	1·6	0·1	.	156·8
		°/o	*29·5*	*12·7*	*1·0*	*34·3*	*21·3*	*1·0*	.	.	.

Round Fishes.

The averages for round fishes show much greater variation and diversity, as one might expect, and this is especially the case with haddocks. The particulars for the three periods are :—

	Hauls.		Cod.	Haddock.	Whiting.	Gurnard.	Total.
I.	65	No.	954	3,462	1,495	697	6,608
		Average.	14·7	53·3	23	10·7	101·7
		°/₀	*14·1*	*52·4*	*22·6*	*10·5*	.
II.	106	No.	1,510	7,873	1,728	1,591	12,706
		Average	14·2	74·3	16·3	15·0	119·8
		°/₀	*11·9*	*62·0*	*13·6*	*12·5*	.
III.	26	No.	542	102	726	549	1,919
		Average	20·9	3·9	27·9	21·1	73·8
		°/₀	*28·2*	*5·3*	*37·7*	*28·6*	.

The average for cod, which was practically the same in the first and second periods, shows an increase in the third; that for haddocks, which indicated a considerable increase in the second period, shows a still more marked decrease in the third, viz., from 74·3 to 3·9. The average for whitings decreased during the second period and increased during the third, and that for gurnards increased throughout. Taking tbe various months in the three periods, the averages for cod in September were, 20·8, 16·9, and 18; in March, 16·7, 15·2, and 18·6; in April, 7·7, 11·5, and 27·3; and in July, 16·5, 12·7, and 18·7.

The averages for haddocks were, in September, 85·9, 94·8, and 1·4; in March, 3·1, 11·6, and 1·3; in April, 9·3, 40·0, and 2·6; in July, 128·9, 157·1, and 9·7.

The averages for whitings were, in September, 25·3, 29·2, and 74·6; in March, 7·0, 9·7, and 11·1; in April, 13·8, 7·1, and 25·9; and in July, 48·5, 20·6, and 13·4.

The averages for gurnards were, in September, 12·8, 23·5, and 14·8; in April, 13·6, 11·6, and 21·9; and in July, 14·6, 24·6, and 46·0.

The diversity and irregularity of these averages are such that little of any value can be deduced from them, and the numbers are, as a rule, small. They show the fluctuations which take place in the abundance of round fishes under ordinary circumstances rather than the effect of closure.

Skates and other Fishes.

The evidence shows that skates and rays have rather increased than diminished in the closed waters. In the first period the number taken was 145, and the average 2·2; in the second the number was 231, and the average 2·2; in the third the number was 92, and the average 3·5. In September the averages were, 3·5, 2·4, 1·6; in March, 1·6, 2·2, and 3·3: in April, 1·7, 2·2, and 5·9; in July, 2·4, 1·9, and 2·9. The same remark applies to "other fishes," which are for the most part inedible, the averages for each of the three periods being 4·0, 4·4, and 5·8.

The renewed investigation above detailed concerning the change in abundance of the various species within the closed waters confirms the conclusions reached in 1896 on this subject.* It was then stated that "it appears to be fairly well proved that there has been a diminution of the more important flat-fishes in the closed waters, instead of an increase, as was anticipated," and that, on the other hand, the numbers of common dabs and long rough dabs had increased, and had to a certain extent taken the place of the more valuable kinds. The above figures, while they show that these changes occurred between the first and the second periods of years, also indicate that a balance has not yet been established, but that the decrease in plaice and the increase in long rough dabs still appear to continue within the closed waters. The increase in common dabs, as indicated by the recent hauls, is less marked, while lemon soles appear to have rather increased; and it may be that in the case of these species a balance has been, or is being, established. It will be seen from the Table on p. 27 that in the first period the number of plaice caught exceeded the number of common dabs by 1286; in the second period the number of common dabs exceeded the number of plaice by 48, and in the third period the excess of dabs was 197. In the first period the number of lemon soles was greater than the number of long rough dabs by 378 (1431 and 1053), in the second period the long rough dabs exceeded the lemon soles by 657 (2676 and 2019), and in the third period by 349 (870 as against 521).

The probable explanation of the falling off in the numbers of plaice and lemon soles in the closed waters and the increase of dabs is given in detail in the Report referred to, viz. (1) increased capture of the two former species in the off-shore waters where they spawn, so that a considerable diminution has occurred in the number of floating eggs and fry which form the main source of supply to the waters inshore; (2) the relatively greater protection of the spawning dabs, which spawn to a large extent inshore; (3) the selective influence of the trawl net, which takes a much larger proportion of plaice and lemon soles that enter it than of dabs, which are smaller in size, and escape in large numbers through the meshes of the net. The results of further experiments on the latter subject are described in last year's Report† in which it is shown, for example, that 91 per cent. of the long rough dabs and 69·8 of the common dabs that entered an ordinary otter trawl, used in commercial fishing, made their way out through tbe meshes and escaped, while the percentage of plaice that escaped in this way was only 0·4.

With regard to round fishes, as already stated, the averages do not allow a certain conclusion to be drawn. The abundance of these fishes, as tested by experimental fishing, while subject to the same vicissitudes as the flat-fishes, is subject to others in addition, due to their shoaling habits and more erratic movements. The diminution of haddocks, for example, from an average of 74·3 and a percentage of 62·0 in the period 1890-95, to an average of 3·9 and a percentage of 5·3 in the hauls in 1900-1, is obviously unassociated with the closure. The only round fish which shows a progressive increase in both the average and the percentage from one period to another is the gurnard, which spawns very largely indeed in the Firth of Forth, and enters it

* *Fourteenth Annual Report*, Part iii. p. 144, *et seq.*
† *Nineteenth Annual Report*, Part iii., p. 62, *et seq.*

in summer for that purpose;* but there is no satisfactory evidence that the closure has increased the number of round fishes generally within the closed area.

Experience shows that the satisfactory determination of the question in regard to round fishes would require more ample means of investigation than were available, because the separation of the fluctuations due to natural causes from any variation that might arise from the closure of the waters to trawling, is, for the reasons above stated, much more difficult than in the case of flat-fishes. Not only did the small size of the "Garland," and its comparative unseaworthiness, interfere with the completeness of the observations, but the small trawl used has proved a most inefficient instrument for the work, compared with the trawls used by ordinary trawlers.† This inefficiency of the "Garland" in these respects for the work assigned to it has been pointed out in each of the Annual Reports since 1889.

Firth of Clyde.

The stations in the Firth of Clyde were examined in October, November, and December, but the work was considerably interrupted owing to stormy weather and other causes. The number of hauls made at the stations in the Firth of Clyde proper (Nos. I.-XII.) was twelve, Stations I.-IV. and Station VI. being trawled over in October, and Stations V. and VII.-XII. in November. The stations in Loch Fyne—XIII.-XVII.—were examined in October, November, and December. The catches were, as a rule, very small, ranging at the outer stations (I.-XII.) from 13 to 405 fishes, the average being 95·8 per haul, and at the stations in Loch Fyne from 4 to 241, the average being 82·5 per haul.

The five hauls in October at Stations I.-IV. and VI. yielded a total of 323 fishes, the average per haul being 64·6. The number of flat-fishes in the five hauls was 89, with an average of 17·8 per haul, the different kinds in these and in the corresponding hauls in the previous years being as follows:—

October—I. IV., VI.

Year.		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Black Soles.	Turbot.	Brill.	Total.
1896.	No.	9	61	147	168	33	.	2	2	422
	Average.	1·8	12·2	29·4	33·6	6·6	.	0·4	0·4	84·4
	°/o	*2·1*	*14·5*	*34·9*	*39·8*	*7·8*	.	.	.	.
1899.	No.	19	97	38	140	33	14	.	1	‡346
	Average.	3·8	19·4	7·6	28	6·6	2·8	.	0·2	69·2
	°/o	*5·5*	*28·0*	*11·0*	*40·5*	*9·5*	*4·0*	.	.	.
1901.	No.	13	14	4	41	17	.	.	.	89
	Average.	2·6	2·8	0·8	8·2	3·4	.	.	.	17·8
	°/o	*14·6*	*15·7*	*4·5*	*46·1*	*19·1*	.	.	.	.

* The Migratory Movements and Rate of Growth of the Grey or Common Gurnard—*Seventeenth Annual Report*, Part iii., p. 222.

† *Vide Nineteenth Annual Report*, Part iii., p. 19.

‡ Including four scald-fish (*Arnoglossus laterna*).

The stations referred to are in Kilbrennan Sound, and so far as these figures show anything, they indicate for this month an increase in plaice, a relative increase in common dabs and long rough dabs, and a marked decrease in witch soles. The average for flat-fishes generally, it will be observed, is less in each year, and least in 1901.

The hauls in November, as stated, were made at Stations V. and VII.-XII. The particulars in regard to flat-fishes are given in the following Table, in comparison with the corresponding hauls in previous years.

Year.		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Black Soles.	Turbot.	Brill.	Total.
1895.	No.	23	19	275	131	222	.	.	2	672
	Average.	3·3	2·7	39·3	18·7	31·7	.	.	0·3	96
	%	*3·4*	*2·8*	*40·9*	*19·5*	*33·0*	.	.	.	.
1899.	No.	7	18	386	59	152	1	.	.	*632
	Average.	1·0	2·6	55·1	8·4	21·7	0·1	.	.	90·3
	%	*1·1*	*2·8*	*61·1*	*9·3*	*24·1*	.	.	.	.
1901.	No.	15	7	198	5·1	212	.	.	.	†486
	Average.	2·1	1·0	28·3	7·3	30·3	.	.	.	69·4
	%	*3·1*	*1·4*	*40·8*	*10·5*	*43·6*	.	.	.	.

The general average is here also less in each successive period, but the fall is not so great. In 1901, compared with 1899, the average for plaice and long rough dabs is greater, and that of all the others less. The proportion, compared with 1895, is about the same for plaice and witch soles, less for lemon soles and for common dabs, and greater for long rough dabs.

Where the hauls are combined for the two months, the averages and percentages are as follow :—

		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Total.
1895-96	Average.	2·7	6·7	35·2	24·9	21·2	91·2
	%	*2·9*	*7·3*	*38·7*	*27·3*	*23·3*	
1899	Average.	2·2	9·6	35·3	16·6	15·4	81·5
	%	*2·6*	*11·8*	*43·4*	*20·3*	*18·9*	
1901	Average.	2·3	1·7	16·8	7·7	19·1	47·9
	%	*4·9*	*3·7*	*35·1*	*16·0*	*39·8*	

* Including six sail-flukes and two scald-fish. † Including three sail-flukes.

At the stations in Loch Fyne (XIII.-XVII.) the catches were still poorer. The hauls at these stations were made in October, November, and December, and the particulars, as well as those of the corresponding hauls in previous years, are given in the following Table.

		Plaice.	Lemon Soles.	Witch Soles.	Common Dabs.	Long Rough Dabs.	Turbot.	Total.
Oct., 1899.	No.	34	3	410	10	436	.	893
	Average.	6·8	0·6	82·0	2·0	87·2	.	178·6
	°/o	*3·8*	*0·3*	*45·9*	*1·1*	*48·8*	.	.
Oct., 1901.	No.	19	3	248	11	210	3	494
	Average.	2·7	0·4	35·4	1·6	30·0	0·4	70·6
	°/o	*3·8*	*0·6*	*50·2*	*2·2*	*42·5*	*0·6*	.
Nov., 1899.	No.	11	2	152	.	125	.	290
	Average.	2·2	0·4	30·4	.	25	.	58
	°/o	*3·8*	*0·7*	*52·4*	.	*43·1*	.	.
Nov., 1901.	No.	10	1	216	9	136	.	372
	Average.	2·0	0·2	43·2	1·8	27·2	.	74·4
	°/o	*2·7*	*0·3*	*58·1*	*2·4*	*36·5*	.	.
Dec., 1898.	No.	3	2	130	1	81	1	218
	Average.	0·6	0·4	26·0	0·2	16·2	0·2	43·6
	°/o	*1·4*	*0·9*	*59·6*	.	*37·1*	.	.
Dec., 1899.	No.	4	3	224	.	103	.	334
	Average.	1·0	0·7	56·0	.	25·7	.	83·5
	°/o	*1·2*	*0·9*	*67·1*	.	*30·8*	.	.
Dec., 1901.	No.	8	.	127	9	132	.	276
	Average.	1·6	.	25·4	1·8	26·4	.	55·2
	°/o	*2·9*	.	*46·0*	*3·3*	*47·8*	.	.

In October the average for all the species was lower in 1901 than in 1899; the percentages showed a slight increase in witch soles, and a slight decrease in long rough dabs. In November, 1901, the average for witches and long rough dabs was higher than in 1899. In December, 1901, the average for witches was lower than in 1899, and about the the same as in 1898, and that for long rough dabs was rather greater in each successive period. The small numbers of the fishes and the absence of uniformity in the averages make any conclusions uncertain.

The number of round fishes taken was, as a rule, much less, and the same observation applies with greater force to them. In the October hauls, at the stations mentioned above, the number of cod, haddock, whitings, and gurnards taken was 134 in 1901, the average being 26·8; in 1896 the corresponding figures were 161 and 32·2, and in 1899, 105 and 21·0, respectively. The great majority consisted of gurnards, viz. 118 in 1901, 125 in 1896, and 56 in 1899. In the November hauls the totals and averages in the various years were as follows:—1895, 231 and 33·0; 1899, 245 and 35·0; and in 1901, 197 and 28·1. Gurnards again greatly predominated. At the Loch Fyne stations (XIII.-XVII.) in October, 1901, the number was 45 and the average 6·4; in November the corresponding figures were 44 and 8·8, and in December 16 and 3·2. In seventeen hauls the total number of cod caught was 17, the number of haddocks 7, the number of whitings 15, and the number of gurnards 66. In October, November, and December, 1899, the averages for round fishes at these stations were 14·4, 14·8, and 9·5; and of the total of 184 round fishes taken in the fourteen hauls, 47 were cod, 58 were haddocks, 26 whitings, and 53 gurnards. It is obvious that numbers of this kind are of no value in such investigations.

T. WEMYSS FULTON,
Scientific Superintendent.

TABLE A.—Showing Summary of Fish taken by the "Garland" in Trawling Operations in 1901.

Station and Date.	Flat Fish.									Round Fish.							
	Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	Long Rough Dab.	Flounder.	Black Sole.	Brill.	Total.	Cod.	Haddock.	Whiting.	Gurnard.	Total.	Skate.	Other Fish.	Grand Total.
Firth of Forth.																	
Station I.																	
1900. Sept. 11,	22	23	.	14	40	.	.	.	99	64	.	132	14	210	.	6	315
1901. Mar. 23,	2	7	.	41	15	1	.	.	66	51	.	39	.	90	8	18	182
April 22,	9	26	.	72	33	2	.	.	142	48	.	30	4	82	3	12	239
July 12,	30	26	.	25	38	.	.	.	119	59	2	23	32	116	1	6	242
	63	82	.	152	126	3	.	.	426	222	2	224	50	498	12	42	978
Station II.																	
1900. Sept. 10,	38	16	.	159	30	.	.	.	243	6	.	30	11	47	1	4	295
1901. Mar. 7,	37	1	.	18	7	8	.	.	71	11	.	5	.	16	1	3	91
April 24,	61	3	.	74	36	.	.	.	174	8	1	8	46	63	4	1	242
July 12,	97	32	.	118	31	1	.	.	279	19	14	19	28	80	.	8	367
	233	52	.	369	104	9	.	.	767	44	15	62	85	206	6	16	995
Station III.																	
1900. Sept. 11,	5	8	.	6	14	.	.	.	33	10	.	9	2	21	5	2	61
1901. Mar. 14,	3	11	.	21	20	2	.	.	57	37	.	9	.	46	7	3	113
April 23,	35	76	.	59	60	3	.	.	233	93	2	44	16	155	10	14	412
July 10,	55	129	.	64	59	.	.	.	307	38	.	23	71	132	2	15	456
	98	224	.	150	153	5	.	.	630	178	2	85	89	354	24	34	1042
Station IV.																	
1900. Sept. 7,	94	2	.	18	.	1	.	.	115	3	.	15	28	46	1	1	163
1901. Mar. 22,	91	.	.	12	.	5	.	.	108	.	.	.	.	.	.	3	111
April 25,	141	17	.	43	11	3	.	.	215	7	.	.	35	42	14	11	282
July 11,	234	32	.	68	.	3	.	.	337	4	.	4	42	50	13	11	411
	560	51	.	141	11	12	.	.	775	14	.	19	105	138	28	26	967
Station V.																	
1900. Sept. 13,	34	1	.	22	107	.	.	.	164	7	7	187	19	220	1	1	386
1901. Mar. 26,	1	2	12	10	78	2	.	.	105	17	9	23	.	49	5	3	162
April 24,	7	6	3	7	67	1	.	.	91	8	9	79	2	98	6	1	196
July 15,	8	14	6	2	71	1	.	.	102	9	45	15	24	93	3	.	198
	50	23	21	41	323	4	.	.	462	41	70	304	45	460	15	5	942
Station VI.																	
1901. Mar. 28,	17	10	.	12	3	1	.	.	43	6	.	1	.	7	.	2	52
April 24,	15	4	.	12	.	.	.	1	32	5	.	.	7	12	.	1	45
July 15,	7	27	.	36	2	.	2	.	74	2	.	6	39	47	.	3	124
	39	41	.	60	5	1	2	1	149	13	.	7	46	66	.	6	221
Station VII.																	
1901. Mar. 29,	46	5	4	170	13	6	.	.	44	8	.	1	.	9	2	4	259
April 23,	59	17	3	161	71	1	.	.	12	22	6	20	43	91	4	3	410
July 9,	55	26	.	165	66	1	.	.	313	.	7	4	86	97	1	16	427
	160	48	7	496	150	8	.	.	869	30	13	25	129	197	7	23	1096

TABLE A.—Showing Summary of Fish taken by the "Garland" in Trawling Operations in 1901—*continued.*

Station and Date.	Flat Fish.									Round Fish.							
	Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	Long Rough Dab.	Flounder.	Turbot.	Sail-fluke.	Total.	Cod.	Haddock.	Whiting.	Gurnard.	Total.	Skate.	Other Fish.	Grand Total.
Firth of Clyde. 1901.																	
Station I. Oct. 25,	.	8	1	13	9	.	.	.	31	.	2	.	18	20	4	3	58
Station II. Oct. 23,	10	2	.	17	.	.	.	.	29	.	1	.	16	17	6	4	56
Station III. Oct. 23,	3	1	3	.	3	.	.	.	10	.	.	3	5	8	.	11	29
Station IV. Oct. 22,	.	.	.	3	5	.	.	.	8	1	.	.	67	68	2	.	78
Station V. Nov. 7,	.	1	.	.	.	.	.	.	1	.	5	.	1	6	1	5	13
Station VI. Oct. 25,	.	3	.	8	.	.	.	.	11	.	3	6	12	21	6	64	102
Station VII. Nov. 7,	.	3	1	2	2	.	.	.	8	.	.	2	15	17	7	6	38
Station VIII. Nov. 5,	.	.	.	.	.	.	.	1	1	.	3	5	13	21	6	14	42
Station IX. Nov. 6,	.	.	5	.	.	.	.	.	5	.	.	1	18	19	3	8	35
Station X. Nov. 1,	.	1	4	.	.	.	.	.	5	.	4	1	42	47	2	14	68
Station XI. Nov. 15,	15	2	102	49	134	.	.	.	302	.	.	26	36	62	.	41	405
Station XII. Nov. 8,	.	.	86	.	76	.	.	2	164	1	.	1	23	25	5	32	226
Station XIII.																	
Oct. 9,	.	.	.	.	2	.	.	.	2	.	1	.	3	4	.	.	6
Oct. 9,	.	.	.	2	2	.	.	.	4	1	.	2	12	15	.	23	42
Nov. 28,	.	.	.	.	4	.	.	.	4	1	.	3	5	9	.	6	19
Dec. 26,	.	.	.	.	.	.	.	.	.	2	.	.	.	2	1	9	12
	.	.	.	2	8	.	.	.	10	4	1	5	20	30	1	38	79

TABLE A.—Showing Summary of Fish taken by the "Garland" in Trawling Operations in 1901—*continued.*

Station and Date.	Flat Fish.									Round Fish.					Skate.	Other Fish.	Grand Total.
	Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	Long Rough Dab.	Flounder.	Turbot.	Sail-fluke.	Total.	Cod.	Haddock.	Whiting.	Gurnard.	Total.			
Firth of Clyde—*continued.* 1901.																	
Station XIV.																	
Oct. 10, .	1	.	.	.	22	.	.	.	23	.	.	3	4	7	.	.	30
Oct. 10, .	1	2	5	1	22	.	.	.	31	1	.	.	6	7	.	8	46
Nov. 28, .	.	.	6	.	3	.	.	.	9	3	3	3	15	24	5	5	43
Dec. 26, .	3	.	.	.	8	.	.	.	11	.	.	.	2	2	1	8	22
	5	2	11	1	55	.	.	.	74	4	3	6	27	40	6	21	141
Station XV.																	
Oct. 12, .	7	.	173	.	125	.	.	.	305	1	.	.	.	1	.	4	310
Nov. 28, .	3	1	135	.	93	.	.	.	232	1	.	3	.	4	2	3	241
Dec. 24, .	4	.	85	.	95	.	.	.	184	1	1	.	2	4	2	7	197
	14	1	393	.	313	.	.	.	721	3	1	3	2	9	4	14	748
Station XVI.																	
Oct. 12, .	.	.	18	.	1	.	.	.	19	.	1	.	.	1	.	1	21
Nov. 27, .	.	.	5	.	1	.	.	.	6	.	.	.	.	.	.	.	6
Dec. 23, .	.	.	4	.	.	.	.	.	4	.	.	.	.	.	.	.	4
	.	.	27	.	2	.	.	.	29	.	1	.	.	1	.	1	31
Station XVII.																	
Oct. 11, .	10	1	52	8	36	.	3	.	110	4	1	.	5	10	1	11	132
Nov. 27, .	7	.	70	9	35	.	.	.	121	1	.	.	6	7	1	56	185
Dec. 24, .	1	.	38	9	29	.	.	.	77	1	.	1	6	8	.	2	87
	18	1	160	26	100	.	3	.	308	6	1	1	17	25	2	69	404

TABLE B.—ANALYSIS OF THE "GARLAND'S" STATISTICS RELATING TO THE RELATIVE ABUNDANCE OF FISH, 1901.

Station.	Flat Fish.									Round Fish.					Skate.	Other Fish.	Grand Total.
	Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	L. Rough Dab.	Flounder.	Black Sole.	Brill.	Total.	Cod.	Haddock.	Whiting.	Gurnard.	Total.			
Firth of Forth.																	
I.	15·75	20·5	–	38	31·5	·75	–	–	106·5	55·5	·5	56·	12·5	124·5	3	10·5	244·5
II.	58·25	13·	–	92·25	26·	2·25	–	–	191·75	11·	3·75	15·5	21·25	51·5	1·5	4·	248·75
III.	24·5	56	–	37·5	38·25	1·25	–	–	157·5	44·5	·5	21·25	22·25	88·5	6·	8·5	260·5
IV.	140·0	12·75	–	35·25	2·75	3·0	–	–	193·75	3·5	–	4·75	26·25	34·5	7·0	6·5	241·75
V.	12·5	5·75	5·25	10·25	80·75	1·0	–	-	115·5	10·25	17·5	76	11·25	115·	3·75	1·25	235·5
VI.	13·	13·66	–	20	1·66	·33	·66	·33	49·66	4·33	–	2·33	15·33	22·	–	2·0	73·66
VII.	53·33	16·0	2·33	165·33	50·	2·66	–	–	289·66	10·0	4·33	8·33	43·0	65·66	2·33	7·66	365·33
Months.																	
1900. September, -	38·6	10	–	43·8	38·2	·2	–	–	130·8	18	1·4	74·6	14·8	108·8	1·6	2·8	244
1901. March, -	28·1	5·1	4	39·3	19·1	3·4	–	–	99·1	18·6	1·3	11·1	–	31	3·3	5·1	138·6
April, - -	46·7	21·3	0·9	61·1	39·7	1·4	–	0·1	171·3	27·3	2·6	25·9	21·9	77·6	5·9	6·1	260·9
July, - -	69·4	40·9	·9	68·3	38·1	·9	·3	–	218·7	18·7	9·7	13·4	46	87·9	2·9	8·4	317·9

TABLE B.—ANALYSIS OF THE "GARLAND'S" STATISTICS RELATING TO THE RELATIVE ABUNDANCE OF FISH, 1901.

Station.	Flat Fish.									Round Fish.					Skate.	Other Fish.	Grand Total.
	Plaice.	Lemon Sole.	Witch Sole.	Common Dab.	L. Rough Dab.	Sail-fluke.	Turbot.	Brill.	Total.	Cod.	Haddock.	Whiting.	Gurnard.	Total.			
							Firth of Clyde.										
I.	–	8	1	13	9	–	–	–	31	–	2	–	18	20	4	3	58
II.	10	2	–	17	–	–	–	–	29	–	1	–	16	17	6	4	56
III.	3	1	3	–	3	–	–	–	10	–	–	3	5	8	–	11	29
IV.	–	–	–	3	5	–	–	–	8	1	–	–	67	68	2	–	78
V.	–	1	–	–	–	–	–	–	1	–	5	–	1	6	1	5	13
VI.	–	3	–	8	–	–	–	–	11	–	3	6	12	21	6	64	102
VII.	–	3	1	2	2	–	–	–	8	–	–	2	15	17	7	6	38
VIII.	–	–	–	–	–	1	–	–	1	–	3	5	13	21	6	14	42
IX.	–	–	5	–	–	–	–	–	5	–	–	1	18	19	3	8	35
X.	–	1	4	–	–	–	–	–	5	–	4	1	42	47	2	14	68
XI.	15	2	102	49	134	–	–	–	302	–	–	26	36	62	–	41	405
XII.	–	–	86	–	76	2	–	–	164	1	–	1	23	25	5	32	226
XIII.	–	–	–	·5	2	–	–	–	2·5	1	·25	1·25	5	7·5	·25	9·5	19·75
XIV.	1·25	·5	2·75	·25	13·75	–	–	–	18·5	1	·75	1·5	6·75	10·	1·5	5·25	35·25
XV.	4·66	·33	131·0	–	104·33	–	–	–	240·3	1	·33	1·	·66	3	1·33	4·66	249·33
XVI.	–	–	9·0	–	·66	–	–	–	9·6	–	·33	–	–	·33	–	·33	10·33
XVII.	6·0	·33	53·33	8·66	33·33	–	1	–	102·66	2	·33	·33	5·66	8·33	·66	23	134·66
Month.																	
October, .	2·66	1·4	21	4·33	18·9	–	·25	–	48·6	·66	·75	1·16	12·33	14·9	1·6	10·75	75·8
November, .	2·1	·66	3·45	5·0	29·0	·25	–	–	71·5	·6	1·25	3·75	14·5	20·1	2·66	15·8	110·1
December, .	1·6	–	25·4	1·8	26·4	–	–	–	55·2	·8	·2	·2	2·0	3·2	·8	5·2	64·4

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth.

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station I.																						
1900. Sept. 11 4-20 p.m. to 5-50 p.m.	Common gurnard, - -	.	1	1	2	4	.	1	2	.	.	1	1	1	.	.	.	.	.	.	.	14
	Angler, - -	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	1	1	.	4
	Dragonet, - -	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod, - - -	.	.	.	.	3	19	24	4	3	2	1	.	4	.	1	1	.	.	1	.	*64
	Whiting, - -	6	.	1	15	38	22	26	13	4	1	.	.	.	.	.	.	.	.	.	.	†132
	Ling, - - -	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1
	Long rough dab,	.	2	5	11	11	10	1	.	.	.	.	.	.	.	.	.	.	.	.	.	40
	Plaice, - -	.	.	.	.	.	.	2	2	6	3	8	1	.	.	.	.	.	.	.	.	22
	Lemon sole, -	.	.	1	1	3	5	9	3	.	1	.	.	.	.	.	.	.	.	.	.	23
	Common dab, -	.	3	.	3	1	5	2	.	.	.	.	.	.	.	.	.	.	.	.	.	14
																						315
1901. March 23. 11-10 a.m. to 0-55 p.m.	Angler - -	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cat-fish, - -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‡1
	Cod, - - -	2	.	6	5	8	4	.	.	2	5	6	6	1	1	1	1	.	1	1	.	§51
	Whiting, - -	.	.	1	15	7	5	6	3	2	.	.	.	.	.	.	.	.	.	.	.	39
	Saithe, - -	.	.	.	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
	Long rough dab,	.	1	9	.	4	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15
	Flounder, - -	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice, - -	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2
	Lemon sole, -	.	.	.	.	.	.	4	1	2	.	.	.	.	.	.	.	.	.	.	.	7
	Common dab, -	.	10	10	4	8	6	2	.	.	1	.	.	.	.	.	.	.	.	.	.	41
	Herring, - -	.	.	1	3	2	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10
	Gray Skate, -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	1	2	.	1	.	7
																						182
April 22. 2-50 p.m. to 4-50 p.m.	Common gurnard, -	.	.	.	.	.	1	.	2	1	.	.	.	.	.	.	.	.	.	.	.	4
	Angler, - -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	1	1	‖9
	Cat-fish, - -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	¶3
	Cod, - - -	1	2	8	9	.	4	2	.	.	2	2	4	6	1	3	.	.	3	1	.	48
	Whiting, - -	.	3	12	3	5	3	2	1	.	.	1	.	.	.	.	.	.	.	.	.	30
	Long rough dab,	.	.	3	15	4	4	6	1	.	.	.	.	.	.	.	.	.	.	.	.	33
	Flounder, - -	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Plaice, - -	.	.	.	.	.	.	.	.	.	1	3	4	1	.	.	.	.	.	.	.	9
	Lemon Sole, -	.	1	2	2	2	5	6	3	4	1	.	.	.	.	.	.	.	.	.	.	26
	Common dab, -	.	9	25	14	17	4	.	2	1	.	.	.	.	.	.	.	.	.	.	.	72
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	**3
																						239
July 12. 11-25 a.m. to 1-15 p.m.	Common gurnard, -	.	1	5	11	9	4	1	.	1	.	.	.	.	.	.	.	.	.	.	.	32
	Angler, - -	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1	1	.	††5
	Dragonet, - -	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod, - - -	.	.	6	18	9	4	.	.	.	.	2	2	3	3	4	2	3	1	1	.	‡‡59
	Haddock, - -	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	2
	Whiting, - -	.	2	4	5	5	1	3	1	.	2	.	.	.	.	.	.	.	.	.	.	23
	Long rough dab,	1	.	.	11	9	11	5	1	.	.	.	.	.	.	.	.	.	.	.	.	38
	Plaice, - -	.	.	.	.	1	1	4	8	3	5	2	2	2	1	1	.	.	.	.	.	30
	Lemon Sole, -	.	.	4	6	2	4	2	3	4	1	.	.	.	.	.	.	.	.	.	.	26
	Common dab, -	.	.	2	5	6	7	4	.	1	.	.	.	.	.	.	.	.	.	.	.	25
	Gray Skate, -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1
																						242

* One 29 inches. † Six 3 inches. ‡ One 28 inches. § One 29 inches. ‖ One 26 inches; two 28 inches; one 29 inches. ¶ One 28 inches: one 29 inches; one 33 inches. ** One 26 inches. †† One 29 inches. ‡‡ One 26 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station II.																						
1900. Sept. 10. 2-35 p.m. to 3-57 p.m.	Common gurnard,		5	3	2	1																11
	Angler,					1																1
	Dragonet,						2															2
	Cod,					2	2	2														6
	Whiting,	1		2	9		12	5		1												30
	Long rough dab,			1	10	3	11	4	1													30
	Plaice,						5	8	7	6	9	1	2									38
	Lemon sole,		1	2		2	2	5	3	1												16
	Common dab,	9	56	24	25	36	7	2														159
	Nurse-hound,																	1				1
	Thornback skate,																			1		1
																						295
1901. March 3. 11-5 a.m. to 0-25 p.m.	Angler,										1											1
	Cat-fish,																					*1
	Cod,		1		1	2	1					1	1	1			1	1	1			11
	Whiting,	1	2	1	1																	5
	Long rough dab,			3	3		1															7
	Flounder,					1	2				3	2										8
	Plaice,			2	1	4	2	1	7	5	8	2	2	1	2							37
	Lemon sole,								1													1
	Common dab,		2	7	3	1	3		1	1												18
	Sprat,																					†1
	Thornback skate,								1													1
																						91
April 24. 3-35 p.m. to 5-5 p.m.	Common gurnard,	1	1	3	13	11	8	3	3	2	1											46
	Angler,							1														1
	Cod,			1		2	1	2				1							1			8
	Haddock,											1										1
	Whiting,	1	3	1		1						2										8
	Long rough dab,			1	4	14	11	6														36
	Plaice,				3	3	8	7	19	8	4	2	3	1		3						61
	Lemon sole,					1			1			1										3
	Common dab,	4	17	32	14	5	1	1														74
	Thornback skate,								1		1		1	1								4
																						242
July 12. 2-0 p.m. to 3-52 p.m.	Common gurnard,	1	1	14	7	3	1					1										28
	Angler,			1		2	1															4
	Dragonet,				2		1															3
	Cod,			1	3	9	3					1					1			1		19
	Haddock,						4	8	2													14
	Whiting,				2	8	3	6														19
	Hake,																					‡1
	Long rough dab,	4	5	3	8	8	2		1													31
	Plaice,					2	2	10	17	16	15	20	10	3	2							97
	Lemon sole,			1	7	10	2	3	5	1	2		1									32
	Common dab,	8	7	43	37	14	6	3														118
	Flounder,				1																	1
																						367

* $40\frac{1}{2}$ inches. † 3 inches. ‡ 29 inches

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station III.																						
1900. Sept. 11. 0-35 p.m. to 3-30 p.m.	Common gurnard,	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Angler,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	.	.	.	.	3	2	1	.	1	.	.	.	.	2	1	.	.	.	10
	Whiting,	.	.	.	2	3	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	9
	Ling,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	3	.	5	2	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	14
	Plaice,	.	.	.	.	.	.	2	.	.	3	.	.	.	.	.	.	.	.	.	.	5
	Lemon sole,	.	.	1	.	.	2	3	1	1	.	.	.	.	.	.	.	.	.	.	.	8
	Common dab,	.	.	2	2	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	6
	Thornback skate,	.	.	.	2	.	.	.	1	.	.	.	.	1	.	.	.	1	.	.	.	5
																						61
1901. Mar. 14. 10-35 a.m. to 1-35 p.m.	Angler,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Cat-fish.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*1
	Cod,	1	5	11	6	.	4	.	.	.	.	4	1	1	.	3	1	.	.	.	.	37
	Whiting,	1	2	1	3	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	9
	Ling,	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	.	3	6	5	4	1	.	1	.	.	.	.	.	.	.	.	.	.	.	20
	Flounder,	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Plaice,	.	.	.	.	.	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	3
	Lemon sole,	.	.	.	1	.	1	2	2	2	1	2	.	.	.	.	.	.	.	.	.	11
	Common dab,	.	2	5	.	5	6	2	.	1	.	.	.	.	.	.	.	.	.	.	.	21
	Gray skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	†1
	Thornback skate,	.	.	.	.	.	.	1	.	1	.	.	.	.	.	2	1	1	.	.	.	6
																						113
April 23. 2-33 p.m. to 5-37 p.m.	Common gurnard,	.	.	2	1	4	.	2	1	3	.	3	.	.	.	.	.	.	.	.	.	16
	Angler,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	1	.	3
	Cat-fish,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‡5
	Cod,	.	2	.	8	12	10	6	.	1	4	18	12	11	3	2	.	.	1	3	.	93
	Haddock,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	2
	Brassie,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Whiting,	1	4	10	13	5	5	2	1	.	2	.	.	.	.	.	.	.	.	.	.	§44
	Ling,	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.	2
	Long rough dab,	.	3	6	20	12	10	4	3	2	.	.	.	.	.	.	.	.	.	.	.	60
	Flounder,	.	1	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice,	.	.	.	.	2	2	3	3	6	3	5	5	2	1	1	.	2	.	.	.	35
	Lemon sole,	.	.	6	12	2	10	11	17	14	2	2	.	.	.	.	.	.	.	.	.	76
	Common dab,	.	11	18	11	5	12	.	2	.	.	.	.	.	.	.	.	.	.	.	.	59
	Herring,	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Gray skate,	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	2
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	2	.	.	.	3	1	.	.	.	1	7
	Starry-ray,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
																						412
July 10. 11-20 a.m. to 0-45 p.m. 1-5 p.m. to 2-40 p.m.	Red gurnard,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Common Gurnard,	2	2	31	19	10	2	1	.	1	.	1	.	1	.	.	.	.	.	.	.	70
	Angler,	.	.	1	.	3	3	1	.	.	1	.	.	.	1	.	.	.	.	.	.	‖11
	Cat-fish,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	¶1
	Dragonet,	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Cod,	.	.	3	7	7	6	6	2	.	.	2	.	2	2	.	.	1	.	.	.	38
	Whiting,	.	.	.	6	6	4	4	2	.	.	.	.	.	.	.	.	.	.	.	.	**23
	Pollack,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	††1
	Long rough dab,	1	5	4	12	12	10	6	7	1	.	1	.	.	.	.	.	.	.	.	.	59
	Plaice,	.	.	.	.	1	3	4	11	13	13	6	1	2	.	1	.	.	.	.	.	55
	Lemon sole,	.	2	16	30	14	11	15	26	12	2	1	.	.	.	.	.	.	.	.	.	129
	Common dab,	1	2	13	15	14	7	3	.	2	.	.	.	.	.	.	.	.	.	.	.	‡‡64
	Thornback skate,	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	2
																						456

* One 31 inches. † One 31 inches. ‡ Two 31 inches; one 32 inches; one 36 inches; one 38 inches.
§ One 3¾ inches. ‖ One 35 inches ¶ One 26½ inches. ** One 3¾ inches. †† One 30 inches.
‡‡ One 3 inches; five 3½ inches; one 3¾ inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station IV.																						
1900. Sept. 7.	Com. gurnard,	.	7	.	3	2	3	3	5		2	.	.	.	.	.	.	.	.	.	.	28
0-12 p.m.	Angler,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
to	Cod,	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	3
1-50 p.m.;	Whiting,	5	1	2	3	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	*15
also,	Flounder,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
2-0 p.m.	Plaice,	.	.	3	6	15	15	23	11	8	8	3	2	.	.	.	.	.	.	.	.	94
to	Lemon sole,	.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	2
3-38 p.m.	Common dab,	.	.	2	.	9	2	3	2	.	.	.	.	.	.	.	.	.	.	.	.	18
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1
																						163
1901. March 3.	Father-lasher,	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
1-0 p.m.	Cat-fish,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	†1
to	Flounder,	.	.	1	2	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
3-0 p.m.;	Plaice,	5	.	1	5	29	11	9	18	8	5	.	.	.	.	.	.	.	.	.	.	91
and	Common dab,	.	6	5	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12
3-15 p.m. to 4-30 p.m.																						111
April 25.	Com. gurnard,	.	.	2	8	6	7	6	1	2	1	2	.	.	.	.	.	.	.	.	.	35
11-20 a.m.	Father-lasher,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
to	Angler.	.	.	.	.	.	1	.	.	.	3	.	.	.	.	.	.	.	.	.	.	4
2-20 p.m.	Cat-fish,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.	1	7
	Long rough dab,	.	.	1	2	1	2	3	1	1	.	.	.	.	.	.	.	.	.	.	.	11
	Flounder,	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice,	.	.	1	8	21	18	21	36	24	7	2	1	1	1	.	.	.	.	.	.	141
	Lemon sole,	.	.	3	1	2	1	4	3	1	2	.	.	.	.	.	.	.	.	.	.	17
	Common dab,	.	2	15	5	8	9	4	.	.	.	.	.	.	.	.	.	.	.	.	.	43
	Sprat,	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‡5
	Thornback skate,	.	.	.	.	.	.	.	2	.	.	1	1	2	1	1	2	1	.	2	.	14
																						282
July 11.	Com. gurnard,	2	1	4	6	6	6	3	3	5	1	2	2	.	.	.	.	.	.	.	.	§42
11-30 a.m.	Pogge,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‖1
to	Angler,	.	.	.	1	.	3	4	1	.	.	.	1	.	.	.	.	.	.	.	.	10
1-0 p.m.;	Cod,	.	.	1	.	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	4
and	Whiting,	.	1	1	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	4
1-18 p.m.	Flounder,	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	3
to	Plaice,	.	15	33	21	23	50	42	19	15	9	5	1	.	.	.	1	.	.	.	.	234
2-15 p.m.	Lemon sole,	.	.	1	10	9	3	1	3	3	1	1	.	.	.	.	.	.	.	.	.	32
	Common dab,	6	2	12	14	11	8	6	1	1	.	1	.	.	.	.	.	.	.	.	.	¶68
	Thornback skate,	.	.	.	.	.	2	.	.	.	.	.	.	1	.	.	2	2	4	2	.	13
																						411
Station V.																						
1900. Sept. 13.	Com. gurnard,	.	1	.	5	1	.	2	6	3	.	.	1	.	.	.	.	.	.	.	.	19
11-56 a.m.	Cod,	.	.	.	.	.	.	.	2	.	.	.	.	1	1	.	1	1	1	.	.	7
to	Haddock,	.	.	.	.	.	.	.	4	3	.	.	.	.	.	.	.	.	.	.	.	7
1-30 p.m.	Whiting,	12	.	.	3	24	51	57	16	12	6	.	.	.	.	.	.	.	.	.	.	**187
	Hake,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	1	12	28	35	17	9	2	2	1	.	.	.	.	.	.	.	.	.	.	.	107
	Plaice,	.	.	.	.	.	1	.	1	3	4	8	9	5	2	1	.	.	.	.	.	34
	Lemon sole,	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1
	Common dab,	1	1	6	6	4	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	22
	Gray Skate,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
																						386

* One $3\frac{3}{4}$ inches. † One $39\frac{1}{4}$ inches ‡ One 3 inches; two $3\frac{1}{4}$ inches; one $3\frac{1}{2}$ inches. § One $3\frac{3}{8}$ inches.
‖ $3\frac{1}{2}$ inches. ¶ Two $3\frac{1}{4}$ inches; one $3\frac{1}{2}$ inches; three $3\frac{3}{4}$ inches.* * Two 3 inches; one $3\frac{1}{4}$ inches; one $3\frac{1}{2}$ inches; two $3\frac{3}{4}$ inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth—*continued.*

Station, Date, and Time Trawl Down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station V.																						
1901. March 26. 4-5 p.m. to 6-5 p.m.	Angler,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
	Cod,	.	.	.	.	.	.	.	.	.	1	1	1	.	.	1	.	1	.	2	.	*17
	Haddock,	1	.	.	.	.	.	.	.	2	1	3	1	1	.	.	.	.	.	.	.	9
	Brassie,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Whiting,	.	4	4	1	1	1	8	1	3	.	.	.	.	.	.	.	.	.	.	.	23
	Long rough dab,	.	2	22	21	16	10	3	.	3	.	1	.	.	.	.	.	.	.	.	.	78
	Flounder,	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Plaice	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Lemon sole,	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	2
	Witch sole,	.	.	.	.	.	.	.	.	.	.	1	1	5	2	1	1	1	.	.	.	12
	Common dab,	.	2	3	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	10
	Herring,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Gray skate,	.	.	.	1	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.	.	4
	Starry ray,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
																						162
April 24. 10-45 a.m. to 0-40 p.m.	Com. gurnard,	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Cod,	.	.	1	1	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	†8
	Haddock,	.	.	.	.	.	.	.	1	1	.	2	2	1	.	.	1	1	.	.	.	9
	Brassie,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Whiting,	3	22	7	5	5	11	8	11	7	.	.	.	.	.	.	.	.	.	.	.	79
	Long rough dab,	1	4	28	18	13	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	67
	Flounder,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	1	1	.	1	.	1	.	.	.	1	2	.	.	.	.	7
	Lemon sole,	.	.	1	.	.	1	1	.	1	2	.	.	.	.	.	.	.	.	.	.	6
	Witch sole,	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	3
	Common dab,	.	5	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
	Gray skate,	.	.	1	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	4
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1
	Starry ray,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
																						196
July 15. 1-30 p.m. to 3-35 p.m.	Com. gurnard,	.	.	.	8	1	7	1	5	2	.	.	.	.	.	.	.	.	.	.	.	24
	Cod,	.	.	1	.	1	1	3	.	.	.	.	.	1	1	.	.	.	.	1	.	9
	Haddock,	.	.	.	.	7	13	12	8	.	2	1	1	.	.	1	.	.	.	.	.	45
	Whiting,	.	.	6	1	1	.	3	2	1	1	.	.	.	.	.	.	.	.	.	.	15
	Long rough dab,	8	2	11	25	10	10	1	2	1	1	.	.	.	.	.	.	.	.	.	.	71
	Flounder,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	.	.	1	.	2	2	.	1	2	.	.	.	.	.	.	8
	Lemon soles	.	.	.	1	.	.	2	4	3	1	2	.	.	1	.	.	.	.	.	.	14
	Witch sole,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	3	2	.	.	.	.	6
	Common dab,	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	2
	Gray skate,	.	.	.	.	.	.	.	.	1	.	.	.	1	1	.	.	.	.	.	.	3
																						198
Station VI.																						
1901. March 28. 0-50 p.m to 1-50 p m.	Cat-fish,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‡1
	Cod,	.	.	.	.	.	1	.	.	.	.	.	2	2	1	.	.	.	.	.	.	6
	Whiting,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	.	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Flounder,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	.	.	3	2	3	4	1	1	2	1	.	.	.	.	.	17
	Lemon sole,	.	.	.	.	.	1	4	3	.	.	2	.	.	.	.	.	.	.	.	.	10
	Common dab,	.	1	6	.	2	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	12
	Halibut,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
																						52

* Three 28 inches; two 30 inches; three 31 inches; one 33 inches; one 36 inches.

†One 28 inehcs; one 34 inches; one 37 inches one 38 inches.

‡ One 31 inches.

TABLE C.—RECORD OF OBSERVATIONS MADE ON BOARD THE "GARLAND" DURING 1901.

A. FISH CAUGHT—FIRTH OF FORTH—*continued.*

Station, Date, and Time Trawl Down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station VI. 1901. April 24. 1-35 p.m. to 2-15 p.m.	Com. gurnard,	.	.	2	1	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	7
	Dragonet,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	1	1	.	.	5
	Brill,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	.	.	1	.	3	4	1	2	.	1	.	2	.	1	.	15
	Lemon sole,	.	.	.	.	.	2	.	1	1	.	.	.	.	.	.	.	.	.	.	.	4
	Common dab,	.	2	7	2	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	12
																						45
July 15. 5-0 p.m. to 6-15 p.m.	Com. gurnard,	1	4	17	10	2	.	1	.	1	2	1	.	.	.	.	.	.	.	.	.	39
	Angler,	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	*3
	Cod,	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Whiting,	.	.	.	3	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	6
	Long rough dab,	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Plaice,	.	.	.	.	.	.	.	.	.	2	.	3	.	2	.	.	.	.	.	.	7
	Lemon sole,	.	.	.	1	1	2	.	4	7	9	2	1	.	.	.	.	.	.	.	.	27
	Common dab,	6	4	6	13	5	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	36
	Black sole,	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	2
																						124
Station VII. Mar. 29. 11-50 a.m. to 1-50 p.m.	Pogge,	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Angler,	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Cod,	.	.	2	1	.	.	1	.	.	.	1	.	.	1	2	.	.	.	.	.	8
	Whiting,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	.	1	4	7	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13
	Flounder,	.	.	.	1	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.	.	6
	Plaice,	.	.	.	.	.	1	8	7	12	8	9	1	.	.	.	.	.	.	.	.	46
	Lemon sole,	.	.	1	.	.	1	1	1	1	.	.	.	.	.	.	.	.	.	.	.	5
	Witch sole,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	4
	Common dab,	13	71	48	21	9	7	1	.	.	.	.	.	.	.	.	.	.	.	.	.	170
	Sprat,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	†1
	Starry-ray,	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	2
																						259
April 23. 0-3 p.m. to 1-42 p.m.	Com. gurnard,	.	2	6	8	9	10	3	2	3	.	.	.	.	.	.	.	.	.	.	.	43
	Angler,	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	2
	Dragonet,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	.	2	4	2	1	.	.	.	1	.	3	7	1	1	.	.	.	.	22
	Haddock,	.	.	1	.	.	.	2	.	.	.	.	1	.	1	1	.	.	.	.	.	6
	Whiting,	1	6	3	4	2	2	.	2	.	.	.	.	.	.	.	.	.	.	.	.	20
	Long rough dab,	.	2	20	17	20	9	3	.	.	.	.	.	.	.	.	.	.	.	.	.	71
	Flounder,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	1	2	2	9	11	10	12	4	7	.	1	.	.	.	.	.	.	59
	Lemon sole,	.	.	2	3	3	2	.	4	3	.	.	.	.	.	.	.	.	.	.	.	17
	Witch sole,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	3
	Common dab,	3	36	60	32	20	7	2	1	.	.	.	.	.	.	.	.	.	.	.	.	161
	Gray skate,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2
	Starry-ray,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
																						410
July 9. 2-0 p.m. to 4-5 p.m.	Com. gurnard,	.	9	55	19	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	86
	Pogge,	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Angler,	.	.	.	1	1	.	.	1	.	.	.	.	.	1	.	.	1	.	.	.	5
	Dragonet,	.	.	.	1	3	5	1	.	.	.	.	.	.	.	.	.	.	.	.	.	10
	Haddock,	.	.	.	.	3	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	7
	Whiting,	.	.	.	3	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	4
	Long rough dab,	.	5	7	17	18	11	7	1	.	.	.	.	.	.	.	.	.	.	.	.	66
	Flounder,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	2	8	5	15	12	11	1	1	.	.	.	.	.	.	.	55
	Lemon sole,	.	.	6	1	7	4	4	2	2	.	.	.	.	.	.	.	.	.	.	.	26
	Common dab,	5	26	75	32	15	9	2	1	.	.	.	.	.	.	.	.	.	.	.	.	165
	Gray skate,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
																						427

* One 26 inches. † One $3\frac{1}{2}$ inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Forth—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station X. 1901. Mar. 20. 0-50 p.m. to 1-50 p.m.	Pogge,	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Father-lasher,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	2
	Whiting,	3	5	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13
	Flounder,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Paddock (*Raniceps raneus*),	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2	.	1	.	.	4
																						26
April 26. 1-0 p.m. to 1-50 p.m.	Cod,	.	.	.	.	1	.	1	.	.	.	1	1	2	.	1	.	.	1	1	.	9
	Whiting,	.	2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
	Lemon sole,	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	3
	Herring,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*1
	Gray skate,	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	1	1	1	5
																						23
	Cromarty Firth.																					
North of Station III. Cromarty Firth. 1901. Jan. 7. 1-30 p.m. to 2-15 p.m.	Cod,	.	.	1	2	2	.	.	1	.	.	1	2	.	1	.	.	.	2	.	.	†14
	Haddock,	.	.	.	.	.	.	.	.	.	.	1	2	2	1	.	1	.	2	.	.	9
	Whiting,	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1
	Saithe,	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice,	.	.	.	.	.	.	2	1	2	1	3	2	1	.	1	1	.	.	.	.	14
	Lemon sole,	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	2
	Witch sole,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
																						45
Crom'ty to Rosskein, Mid-Channel. Jan. 8. 10-30 a.m. to 11-30 a.m.	Cod,	.	1	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	‡5
	Haddock,	.	.	.	.	.	.	.	.	.	.	1	.	2	1	.	.	.	.	.	1	5
	Whiting,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Saithe,	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Common dab,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
																						17
Crom'ty to Rosskein Church, near N. side. Jan. 8 0-25 p.m. to 2-0 p.m.	Cod,	.	.	.	2	6	.	1	2	3	4	1	2	1	.	1	.	.	.	1	1	§26
	Haddock,	.	.	.	.	.	.	.	.	.	.	.	1	1	2	3	1	2	1	.	.	11
	Whiting,	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Saithe,	.	1	7	7	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	15
	Long rough dab,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	.	.	.	1	.	2	1	1	.	1	.	.	1	.	.	7
	Lemon sole,	.	.	.	.	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	3
	Common dab,	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1
																						68

* 2¾ inches. † One 31 inches; one 33 inches. ‡ One 34 inches; one 40 inches. § One 31 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901

A. FISH CAUGHT—Cromarty Firth—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
From off Alness to Invergordon, Mid-Channel. 1901. Jan. 8. 2-30 p.m. to 3-20 p.m.	Cod,	.	.	1	.	.	.	3	4	5	4	3	.	.	.	1	.	1	.	.	.	*23
	Haddock,	.	.	.	.	.	.	.	.	.	.	.	1	2	1	1	.	2	2	1	.	10
	Whiting,	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Saithe,	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Ling,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1
	Lemon sole,	.	1	.	.	1	1	1	1	.	1	.	.	.	.	.	.	.	.	.	.	6
																						44
From off Invergordon to Cullicudden. Jan. 9. 9-40 a.m. to 10-40 a.m.	Father-lasher,	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Pogge,	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cod,	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	†5
	Haddock,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	1	.	3
	Whiting,	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Ling,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1
	Lemon sole,	.	.	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	3
																						18
Firth of Clyde.																						
Station I. 1901. Oct. 25. 10-20 a.m. to 11-55 a.m.	Com. gurnard,	.	.	1	9	7	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	18
	Dory,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Haddock,	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	2
	Hake,	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	2
	Long rough dab,	.	1	6	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9
	Lemon sole,	.	.	1	1	1	1	3	.	.	1	.	.	.	.	.	.	.	.	.	.	8
	Witch sole,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Common dab,	.	2	7	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13
	Grey skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‡1
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	§1
	Cuckoo-ray,	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	.	.	2
																						58
Station II. 1901. Oct. 23. 0-50 p.m. to 2-20 p.m.	Com. gurnard,	.	3	2	2	5	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	‖16
	Dory,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Liparis montagui,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Haddock,	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
	Hake,	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1
	Plaice,	.	.	.	.	.	.	1	.	.	1	2	1	3	.	.	.	.	1	1	.	10
	Lemon sole,	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	¶2
	Common dab,	.	2	7	3	2	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	**17
	Grey skate	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	††2
	Thornback skate,	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	.	3
	Cuckoo-ray,	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
																						56

* One 48 inches. † One 29 inches; one 32 inches. ‡ 37 inches. § 26 inches. ‖ One 3 inches. ¶ 2¼ inches. ** One 2¼ inches. †† One 36 inches; one 38 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station III. 1901. Oct. 23. 10-35 a.m. to 11-55 a.m.	Com. gurnard, -	.	.	.	.	.	.	.	.	.	2	2	.	1	.	.	.	.	.	.	.	5
	Angler, - -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*2
	Whiting, - -	.	.	.	1	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	3
	Hake, - -	.	.	.	.	.	.	.	.	.	.	.	1	1	2	1	2	.	1	.	.	†9
	Long rough dab,	1	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice, - -	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	1	.	1	.	3
	Lemon sole, -	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1
	Witch sole, -	.	.	.	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	3
																						29
Station IV. 1901. Oct. 22. 3-35 p.m. to 4-20 p.m.	Com. gurnard, -	.	.	1	14	24	8	8	4	4	2	.	1	1	.	.	.	.	.	.	.	67
	Cod, - - -	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	3	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
	Common dab, -	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	2
																						78
Station V. 1901. Nov. 7. 2-50 p.m. to 3-50 p.m.	Com. gurnard, -	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Haddock, - -	.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	2	.	.	.	5
	Brassie, - -	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
	Lemon sole, -	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
																						13
Station VI. 19 1. Oct. 25. 0-25 p.m. to 2-25 p.m.	Red gurnard, -	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	2
	Com. gurnard, -	.	.	.	3	1	1	1	1	3	.	.	.	.	.	.	.	.	.	.	.	10
	Haddock, - -	.	.	.	.	.	.	.	.	1	.	.	1	.	1	.	.	.	.	.	.	3
	Brassie, - -	.	13	41	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	60
	Whiting, - -	.	.	.	.	.	.	.	2	1	3	.	.	.	.	.	.	.	.	.	.	6
	Hake, - -	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	2
	Lemon sole, -	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Common dab, -	.	.	1	4	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	8
	Nurse Hound, -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	‡2
	Thornback skate,	.	.	.	.	.	.	.	.	.	1	.	1	1	.	.	.	.	.	.	.	3
	Cuckoo-ray, -	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	.	.	.	.	.	3
																						102
Station VII. 1901. Nov. 7. 9-33 a.m. to 11-33 a.m.	Red gurnard, -	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	2
	Com. gurnard, -	.	.	2	2	1	.	.	.	5	3	.	.	.	.	.	.	.	.	.	.	13
	Brassie, - -	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Whiting, - -	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	2
	Hake, - -	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.	1	.	.	.	.	4
	Long rough dab,	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Lemon sole, -	.	.	.	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Witch sole, -	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Common dab, -	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Thornback skate,	.	.	.	.	1	1	.	.	.	.	.	.	1	.	.	.	.	1	.	.	§5
	Cuckoo-ray, -	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Homelyn-ray, -	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
																						38

* One 40 inches; one 41 inches. † One 28 inches. ‡ One 26½ inches. § One 27½ inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station VIII.																						
1901. Nov. 5. 10-40 a.m. to 0-40 p.m.	Com. gurnard, -	.	.	.	2	2	2	1	3	.	1	1	.	.	.	.	.	.	.	.	.	*13
	Haddock, - -	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Whiting, - -	.	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	5
	Hake, - -	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
	Sail-fluke, - -	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Piked-dog, -	.	.	.	.	.	.	.	.	1	2	4	2	2	2	.	.	.	.	.	.	13
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	†4
	Homelyn-ray, -	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
																						42
Station IX.																						
1901. Nov. 6. 10-3 a.m. to 0-9 p.m.	Com. gurnard, -	.	.	.	.	1	2	6	3	3	3	.	.	.	.	.	.	.	.	.	.	18
	Angler, - -	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Whiting, - -	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Hake, - - -	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	2
	Witch sole, -	.	.	.	.	.	1	1	2	.	1	.	.	.	.	.	.	.	.	.	.	5
	Piked-dog, - -	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	1	.	.	.	‡5
	Thornback skate,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.	§3
																						35
Station X.																						
1901. Nov. 1. 0-18 p.m. to 2-20 p.m.	Red Gurnard, -	.	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	3
	Com. gurnard, -	.	1	1	10	17	3	2	3	2	.	.	.	.	.	.	.	.	.	.	.	39
	Haddock, - -	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
	Whiting, - -	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Hake, - - -	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	2
	Lemon sole, -	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Witch sole, -	.	.	.	.	.	3	.	.	.	1	.	.	.	.	.	.	.	.	.	.	4
	Nurse Hound, -	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	‖1
	Piked-dog, - -	.	.	.	.	.	.	.	.	1	3	3	3	1	.	.	.	.	.	.	.	11
	Gray skate, -	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Cuckoo-ray, -	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
																						68
Station XI.																						
1901. Nov. 15. 11-0 a.m. to 1-5 p.m.	Streaked gurnard	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Com. gurnard, -	.	.	.	12	13	4	3	1	1	1	.	.	.	.	.	.	.	.	.	.	35
	Angler, - -	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	2
	Whiting, - -	1	1	1	4	3	1	11	3	1	.	.	.	.	.	.	.	.	.	.	.	26
	Hake, - -	.	.	.	.	.	.	2	.	2	1	5	13	4	3	2	1	.	.	.	.	33
	Long rough dab,	8	11	40	37	26	10	1	.	.	.	.	.	.	.	.	.	.	.	.	.	¶134
	Plaice, - -	.	.	.	.	.	.	.	1	.	1	3	3	.	2	2	2	1	.	.	.	15
	Lemon sole, -	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	2
	Witch sole, -	.	.	2	5	19	15	16	14	16	9	5	1	.	.	.	.	.	.	.	.	102
	Common dab, -	.	2	14	26	6	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	49
	Argentine, -	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Piked-dog, -	.	.	.	.	.	.	.	.	.	.	1	2	.	1	.	1	.	.	.	.	5
																						405

* One $3\frac{3}{4}$ inches. † One 26 inches. ‖ One $27\frac{1}{2}$ inches. ‡ One $26\frac{1}{2}$ inches. ¶ One $3\frac{1}{2}$ inches. § One 28 inches

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station XII.																						
1901. Nov. 8. 9-0 a.m. to 11-5 a.m.	Com. gurnard, -						4	3	1	8	6	1										23
	Angler, - -																					*2
	Cod, - - -																					†1
	Whiting, - -							1														1
	Hake, - -							1	1				3	2	7	6						‡21
	Ling, - - -																					§1
	Long rough dab,	1	4	19	29	17	6															76
	Sail-fluke, - -																		1	1		2
	Witch sole, -				2	6	14	20	19	13	9	1		1								‖86
	Piked-dog, - -												2	1	3	1	1					8
	White skate, -																			1		1
	Fullers-ray, -																		1			¶2
	Thornback skate,												1									**2
																						226
Station XIII.																						
1901. Oct. 9. 1st *Haul,* 11-15 a.m. to 0-15 p.m.	Com. gurnard, -				3																	3
	Haddock, - -			1																		1
	Long rough dab,					1	1															2
																						6
2nd *Haul,* 1-5 p.m. to 2-5 p.m.	Com. gurnard, -		1	4	1	2	3	1														☛12
	Liparis vulgaris,																					††18
	Liparis montagui, - -																					‡‡3
	Cod, - - -														1							1
	Brassie, - -			1																		1
	Whiting, - -				2																	2
	Long rough dab,		1	1																		2
	Common dab, -					1	1															2
	Argentine, -				1																	1
																						42
Nov. 28. 3-10 p.m. to 4-10 p.m.	Com. gurnard, -				3		2															5
	Cod, - - -									1												1
	Brassie, - -			2		1																3
	Whiting, - -				1	1	1															3
	Hake, - -												3									3
	Long rough dab,			1	1	2																4
																						19
Dec. 26. 10-53 a.m. to 12-28 p.m.	Angler, - -																				1	1
	Liparis sp. -																					§§3
	Cod, - - -								2													2
	Coal-fish, - -										1											1
	Herring, - -								1													1
	Piked-dog, - -																		2	1		3
	Thornback skate,																					‖‖1
																						12

* Two 28 inches. † 27½ inches. ‡ One 27 inches. § 31 inches. ‖ One 2½ inches. ¶ One 30 inches.
** One 29 inches. †† Five 1¼ inches; four 1½ inches; three 1¾ inches; four 2 inches; two 2¼ inches.
‡‡ One 1¼ inches; two 1¾ inches §§ 2 inches ‖‖ 27½ inches

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station XIV. 1901. Oct. 10. 1st. *Haul,* 8-15 a.m. to 9-15 a.m.	Com. gurnard,	.	1	.	1	1	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	4
	Whiting,	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Plaice,	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	1	6	8	6	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	22
																						30
2nd *Haul,* 9-35 a.m. to 10-35 a.m.	Com. gurnard,	.	1	3	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
	Cod,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Brassie,	.	.	3	2	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6
	Saithe,	.	.	.	.	.	1	.	.	.	.	1	.	.	.	.	.	.	.	.	.	2
	Long rough dab,	1	2	5	6	6	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	22
	Plaice,	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
	Lemon sole,	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	2
	Witch sole,	.	.	.	.	1	.	.	2	.	2	.	.	.	.	.	.	.	.	.	.	5
	Common dab,	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
																						46
Nov. 28. 1-30 p.m. to 2-50 p.m.	Com. gurnard,	.	1	.	3	.	1	2	3	5	.	.	.	.	.	.	.	.	.	.	.	15
	Cod,	.	.	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	1	.	.	3
	Haddock,	.	.	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1	.	.	3
	Brassie,	.	.	1	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5
	Whiting,	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Long rough dab,	.	1	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Witch sole,	.	.	.	.	1	1	.	2	.	1	.	1	.	.	.	.	.	.	.	.	6
	Gray skate,	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	.	.	1	2	.	.	1	.	.	.	.	.	.	.	.	4
																						43
Dec. 26. 1-45 p.m. to 3-0 p.m.	Com. gurnard,	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Brassie,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Long rough dab,	.	3	2	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	8
	Plaice,	.	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	3
	Piked-dog,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	4	1	.	.	7
	Thornback skate,	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1
																						22
Station XV. 1901. Oct. 12. 11-55 a.m. to 1-25 p.m.	Cod,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	1
	Brassie,	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
	Saithe,	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	1
	Three-bearded rockling,	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Plaice,	2	5	11	39	40	25	3	.	.	.	.	.	.	.	.	.	.	.	.	.	125
	Long rough dab,	.	.	.	.	.	.	.	.	.	4	2	.	1	.	.	.	.	.	.	.	7
	Witch sole,	.	.	.	.	.	2	9	31	55	43	27	6	.	.	.	.	.	.	.	.	173
																						310
Nov. 28 9-30 a.m. to 11-15 a.m.	Cod,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	1
	Brassie,	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
	Whiting,	2	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
	Hake,	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
	Long rough dab,	3	3	10	37	30	10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	93
	Plaice,	.	.	.	.	.	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.	3
	Witch sole,	.	.	.	1	.	1	8	21	57	28	13	6	.	.	.	.	.	.	.	.	135
	Lemon sole,	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	1
	Piked-dog,	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*1
	Gray skate,	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
	Thornback skate,	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
																						241

* 30 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches.																				Total.
		4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	
Station XV.																						
1901. Dec. 24. 1-5 p.m. to 2-45 p.m.	Com. gurnard,				1		1															2
	Cod,														1							1
	Haddock,																1					1
	Brassie,				1	1																2
	Coal-fish,															1						1
	Long rough dab,		2	2	34	34	22	1														95
	Plaice,									1		2	1									4
	Witch sole,				1	1	4	5	16	20	26	10	2									85
	Argentine,				1																	1
	Piked-dog,															1	1			1		3
	Thornback skate,					1						1										2
																						197
Station XVI.																						
1901. Oct. 12. 8-30 a.m. to 10-20 a.m.	Haddock,														1							1
	Long rough dab,					1																1
	Witch sole,								2	10	4	1	1									18
	Herring,																					*1
																						21
Nov. 27. 2-10 p.m. to 3-55 p.m.	Long rough dab,				1																	1
	Witch sole,								3	1	1											5
																						6
Dec. 23. 1-15 p.m. to 3-13 p.m.	Witch sole							2		1			1									4
																						4
Station XVII.																						
1901. Oct. 11. 1-35 p.m. to 2-55 p.m.	Com. gurnard,					3		2														5
	Cod,										1		2			1						4
	Haddock,																	1				1
	Brassie,				1	1																2
	Saithe,						1		1	1		2										5
	Hake,										1		1		1		1					4
	Turbot,														2				1			3
	Long rough dab,		1	6	7	5	10	4	2	1												36
	Plaice,											1	2	5			2					10
	Lemon sole,							1														1
	Witch sole,					1		4	9	13	13	11	1									52
	Common dab,				1	1	3	2	1													8
	Thornback skate,																			1		1
																						132

* 3 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

A. FISH CAUGHT—Firth of Clyde—*continued.*

Station, Date, and Time Trawl down.	Kind of Fish.	Size in Inches. 4 +	5 +	6 +	7 +	8 +	9 +	10 +	11 +	12 +	13 +	14 +	15 +	16 +	17 +	18 +	19 +	20 +	21 +	23 +	25 +	Total.
Station XVII.																						
Nov. 27.	Com. gurnard, -				1	3	1	1														6
11-10 a.m.	Cod, - - -							1														1
to	Brassie, - -		1	10	16	20	3															50
0-40 p.m.	Hake, - -												1	2								3
	Long rough dab,		2	3	6	11	10	2	1													35
	Plaice, - -									1	1	1	3		1							7
	Witch sole, -							1	5	16	25	18	5									70
	Common dab, -				1	2	3	2	1													9
	Conger, - -																					*1
	Thornback skate,							1									1					2
	Lythe, - -								1	1												2
																						186
Dec. 24.	Com. gurnard, -				2	2		1	1													6
10-10 a.m.	*Liparis sp.* -																					†1
to	Cod, - - -						1															1
11-25 a.m.	Whiting, - -			1																		1
	Hake, - -															1						1
	Long rough dab,	1	3	3	4	6	5	6	1													29
	Plaice, - -										1											1
	Witch sole, -							2		5	12	14	5									38
	Common dab, -			1	3	1	3		1													9
																						87

* 39 inches. † 2 inches.

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B—PHYSICAL OBSERVATIONS—Cromarty Firth.

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Water Surface.	Water Bottom.	Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
1901. Jan. 7. 10.15 a.m.	Over Stn. III.	4·0	44·4	45·0	9	E.S.E.	5	Overcast.	Slight.	3 h. fl.	30·27	2
Jan. 8. 10.20 a.m.	,,	4·4	43·4	44·3	14	,,	4	,,	,,	2 h. 8 m. fl.	30·08	2
Jan. 9. 9.30 a.m.	Off Invergordon.	2·3	42·4	43·0	11	W.	1	,,	Calm.	½ h. fl.	29·78	1
Jan. 10. 9.40 a.m.	West Invergordon.	0·04	40·9	43·3	8	W.	Light	Cloudy. Frost.	,,	Low water	29·90	1
Jan. 17. 10.15 a.m.	Off Saltburn.	2·2	42·2	45·2	12¼	S.S.W.	2	Cloudy.	Smooth.	Near high water.	29·75	2
Jan. 18. 11.0 a.m.	Off Cas'le-craig.	7·3	42·4	43·9	4	S.W	2	,,	Calm.	High water.	29·78	2
Jan. 21. 10.20 a.m.	East of Jaminia Village in bay.	2·5	44·3	43·2	3	W.S.W.	4	Overcast.	Slight.	3h. 50m. fl.	29·78	1
Jan. 23. 10.40 a.m.	Close off the West Suter.	6·6	43·9	44·5	5½	S.W.	Squally.	Cloudy.	,,	2h. 35m. fl.	30·26	1¾
Moray Firth.												
Station XIV. 1901. Feb. 2. 2.0 p.m.	N.	3·4	43·7	42·8	25¼	N.N.W.	4	Cloudy, passing snow showers.	Slight, N.E. swell.	Low water	30·47	3¾
4.20 p.m.	S.	3·8	43·0	43·2	43	N.N.W.	4			2h. 20m. fl.	30·47	4
Station XV. 1901. Feb. 2. 10.0 a.m	S.	3·2	43·9	42·9	26	N.W.	3	Overcast, snow showers.	,,	2h. 12m. ebb.	30·45	4½
12.25 p.m.	N.	3·8	43·3	43·2	33	N.W.	5			4½ h. ebb.	30·46	4½

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Forth.

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Temperature. Water. Surface.	Temperature. Water. Bottom.	Temperature. Water. Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
Station I.												
1900. Sept. 11. 4.5 p.m.	W.	64·04	55·9	55·0	9	W.	2	Cloudy, slight haze.	Slight.	—	30·39	2
6.0 p.m.	E	61·70	56·4	54·7	15½	W.	2	Fine, slight haze.	,,	—	30·40	3½
1901. Mar. 23. 11.5 a.m.	E.	47·30	41·5	41·3	13½	S.S.W.	1	Hazy.	Calm, slight E. swell.	—	30·49	2½
1.5 p.m.	W.	44·24	42·3	41·2	13	S.	1	Fine, moderate, clear.	,,	—	30·49	1½
April 22. 2.50 p.m.	E.	56·30	43·4	42·1	15	S.W.	1	Overcast, hazy.	Slight.	4 h. fl.	29·77	2½
5.5 p.m.	W.	60·62	44·3	42·5	14	S.W.	2	,,	,,	10 m. ebb.	29·76	1½
June 19. 3.35 p.m	W	51·26	50·9	49·9	7	W.	0	Rain, continuous.	Smooth.	5 h. fl.	30·02	1¾
6.0 p.m.	E	52·70	50·6	48·9	15	—	0	Heavy rain.	,,	1½ h. ebb.	29·97	2¼
July 12. 11.17 a.m.	E.	63·32	57·1	56·1	7½	W.	4	Fine, moderate, clear.	Choppy.	9 m. ebb.	30·14	2¼
1.20 p m.	W.	64·22	59·5	51·9	16	W.	4	,,	,,	2 h. ebb.	30·14	0
Station II.												
1900. Sept. 11. 2.35 p.m.	W.	62·60	55·4	50·0	14	N.N.W.	3	Cloudy.	Slight.	5h. 26m. fl.	30·08	3
4.10 p.m.	E.	61·16	55·3	54·8	13½	N.	2	,,	,,	2 h. ebb.	31·02	3
1901. Mar. 7. 10.0 a.m.	E.	42·26	41·6	40·9	10	E.	4	O'rcast, with rain and fog.	Slight.	1 h. fl.	29·11	1¾
12.53 p.m.	W.	41·72	40·9	40·9	14	N.E.	6	Cloudy.	Moderate,	3 h. fl.	29·22	2
April 24. 3.25 p.m.	E.	49·64	45·3	42·6	12¾	E.	5	Cloudy, fine haze.	Choppy, E. swell.	3 h. fl.	30·07	3
5.50 p.m.	W.	46·76	43·8	43·2	12	E.	6	Cloudy, fine.	Rough.	5h.25m.fl.	30·05	2
May 17. 11.45 a.m.	W.	49·10	51·2	46·1	13	E.	2	Fine, slight haze.	Slight E. swell.	4¼ h. fl.	30·22	4
2.15 p.m.	E.	50·54	50·2	44·8	16	E.S.E.	3	Fine, moderate, clear.	,,	¾ h. ebb.	30·22	3½
May 29. 12.0 noon.	W.	56·48	52·9	49·0	14	E.S.E.		Fine, cloudy, slight haze.	Slight,	High water.	29·84	3
2.40 p.m.	E.	53·96	51·1	49·2	13	E. by S.	3	Cloudy, fine.	,,	2h.40m.eb.	29·83	3¼
June 5. 12.25 p.m.	E.	58·28	49·5	47·3	15¾	E.S.	5	Cloudy, slight haze.	Choppy.	2¼ h. fl.	30·00	2¾
4.5 p.m.	W.	55·40	49·4	47.4	14	W.	5	Fine, cloudy, slight haze.	,,	Low water.	30·00	2¼
June 10. 12.55 p.m.	W.	52·70	48·9	47·3	12¾	W.S.W.	5	Cloudy, passing showers.	,,	4¾ h. ebb.	29·84	2¼
3·40 p.m.	E.	55·76	49·8	47·2	14	W.S.W.	5	,,	,,	1¾ h. fl.	29·80	2¾

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS—Firth of Forth—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Barometer.	Transparency Fathoms.
		Air.	Water.									
		Dry Bulb.	Surface.	Bottom.	Depth in faths.	Direction.	Force.					
Station II. 1901. June 14. 12.0 noon.	W.	50·90	48·8	48·3	13½	—	0	Cloudy, fine.	Smooth, E. swell.	High water.	29·81	2½
2.20 p.m.	E.	53·24	49·0	47·9	13	E.S.E.	3	Cloudy.	Slight.	2h.20m.eb.	29·84	3
June 24. 11.40 a.m.	W.	60·08	51·0	49·1	12	W.	4	Cloudy, fine.	,,	3½h. ebb.	30·06	3
1.30 p.m.	E.	58·10	51·0	48·9	17	W.	3	Fine, cloudy, clear.	,,	5h.20m.eb.	30·10	2½
July 12. 2.0 p.m.	W.	63·68	57·0	52·8	13	W.	2	Fine, clear.	,,	2h.40m.eb.	30·14	5
4.5 p.m.	E.	64·94	58·7	52·0	17½	W.	3	Fine, mod., clear.	,,	4h.45m.eb.	30·14	5
Station III. 1900. Sept. 10. 12.30 p.m.	E.	61·34	56·2	55·7	7	W.N.W.	2	Hazy.	Ripple.	2h. 55m. fl.	30·40	1½
3.45 p.m.	W.	64·04	56.2	54·7	9	W.	2	Cloudy, with haze.	Slight.	4h. 10m.fl.	30·40	3
1901. March 14. 10.35 a.m.	W.	40·64	41·3	42·4	7½	E.S.E.	2	Overcast	,,	2h.17m.fl.	30·06	2
2.0 p.m.	E.	42·44	41·4	41·4	12	S.E.	2	,,	Calm.	Low water.	30·07	2
April 23. 2.25 p.m.	E.	57·02	44·3	43·8	7	S.W.	4	Cloudy, fine, haze.	Slight.	2¾ h. fl.	29·86	2
5.55 p.m.	W.	49·28	43·9	42·9	7¾	W.	3	Fine, haze.	,,	¼ h. ebb.	29·93	1¾
May 9. 12.30 p.m.	E.	44·60	46·8	46·8	7	E.	2	Rain.	E. swell.	¾ h. fl.	30·02	2¾
4.40 p.m.	W.	46·76	47·0	46·1	10½	—	0	Overcast, haze.	,,	4¾ h. fl.	30·02	2¼
May 13. 11.32 a.m.	W.	54·32	49·6	46·2	7	E.N.E.	1	Fine, hazy.	Smooth, slig't swell	1½ h. ebb.	30·40	2¼
4.5 p.m.	E.	55·94	49·2	49·2	10	E.	2	,,	Slight.	4½ h. ebb.	30·39	1¾
May 16. 11.30 a.m.	E.	52·88	46·1	49·0	7½	E.	1	,,	Slight E. swell.	5h.10m.fl.	30·26	2¾
2.15 p.m.	W.	54·86	50·2	48·6	7¼	E.	3	Fine, mod., clear.	Slight.	2 h. ebb.	30·21	2
May 28. 11.10 a.m.	W.	53·60	51·4	51·0	7½	S.S.E.	Light airs.	Cloudy, thick haze.	Calm.	High water.	29·86	2½
2.45 p.m.	E.	58·64	52·3	49·6	7½	N.W.	1	Cloudy, fine, slight haze.	Slight E. swell, calm	3 h. 35 m. ebb.	29·84	3
May 30. 11.15 a.m.	W.	54·14	51·8	51·1	7	E.N.E.	1	Passing showers, o'rcast.	E. swell.	5 h. fl.	29·62	2½
3.15 p.m.	E.	55·04	53·4	49·9	12	E.	2	Fine, cloudy.	Slight E. swell.	3 h. ebb.	29·56	3
June 4. 12.10 p.m.	E.	59·00	53·4	52·9	6½	S.W.	4	Cloudy.	Slight.	2¾ h. fl.	29·07	2
3.35 p.m.	W.	57·20	51·5	47·3	13	S.W.byS	6	Cloudy, dull.	Choppy.	25 m. ebb.	29·91	2
June 7. 11.30 a.m.	E.	62·24	55·2	53·0	6	—	0	Fine, hazy.	Quite smooth.	Low water.	30·29	2
4.0 p.m.	W.	62·06	52·7	50·8	7	N.N.E.	1	,,	Calm.	4¼ h. fl.	30·26	1¾

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Forth—*continued.*

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Water. Surface.	Water. Bottom.	Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency Fathoms.
Station III. 1901. June 13. 11.20 a.m.	W.	53·24	48·6	48·2	8	W.N.W.	4	Cloudy, passing show'rs.	Slight.	High water.	29·40	2
2.50 p.m.	E.	55·76	51·0	50·0	12	N.	4	"	Slight to choppy.	3½ h. ebb.	29·44	2
June 20. 1.0 p.m.	E.	57·92	52·4	51·9	6	W.S.W.	3	Cloudy, and dull.	Slight.	1¾ h. fl.	29·93	1½
4.40 p.m.	W.	58·28	50·8	50·1	8	Variable	1	O'rcast, passing show'rs.	Smooth.	5½ h. fl.	29·85	1¾
July 10. 11.15 a.m.	W.	67·64	56·5	55·4	7	W.	2	Fine, hazy.	"	1 h.10 m.fl.	30·09	2
2.55 p.m.	E.	69·00	57·8	56·7	7½	W.	1	"	"	5 h.50m.fl.	30·09	2½
Station IV. 1900. Sept. 7. 12.0 noon	W.	58·28	56·1	55·9	5	S.W.	2	Cloudy, with fine rain.	Calm.	5 h. fl.	30·01	1¾
3.48 p.m.	E.	56·84	56·2	55·6	6½	E.N.E.	2	Overcast.	"	2h.48m.eb.	29·97	1¾
1901. Mar. 22. 12.55 p.m.	E.	42·44	41·4	41·4	7	N.E.	Light airs.	Cloudy.	Calm, sl'ht N.E. swell.	—	30·41	2
4.40 p.m	W.	44·60	41·5	41·1	7½	—	0	Fine, haze.	Calm, N.E. swell	—	30·41	1
April 25. 11.15 a.m.	E.	48·92	45·7	44·2	6¾	E.	5	Cloudy, slight haze.	Choppy.	4 h ebb.	30·08	2
2.35 p.m.	W.	53·60	46·2	46·2	4	E.	5	"	Moderate.	1¼ h. fl.	30·09	1
June 21. 12.10 p.m.	E.	52·16	52·3	51·9	5½	W. by S.	2	Fine, cloudy.	Slight.	½ h. fl.	29·88	1½
4.20 p.m.	W.	63·32	52·6	52·0	5	S.W.	3	"	"	4h.10m.fl.	29·90	1¾
July 11. 11.25 a.m.	W.	64·04	59·4	57·0	5	E.	1	Fine, hazy.	Smooth.	1h.25m.eb.	30·06	2½
3.5 p.m.	E.	68·02	61·1	57·2	5	Light airs.	0	Fine, hazy, thunder.	Quite smooth.	5h. 5m. eb.	30·04	2
Station V. 1900. Sept. 13. 11.48 a.m.	E.	62·60	55·9	54·5 54·1	11¼ 23	W.	Light.	Fine, haze.	Calm.	—	30·45	5
1.43 p.m.	W.	63·50	55·4	54·6	27	S.	1	Fine, hazy.	"	—	30·44	3½
1901. Mar. 26. 1.55 p.m.	E.	36·30	41·3	41·3	23	N.N.E.	6	Snow sh'rs.	Choppy, N.E. swell.	1½h. fl.	29·90	2¼
3.55 p.m.	W.	36·68	41·2	41·2	38	N.N.E.	6	Cloudy, passing snow sh'rs.	" "	3½h fl.	29·87	2¾
April 24. 10.40 a.m.	W.	47·30	43·9	42·4	28	E.	3	Fine, hazy.	Slight, E. swell.	4¼h. ebb.	30·11	3½
12.50 p.m.	E.	49·64	43·8	42·3	19	E.	2	"	" "	¼h. fl.	30·11	3
May 10. 1.20 p.m.	E.	47·48	46·2	44·8	22	S.E.	5	Fine, moderate, clear.	Slight. S.E. swell.	¾h. fl.	30·03	3
4.20 p.m.	W.	47·66	46·3	44·9	31	S.E.	5	Cloudy.	Choppy.	3¾h. fl.	29·98	2½

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Forth—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
		Air.	Water.									
		Dry Bulb.	Surface.	Bottom.	Depth in faths.	Direction.	Force.					
Station V. 1901.												
June 27. 10.43 a.m.	E.	58·64	52·8	49·0	24½	N.N.E.	1	Overcast.	Smooth.	5½h. fl.	30·26	5
1.0 p.m.	W.	59·00	53·0	48·8	26	E.	1	Fine, cloudy	,,	1h. 40m. ebb.	30·25	5
June 28. 6.20 a.m.	E.	53·96	53·0	49·6	25	–	0	Fine, hazy.	,,	Low water.	30·23	6
8.50 a.m.	W.	—	59·9	48·9	27	Light airs.	0	,,	,,	2½h. fl.	30·22	6
July 15. 1.22 p.m.	W.	63·50	55·8	51·2	31½	W.	5	Fine, moderate, clear.	Moderate.	High water.	29·97	6
3.47 p.m.	E.	62·24	55·3	50·0	24	W.	5	,,	,,	2h. 20m. ebb.	30·00	5
Station VI. 1901.												
April 28. 12.45 p.m.	W.	36·50	40·9	40·8	12	N.	7	Cloudy, passing snow sh'rs.	Rough.	4h. ebb.	29·72	2½
1.53 p.m.	E.	37·22	40·6	40·9	21	N.E.	7	Cloudy.	Choppy.	5h.8m.ebb.	29·71	2½
April 24. 1.30 p.m.	E.	47·48	43·8	42·8	14	E.	3	Fine, hazy.	E. swell.	1h. fl.	30·10	3
2.25 p.m.	W.	48·92	43·9	44·2	12	E.	3	Fine, haze.	Slight, E. swell.	2 h. fl.	30·09	2
May 22. 3.20 p.m.	W.	51·80	48·2	47·7	12½	S.E.	5	Moderate, clear.	Choppy.	4h. ebb.	30·45	3½
May 29. 3.30 p.m.	W.	53·60	51·1	48·4	12½	E. by S.	3	Fine, cloudy, slight haze.	Slight.	3½h. ebb.	29·83	3
5.10 p.m.	E.	55·04	51·1	48·6	12½	E. by S.	3	,,	,,	5h. 10m. ebb.	29·82	4
June 6. 12.40 p.m.	E.	59·72	49·0	47·1	14½	S.W.	1	Fine, slight haze.	Calm.	3h. fl.	30·24	3¼
1.40 p.m.	W.	58·28	49·8	47·3	12	S.W.	1	Fine, cloudy, clear.	Smooth.	4h. fl.	30·25	5
June 12. 1.25 p.m.	W.	56·84	47·6	47·3	11	N.W.	4	Fine, cloudy.	Slight.	3h.5m.ebb.	29·66	3
2.15 p.m.	E.	55·76	49·0	49·0	15	N.W.	4	,,	,,	4h. ebb.	29·66	5
June 26. 1. 5 p.m.	W.	62·96	52·0	50·6	11	S.W.	1	Fine, moderate, clear.	Calm.	3h. 20m. ebb.	30·36	3
2.50 p.m.	E.	62·60	52·0	50·1	16	S.W.	1	,, ,,	,,	4h. 35m. ebb.	30·35	4
July 15. 4.53 p.m.	E.	61·70	54·4	52·3	15	W.	3	Fine, clear.	Choppy.	3h. 23m. ebb.	29·99	4
6.25 p.m.	W.	60·62	54·2	51·6	11½	W.	3	Fine, moderate, clear.	,,	4h. ebb.	30·00	3½

TABLE B.—Record of Observations made on Board the "Garland" during 1901.

C. PHYSICAL OBSERVATIONS.—Firth of Forth—*continued.*

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Water. Surface.	Water. Bottom.	Water. Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
Station VII. 1901. March 29. 11.43 a.m.	W.	38·12	39·9	39·8	11½	S.E.	5	Maderately clear.	Slight, N.E. swell.	1h. 25m. ebb.	29·65	2½
2.0 p.m.	E.	37·58	40·0	40·9	21½	S.E.	6	,, ,,	Choppy, E. swell.	3h. 41m. ebb.	29·60	2½
April 23. 11.50 a.m.	E.	59·00	44·2	42·3	20½	S.S.W.	5	Fine, hazy.	Slight, S.E. swell.	10m. fl.	29·84	2¼
1.55 p.m.	W.	59·54	44·6	43·3	13	S.W.	5	Cloudy, haze.	,, ,,	2¼h. fl.	29·84	2
July 9. 1.30 p.m.	E.	62·24	55·6	52·0	17	E.S.E.	4	Fine, cl'dy.	Slight, E. swell.	1h. 50m. ebb.	30·05	6
4.20 p.m.	W.	63·14	56·6	55·0	10	E.S.E.	3	Fine, clear.	,, ,,	3h.10m.fl.	30·04	4
Station X. 1901. March 20. 12.45 p.m.	E.	41·18	41·0	41·6	12	E.N.E.	6	Cloudy, passing showers of sleet and snow.	Slight.	4h. 3m. fl.	29·97	¾
1.50 p.m.	W.	41·00	40·0	41·0	9	E.N.E.	6	Overcast, passing sleet sh'rs.	,,	5h. 9m. fl.	29·98	½
April 26. 12.55 p.m.	W.	50·00	46·9	46·3	7	S.E.byE.	4	Fine, moderate, clear.	,,	4h. 15m. ebb.	30·17	½
2.0 p.m.	E.	50·54	46·8	45·6	10	S.E.byE.	3	,, ,,	,,	15m. fl.	30·15	1

Firth of Clyde.

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Water. Surface.	Water. Bottom.	Water. Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
Station I. 1901. Oct. 25. 11.15 a.m.	N.	49·64	52·0	52·8 52·5	28 14	W.	3	Fine, mod. clear.	Slight.	65 m. ebb.	29·91	4¾
12.5 p.m.	S.	50·00	52·0	52·3 52·2	23 11½	S.W.	5	Cloudy, fine, clear.	Slight, S. W. swell.	2h. 5m. eb.	29·91	3½
1902. Jan. 11. 8.50 a.m.	S	38·84	46·8	47·0	21	N.E.	3	Dull, cloudy.	Slight.	1h.40m.fl.	30·09	3½
10.30 a.m.	N.	39·56	46·4	46·8 46·7	28 14	N.E.	2	Fine, cloudy.	Smooth.	3h.10m.fl	30·13	4¾
Station II. 1901. Oct. 23. 12.45 p.m.	Outer S.	52·34	52·0	52·3	17	S.W.	Light airs.	Cloudy, fine, slight haze.	,,	5h.40m.fl.	29·98	5¼
2.30 p.m.	Inner S.	52·16	52·3	52·8	15	W.S.W.	1	Cloudy, fine, clear.	Calm.	1h.20m.eb.	29·98	4¾
1902. Jan. 13. 10.0 a.m.	Inner S	38·30	46·3	46·5	18	N.	1	,,	,,	2½ h. fl.	30·33	3¾
1.40 p.m.	Outer S.	38·30	46·4	46·5	20	N.	3	Fine, Overcast.	Ripple,	5h.10m.fl.	30·36	4½

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS—Firth of Clyde—*continued*.

Station. Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
		Air.	Water.									
		Dry Bulb.	Surface.	Bottom.	Depth in faths.	Direction.	Force.					
Station III.												
1901. Oct. 23. 10.30 a.m.	N.	50·54	52·3	53·2	24	—	0	Cloudy, bright sunshine.	Smooth.	3h.25m.eb.	29·95	5
12.5 p.m.	S.	50·72	52·5	52·8 53·2	40 20	—	0	Cloudy, fine, slight haze.	,,	5h. ebb.	29·98	5¼
1902. Jan. 10 1 10 p.m.	N.	43·16	47·0	46·8 46·8	25 12½	N.W. by W.	3	Overcast.	Slight.	25 m. ebb.	29·83	5
2.35 p.m.	S.	43·34	46·4	46·5 46·7	30 15	N.W.	3	Overcast, rain.	,,	1h.25m.eb.	29·84	4
Station IV.												
1901. Oct. 22. 3.30 p.m.	S.W.	49·64	52·7	53·2	20	S.	1	Cloudy, haze.	Calm.	3 h. fl.	29·81	4
4.30 p.m.	N.E.	49·64	52·9	53·2 53·0	24 12	S.	1	,,	,,	4 h. fl.	29·84	4¼
1902. Jan. 10. 11.15 a.m.	S.W.	42·44	47·0	47·3 47·2	25 12½	W.	2	Overcast. rain.	Ripple.	4h. 25m. fl.	29·83	4
12.15 p.m.	N.E.	42·98	47·2	47·1 47·0	25 12½	W.	1	,,	Calm.	5h. 25m. fl.	29·84	3¾
Station V.												
1901. Nov. 7. 2.43 p.m.	S.	48·92	51·2	52·1	17	N.N.W.	2	Cloudy,	Slight.	Top of h. water.	30·23	3½
4.5 p.m.	N.	49·64	51·2	51·8	7	N.N.W.	Squally.	Showery.	,,	1h.22m.eb.	30·21	4¾
1902. Jan. 23. 11.35 a.m.	N.	46·40	45·7	46·0 45·8	20 10	S.W.	6	Overcast, hazy.	Moderate.	25 m. ebb.	29·94	6½
1.5 p.m.	S.	46·76	46·0	46·7	9½	S.W.	6	,,	Choppy.	1h 55m.eb.	29·91	5½
Station VI.												
1901. Oct. 25. 12.15 p.m.	N.	50·36	52·3	52·8 52·4	25 12½	S.W.	5	Cloudy, fine, clear.	Choppy, S.W. swell.	2h.10m.eb.	29·91	3½
2.37 p.m.	W.	49·28	52·5	52·8 52·4	20 10	S.W.	5	Overcast, rain.	Choppy.	4½ h. ebb.	29·87	5
1902. Jan. 14. 1.10 p.m.	W.	37·58	46·4	46·3 46·3	30 15	S.E.	2	Moderate clear.	Slight.	4h. 5m. fl.	30·64	3½
2.30 p.m.	N.	38·12	46·0	46·2 46·2	23 11½	S.	3	Fine, clear.	,,	25m. ebb.	30·64	3¾

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Clyde—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Baro-meter.	Transparency. Fathoms.
		Air.	Water.									
		Dry Bulb.	Sur-face.	Bot-tom.	Depth in faths.	Direc-tion.	Force.					
Station VII. 1901. Nov. 7.												
9.25 a.m.	N.E.	48·92	52·5	52·9 52·7	24 12	N. by W.	4	Overcast.	Choppy.	48m. ebb.	30·25	5
11.43 a.m.	S.W.	49·64	52·5	52·3	14	N. by W.	4	,,	,,	3h. 6m. eb.	30·26	4½
1902. Jan. 22.												
10.45 a.m.	N.E.	46·40	45·7	46·1 45·9	21 10½	W.	1	Fine, over-cast.	Smooth.	1h.11m.eb.	30·16	3¼
1.5 p.m.	S.W.	46·94	45·8	46·6 46·4	20 10	S.	Light airs.	Overcast.	,,	3h.31m.eb.	30·15	4¾
Station VIII. 1901 Nov. 5.												
10.30 a.m.	W.	48·74	54·0	54·0 53·9	35	S.	3	Fog.	Slight.	3h.50m.eb.	30·36	3
12.55 p.m.	E.	50·36	53 5	53·7 53·6	27½	S.	3	,,	,,	10m. fl.	30·37	3
1902. Jan. 21.												
11.30 a.m.	E.	48·02	46 0	46·6 46·0	30 15	W.	4	Overcast.	Moderate.	2h.39m.eb.	30·13	5
2.5 p.m.	W.	48·20	49·8	46·9 46·5	34 17	W. by S.	4	,,	,,	5h.14m.eb.	30·14	5
Station IX. 1901. Nov. 6.												
9.53 a.m.	N.E.	50·72	52·2	53·9 52·3	29 14½	W.	2	Overcast.	Calm.	1h.53m.fl.	30·29	4
12.20 p.m.	S.W.	50·90	53·1	53·2 53·0	28 14	N.W. by W.	4	,,	Slight.	3h.27m.fl.	30·27	3
1902. Jan. 17.												
1.35 p.m.	S.W.	43·70	45·5	46·9 46·6	30 15	W.	2	Fine, cloudy.	,,	1h.47m.fl.	30·40	5¾
4.5 p.m.	N.E.	44·24	45·6	46·1 45·6	28 14	W.	2	,, ,,	,,	4h.47m.fl.	30·38	5¼
Station X. 1901. Nov. 1.												
12.7 p.m.	W.	50·00	53·0	53·0 53·0	25 12½	E.	5	Fine, slight, haze.	Choppy.	3h.17m.fl.	30·35	3½
2.30 p.m.	E.	54·14	52·5	52·7 52·4	28 14	E.	3	Fine, clear.	Moderate.	5h.40m.fl.	30·30	3½
1902. Jan. 17.												
9.47 a.m.	W.	43·16	45·3	46·5 45·7	27½ 13¼	W.S.W.	4	Fine, cloudy.	,,	4h.47m.eb.	30·48	6
12.5 p.m.	E.	42·80	45·4	46·1 45·5	27 13	W.S.W.	4	,, ,,	,	17m. fl.	30·44	5¼
Station XI. 1901. Nov. 15.												
10.50 a.m.	S.W.	38·84	50·3	51·5 51·3	28 14	S.	1	Cloudy, fog banks.	Calm.	3h. fl.	29·58	3
1.20 p.m.	N.E.	41·00	51·2	51·1 51·2	28 14	E.S.E.	1	Fine, cloudy, fog banks.	,,	5h.45m.fl.	29·61	4

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS—Firth of Clyde—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Barometer.	Transparency Fathoms.
		Air.	Water.									
		Dry Bulb.	Surface.	Bottom.	Depth in faths.	Direction.	Force.					
Station XII. 1901. Nov. 8.												
8.50 a.m.	W.	49·46	52·1	52·8 52·5	45 22½	W.N.W.	3	Cloudy.	Mod'ate.	5h.35m.fl.	30·14	4¾
11.20 a.m.	E.	50·54	52·0	52·8 53·0	36 18	W.N.W.	4	,,	Choppy.	1h.55m.eb.	30·15	5
Station XIII. 1901. Oct. 9.												
11.5 a.m.	N.E.	52·70	52·7	52·9 53·0	27 13½	N.	Squally.	Cloudy, bright sunshine	Slight.	1¾ h. ebb.	29·78	7½
12.30 p.m.	S.W.	53·24	52·8	53·0 52·9	28 14	N.	Squally.	,,	,,	3 h. ebb.	29·85	4½
Oct. 16. 3.25 p.m.	N.E.	47·66	50·06	52·9 52·7	28 14	S.E.	5	Overcast, hazy.	,,	1h.2m.eb.	29·46	2½
4.55 p.m.	S.W.	47·84	51·0	53·0 52·7	32 16	S.	3	Overcast, fine rain.	Ripple.	2½ h. ebb.	29 44	3
Nov. 28. 3.5 p.m.	N.E.	44·96	50·1	52·1 51·3	22 16	N.W.	Squally.	Fine, cloudy.	,,	1¼ h. ebb.	30·46	5
4.20 p.m.	S.W.	43·70	51·9	51·2 50·0	24 12	N.W.	Squally.	,,	,,	2¾ h. ebb.	30·48	5¼
Dec. 18. 10.30 a.m.	S.W.	40·28	48·3	46·7	24	N.	4	Fine, clear.	Slight.	Low water.	29·30	5
12.15 p.m.	N.E.	43·52	48·4	48·8	29	N.	4	Fine, mod. clear.	,,	1¾ h. fl.	29·30	5
Dec. 26. 10.27 a.m.	S.W.	41·90	47·6	48·7 48·0	25½ 12¾	N.	4	Fine, cloudy.	,,	1h.52m.fl	29·11	4
12.43 p.m.	N.E.	42·44	47·5	48·3 47·8	28 16	N.	Squally.	Cloudy, passing showers.	Ripple.	4h. 8m. fl.	29·15	4¾
1902. Jan. 29. 9.40 a.m.	S.W.	37·58	43·5	46·2 45·4	23 11½	N.W.	2	Fine, cloudy.	Calm.	Top of low water.	29·89	5¼
11.20 a.m.	N.E.	37·22	43·9	46·4 46·0	28 14	N.	Squally.	,	Smooth.	1h.20m.fl.	29·96	5
Station XIV. 1901. Oct. 10.												
8.10 a.m.	N.E.	52·52	51·0	52·9 53·0	30 15	S.S.W.	5	Overcast, fine rain.	Slight.	5 h. fl.	29·95	3
9.30 a.m.	S.W.	52·88	50·9	52·9 53·0	30 15	S.S.W.	5	O'rcast, continuous rain.	,,	¼ h. ebb.	29·94	3
Oct. 17. 9.45 a.m.	S.W.	49·82	50·9	52·9 52·4	27 13½	S.W.	4	Cloudy, bright sunshine.	Ripple.	1h.25m.fl.	29·19	3
11.10 a.m.	N.E.	50·72	51·2	52·5 52·7	26 13	S.W.	3	,,	,,	2h.50m.fl.	29·19	3¼
Nov. 28. 1.20 p.m.	N.E.	46·04	50·0	50·0 50·1	25 12½	N.W.	Squally.	Fine, mod. clear.	Calm.	5½ h. fl.	30·45	5¼
3.5 p.m.	S.W.	44·96	50·1	52·1 51·3	32 16	N.W.	Squally.	Fine, cloudy.	Ripple.	1¼ h. ebb.	30·46	5
Dec. 18. 12.15 p.m.	S.W.	43·52	48·4	48·8	29	N.	4	Fine, mod. clear.	Slight.	1¾ h. fl.	29·30	5
1.35 p.m.	N.E.	42·44	48·3	49·3	25	N.	Squally.	Cloudy, snow showers.	Choppy.	3¾ h. fl.	29·29	4½

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS—Firth of Clyde—*continued.*

Station, Date and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Temperature. Water. Surface.	Temperature. Water. Bottom.	Temperature. Water. Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
Station XIV.												
1901. Dec. 26. 12.43 p.m.	S.W.	42·44	47·5	48·3 47·8	28 16	N.	Squally.	Cloudy, passing showers.	Ripple.	4h. 8m. fl.	29·15	4¾
1.37 p.m.	N.E.	41·90	47·9	48·0 48·0	26½ 13¼	N.	Squally.	Fine, mod. clear.	,,	5h. 3m fl.	29·15	5
1902. Jan. 29. 11.20 a.m.	S.W.	37·22	43·9	46·4 46·0	28 14	N.	Squally.	Fine, cloudy.	Smooth.	1h.20m.fl.	29·96	5
1.5 p.m.	N.E.	40·28	44·5	46·7 46·4	23 11½	N.	1	Fine, mod. clear.	,,	3h. 5m. fl.	29·98	7½
Station XV.												
1901. Oct. 12. 11.40 a.m.	N.E.	54·50	50·9	48·9 52·6	50 25	S.	2	Overcast, rain.	Ripple.	3h. 35m. fl.	29·92	3½
1.40 p.m.	S.W.	52·88	51·5	51·3 52·8	31 15½	S.W.	3	Overcast, heavy rain.	,,	5h. 55m. fl.	29·92	3½
Oct. 17. 11.25 a.m.	S.W.	51·44	51·5	49·9 52·3	37 18½	S.W.	3	Cl'dy, bright sunshine.	,,	3h. 5m. fl.	29·19	3½
12.50 p.m.	N.E.	52·16	50·7	48·0 51·7	55 27½	S.W.	4	,,	,,	4½ h. fl.	29·19	3
Nov. 28. 9.25 a.m.	S.W.	44·96	49·6	51·0 50 4	30 15	W.	Light airs.	Fine, clear.	Smooth.	1½ h. fl.	30·42	5¼
11.30 a.m.	N.E.	45·14	49·7	50·4 50·9	44 22	W.N.W.	2	Fine, mod. clear.	Calm.	3h. 5m. fl.	30·45	6
Dec. 18. 1.50 p.m.	S.W.	39·92	49·0	48·7 48·5	29½ 14¼	N.	heavy sq'lls.	Cloudy, snow showers.	Choppy.	3½ h. fl.	29·28	4½
3.20 p.m.	N.E.	40·28	48·8	49·7 49·5	48 24	N.	heavy sq'lls.	Rain and sleet, cl'dy.	Calm.	5 h. fl.	29·27	5
Dec. 24. 12.55 p.m.	N.E.	40·46	48·5	48·8 48·9	38 19	W.	1	Moderately clear.	,,	2 h. ebb.	28·77	4½
2.55 p.m.	S.W.	40·46	47·4	48·0 48·1	18 9	W.	2	Overcast, rain.	Ripple.	4 h. ebb.	28·76	4¾
1902. Jan. 29. 1.23 p.m	S.W.	39·02	44·7	46·6 46·3	24 12	N.	Light airs.	Fine, clear.	Smooth.	3h.23m.fl.	29·99	5
3.30 p.m.	N.E.	40·10	45·3	46·8 46·5	40 20	N.N.W.	1	Fine, mod. clear.	,,	5h.10m.fl.	30·04	6¾
Station XVI.												
1901. Oct. 12. 8.10 a.m.	S.W.	48·74	50·08	46·4 50·9	68 34	S.E.	2	Cloudy, haze.	Calm.	25 m. fl.	29·97	4
10.35 a.m.	N.E.	52·52	50·4	47·0 48·6	70 35	S.	2	Cloudy.	Ripple.	2½ h. fl.	29·94	4
Oct. 17. 1.25 p.m.	S.W	51·62	51·0	47·7 51·3	70 35	S.W.	4	Cl'dy, bright sunshine.	,,	5 h. fl.	29·19	3¼
3.15 p.m.	N.E	52·52	50·3	48·0 52·0	67 25½	S.W.	5	Cloudy, squally.	Slight.	50 m. ebb.	29·19	3
Oct. 18. 11.15 a.m.	S.W.	45·86	50·8	46·4 50·0	75 37½	E.	1	Overcast, fine rain.	Smooth.	1h.20m.fl.	29·17	3¼
2.40 p.m.	N.E.	48·74	51·4	46·9 52·2	60 30	E.	1	Cl'dy, bright sunshine.	,,	4h.45m.fl.	29·16	2¼

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Clyde—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
		Air.	Water.									
		Dry Bulb.	Surface.	Bottom.	Depth in faths.	Direction.	Force.					
Station XVI. 1901. Nov. 27. 1.55 p.m.	N.E.	48·38	48·1	47·3 50·5	60 30	N.W.	Heavy sq'lls.	Fine, cloudy.	Slight.	55 m. ebb.	30·36	5
4.10 p.m.	S.W.	47·84	48·8	47·2 51·0	58 29	N.W.	Sq'lly.	Cloudy, passing showers.	Calm.	3 h. ebb.	30·36	5
Dec. 19. 10.45 a.m.	S.W.	35·24	48·0	47·8 50·0	58 29	N.E.	Light airs.	Cloudy.	,,	5¼ h. ebb.	29·48	6
1.55 p.m.	N.E.	39·20	46·9	49·1 50·0	59½ 29¾	N.E.	Sq'lly.	Overcast.	Slight.	2h.55m.fl.	29·50	5
Dec. 23. 1.5 p.m.	N.E.	36·66	49·2	48·1 49·8	61 30½	S.E.	6	Continuous rain.	Choppy.	3¼ h. ebb.	29·28	3½
3.30 p.m.	S.W.	37·22	49·0	49·0 48·7	57 28½	S.E.	8	Heavy sleet.	,,	5h.40m.eb.	29·18	3½
1902. Jan. 30. 9.55 a.m.	S.W.	32·62	43·8	47·0 47·2	58 29	E.N.E.	1	Fine, clear, frosty.	Smooth.	5h. ebb.	30·52	5
11.50 a.m.	N.E.	32·90	44·5	47·6 47·3	59½ 29¾	N.N.E.	Variable.	,,	,,	1h.35m.fl.	30·58	5
Station XVII. 1901. Oct. 11. 1.25 p.m.	N.E.	50·36	51·0	52·0	16½	E.N.E.	1	Cloudy, passing showers.	Smooth.	1½h. ebb.	30·15	2½
3.5 p.m.	S.W.	50·00	51·3	49·0 52·8	35 17½	S.	1	,,	Calm.	3h. ebb.	30·13	3
Oct. 18. 9.0 a.m.	N.E.	46·58	46·5	52·4	16		Light airs.	Overcast, heavy rain.	Smooth.	5h.10m.eb.	29·19	2
10.30 a.m.	S.W.	46·94	49·0	49·4 52·9	38 19	E.	1	,,	,,	40m. fl.	29·18	2¼
Nov. 27. 11.0 a.m.	N.E.	49·82	46·2	50·2	16½	W.N.W.	Sq'lly.	Cloudy, passing showers.	Calm.	4h. fl.	30·43	3½
1.30 p.m.	S.W.	47·84	48·0	50·6 50·4	38 19	W.N.W.	Heavy sq'alls	Fine, cloudy.	Slight.	½h. ebb.	30·37	5
Dec. 20. 9.45 a.m.	N.E.	35·42	48 0	49·5	16½	S.W.	Light airs.	Fine, moderate, clear.	Smooth.	—	29·76	5
11.30 a.m.	S.W.	39·20	48·0	50·0 49·8	35 17½	S.W.	,,	Fine, clear, frosty.	Calm.	—	29·75	6
Dec. 24. 10.0 a.m.	N.E.	38·48	49·5	49·4	17	W.	Sq'lly.	Fine, cloudy.	Ripple.	5h. 7m. fl.	28·80	4¾
11.45 a.m.	S.W.	39·02	49·0	49·2 49·3	38 19	W.	,,	,, ,,	,,	53m. ebb.	28·78	5¼
1902. Jan. 30. 12.15 p.m.	S.W.	33·34	44·4	47·7 47·8	37 18½	S.S.E.	Light airs.	Fine, clear, frosty.	Smooth.	2h. fl.	30·58	6¾
2.30 p.m.	N.E.	36·50	45·0	47·6	16½	E.	,,	,,	Quite smooth.	4¼h. fl.	30·60	7
Station II. Shrimp Trawl, Sanda to Bennan Head. 1901. Nov. 25. 10.25 a.m.	N.W.	50·18	51·2	51·8 52·8	30 15	Light airs.	—	Overcast, slight haze.	Smooth.	5m. ebb.	30·53	5

TABLE C.—Record of Observations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS.—Firth of Clyde—*continued.*

Station, Date, and Hour.	End of Station.	Temperature. Air. Dry Bulb.	Water. Surface.	Water. Bottom.	Water. Depth in faths.	Wind. Direction.	Wind. Force.	Weather.	Sea.	Tide.	Barometer.	Transparency. Fathoms.
Station III. Sprimp Trawl, Sanda to Bennan Head. 1901. Nov. 25. 1.35 p.m.	S.E.	55·04	52·7	52·0 51·9	32½ 16¼	S.W. by W.	1	Cloudy.	Smooth.	3¼h. ebb.	30·58	4¾
Station V. Shrimp Trawl, Sanda to Bennan Head. 1901. Nov. 25. 3.45 p.m.	N.W.	50·90	50·4	50·5 50·4	25½ 12¾	S.W. by W.	1	Cloudy.	Smooth.	5h.25m.eb.	30·57	4
Staion VI. Shrimp Trawl, Mull of Cantyre to Corsewall Point. 1901. Nov. 23. 10.47 a.m.	N.	41·00	52·7	52·6 52·6	60 30	S.E.	3	Moderately clear.	Slight.	3h. fl.	30·48	3½
Station VII. Shrimp Trawl, Mull of Cantyre to Corsewall Point. 1901. Nov. 23. —	S.	45·68	52·7	52·8 52·5	64 32	S.E.	4	Fine, moderate, clear.	Moderate.	4h. fl.	30·48	4
Station VIII. Shrimp Trawl, Pladda to Turnberry Point. 1901. Nov. 22. 10.20 a.m.	N.W.	39·02	50·8	51·2 50·9	40 20	E.	6	Moderate, clear.	Choppy.	2h.10m.eb.	30·7	4

TABLE C.—Record of Obervations made on Board the "Garland" during 1901.

B. PHYSICAL OBSERVATIONS—Firth of Clyde—*continued.*

Station, Date, and Hour.	End of Station.	Temperature.				Wind.		Weather.	Sea.	Tide.	Baro-meter.	Transparency Fathoms.
		Air.	Water.									
		Dry Bulb.	Sur-face.	Bot-tom.	D pth in Faths.	Direc-tion.	Force.					
Station IX. Shrimp Trawl, Pladda to Turnberry Point. 1901. Nov. 22. 11.45 a.m.	N.W.	40·28	50·3	51·3 50·5	32 16	E.	6	Moderate, clear.	Choppy.	3h.45m.eb.	30·10	4½
Station X. Shrimp Trawl, Pladda to Turnberry Point. 1901. Nov. 22. 2.25 p.m.	S.E.	40·64	50·6	51·2 51·0	25 12½	E.	5	Moderate, clear	Moderate.	20m. fl.	30·14	4

TABLE D.—SHOWING THE QUANTITIES OF FISH CAUGHT BY LINE IN 1901 WITHIN THE MORAY FIRTH (INSIDE A LINE BETWEEN DUNCANSBY HEAD AND RATTRAY POINT), AND THE NUMBER OF SHOTS OF THE BOATS BY WHICH THE FISH WERE CAUGHT.

WICK DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.
Jan.	102	211	782	2·5	84	0·268	.	.	494	1·578	52	0·166	.	.	2	0·006	25	0·08	.	.	21	0·066	44	0·14	208	0·664	37	0·115	1,749	5·587
Feb.	600	466	5,264	4·938	664	0·604	73	0·068	382	0·358	562	0·527	.	.	.	.	133	0·124	.	.	83	0·077	145	0·136	1,148	1·076	94	0·088	8,528	8·000
March	360	220	3,809	6·567	1565	2·698	59	0·101	336	0·579	88	0·151	.	.	7	0·012	333	0·574	.	.	78	0·134	74	0·126	1,523	2·625	88	0·151	7,960	13,721
April	74	342	727	1·747	232	0·557	15	0·036	192	0·461	110	0·264	.	.	.	.	71	0·170	.	.	34	0·081	12	0·028	263	0·632	22	0·052	1,678	4·033
May	.	769	970	1·261	29	0·037	.	.	268	0·348	117	0·152	.		.	.	2	0·002	.	.	60	0·078	.	.	.	.	17	0·022	1,463	1·902
June	.	368	518	1·341	.	.	.	.	330	0·854	67	0·173	.	.	.	.	3	0·007	.	.	31	0·08	.	.	.	.	4	0·01	953	2·468
July	2	417	796	1·9	.	.	.	.	501	1·195	126	0·3	.	.	.	.	2	0·004	.	.	40	0·095	.	.	.	.	9	0·021	1,474	3·517
Aug.	30	641	644	0·959	59	0·087	.	.	408	0·608	189	0·281	.	.	.	.	.	.	.	.	41	0·060	.	.	.	.	35	0·052	1,376	2·050
Sept.	.	470	374	0·795	.	.	.	.	153	0·325	378	0·804	.	.	.	.	.	.	.	.	36	0·076	.	.	.	.	9	0·019	950	2·021
Oct.	.	617	467	0·756	.	.	.	.	.	.	407	0·659	.	.	.	.	.	.	.	.	55	0·089	.	.	.	.	9	0·014	938	1·52
Nov.	.	552	544	0·985	35	0·063	.	.	20	0·036	313	0·565	.	.	.	.	.	.	.	.	20	0·036	.	.	.	.	13	0·021	945	1·711
Dec.	24	319	339	0·988	25	0·072	.	.	44	0·128	209	0·609	.	.	.	.	2	0·005	.	.	11	0·032	.	.	.	.	5	0·014	635	1·851
Totals,	1,192	5,410	15,234	2·307	2,673	0·404	147	0·022	3,128	0·473	2,618	0·396	.	.	9	0·001	571	0·086	.	.	510	0·077	275	0·041	3,142	0·475	342	0·051	28,649	4·339

TABLE D.—*continued.*—LYBSTER DISTRICT.

Months.	Number of Shots.		Cod.		Ling		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Jan.	30	86	115	0·991	.	.	.	.	15	0·129	57	0·491	.	.	.	.	.	.	.	.	.	.	.	.	.	.	13	0·112	200	1·724
Feb.	60	198	607	2·352	2	0·007	.	.	68	0·263	68	0·263	.	.	.	.	3	0·011	.	.	.	.	9	0·034	.	.	54	0·209	811	3·143
March	42	62	306	2·923	.	.	.	.	32	0·307	44	0·423	.	.	.	.	4	0·038	.	.	2	0·019	2	0·019	.	.	23	0·221	413	3·971
April	.	53	64	1·207	.	.	.		.	.	25	0·471	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	0·075	93	1·754
May	8	91	100	1·011	.	.	.	.	21	0·12	23	0·232	.	.	.	.	.	.	.	.	.	.	.	.	.	.	11	0·111	155	1·565
June	16	79	103	1·084	.	.	.	.	8	0·084	15	0·157	.	.	.	.	.	.	.	.	.	.	.	.	.	.	16	0·168	142	1·494
July	344	26	74	0·2	.	.	.	.	148	0·4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	19	0·051	241	0·651
Aug.	16 8	6	59	0·339	.	.	.	.	52	0·298	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	25	0·143	136	0·781
Sept.	5	61	61	0·927	.	.	.	.	13	0·196	25	0·378	.	.	.	.	.	.	.	.	.	.	.	.	.	.	29	0·439	128	1·939
Oct.	.	64	73	1·14	.	.	.	.	.	.	209	3·109	8	0·125	.	.	.	.	.	.	4	0·062	.	.	.	.	26	0·406	320	5·200
Nov.	.	106	110	1·037	.	.	.	.	.	.	133	1·254	5	0·047	.	.	.	.	.	.	2	0·018	.	.	.	.	29	0·273	279	2·632
Dec.	.	51	94	1·843	.	.	.	.	.	.	22	0·431	.	.	.	.	.	.	.	.	.	.	.	.	.	.	9	0·176	125	2·450
Totals,	673	883	1,766	1·134	2	0·001	.	.	357	0·229	621	0·399	13	0·008	.	.	7	0·004	.	.	8	0·005	11	0·007	.	.	258	0·165	3,043	1·955

TABLE D.—*continued.*—HELMSDALE DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Jan.	129	291	555	1·321	10	0·023	.	.	21	0·05	664	1·580	7	0·016	.	.	.	.	.	.	2	0·004	21	0·05	3	0·007	66	0·157	1,349	3·211
Feb.	178	349	1,478	2·804	42	0·079	.	.	31	0·058	485	0·869	4	0·007	.	.	13	0·024	.	.	176	0·333	21	0·039	11	0·02	31	0·058	2,265	4·297
March	44	233	453	1·635	.	.	.	.	4	0·014	282	1·018	4	0·014	.	.	1	0·003	.	.	108	1·389	.	.	.	.	28	0·101	880	3·176
April	.	261	204	0·781	.	.	.	.	17	0·065	134	0·513	2	0·007	.	.	.	.	.	.	98	0·375	.	.	.	.	33	0·126	488	1·869
May	.	165	196	1·187	.	.	.	.	28	0·169	90	0·545	.	.	.	.	.	.	.	.	35	0·212	5	0·03	6	0·036	.	.	360	2·181
June	6	130	102	0·75	.	.	.	.	8	0·058	59	0·169	.	.	.	.	.	.	.	.	31	0·227	23	0·169	.	.	30	0·22	253	1·86
July	.	75	51	0·68	.	.	.	.	12	0·16	63	0·84	6	0·08	.	.	.	.	.	.	38	0·506	.	.	.	.	.	.	170	2·266
Aug.	.	57	52	0·912	.	.	.	.	21	0·368	75	1·315	5	0·087	.	.	.	.	.	.	.	.	.	.	.	.	.	.	153	2·684
Sept.	.	109	44	0·403	.	.	.	.	.	.	171	1·568	2	0·018	.	.	.	.	.	.	34	0·302	13	0·119	2	0·018	25	0·229	291	2·669
Oct.	.	399	140	0·35	.	.	.	.	.	.	973	2·438	13	0·032	.	.	1	0·002	.	.	23	0·057	36	0·09	8	0·02	15	0·037	1,209	3·03
Nov.	.	294	224	0·761	.	.	.	.	.	.	804	2·7	16	0·054	.	.	2	0·006	.	.	.	.	56	0·19	10	0·034	30	0·102	1,142	3·884
Dec.	.	82	86	1·048	.	.	.	.	.	.	268	3·265	3	0·036	.	.	.	.	.	.	5	0·060	5	0·060	.	.	.	.	367	4·475
Totals.	357	2,445	3,585	1·279	52	0·018	.	.	142	0·050	4,041	1·442	62	0·022	.	.	17	0·006	.	.	550	0·196	180	0·064	40	0·014	258	0·092	8,927	3·185

TABLE D.—*continued.*—CROMARTY DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Jan.	.	474	218	0·459	.	.	.	.	12	0·025	442	0·932	6	0·012	.	.	.	.	.	.	16	0·033	.	.	.	.	14	0·029	708	1·472
Feb.	.	647	346	0·534	.	.	.	.	6	0·009	572	0·884	3	0·004	.	.	.	.	.	.	239	0·369	.	.	.	.	67	0·103	1233	1·905
March	.	484	244	0·504	.	.	.	.	5	0·01	368	0·760	9	0·018	.	.	.	.	.	.	122	0·252	.	.	2	0·004	19	0·039	769	1·588
April	.	458	212	0·462	.	.	.	.	6	0·013	326	0·711	6	0·013	.	.	.	.	.	.	87	0·189	.	.	12	0·026	48	0·104	697	1·524
May	.	624	331	0·53	.	.	.	.	9	0·014	255	0·408	9	0·014	.	.	.	.	.	.	195	0·312	.	.	22	0·035	53	0·084	874	1·400
June	.	374	219	0·585	.	.	.	.	5	0·013	141	0·377	11	0·029	.	.	.	.	.	.	112	0·299	.	.	11	0·029	36	0·096	535	1·430
July	.	172	57	0·331	.	.	.	.	.	.	167	0·97	22	0·127	.	.	.	.	.	.	25	0·145	.	.	.	.	36	0·209	307	1·784
Aug.	.	195	57	0·292	.	.	.	.	.	.	216	1·11	.	.	.	.	.	.	.	.	28	0·143	.	.	.	.	37	0·189	338	1·733
Sept.	.	497	100	0·201	.	.	.	.	5	0·01	514	1·034	.	.	.	.	.	.	.	.	113	0·227	.	.	.	.	63	0·126	795	1·599
Oct.	.	690	214	0·31	2	0·002	.	.	3	0·004	599	0·868	12	0·017	.	.	.	.	.	.	135	0·195	.	.	.	.	81	0·117	1,046	1·515
Nov.	1	486	224	0·459	.	.	.	.	5	0·01	546	1·121	7	0·014	.	.	.	.	.	.	56	0·115	.	.	.	.	85	0·174	923	1·895
Dec.	.	571	274	0·48	.	.	.	.	9	0·015	732	1·281	6	0·010	.	.	.	.	.	.	48	0·084	.	.	.	.	84	0·147	1,153	2·019
Totals,	1	5,672	2,496	0·440	2	0·0003	.	.	65	0·011	4,878	0·859	91	0·016	.	.	.	.	.	.	1,176	0·207	.	.	47	0·008	623	0·109	9,378	1·653

TABLE D.—*continued.*—FINDHORN DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Jan.	87	784	566	0·649	33	0·037	.	.	24	0·027	1,018	1·168	85	0·097	.	.	8	0·009	.	.	.	.	16	0·018	36	0·041	2	0·002	1,788	2·052
Feb.	115	685	1,148	1·435	34	0·042	.	.	.	.	832	1·04	44	0·055	.	.	6	0·007	.	.	197	0·246	2	0·002	63	0·078	3	0·003	2,329	2·911
March	180	538	735	1·023	43	0·06	.	.	.	.	733	1·020	66	0·091	.	.	5	0·006	.	.	320	0·445	.	.	32	0·044	7	0·009	1,941	2·703
April	51	494	361	0·662	13	0·023	.	.	34	0·062	442	0·811	38	0·069	.	.	2	0·003	2	0·003	219	0·401	.	.	99	0·181	9	0·016	1,219	2·236
May	.	434	74	0·170	12	0·027	.	.	49	0·092	318	0·732	97	0·223	.	.	.	.	1	0·002	86	0·198	.	.	.	.	13	0·03	641	1·476
June	.	369	45	0·121	2	0·005	.	.	23	0·062	369	1·000	102	0·271	.	.	.	.	1	0·002	42	0·113	2	0·005	.	.	12	0·032	598	1·620
July	.	332	8	0·024	.	.	.	.	.	.	391	1·177	150	0·451	.	.	.	.	2	0·006	11	0·033	.	.	.	.	10	0·030	572	1·722
Aug.	.	367	24	0·065	.	.	.	.	.	.	535	1·430	147	0·400	.	.	.	.	2	0·005	30	0·081	.	.	.	.	27	0·073	765	2·084
Sept.	.	629	12	0·019	.	.	.	.	.	.	878	1·395	155	0·246	.	.	.	.	2	0·003	93	0·147	.	.	.	.	7	0·011	1,147	1·823
Oct.	60	820	14	0·015	.	.	.	.	.	.	964	1·095	147	0·167	.	.	.	.	1	0·001	227	0·258	.	.	.	.	9	0·01	1,362	1·548
Nov.	15	555	13	0·022	.	.	.	.	.	.	844	1·480	68	0·119	.	.	.	.	.	.	30	0·052	.	.	.	.	8	0·014	963	1·689
Dec.	38	531	85	0·149	.	.	.	.	.	.	804	1·413	56	0·098	.	.	.	.	.	.	10	0·017	.	.	.	.	6	0·010	961	1·688
Totals,	546	6,538	3,085	0·435	137	0·019	.	.	121	0·017	8,128	1·147	1,155	0·163	.	.	21	0·002	11	0·001	1,265	0·178	20	0·002	230	0·032	113	0·015	1,4286	2·016

TABLE D.—*continued.*—BUCKIE DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age.	Cwt.	Aver-age
Jan.	432	649	816	0·754	21	0·019	.	.	83	0·076	2,762	2·555	.	.	.	.	6	0·005	.	.	.	.	2	0·001	70	0·064	46	0·042	3,806	3·52
Feb.	299	484	1,213	1·549	32	0·04	.	.	21	0·026	2,007	2·563	.	.	.	.	11	0·014	.	.	.	.	.	.	76	0·097	78	0·099	3,438	4·39
March	106	190	545	1·841	4	0·013	.	.	47	0·158	703	2·361	11	0·037	.	.	10	0·033	.	.	.	.	.	.	25	0·084	24	0·081	1,369	4·625
April	29	292	128	0·398	.	.	.	.	.	.	187	0·582	.	.	.	.	.	.	.	.	4	0·012	.	.	.	.	3	0·009	322	1·003
May	.	898	327	0·364	.	.	.	.	15	0·016	328	0·365	.	.	.	.	2	0·002	.	.	3	0·003	.	.	.	.	.	.	675	0·751
June	.	233	129	0·553	.	.	.	.	.	.	237	1·017	4	0·017	.	.	.	.	.	.	3	0·012	.	.	.	.	.	.	373	1·600
July	.	78	14	0·179	.	.	.	.	.	.	40	0·512	7	0·089	.	.	.	.	.	.	.	.	.	.	.	.	.	.	61	0·782
Aug.	.	166	19	0·114	.	.	.	.	8	0·048	83	0·500	15	0·09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	125	0·753
Sept.	19	324	67	0·195	.	.	.	.	.	.	487	1·42	6	0·017	.	.	.	.	.	.	14	0·04	.	.	.	.	.	.	574	1·673
Oct.	72	723	339	0·426	.	.	.	.	.	.	1,721	2·164	.	.	.	.	.	.	.	.	14	0·017	.	.	.	.	20	0·025	2,094	2·633
Nov.	31	470	116	0·231	.	.	.	.	6	0·011	1,337	2·668	.	.	.	.	.	.	.	.	3	0·005	.	.	4	0·007	15	0·029	1,481	2·956
Dec.	108	438	213	0·390	.	.	.	.	.	.	1,645	3·012	.	.	.	.	.	.	.	.	.	.	.	.	.	.	76	0·139	1,934	3·542
Totals,	1,096	4,945	3,926	0·649	57	0·009	.	.	180	0·029	11,537	1·909	43	0·007	.	.	29	0·004	.	.	41	0·006	2	0·0003	175	0·038	262	0·043	16,252	2·690

TABLE D.—*continued.*—BANFF DISTRICT.

Months.	Number of Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Jan.	59	496	530	0·954	238	0·428	.	.	6	0·01	445	1·8	6	0·01	.	.	14	0·025	.	.	.	.	28	0·05	85	0·153	22	0·039	1,374	2·475
Feb.	103	538	289	0·45	12	0·018	.	.	.	.	659	1·028	10	0·015	.	.	.	.	.	.	2	0·003	1	0·001	4	0·006	19	0·029	996	1·553
March	109	390	259	0·519	41	0·082	.	.	.	.	535	1·072	4	0·008	.	.	10	0·02	.	.	4	0·008	2	0·004	14	0·028	16	0·032	885	1·773
April	27	592	127	0·205	.	.	.	.	18	0·029	606	0·979	7	0·011	.	.	.	.	.	.	4	0·006	.	.	.	.	26	0·042	788	1·271
May	2	411	53	0·128	33	0·08	.	.	46	0·111	345	0·835	22	0·053	.	.	5	0·012	.	.	.	.	.	.	.	.	18	0·043	522	1·263
June	.	231	36	0·155	.	.	.	.	96	0·415	139	0·601	44	0·19	.	.	1	0·004	.	.	6	0·026	.	.	.	.	16	0·069	338	1·462
July	.	263	14	0·053	.	.	.	.	53	0·201	313	1·19	68	0·258	.	.	.	.	.	.	.	.	.	.	.	.	36	0·136	484	1·84
Aug.	.	165	2	0·011	.	.	.	.	10	0·06	163	0·987	43	0·26	.	.	.	.	.	.	8	0·048	.	.	.	.	6	0·036	232	1·4
Sept.	.	846	131	0·154	.	.	.	.	.	.	1,580	1·867	94	0·111	.	.	.	.	.	.	18	0·021	.	.	.	.	47	0·055	1,870	2·21
Oct.	12	1,152	463	0·397	.	.	.	.	6	0·005	1,591	1·366	209	0·179	.	.	.	.	.	.	32	0·018	.	.	.	.	58	0·049	2,359	2·026
Nov.	9	506	305	0·592	.	.	.	.	.	.	569	1·104	46	0·089	.	.	.	.	.	.	13	0·024	.	.	.	.	30	0·058	963	1·869
Dec.	11	509	558	1·073	.	.	.	.	.	.	505	0·971	23	0·044	.	.	.	.	.	.	2	0·004	.	.	.	.	19	0·036	1,107	2·128
Totals,	332	6,099	2,767	0·430	324	0·050	.	.	235	0·036	7,450	1·158	576	0·089	.	.	30	0·004	.	.	89	0·013	31	0·004	103	0·016	313	0·048	11,918	1·853

TABLE E.—TOTAL QUANTITIES OF FISH CAUGHT BY LINE IN 1901 WITHIN THE MORAY FIRTH (INSIDE A LINE BETWEEN DUNCANSBY HEAD AND RATTRAY POINT), AND THE NUMBER OF SHOTS OF THE BOATS BY WHICH THE FISH WERE CAUGHT.

Districts.	Number Shots.		Cod.		Ling.		Torsk (Tusk).		Saithe (Coalfish).		Haddock.		Whiting.		Turbot.		Halibut.		Sole (Lemon Sole).		Flounder, Plaice, Brill.		Eel.		Skate.		Other kinds of White Fish.		Total of Line-caught Fish.	
	Large Boats.	Small Boats.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.	Cwt.	Average.
Wick, . .	1,192	5,410	15,234	2·307	2,673	0·404	147	0·022	3,128	0·473	2,618	0·396	.	.	9	0·001	571	0·086	.	.	510	0·077	275	0·041	3,142	0·475	342	0·053	28,649	4·339
Lybster, .	673	883	1,766	1·134	2	0·001	.	.	357	0·229	621	0·399	13	0·008	.	.	7	0·004	.	.	8	0·005	11	0·007	.	.	258	0·165	3,043	1·955
Helmsdale, .	357	2,445	3,585	1·279	52	0·018	.	.	142	0·050	4,041	1·442	62	0·022	.	.	17	0·006	.	.	550	0·196	180	0·064	40	0·014	258	0·092	8,927	3·185
Cromarty, .	1	5,672	2,496	0·440	2	0·0003	.	.	65	0·011	4,878	0·859	91	0·016	.	.	.	.	.	.	1,176	0·207	.	.	47	0·008	623	0·109	9,378	1·653
Findhorn, .	546	6,538	3,085	0·435	137	0·019	.	.	121	0·017	8,128	1·147	1,155	0·163	.	.	21	0·002	11	0·001	1,265	0·178	20	0·002	230	0·032	113	0·015	14,286	2·016
Buckie, .	1,096	4,945	3,926	0·649	57	0·011	.	.	180	0·029	11,537	1·909	43	0·007	.	.	29	0·004	.	.	41	0·006	2	0·0003	175	0·028	262	0·043	16,252	2·690
Banff, . .	332	6,099	2,767	0·430	324	0·050	.	.	235	0·036	7,450	1·158	576	0·089	.	.	30	0·004	.	.	89	0·013	31	0·004	103	0·016	313	0·048	11,918	1·853
Totals,	4,197	31,992	32,859	0·907	3,247	0·090	147	0·004	4,228	0·116	39,273	1·085	1,940	0·053	9	0·0002	675	0·018	11	0·0003	3·639	0·100	519	0·014	3,737	0·103	2,169	0·059	92,453	2·554

II. NORTH SEA INVESTIGATIONS.

II.

By Dr. T. Wemyss Fulton, F.R.S.E., Scientific Superintendent.

(Plates I.–III.)

INTRODUCTION.

In the last Annual Report it was stated that the Fishery Board had granted authority for the occasional employment of steam trawlers within the Moray Firth and other parts of the territorial waters for the purpose of scientific observations. These investigations were continued during the greater part of last year, mostly in the Moray Firth and Aberdeen Bay, but hauls were also taken in Lunan Bay, Sinclair Bay, Thurso Bay, and in the deep water off Aberdeen. No expenditure was incurred in the hire of the vessels, but since the inshore fishing in the bays is usually more profitable than the deep-sea fishing, there was little difficulty in obtaining the necessary facilities for the work, and in some cases facilities were also granted for similar observations in the deep water off the Orkney and Shetland Islands, where the fishing of the large steam trawlers is now mostly carried on.

Under the most favourable circumstances scientific work on board steam trawlers must be pursued under certain difficulties and disadvantages. The accommodation for the purpose is defective, and the observations had to be made entirely on deck; but this disadvantage has now been to some extent obviated by the use of a portable deck-house, which can be fitted up on any of the vessels (*see* p. 332). The vessels are also only partially under one's control, and since the chief consideration of those connected with them is, naturally enough, the financial result of the expedition, it was found in practice that more work could be accomplished when profitable catches were being obtained than when the fishing was poor and unremunerative. On the other hand, there were certain compensations in being able to ascertain the actual conditions under which commercial trawling is carried on; to observe the proportions of immature and unmarketable fishes to the marketable, their vitality when brought on deck, &c., and, above all, to have at one's disposal the great numbers and varieties of fishes which are taken by the large otter-trawls.

The observations made on board the trawlers were as follows:—The temperature of the surface and bottom water was determined at each locality and the depth during each haul; tow-nets and the dredge were used when possible; the number of each kind of fish caught in the net was ascertained, and a note taken of the duration of the haul and of the proportion of the fishes taken to market to those thrown overboard. Large numbers of fishes were also measured and recorded in connection with the investigation on the rate of growth of fishes (p. 326) and rare specimens preserved. Since the trawling operations go on continuously day and night, unless when interrupted by unfavourable weather, it was not found possible to enumerate, examine, and record all the catches, even with the assistance rendered. In some cases the mere separation and enumeration of the "offal," *i.e.*, the unmarketable fishes, occupied hours. In as many cases as possible complete records were made of the hauls; when that could not be accomplished the detailed record was limited to the marketable fishes, the unmarketable being stated according to the gross quantity, or estimated, as indicated in the Tables appended. In some cases no record was made of the hauls brought on board during night. In order to bring the catches made on these trips in the territorial waters into relation with those from the usual trawling grounds, I have also given the gross quantities of the marketable fishes in cwts. as well as the values. As on previous occasions, I received much assistance in this work from Mr. H. Dannevig and also from Mr. P. Jamieson. The hauls made in May in the deep water off the Shetlands were all recorded by Mr. H. Dannevig.

Besides the investigations made on board trawlers, I have been able to obtain detailed statistics of the quantities of fish landed at Aberdeen by a considerable number of other trawlers, and these are also dealt with in this paper. They are of two kinds. The first series shows the quantities landed each trip by six steam trawlers over a period of years; in two instances the period comprises sixteen years, from 1885 to 1900 inclusive, and in the other four cases it comprises ten years, from 1890 to 1900. The period is thus considerable, and the information they furnish as to the quantities of fish caught in the various successive years is of interest. They are, however, defective in one important particular, inasmuch as they do not show the places where the fish were taken, a defect common to most fishery statistics, and thus conclusions drawn from them as to change in the abundance of bottom fishes are uncertain. The fish, and especially the flat-fish, on different grounds vary greatly in kind and in relative proportion to one another. Plaice, for example, is the most abundant marketable flat-fish in the bays and inshore waters on the East Coast, while it is extremely scarce in the deep water at a distance from shore. On the other hand, witches and megrims are absent from the shallow inshore waters and are abundant in the deep water, where they form the greater proportion of the marketable flat-fishes. Thus, twenty-three hauls, occupying 102 hours actual trawling, in 65 fathoms, about 35 miles from the Shetlands, yielded 193 plaice, 1352 witches, and 782 megrims, while five hauls occupying $9\frac{1}{2}$ hours, in Aberdeen Bay, by the same vessel, immediately after the deep-water hauls referred to, yielded 1097 plaice, no witches, and no megrims. At a somewhat greater distance from the Shetlands plaice are practically absent.

The statistics of the six trawlers mentioned above show a great decrease in the quantitly of plaice caught by them in the later years of the period; but they show at the same time a great increase in the quantity of witches and megrims, which indicates that the grounds fished over were not the same in the earlier and later years. The records of two of the vessels go back, indeed, to a period when the whole of the territorial waters in Scotland were still open to trawlers, and the others to a time when the greater part of the Moray Firth was likewise open to them; there is no doubt that they often fished then in the areas now closed, and that this accounts to a great extent for the diminution in the catch of plaice. But it is impossible to say how much of the decrease is due to diminished abundance of this fish on the old grounds and how much to the transference of the fishing to new grounds, where it is naturally scarce.

The other series of statistics was devised with the object of remedying this defect by ascertaining and recording the place where the fish were caught. For this purpose a considerable number of steam trawlers were selected, fishing, like the others, from the port of Aberdeen and landing their fish there, and a note of the place of fishing was furnished by the skipper to the statistical clerk (Mr. J. Robb), who also recorded, in the usual manner, the quantities of fish landed. Obviously the trustworthiness of this information depends upon the good faith of the skipper—and the most reliable men were chosen—and in the great majority of cases there was no motive for giving misleading information and no reason to suppose that it was misleading. In cases where any doubt occurred the record was rejected; those records were also rejected which showed the fish to have been caught at more than one place, unless the places were within the same area on the chart.

By a fortunate chance I have been able to obtain similar information for the first three months of the year 1891, during which period a note was made of the place of fishing of all the trawlers landing fish at Aberdeen. The results are given in the Tables, and the information for these months, for the corresponding months of 1901, and for the whole of 1901, have been placed on charts for the purpose of comparison. The information is discussed below; but it may be said here that the two chief points brought out are, first, the great change which has occurred in the area of fishing in the interval of ten years, and, secondly, the very different proportions of the various kinds of food-fishes caught in different parts of the North Sea. These facts have an important bearing upon the interpretation of fishery statistics, and it may be desirable to consider the point in some detail.

The statistics of fisheries as at present exhibited although very valuable from the economic point of view, as in any other industry, are not capable of showing whether, or if so to what extent, impoverishment of any given fishing ground is taking place. They cannot be used to measure the variations in the fish supply in a given area of the sea from year to year, or the effects of any particular method of fishing, because the factors which are necessary for these objects are neglected. Thus they fail to serve the main purpose for which they were instituted.* It is agreed that the information referred to is essential for the rational regulation of fisheries, and it cannot be obtained by any but statistical methods applied to the fisheries themselves. Owing to the great extent of the area from which the fish supply is drawn, and the fluctuations which occur from natural causes, the work of a few special steamers would be quite inadequate; and if the experimental fishing of such steamers were confined to a limited area, there would be no certainty that any definite results obtained there would apply elsewhere.

At present, for example, the statistics show that the gross quantity of fish landed is increasing from year to year, and that circumstance is sometimes adduced as proving that the fisheries and the fishing grounds are in a satisfactory condition. It is, however, well known that within recent years a considerable proportion of the fish supply is drawn from distant seas, as Iceland and the Faröes, and that the means of capture has been multiplied both in number and efficiency. The English trawlers, and most of the Scottish trawl-fishermen maintain that the abundance of fish on the old fishing grounds in the North Sea has become greatly reduced, and that if fishing operations were restricted to the same places and the same scale as previously there would be a material reduction in the fish supply.

It is, however, necessary that this conclusion to be convincing and of practical value should be established by clearly ascertained facts.

Experience makes it evident that the fishery statistics in order to provide the information required to prove whether the supply on any given grounds is increasing, decreasing or stationary, must be based throughout on certain principles. They should show

(1) The quantities of the various kinds of fishes landed;
(2) The method of fishing by which the fish are caught;
(3) The places where the fish are taken;
(4) The duration of the fishing operations;
(5) The season of fishing.

*Report of the Commissioners appointed to inquire into the Sea Fisheries of the United Kingdom, cvi., 1866; Report on the Sea Fisheries of England and Wales, 1879, xxxii.; Report of Commissioners on Trawl Net and Beam Trawl Fishing, 1885.

It would probably be impossible in practice—it certainly would be expensive—to obtain all this detailed information from each of the fishing places around the coast. At many of them the fish are not sufficiently separated into the different kinds to enable the quantities to be accurately recorded, and the other information required, even if procurable, would necessitate a very large staff of collectors. It is not, however, necessary for the purpose in view that the detailed information should be obtained from each little fishing creek. It would be quite sufficient that it should be got at a few of the leading fishery ports, where the difficulties in the way are not great, and where the great bulk of the white fish are landed. About 57 per cent. of all the white fish landed on the Scottish coast last year were, for example, landed at Aberdeen by trawlers and liners (viz. 1,161,566 cwts. of a total of 2,024,867 cwts.) including 65 per cent. of all the flat-fishes landed. If the particulars above set forth were ascertained regarding this quantity of fish, or even a considerable proportion of it, they would in a few years furnish important testimony as to any change in the productiveness of the grounds from which the fish were taken. Similar particulars might also be procurable at certain English ports as Grimsby and Hull, and perhaps North Shields and London, and these with Aberdeen would probably suffice to measure the fluctuations in the fish supply from the North Sea.

The Statistics of the Fish Landed.

It is, of course, of primary importance that the fish landed should be separately distinguished, as far as that can be done, as well as the quantities of each kind accurately recorded; and the observation applies to species which may not at the time appear to have great commercial importance. It was customary, for example, some years ago to combine turbot with brill, and dabs and witches with plaice even at the chief ports; and it is now impossible to precisely distinguish the quantities of each in these years in the original records, although the information would be of value. So far as I am aware, the statistics collected at the port of Aberdeen by Mr. James Ingram, the Fishery Officer, and his assistants, are the best and most detailed obtained anywhere, and will serve as a model in this respect. With regard to the fish landed by trawlers, for example,—which form the great bulk of the fish brought to the port—the following kinds are distinguished, viz., herrings, mackerel, cod, codling, ling, tusk, saithe, hake, haddock, whiting, turbot, halibut, lemon soles, brill, plaice, dabs, witches, megrims, conger-eel, gurnard, catfish, monks, skates and rays and "other fish," as well as the quantities of squids, crabs, and clams. The catch of each boat is ascertained in detail every morning by observation at the market and from the salesmen's books; and notes are also made of the "other fishes" not separately distinguished, as the black or common sole, which is very rare in Scottish waters—the bream, the Norway haddock, &c.

The catches of line boats, which comprise much less variety in the kinds of fishes, are similarly and separately recorded.

Moreover, the sizes of the fishes, as classified for the market and sold, are recorded, a distinction which is becoming more important as the smaller sizes are now brought to market in greater quantity than previously. Thus cod and codling are separately recorded; haddocks are separately recorded as extra-large (mostly Icelandic), large, medium, and small; whitings, lemon soles, witches, and megrims are recorded as large and small, and plaice as large, medium, and small.

As previously stated, information of this detailed kind could not be obtained at the smaller ports, and even at some of the larger it appears to be difficult to procure it. In the most important group of fishes so far as concerns the question of depletion of the grounds, viz., the flat-fishes, the published returns separately distinguish only halibut, turbot, and lemon sole ; flounders, plaice, and brill being slumped together into a common group, which, moreover, contains also witches, megrims, and dabs—so that in this case six species of flat-fishes are mixed up together, and it is impossible to ascertain the quantity of any of them.

Since the question is of so much importance from the point of view of the investigations on the impoverishment of fishing grounds, the Secretary of the Board kindly procured for me a statement showing as nearly as possible the kinds of fish included among "flounder, plaice, and brill," in the various districts of the east coast of Scotland in 1900. It is as follows :—

Statement showing the kinds of Fish included under the heading "Flounder, Plaice, and Brill" in the Board's Annual Report, and the quantity of each kind landed in East Coast Districts during the year 1900.

District.	Flounders.	Plaice.	Brill.	Dabs.	Witches.	Megrims.
	cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
Eyemouth - -	37	17	1	22	–	–
Leith - - -	3,400	5,200	20	800	–	10
Anstruther - -	797	1,150	–	–	–	–
Montrose - -	1,034	5,474	36	–	81	159
Stonehaven - -	250	40	–	–	–	–
Aberdeen - -	–	20,964	402	3,818	24,343	12,040
Peterhead - -	650	1,303	10	–	759	419
Fraserburgh - -	6	394	152	–	1,216	761
Banff - - -	118	–	–	–	–	–
Buckie - - -	27	–	–	–	–	–
Findhorn - -	–	1,836	–	–	–	–
Cromarty - -	277	554	–	–	–	–
Helmsdale - -	849	–	–	–	–	–
Lybster - - -	4	–	–	–	–	–
Wick - - -	242	2,183	10	–	–	–
Orkney - - -	47	–	–	–	–	–
Shetland - -	165*	–	–	–	–	–
Totals - -	7,873	39,115	631	4,640	26,399	13,389

Note.—In Findhorn district there were also landed 76 cwts. of "greybacks."

* In the Shetland officer's report this quantity was stated to be "flounders or common dabs."

It will be observed that the flat-fishes in the order of quantities are plaice, witches, megrims, flounders, dabs, and brill, and that the total quantity of dabs, witches, and megrims is almost as great as the total quantity of flounder, plaice, and brill (44,428 cwts., and 47,619 cwts.). The proportion of certain kinds, moreover, varies greatly in different districts. In Leith district, for example—which contains the second most important trawling centre in Scotland—3400 cwts. of flounders, 5200 cwts. of plaice, 10 cwts. of megrims, and no witches are returned as landed; while at Aberdeen there were 20,964 cwts. of plaice, 24,343 cwts. of witches, 12,040 cwts. of megrims, and no flounders. The trawling grounds differ to some extent, and from the deeper water in the northern areas, one would expect the proportion of megrims to be greater at Aberdeen, although to nothing like the degree indicated. Witches are abundant in the deeper parts of the more southerly grounds, as off the Firth of Forth, and their absence from the records cannot be taken as showing their absence from the catches; and it is, I think, probable that the witches, as well as other flat-fishes, are returned as "flounders" in the case in question. The quantity of flounders (*Pleuronectes flesus*) actually landed anywhere is very small. Trawlers rarely take them in ordinary circumstances; they never get them in the deeper water, and only occasionally when fishing (for scientific purposes) in the territorial waters (*see* Tables, p. 143), and such as are brought to Aberdeen market are sold with the dabs or the line-caught plaice.

A similar return of "flounder, plaice, and brill" landed in the West Coast districts comprises in reality only flounders, plaice, and dabs, without any brill. The quantities are small, viz., 2583 cwts. of flounders, 5521 cwts. of plaice, and 69 cwts. of dabs. In some cases they are all returned as "flounders," and in other cases all as "plaice"; in two of the districts it is stated they cannot be specified since the distinction between the different kinds of flat-fishes is unknown.

It is evident from the facts stated that it would be hazardous to make use of statistics of the nature described in dealing with such questions as the depletion or productiveness of fishing grounds. The proportion of error introduced would probably far outweigh the advantage of having larger totals from which to draw conclusions. And, indeed, with the exception of one district—Leith—the returns, for the purpose in view, might be discarded. From the position of the Leith district, midway between Aberdeen and the English ports, and the quantity of white fish landed (232,824 cwts. in 1891, about the same as at North Shields), it would undoubtedly be of value if the returns referring to it could be made use of. But there are special difficulties from the employment of carriers and from the direct dispatch of fish to the Glasgow market, and it is stated that the trawl-owners in many cases decline to give the particulars of the different kinds of flat-fishes owing to the extra trouble involved.*

It is undoubtedly much better in the meantime, even with regard merely to the accuracy of the returns of the fish landed, that the statistical information for practical scientific investigations concerning the impoverishment of fishing grounds should be confined to the chief ports where a large quantity of fish is landed, and where the returns can be obtained with substantial accuracy, and in great detail.

* The collection of the statistics generally in Scotland, it may be said, is facilitated by the provision in the sixth clause of the Sea Fisheries (Scotland) Amendment Act, 1885, as follows:—"The Fishery Board shall have power to require all fishermen and other persons belonging to British sea-fishing boats, and all fish-curers catching or curing any kind of sea fish in Scotland, or in any part of the sea adjoining Scotland, to make returns, in such form and at such periods as may be prescribed by the Fishery Board with the sanction of the Secretary for Scotland, of all sea fish which are caught or cured by them respectively." The penalty for "failing to make a full and correct return" is not to exceed £20.

The Method of Fishing.

It is also necessary that the method of fishing by which the fish are caught should be distinguished, and the quantities taken by each method separately recorded as at Aberdeen. The principal modes by which bottom fishes, that is to say white fish, are taken are trawling, great-lining and small-lining. In some places there are subsidiary methods as gill-nets or "trammels" (especially for cod and turbot and skates) and fixed (trap) nets, but their contribution to the total is extremely small. Seine-net fishing for flat-fishes is not allowed in Scotland.

An important reason why it is necessary to separately distinguish the product of each mode of fishing is that not only the quantities but the proportions of the different kinds of fish taken by each mode varies considerably. The catches, for example, of trawlers and liners differ to a large extent. In the following Table I have given the percentages of the different kinds of fish caught (1) by a steam-trawler in the course of a whole year, the total being 5138 cwts.; (2) by the steam-liners landing fish at Aberdeen in the month of March, making 157 landings, the total quantity being 15,725 cwts; (3) by 424 landings of small-line boats at Aberdeen in April, the total quantity being 1005 cwts.:—

	Cod.	Cod-ling.	Ling.	Saithe.	Tusk.	Hake.	Had-dock.	Whit-ing.	Conger.
I.	13·5	3·6	5·4	2·4	–	0·5	56·6	4·4	–
II.	23·7	0·1	31·7	1·3	2·6	–	0·02	–	1·4
III.	–	17·2	–	–	–	–	53·4	26·6	–

	Tur-bot.	Hali-but.	Brill.	Lemon.	Dabs.	Plaice.	Witches.	Me-grims.	Skate.	'Others.'
I.	0·7	0·3	–	2·4	0·1	1·0	2·5	1·7	3.0	1·9
II.	0·1	5·0	–	–	–	–	–	–	34·0	–
III.	–	–	–	0·1	2·2	0·5	–	–	–	–

Rather more than half the total quantity caught by the beam-trawler and the small-liners was composed of haddocks, while the steam-liners, as one would expect, caught only a fractional quantity of this fish, the bulk of their catches being composed of skates, ling, and cod. The small-liners caught chiefly haddocks, whiting, and codling. The basis of comparison in the three cases is not, however, strictly the same throughout, and the figures cannot be taken as showing accurately the relative proportions for the whole year. The proportions caught by the steam-liners, for example, vary considerably according to the ground on which they fish—cod in some places forming the bulk of the catches, in other places skates, and in others, as at the Faröes, halibut. But the figures suffice to show how different the general proportions are in these methods of fishing.

The bearing of the facts when dealing with the aggregate statistics of the fishes landed is obvious. Even if the other factors were ascertained, and the number of boats fishing and the number of voyages, the information would be of little value in comparing the returns from year to year, unless it were shown that the relative proportion or ratio of one mode of fishing to the other had remained constant. A decrease or increase of the quantity of any particular species landed from a given area might be due, not to a change in the natural abundance of the fish, but to the preponderance of one mode of fishing over another. In recent years a considerable change has occurred in the relative proportion of these modes of fishing, trawling having greatly increased and line-fishing diminished, and this circumstance alone must have materially affected the proportional quantities of the fishes landed.

At large ports there ought not to be difficulty in ascertaining the quantities landed by the boats pursuing the different methods of fishing, since the particulars are separately obtained.

The Places Where the Fish are Taken.

It is also very necessary, for the purpose in view, to determine the area where the fish are caught. In dealing, for example, with the question of the alleged impoverishment of the North Sea, it would be manifestly wrong to include among the fish from that sea those which are taken in other regions, as Iceland, the Faröe Islands, the Bay of Biscay, the coasts of Ireland, the west coast of England and Scotland, the south coast of England or the north coast of Scotland. The fish from these various regions are not distinguished in the returns from fish caught in the North Sea, and they form an increasingly great part of the total fish landed. It by no means follows that fish landed on a particular coast, *e.g.*, the East Coast, were caught in the sea which washes that coast. This remark was applicable to some extent in the days before steam fishing vessels were employed, but it has now much greater force when the bulk of the supply is landed by steamers. The place of landing thus furnishes no evidence as to the place of fishing.

The inclusion of fish from different places may affect the result in two ways. It may affect the total quantity landed, and it may affect the proportional quantities of the different kinds of fish. Fish are much more abundant at Iceland than in the North Sea—that is why the trawlers go there. A two hours' drag may more than equal several five hours' drags in the North Sea. In the North Sea itself the abundance of fishes varies much in different parts. The catches obtained on the Fisher Bank are fully one-third less in quantity than those obtained on the northern grounds in deeper water. It is thus clear that, with the other factors remaining unchanged, the places of fishing may alone profoundly affect the total quantity landed, and an increase or decrease in the latter is not evidence of an increase or decrease on the grounds in a particular region. In order to obtain the information desired as to the productiveness of any area the fish from that area must be separately specified.

Not only does the gross abundance of fish vary in different regions, but the proportional abundance of the different kinds of fishes varies in still greater degree, so that it is possible by looking at a shot laid out in the market to tell with fair accuracy the region from which it comes. In a catch got in the deeper water, *e.g.*, off the Shetlands, there is a preponderating proportion of long fish, for example, such as ling, saithe, and hake, and the flat-fishes consist almost entirely of witches and megrims, with a few lemon soles and few or no plaice; haddocks are usually also more abundant. Particulars on these points are given in the following pages (p. 135), but I may here adduce one or two comparisons to show how the proportions differ in different places, the place in each case having been independently ascertained, apart from those connected with the vessel.

	Cod.	Codling.	Ling.	Saithe.	Tusk.	Hake.	Haddock.	Whiting.
I.	7·2	3·0	12·2	2·9	0·7	11·4	46·6	5·7
II.	3·6	2·7	1·1	0·9	0·5	0·1	80·0	4·1
III.	17·1	1·6	–	–	–	–	11·4	–

	Halibut.	Turbot.	Brill.	Plaice.	Lemon.	Dabs.	Witches.	Megrims.	Skate.
I.	0·9	–	–	2·1	0·4	–	2·1	3·0	1·4
II.	0·7	–	–	–	–	–	4·3	1·1	0·9
III.	–	0·08	0·8	60·6	0·5	5·2	1·0	–	1·6

The above Table represents the percentage proportions (in cwts.) of three voyages of a trawler, the fish in No. I. being caught in 65 fathoms about sixteen miles off Fair Isle; the fish in No. II. were caught in 65-68 fathoms, sixty-five miles S.E, by E. of Sumburgh Head, Shetlands (*i.e.*, nearly halfway towards Norway), and the fish in No. III. were caught in 8–10 fathoms in the Dornoch Firth, and therefore within a few miles of the shore. The proportions of the various flat-fishes and of the long fishes are noteworthy in the different cases.

As another example I may give the results of five drags taken (I.) about 111 miles N.E. by E. easterly, from Buchan Ness (about 110 miles due east of the Orkneys and about 140 miles due west of Norway) in 70 fathoms, and (II.) in 34 fathoms about 170 miles E. by S. from Girdleness, in the neighbourhood of the Fisher Bank, and about 105 miles from Norway. The position of the place where the second five drags were taken (a week later) is about 120 miles southerly and easterly from the place where the first five drags were taken, but in much shallower water. I give the average number of fishes in each drag.

	Cod.	Codling.	Ling.	Saithe.	Hake.	Tusk.	Haddock.	Whiting.
I.	5	113	1·4	2	3	1·4	1247·6	424·4
II.	5·4	2·2	0·4	0·4	–	–	187·4	32·2

	Catfish.	Halibut.	Plaice.	Witches.	Megrims.	Lemon.	Dabs.	Skate.
I.	4·8	0·6	0·0	187·4	9·6	0·4	1·0	1·2
II.	4·8	1·0	66·7	0·6	–	1·2	0·4	0·2

Haddocks, whitings, and "long" fish, it will be observed, were much less abundant on the eastern grounds, and the proportion of flat-fishes was very different. Thus on the northern grounds, in deeper water, no plaice at all were caught, while the average per drag on the Fisher Bank was 66·7. On the latter no megrims were taken and only 0·6 witches; on the former the average catch of megrims was 9·6 and of witches 187·4.

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It is obvious, from these illustrations, what result a predominant fishing in one or other of these areas would have on the statistics of the fish landed. If it were carried on principally in the area of the Fisher Bank there would be no tusk, probably no hake, few ling and saithe, and comparatively few haddocks. There would, on the other hand, be a large quantity of plaice, scarcely any witches, and no megrims from these grounds. In the more northern area the quantity of ling, hake, saithe, and tusk would be considerable; there would be practically no plaice, but a large quantity of witches and a considerable quantity of megrims. These grounds, it will be observed, are both in the North Sea and not very far apart, viz., 120 miles.

The impoverishment which has taken place on the older fishing grounds of the North Sea has been most marked in the case of flat-fishes, and it is chiefly with regard to this group of fishes that remedies are demanded. I may, therefore, further illustrate the important bearing which the place of fishing has upon the relative quantities indicated in the statistics of fish landed. In the section of this paper dealing with the catches of Aberdeen trawlers in various areas in the North Sea (p. 135) it will be found that the relative quantities of the various kinds of flat-fishes taken vary greatly according to the area in which they are caught. Taking, for example, two of the areas near the coast, xxiii and xxix, and four of the areas further north-east (to the south and east of the Shetlands), viz., xiv, xv, xviii, and xix, it will be found that in the former the predominant flat-fishes are lemon soles and plaice, while in the latter areas these species are very scarce, witches and megrims making up the bulk of the flat-fishes. The particulars, in percentages, are shown in the following Table. Each area, it may be said, corresponds to 1 degree of latitude and 2 degrees of longitude, and includes approximately about 3600 square miles (geographical) of sea. The depth in xxix ranges from about 30 to 50 fathoms, and is mostly under 40 fathoms; in xxiii it is about the same, except in the north-east part where it exceeds 50 fathoms; the depth in the other areas ranges from about 50 to over 80 fathoms, the general run being between 60 and 70 fathoms. The quantity of flat-fishes taken in the various areas (in cwts.) was as follows:—

xxiii.	xxix.	xiv.	xv.	xviii.	xix.	Total.
2,599	1,561	2,356	1,965	3,442	2,062	13,985 cwts.

The percentages of the different kinds in the various areas are these:—

	Turbot.	Halibut.	Brill.	Lemon.	Plaice.	Dabs.	Witches.	Megrims.
xxiii.	6·3	1·2	1·0	28·1	32·5	7·2	9·7	13·9
xxix.	9·8	1·1	0·1	50·0	34·0	2·3	0·8	1·9
xiv.	0·7	5·3	0·07	1·7	9·1	1·9	56·4	24·8
xv.	0·6	8·1	0·05	0·9	1·2	0·5	74·9	13·9
xviii.	0·8	5·2	0·1	2·9	2·3	0·4	55·9	32·3
xix.	0·7	5·4	–	1·6	0·7	0·1	79·8	11·6

The difference may be further shown by contrasting the totals and percentages of the two shallower water areas, xxiii, xxix, which, broadly speaking, comprise the grounds to a distance of about sixty miles from the east coast of Scotland, between the Moray Firth and St. Abbs Head, and the other four deeper-water areas, which comprise over 14,000 square miles of the North Sea, extending from off the Moray Firth to the Shetlands, and rather more than half-way to Norway. The quantities (in cwts.) as well as the percentages are given. The former do not represent the ratio of productiveness of the various areas, since the amount of fishing was unequal; but the percentages show the relative proportions among the flat-fishes.

		Turbot.	Halibut.	Brill.	Lemon.	Plaice.	Dabs.	Witches.	Megrims.	Total.
xxiii., xxix.	cwts.	317	47	28	1,512	1,376	224	266	390	4,160
	°/o	*7·6*	*1·1*	*0·7*	*36·3*	*33·1*	*5·4*	*6·4*	*9·4*	.
xiv., xv., xviii., xix.	cwts.	72	574	5	189	335	69	6,371	2,210	9,825
	°/o	*0·7*	*5·8*	*0·06*	*1·9*	*3·4*	*0·7*	*64·8*	*22·5*	.

Thus, of each hundred tons of flat-fishes taken by trawlers in these shallower water areas, about 36 tons are lemon soles, about 33 tons are plaice, about 6 tons are witches, and about 9 tons are megrims. In the deeper-water areas, of each hundred tons caught about 2 tons are lemons, about 3 tons are plaice, about 65 tons are witches, and about 22 tons are megrims. Turbot, brill, and dabs are relatively much more abundant in the shallower water, and halibut is more abundant in the deeper water.

It will be observed from an examination of a chart that the shallower water areas (xxiii, xxix) are not so shallow as the greater part of the North Sea to the south and east of them, and if sufficient information existed to show the relative proportions of the various flat-fishes in that stretch of the North Sea, the contrast with the northern grounds would be still more striking.

It is evident from these facts regarding the proportional distribution of flat-fishes that if trawling were carried on predominantly in different parts of the North Sea in different years, the result on the statistics of the flat-fishes landed would be marked. A mere transference of the fishing from the shallower to the deeper water would cause a decrease in the quantity of plaice, lemon soles, and turbot landed and an increase in the witches and megrims, and this would occur quite apart from change in the other factors. It would not necessarily show any impoverishment of the grounds, but merely a change in the area of fishing.

In point of fact such a transference of the area of fishing has taken place in recent years. From the Tables and Charts appended (p. 214) it will be seen that in the first three months of 1891 none of the Aberdeen trawlers fished in the deeper areas referred to. Fishing was then carried on practically within the 50-fathom line, south of 57°30′ or 58°, down to about 55°—off the coast of Northumberland and to the northern part of the Dogger—and also in the Moray Firth and around the Orkney Islands. At the period referred to over 93 per cent. of the fish landed were caught from the Orkneys to the Firth of Forth within fifty or sixty miles from the shore.

The apparatus then used—the beam-trawl—could not be employed in the deeper water, but so soon as the vessels were equipped with the otter- or beamless-trawl, which can be used up to and even over 100 fathoms, they pushed further to the north-east, where heavy catches were got on the virgin grounds. Thus, in the first three months of 1901 the area of fishing extended north to 61°, and eastwards to about the 100-fathom line—that is to say, to within about 50 or 60 miles of the Norwegian coast, while its southward limit (so far as concerns the vessels about which particulars were obtained) was 57°, except near the coast between 57° and 56°. The new area in the North Sea which the introduction of the

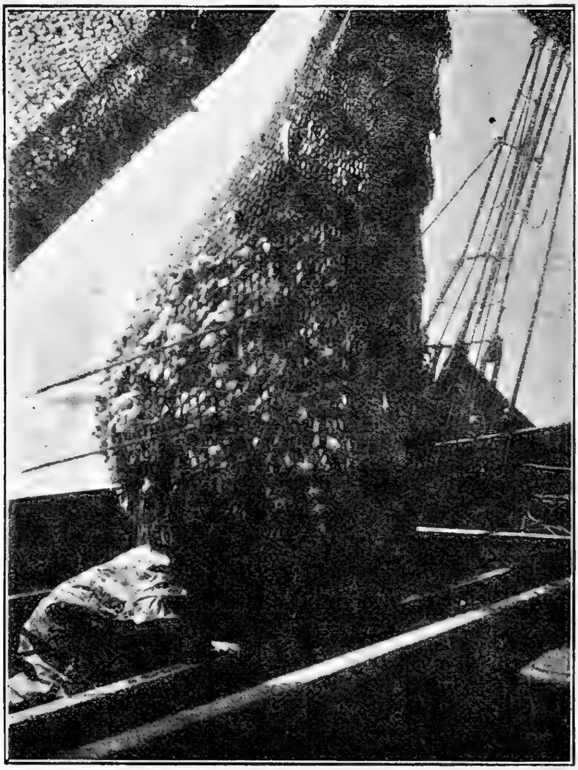


Fig. 1.—A Heavy Bag on the North-Eastern Grounds.
Opening the Cod-end.

otter-trawl enabled to be brought within the sphere of trawling operations may be said to be the region between the 50-fathom and 100-fathom line, or, broadly, about 30,000 square miles. In the three months in 1901 referred to, more than 76 per cent. of the trawl-caught fish was taken from these deep-water grounds, where none were taken in 1891, or for some years later.

The influence of this change of ground is indicated in the statistics of the fish landed, and it corresponds with what was above deduced from the special information collected. The general statistics, as published, do not show it, since most of the flat-fishes are slumped together under the heading "flounder, plaice, and brill." But the statistics of the fish landed by trawlers at the port of Aberdeen exhibit the great increase in witches and megrims in recent years and the decrease of plaice. These statistics, it is to be noted, include fish from all quarters, comprising Iceland, the North and West Coasts, &c., as well as the North Sea; and since dabs were included with plaice and megrims with witches prior to 1897, this combination is maintained throughout the Table.*

Year.	No. of Landings.	Turbot.	Halibut.	Lemon.	Brill.	Plaice and Dabs.	Witches. and Megrims.
		cwts.	cwts.	cwts.	cwts.	cwts.	cwts.
1890	.	2,747	23	11,922	525	27,964	5,620
1891	.	3,024	14	13,592	213	31,359	4,158
1892	.	2,480	66	18,355	171	26,297	3,647
1893	.	2,527	‡542	12,833	67	32,089	4,633
1894	.	1,634	624	13,477	237	35,006	4,118
1895	.	2,095	818	15,424	275	35,304	3,774
1896	.	†3,668	814	14,882	485	38,001	5,186
1897	5,788	3,301	1,261	10,197	262	27,040	6,436
1898	6,758	4,269	1,496	13,027	300	24,867	9,593
1899	7,522	3,821	2,511	15,525	226	24,912	21,746
1900	7,132	3,133	4,475	12,243	402	23,642	36,383
1901	8,390	3,607	5,921	13,250	506	23,518	52,741

Witches and megrims, as well as plaice, are brought in considerable quantities from Iceland, but there is no doubt that the bulk of those in the Table were taken in the northern part of the North Sea.

In the Board of Trade returns of the fish landed in England, witches and megrims are not distinguished, and it is not clear in what category they are placed. But if similar information were available for the fish landed in England by English trawlers, it is probable that a corresponding increase would be shown in witches and megrims, for not only are they brought from Iceland, but large numbers of English trawlers fish in the northern part of the North Sea, where these fish are abundant. I have myself, when on board a trawler, seen more English than Scotch boats fishing on the deep-water grounds.

The larger round fishes have also increased in proportion, like the witches and megrims. The quantity of ling caught by trawlers rose from 5036 cwts. in 1897 to 41,704 cwts. in 1901, an increase of over 700 per cent.; saithe increased in the same period by nearly 500 per cent.; tusk —a northern deep-water fish—increased from 92 cwts. in 1898 to

* The separate quantities since 1897 are these:—

	Plaice.	Dabs.	Witches.	Megrims.
1897	25,858	1,182	4,932	1,504
1898	23,484	1,383	6,074	3,519
1899	22,741	2,171	12,569	9,177
1900	20,964	2,678	24,343	12,040
1901	21,522	1,996	35,507	17,234

† The increase in turbot in 1896 was due to the discovery of new grounds at St. Kilda; two of the best shots were 744 and 660 turbots. Large takes of cod and ling were also obtained.

‡ The increase in halibut in 1893 and afterwards was owing to the fact that for the first time a number of local vessels began to make trips to Iceland.

1199 cwts. in 1901; cod increased by only 57 per cent., haddocks by nearly 110 per cent., and whitings by nearly 1100 per cent. The increase in round fishes may be partly due to the superior efficiency of the otter-trawl, *per se*, apart from its employment on richer grounds (*see* p. 119).

What has been stated above in regard to fish caught by trawlers is true also with respect to fish caught by great-lines, and especially by steam-liners. These vessels may go considerable distances, and further from shore than the trawlers, since they can fish in deeper water. In March, for example, most of those belonging to Aberdeen work in the Atlantic from 12 to 50 miles, or more, north-west of Hoy, Orkney; others at the Faröes and N.E. of Shetland, and others E.S.E., where many fish later. The shots from the different grounds vary considerably. I give four examples (in cwts.)—I., 45 miles N. ½ W. from Hoy; II., at Faroe; III., 200 miles E.N.E. of Aberdeen; IV., 135 miles E.S.E.:—

	Cod.	Ling.	Tusk.	Saithe.	Halibut.	Conger.	Skate.
I.	5½	48	5	1½	17	.	25
II.	4	5	3	.	62	.	3
III.	15	57	55	4	15	6	86
IV.	47	3	.	½	2	.	8

To summarise these facts in relation to the question of the impoverishment of the North Sea, it is necessary (1) that the fish caught within the North Sea should be separately distinguished from those caught elsewhere. It is not sufficient for the purpose in view merely to separate the fish taken in distant regions, as at Iceland, the Faröes, and the Bay of Biscay, and to leave those caught at all other parts of the British seas—the North, West, and South coasts, and around the Irish coast—combined with the North Sea fish. (2) It is also necessary to distinguish different areas in the North Sea, because the gross abundance, and the proportional abundance of different species, especially of flat-fishes, vary greatly in different parts; and if in any year the fishing predominates in one region more than another the statistics may show a decrease or an increase which has nothing to do with decreased or increased productiveness of the grounds (although that might appear on their face), but merely with a predominant change of the place of fishing. Recently, for example, there is a tendency to resume trawling in greater force in the region of the Fisher Bank, and one consequence of this will be an increased quantity of plaice landed. In that case, without specification of the grounds, it might be assumed, erroneously, that plaice was increasing in abundance, while the increased quantity was due merely to change in the place of fishing. Trawlers go, not necessarily where fish are most abundant, but where the most profitable catches may be got. The price of flat-fish, and especially plaice, has enormously risen, and thus a relatively small catch of plaice may be more profitable than a large catch of haddocks. It is probable, as the northern grounds are more worked over, they will become less productive, and the older grounds may be more frequented; and the movement of recent years to some extent reversed. Should this continue, the quantity of plaice landed in the next few years will be augmented, although that fish in the North Sea may be really less abundant than before. It would require an equal distribution of fishing operations throughout the whole of the North Sea, in each of a period of successive years, to allow conclusions to be drawn from statistics which referred to the whole area respecting change in its productiveness; and that is a condition most improbable.

With regard to this question of the place of fishing, there are two points to be considered; first, the areas which should be chosen for comparison, and, second, the means by which the information may be acquired.

With regard to the first, by far the most important factor determining the proportional distribution of the various species of fish is the depth of water. It is not the distance from the shore, but the depth. The fish obtained, for example, in a small depression of 50–75 fathoms, a few miles from Aberdeen, where I have carried on trawling experiments, resemble in kind and proportional abundance those caught in water of somewhat similar depth south east of the Shetlands. A haul made in 30 or 40 fathoms in the middle of the sea more closely resembles one got near shore in about the same depth. A subsidiary cause of variation is the geographical position; the black or common sole, for instance, is extremely rare on the east coast of Scotland, even where the depth is suitable.

Such being the case, the most natural areas would be those representative of the depth of the water, and in the North Sea the twenty fathom, thirty fathom, fifty fathom, and one hundred fathom contour lines might be selected. The actual areas within these lines are, however, too large for the purpose, for although the range of migration of the fishes, or the correlation of one part with another, is not sufficiently well known, there is little or no doubt that the inclusion of such distant parts as the Fisher Bank and the sea off the coast of Northumberland in the same area would be wrong. Extent as well as depth must be taken into account. In dealing with the information at Aberdeen, I selected as most convenient areas of 1° latitude and 2° longitude, which in most cases would probably answer well.

The precise area to be selected for exhibiting the results is not, however, of much immediate importance. The chief thing is to determine and record the place of fishing. In ascertaining the place of fishing it appears to be sometimes supposed that it would be necessary, first of all, to fix the position and extent of certain areas, and to ask the fisherman to say which area he had been fishing in; or to ascertain from him the latitude and longitude of the place, or to discover if he was fishing north or south, east or west of a given line. But this is unnecessary, and would probably be confusing. Every fisherman knows very well where he is fishing. If near the coast he has landmarks, or it may be compass and his lead. If at a distance from the coast he steers a course by his compass, runs a certain distance as determined by his log, ascertains the depth and the nature of the bottom with the sounding lead, and then shoots his gear. From Aberdeen, for example, when fishing on the north-eastern grounds, the practice is for the trawler to run up the coast to Buchan Ness and then to shape his course to where he has decided to go, measuring the distance from there; if he is going east or south-east the course is steered and the distance measured from Girdleness on leaving port. All that requires to be asked is—"What course did you steer?" The answer may be, "North-east by east, easterly, from Buchan Ness." "How far did you run?" "120 miles." "What depth?" "70 fathoms." The place of fishing can then be marked on a chart, similar to the one used by the trawler. Obviously, for the purpose of subsequently exhibiting the results of a large number of observations, any area on the chart that is most suitable for the purpose may be selected. It may happen that when fishing more towards the north and west land may be sighted or the light of a lighthouse observed and recognised, and this forms an additional guide, *e.g.*, "twenty miles south-east of Fair Isle." In other cases nearer the coast a well-known ground may be stated, as "Buchan Deeps," "Aberdeen Bank," &c., or it may be stated that the fish were caught 30 to 40 miles off a given part of the coast, say, Aberdeen. It is, however, best to obtain the course steered and the distance run, for sometimes the name of a bank may be used in a very wide sense, including not merely the bank proper, but the neighbouring parts of the sea. Thus, "Fisher Bank" may mean a very large stretch of sea in the neighbourhood of the place where that name more strictly applies.

In some cases it may happen that the whole of the catch is not obtained at the same place, and an additional question to elicit this fact is necessary. As a rule, however, it is, and when it is not, each place where the catch is got is ascertained—for a course is steered and a distance run to the new place, where the depth is again determined. On subsequently charting this information it may be found that the distance separating one place from the other is inconsiderable, and that they both fall within the same area selected as a unit. Should this not happen the record is entirely rejected, for it is not desirable to endeavour to ascertain the quantity of fish got at each place, which would probably lead to error. It may be here said that the suggestion sometimes made that the trawling skipper might himself record the quantities caught is scarcely feasible and is inadvisable. That information can be obtained much better and more accurately when the fish are landed—and when a uniform standard can be applied to transform numbers or boxes into cwts.—either by observation on the market or from the salesman's books.

There remains the further question, whether or not the information given by the skipper or fishermen as to the place of fishing can be trusted, a question concerning which very different opinions have been expressed. There is no doubt that in certain cases the fisherman does not wish that the exact spot where he is getting specially good shots should become known to other fishermen. There is no objection to give the information except on this score. Such cases in deep-sea trawling are not, however, so numerous as is sometimes imagined. As a rule, when the fishing is steady, there is no secret as to where the boats are fishing; but at some periods of the year, when the fish shift a good deal, a consideration of the kind mentioned may prevail, and it will depend upon the probity of the skipper whether the information as to the place of fishing is altogether withheld or is made wilfully misleading. In the work at Aberdeen only a proportion of the skippers have been asked for the information, those regarded as the most trustworthy being selected, and the promise being given that the information would not be divulged to others. Cases in which there was doubt, from the nature of the catch, that a mistake had been made as to the real place where the fish were caught, were rejected. Notwithstanding this there may be a percentage of error, but there is every reason to believe it is small, and that the Tables (p. 214) show substantially the areas in which the fish were taken, the facts agreeing with the observations made on board trawlers as to the distribution of the fish.

The information in regard to the place of fishing is, however, so important from the point of view of determining change in the productiveness of the grounds, that I think further measures ought to be taken to extend its scope and to ensure as great accuracy as possible. It ought to be made compulsory, under due precautions to preserve the fishermen from detriment, to disclose the place of fishing. At present (in Scotland) it is compulsory by statute to furnish returns of the fish caught; and the place where they are caught is at least of equal importance for the purpose as the quantity landed. If the trawling skipper was provided with a form, of the following description, on which certain simple information was required to be written, and the form was then sealed in an envelope provided and posted to the central official, all the necessary information would be obtained, without any expense to him and with complete secrecy.

No.________ Port of________________

Vessel________________ Date of Landing________________

PLACE OF FISHING.—*Note.*—If the fishing during the voyage is made at more than one place the particulars for each place must be inserted.

	Course Steered from*	Distance Run in Miles.	Name of Fishing Ground.	Depth of Water at Fishing Ground.	Number of Drags.				Number of Hours actual Fishing.
					3 hours.	4 hours.	5 hours.	6 hours.	
1	N.E.	209	.	75–78	.	1	10	.	54
2†	N.E.	40	.	85	. .	.	2	.	10
3†	W.½ S.	57	.	85	.	.	4	.	20
4†	.	.	.	.	.	.	.	.	.

* Insert place. † Course and distance to be stated from previous place of fishing.

The information indicated in the above form is well-known to the skipper and fishermen of the vessel, and a few trials and a little explanation would, I am sure, ensure the form being filled up with accuracy.

There are other means which may be taken to safeguard the trustworthiness of the information given. In the first place, it ought to be made a duty of all cruisers and Government vessels to log and report the distinguishing number and letters of every fishing vessel they encounter, with the date and place observed, and whether they are fishing or not. This information is obtained and published by certain foreign states, as the Netherlands and Germany, and refers not merely to national vessels but to all fishing vessels observed, a great number of which are British.‡ Similar information as to foreign trawlers working off the Danish coast, obtained both from cruisers and from lightships, is published in condensed tabular form in the Danish Report, and no doubt the number and letters are ascertained in each case and could be made available.§ Particulars of the kind in question would be very useful as a check.

Probably even more important would be the construction of charts showing the proportional distribution, or the percentage numbers, of the various marketable fishes taken in different parts of the North Sea with an ordinary commercial otter trawl. At present, as stated above, it is possible by a cursory examination of a catch to say within certain limits where it has come from, owing to the presence or absence of certain kinds and the proportion between the fishes generally. It will probably be

‡ The information collected by the Netherlands cruisers is published in the *Staats-Courant*, and is re-published monthly in *Mededeelingen over Visscherij*; that collected by the German cruisers is published in *Mittheilungen des Deutschen Seefischerei-Vereins*. For example, from the *Reisrapport* of the *Dolfijn* for 11-29 November 1901, it appears the English steam trawlers G.Y. 252, 348, S.N. 241, B.N. 172 and 187 were working at the Outer Silver Pit on 26th November.

§ *Fiskeri-Beretning*. Thus in 1900, 2191 trawlers were recorded, of which 156 were English and 469 German. The distance from the coast up to 15 miles and the position are given.

found, when this subject has been investigated in a scientific manner in each season, that the differentiation of the place of fishing from the nature of the catch may be made much more precisely, and the extent of the possible area of capture greatly restricted. A standard of proportional distribution of this kind would be most valuable. It might be gradually evolved from the scheme above outlined, the preponderance of the observations which gave results of a particular and uniform kind enabling anomalous and mistaken results to be eliminated. It might be done by sending trustworthy observers on board the fishing vessels, as I am doing now, to record the place of fishing and the catches. Still better would be the examination of the grounds by the steamers provided for scientific investigations, in which case all the conditions could be accurately ascertained.

The Duration of the Fishing Operations.

It is also necessary for the purpose in view to obtain information as precise as possible regarding the duration of the fishing operations. In dealing with a large volume of statistics of fish landed by a particular mode of fishing, *e.g.*, trawling, the number of registered vessels of the class in question might be taken for broad results—so much fish and so many vessels. But there are various circumstances which tend to render this method inaccurate, especially if the question becomes limited to one or a few ports. Some of the vessels during part of the year may be engaged in another method of fishing, *e.g.*, lining, by which a different class of fishes are obtained. Some may be fishing part of the year, or the whole year, at other ports, or landing their fish at other ports —it may be in another country—and not at the port of registry. For some years, for example, a number of steam trawlers registered at Port-Glasgow, in the Clyde, fished entirely from Aberdeen; vessels from Fraserburgh, Granton, Peterhead, Grimsby, Hull, and from foreign ports land fish at Aberdeen frequently or occasionally, and Aberdeen trawlers may land fish at English ports. Thus the quantity of fish landed at a particular port cannot be assumed to have been caught by the vessels registered at that port, and there is no certainty that the discrepancy will remain substantially the same in a series of years.

The number of landings, trips, or voyages of the vessels has also been suggested as a convenient means of supplying the information required, but it is probably even less satisfactory than the numbers of registered vessels. The duration of a voyage may vary greatly, from over a month to a single night, the quantity of fish brought ashore at each "landing" varying in a corresponding degree from a few cwts. to perhaps fifty or sixty tons. Thus, the number of landings by trawlers at Aberdeen, the gross quantity of fish landed, and the average quantity per landing, in each of the five last years, were these:—

	Landings.	Quantity.	Average Quantity per Landing.
		cwts.	cwts.
1897	5,788	436,040	75·3
1898	6,758	568,808	84·2
1899	7,522	687,841	91·4
1900	7,132	787,745	110·4
1901	8,390	992,167	118·2

Thus, within five years the quantity per landing has increased by 42·9 cwts. Obviously, information of this kind throws no light on the fundamental question of the productiveness of fishing grounds, because the increased quantity per voyage is, without doubt, due not to the increased abundance of fish but to the greater duration of the average voyage, *i.e.*, more fishing. The tendency is for the smaller boats which fish near the coast, and land "live" fish twice or several times weekly, to be replaced by larger and more powerful vessels fishing usually in more distant waters and landing weekly, or at longer intervals.

In dealing with the vessels individually, and when the place of fishing is ascertained at the same time, no doubt the duration of the voyage may afford valuable information, for the time consumed in steaming to and from the ground can be calculated. But other conditions may interfere, and especially bad weather, which may interrupt the fishing or compel the vessel to run for shelter, and it may lie at anchor for days; and although over a term of years such weather interruptions may be fairly equalised, they could only be ignored if the number of vessels under consideration was large in proportion to the total.

It would be much better to ascertain the "number of days fishing," but there are difficulties in stating this in a uniform way, especially with regard to parts of a day; and the best course is to determine the number of hours' actual fishing, which can be done by ascertaining the number of drags. As a rule on the north-east grounds the drags are made for five hours, the watches being arranged accordingly, but some may be for four hours, and odd drags may be for three hours or six hours. The facts, however, are well-known on board, and in the form already described for indicating the position of the fishing grounds (p. 89) the number of drags could readily be inserted and the total duration of the fishing operations, which gives accurately the information wanted.

On one other point information may be desired, viz., so far as regards trawlers, the length of the headline of the otter-trawl. The length varies to some extent according, as a rule, to the size of the vessel (p. 120). This information, however, can readily be procured at the port at intervals, and at the end of the year it would be easy to strike an average for the size of the trawls used by the vessels in question. The size of the mesh is almost always uniform.

With regard to great-line fishing the corresponding information concerns the length of the lines, and the number of shots actually made during each voyage; and this can be readily ascertained in the same way.

The Season of Fishing.

In certain places the quantity of fish, or of particular kinds, may vary considerably during different periods of the year, *e.g.*, haddocks on the north-eastern grounds in winter and early summer. If, however, the records are made up monthly changes of this kind will be shown, and the fishing operations in any area can be contrasted monthly or annually provided the particulars required and above described are ascertained.

Conclusion.

Since the ordinary trade or commercial statistics are not fitted to show the variations in the productiveness of the fishing grounds, it is desirable that specially organised statistics should be instituted at the principal fishing ports for this purpose, especially concerning steam-trawlers and steam-liners. It is necessary *that the operations of the individual boat* *should be taken as a unit,* and that throughout the manipulation and condensation of the information referring to a large number of boats the various factors should be kept separate and distinct—the method of fishing, the quantities of the various species of fish, the place of fishing, the duration or extent of fishing, and the season of fishing.

It would be most desirable that all steam-trawlers and steam-liners should be included in the scheme, the information as to the place of fishing, and the duration and extent of the fishing operations, being made compulsory by the filling up of a form, such as is described above, at the end of each voyage, the particulars as to the catch being obtained in the ordinary manner at the market, or from the books of the salesmen. Failing the inclusion of the whole fleet in a compulsory system, the information should be obtained from as many vessels as possible. Probably fifty per cent. or even thirty per cent. would suffice to show substantially the operations of the whole fleet. It would, at all events, in the course of a very few years, if properly carried out, provide a large volume of accurate knowledge regarding the variations in the productiveness of the fishing grounds, or their impoverishment. which cannot be otherwise acquired.

I. Investigations on Board Steam Trawlers.

The Inshore Grounds.

The investigations on board steam-trawlers were made in May, June, July, August, September, October, November, December, and January, as a rule for about a week on each occasion, the vessels employed being the "Star of Peace," "Strathcona," "Strathearn," Strathclyde," "Star of Hope," "Ocean King," "Lochryan," and "Lochnagar." The contents of 155 hauls of the large otter-net were recorded, and 39 hauls with the small-meshed net were also taken.

I.

The first trip in the territorial waters was made on board the "Star of Peace," one of the largest and best-equipped trawlers, under Captain Caie, and it extended from 30th May to 7th June, the hauls being taken in Aberdeen Bay, the Moray Firth, Sinclair Bay, and Thurso Bay. Compared with the catches made in the previous autumn and winter, it was found that fish were scarce inshore, the number of plaice and haddocks being very much less. Two hauls, in twelve to sixteen, and nine to fourteen, fathoms in Aberdeen Bay, on 30th May, occupying four hours of actual trawling, yielded 214 plaice, of which 213 were marketable, 208 haddocks, of which 174 were marketable, 219 whitings, of which 152 were marketable, and a few other fishes. Other three hauls were taken on 6th and 7th June, the trawling occupying thirteen hours, with much the same results, the five drags, lasting altogether for seventeen hours, furnishing the following numbers of fish :—

	Cod.	Codling.	Saithe.	Hake.	Haddock.	Whiting.	Catfish.	Gurnard.
Marketable,	29	1	1	2	685	413	1	.
Unmarketable,	.	9	.	.	470	154	.	1,419
Total,	29	10	1	2	1,155	567	1	1,419

	Brill.	Plaice.	Lemon Sole.	Flounder.	Common Sole.	Common Dab.	Long Rough Dab.
Marketable,	16	877	3	3	1	2,229	.
Unmarketable,	.	14	.	.	.	7,299	5
Total,	16	891	3	3	1	9,528	5

Four thornback rays, thirteen starry rays, eight grey skates, and two sandy rays were also taken, of which only two thornbacks and six grey skates were marketable.

Besides complete records of these five hauls, the numbers of marketable fishes obtained in other nine hauls, occupying thirty-seven hours' actual trawling, were ascertained, the total marketable fishes in the fourteen hauls, representing fifty hours' trawling, being as follows :—

Cod.	Codling.	Saithe.	Ling.	Hake.	Haddock.	Whiting.	Catfish.
120	9	5	1	5	1,179	2,566	1

Turbot.	Brill.	Halibut.	Plaice.	Common Sole.	Lemon Sole.	Flounder.	Common Dab.	Megrim.
2	30	6	3,312	1	25	7	4,544	2

There were also fifteen grey skates and three thornbacks. Most of the cod, the halibut and megrims, were got in the deeper water (14 to 20 fathoms) in the northern part of the bay. The scarcity of haddocks was marked, the fourteen hauls producing less than a single haul often yielded in the previous autumn and winter.

On the night of the 31st May the vessel began to trawl in the Moray Firth, and during the following five days trials were made at various places. Two hauls were taken off Lossiemouth, one in from 12 to 16 fathoms, and the other further off in 24 fathoms. The former, occupying three hours, yielded only 290 marketable fishes—viz., 274 haddocks, 10 cod, one brill, one lemon sole, four common dabs, and not a single plaice. There were also $8\frac{1}{2}$ baskets of "offal," consisting chiefly of gurnards. The second haul, also for three hours, produced only 168 fishes, of which 84 were marketable, comprising 47 haddocks and 23 plaice. A third haul was taken further westwards in Burghead Bay, in from five to fourteen fathoms, and the catch was also small, comprising 396 fishes, of which 229 were marketable. Only two haddocks, and no whitings, were caught, but there were 193 plaice, of which 186 were marketable. A fourth haul was taken for an hour in Cromarty Firth, in from five to fourteen fathoms, and 34 fishes were caught, 26 being marketable, including two haddocks and twenty plaice. The vessel then steamed to the Dornoch Firth, where large catches of plaice were obtained in the previous autumn and winter, as many sometimes as over two thousand in a four hours' drag. Two hauls were taken in from five to twelve and a half fathoms, but very few fish were caught, the net containing chiefly mud and weeds. The first yielded 153 fishes, of which 91 were marketable, comprising 62 haddocks and 26 plaice, and the second 245 fishes, of which 89 were marketable, including 18 haddocks and 61 plaice. It is noteworthy that dabs as well as plaice were extremely scarce on this ground, where they were previously abundant, the two hauls yielding only 29, of which one was marketable.

Since fishing of this kind was unsatisfactory as well as unprofitable, the vessel steamed northwards to the Caithness coast, where the net was shot off Dunbeath in twenty-five fathoms, and towed for three hours at about that depth. On being hauled no fish were found in the net, and as it had probably not been working properly another drag for an hour was made in the same place, but in twenty-two fathoms, the small-meshed net being put on outside the cod-end. On this occasion about a quarter of a basket of fish were taken; they numbered 23, of which 16 were marketable—namely, nine plaice, four lemon soles, and three common dabs. No haddocks, codling, or whiting were caught. The contents of the small-meshed net consisted of eight common dabs and one lemon sole, and did not include a single round fish. The lemon soles were spawning, one of the ripe males measuring only 131 mm. ($5\frac{1}{8}$ inches); the smallest female was $13\frac{3}{4}$ inches long. While fish were so scarce in this haul, the quantity of "jelly-fishes" (chiefly *Cyanea*) contained in the net was very considerable, amounting to about twenty basketfuls. They were present in abundance in the bays and inshore waters throughout the summer, and it was mainly to this circumstance that the trawl-fishermen (who call them "slithers") attributed the poor catches of fish.

Steaming further north, a series of hauls was made in Sinclair Bay, between Noss Head and Duncansby Head, in from $5\frac{1}{2}$ to 17 fathoms, and here better results were obtained. On 3rd and 4th June five hauls were made, the actual trawling occupying thirteen hours and forty minutes, and 2759 fishes were caught, of which 1439 were marketable and 1320 unmarketable. They are as follows (I. = marketable and II. = unmarketable):—

	Cod.	Cod-ling.	Had-dock.	Gur-nard.	Tur-bot.	Brill.	Plaice.	Lemons.	Common Dab.	Floun-der.
I.	25	52	323	187	1	4	717	9	118	3
II.	.	9	10	1,240	.	.	19	.	41	.
	25	61	333	1,427	1	4	736	9	159	3

One angler was also taken, but no skates or rays or whitings. A large proportion of the gurnards were ripe or nearly ripe, and many were spawning. Several were of large size, measuring up to 45·5 cm. (18 inches), and on this occasion the larger fishes were preserved for market. The gurnards were feeding on young sand-eels, with which their stomachs were crammed.

The ground in Sinclair Bay was in parts strewn with boulders, and the net caught on several occasions, and on the forenoon of the 4th

June the vessel steamed round Duncansby Head and shot the trawl in the afternoon in Thurso Bay, and towed it around in from ten to twenty-five fathoms for four hours. The catch was very poor, consisting of 115 fishes, of which 53 were marketable—viz., one cod, one haddock, two catfish, twenty-two plaice, and 27 common dabs. Up to this time the weather had been very favourable, but a strorg breeze from the south-west arose, and the vessel remained at Scrabster until the following morning, when it steamed to Smith Bank in the Moray Firth, where two hauls were taken. The first, in twenty-two fathoms, lasted an hour, and the catch consisted of 333 fishes, of which 181 were marketable. The second haul, on the west edge, occupying four hours, yielded 539 fishes, of which 374 were marketable and 165 unmarketable. The record of the two hauls is as follows:—

	Codling.	Haddock.	Whiting.	Gurnard-	Catfish.	Brill.	Plaice.	Lemons.	Common Dab.
I.	5	315	51	.	1	1	124	36	22
II.	2	15	14	81	.	.	.	8	192
	7	330	65	81	1	1	124	44	214

This was poor fishing, and the vessel returned to Aberdeen Bay and made better hauls there, as above described.

The quantity of fish landed at Aberdeen as a result of the eight days' work in territorial and closed waters was $127\frac{1}{2}$ cwts., which brought £128 2s. They were as follows (in cwts.):—

Cod.	Codling-	Saithe.	Haddock.	Whiting.	Turbot.	Halibut.	Brill.	Lemons.	Plaice.	Dabs.	Skate.	Catfish.
$20\frac{3}{4}$	1	$\frac{1}{2}$	$14\frac{1}{2}$	9	$\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{4}$	$\frac{1}{4}$	$53\frac{1}{4}$	24	2	$\frac{1}{2}$

No foreign trawlers were observed at this time working within the Moray Firth.

II.

On 13th and 14th June, four hauls were made by the steam-trawler "Strathcona" in Aberdeen Bay, in from six to fourteen fathoms; in the last of these, which was for four hours in from six to eight fathoms, off the Black Dog, the net was full of little else than jelly-fishes, from among which six small plaice, about a dozen dabs, two haddocks, and about $\frac{1}{3}$ of a basket of whitings were picked out. The records of the fish in the other hauls, which occupied $7\frac{1}{4}$ hours, were imperfect; but the quantities of marketable fishes, in cwts., of the four drags (occupying $11\frac{1}{4}$ hours) were as follows:—Cod $\frac{1}{2}$, haddock $3\frac{1}{2}$, whiting 5, plaice $1\frac{3}{4}$, dabs $\frac{1}{2}$, the total being $11\frac{1}{4}$ cwts., which realised £10 14s. 6d. One black sole, $12\frac{1}{2}$ inches long, was taken in one of the drags.

III.

The next trip was made in the steam-trawler "Strathearn," from 28th June to 5th July, and the results in regard to the quantity of fish taken were also poor. The first haul was made outside the territorial waters, in the deep water off Aberdeen—known locally to fishermen as the "Dog Hole"—eleven miles S.S.E., in 65 fathoms. One hour's drag here yielded 1198 fishes, of which 349 were marketable, 225 being haddocks, 72 whitings, 27 lemon soles, and 12 megrims. The unmarketable fishes consisted principally of the previous year's haddocks (508 in number), small whitings, and long rough dabs. The vessel then steamed to Lunan Bay, near Montrose, and shot the trawl in 12½ fathoms, the small mesh being around the cod-end. Sixteen minutes later the net caught on the bottom, and it was brought up. The cod-end contained 82 fishes, of which twenty were marketable, viz., nineteen plaice and one lemon sole; the unmarketable fishes consisted chiefly of haddocks and long rough dabs. Although only fishing for sixteen minutes the small-meshed net contained 2061 fishes, comprising 1916 small herrings, 80 sprats, six haddocks, 35 whitings, 15 common dabs, five long rough dabs, one gurnard, and three Norway pouts. Another shot was made, but in half-an-hour the net again caught on the bottom and was hauled. It contained 35 plaice and 34 haddocks, all marketable, also a dragonet and a flounder.

Thereafter the vessel returned to Aberdeen Bay and made two hauls between Newburgh and the Black Dog, one in eight, and the other in from six to eleven fathoms, each haul occupying four hours. The number of marketable fishes (I.) and unmarketable (II.) taken in the eight hours was as follows:—

	Cod.	Codling.	Haddock.	Whiting.	Hake.	Gurnard.	Plaice.	Common Dab.	Flounder.	Long Rough Dab
I.	2	1	537	131	1	1	360	315	6	.
II.	.	1	870	223	.	25	2	751	.	39
	2	2	1,407	354	1	26	362	1,066	6	39

One red gurnard (*T. cuculus*) and two anglers were also taken. The number of marketable fishes was thus 1354, while 1914 were unmarketable.

Entering the Moray Firth, the trawl was dropped on the east edge of Smith Bank, in thirty fathoms, and a four hours' drag yielded 144 fishes, of which 21 were marketable and 123 unmarketable. Shifting to the west edge of the bank, two drags were taken in about 31-32 fathoms, and the 8½ hours' trawling gave 1224 fishes, of which 681 were marketable and 543 unmarketable. The numbers of the various kinds taken in the three drags (12½ hours) are these:—

	Cod.	Codling.	Haddock.	Whiting.	Saithe.	Hake.	Gurnard.
I.	2	4	527	19	2	2	.
II.	.	5	208	50	.	.	315
	2	9	735	69	2	2	315

	Halibut.	Turbot.	Brill.	Plaice.	Lemon Sole.	Common Dab.	Long Rough Dab.
I.	1	1	1	127	13	.	.
II.	.	.	.	.	2	72	7
	1	1	1	127	15	72	7

Eight thornback rays, three of which were marketable, one angler, and one pogge (*Agonus*) were also taken.

The vessel then steamed to the south coast of the Firth and made six drags, occupying altogether 24 hours and 20 minutes of actual trawling, between Burghead and Hopeman, in depths from six to fifteen fathoms. The total catch of fish in these hauls amounted to 2451, of which 1031 were marketable and 1420 unmarketable, as follows:—

	Cod.	Codling.	Haddock.	Whiting.	Hake.	Saithe.	Gurnard.	Catfish.
I.	18	1	262	32	1	4	.	.
II.	.	8	431	119	1	1	525	2
	18	9	693	151	2	5	525	2

	Turbot.	Brill.	Plaice.	Lemon Sole.	Common Dab.	Witch.	Long Rough Dab.
I.	2	1	589	10	39	7	.
II.	.	.	10	2	311	2	8
	2	1	599	12	350	9	8

Nineteen thornback rays, of which sixteen were marketable, three herrings, one Norway pout, one pogge, one dragonet, one red gurnard, and 39 anglers were also taken in these hauls.

On 2nd July the "Strathearn" steamed to the Dornoch Firth, where the hauls made by the "Star of Peace" a month previously were so disappointing, and anchoring a "dan" in ten fathoms south-east from Dunrobin Castle, eight drags were made around it in from five to twelve fathoms. The catches were less satisfactory than at Burghead Bay, the total number of fishes obtained in the 28 hours and 52 minutes actual trawling being 1809, of which 1288 were marketable and 521 unmarketable. The particulars are as follow:—

	Cod.	Codling.	Haddock.	Whiting.	Gurnard.	Plaice.	Lemon.	Common Dab.	Flounder.
I.	7	.	418	.	.	827	1	18	4
II.	.	1	91	4	140	105	.	120	7
	7	1	509	4	140	932	1	138	11

Thirteen thornbacks, all except one marketable, one grey skate, ten herrings, twenty-nine sprats, and thirteen anglers were also taken.

At this time the quantity of medusidæ (*Cyanea* and *Aurelia*) in the Dornoch Firth was very great, and the net when brought on board was pretty well filled with them. Owing to their abundance the drag with the small-meshed net around the cod-end was limited to twenty-one minutes. When hauled, the ordinary cod-end was found to contain six marketable plaice, and twelve unmarketable fishes, viz., nine common dabs, two sprats, and one gurnard. The small-meshed net itself contained only one small dab, along with several bucketfuls of jelly-fishes. A considerable quantity of weed was also found in the net after each haul. After one of the four-hour drags sixty-eight small plaice and four dabs, all living, were picked out from among the "slithers" and weed and placed in a tub of sea-water. Twenty minutes later it was found that all the dabs and one of the plaice were dead, and the sixty-seven living plaice were returned to the sea.

On the evening of the 3rd July the vessel left the Dornoch Firth and returned to Burghead Bay, but as herring-drifters were at work, the net was not shot, and we steamed for Kinnaird Head, and then to the deep water about $8\frac{1}{2}$ miles off, shot the trawl with the small-meshed net in 83 fathoms, and hauled it, fifty minutes later, in 85 fathoms. The cod-end of the otter-trawl contained 396 fishes, of which 192 were marketable, comprising three cod, two codling, 111 haddocks, 48 whitings, one catfish, two megrims, and twenty-five witches. The unmarketable fishes consisted of one codling, 92 haddocks, 66 whitings, four lemon soles, and 41 long rough dabs. The small-meshed net contained 285 fishes which had passed though the meshes of the cod-end of the otter-trawl, viz., 11 haddocks, eight whitings, one gurnard, one lemon sole ($5\frac{5}{8}$ inches), one common dab, 205 long rough dabs, eight four-bearded rocklings, sixteen Norway pouts, and thirty-four *Lumpenus*. As usual in short drags, the fish were alive when brought to deck, and many specimens of *Lumpenus* and of the Norway pout were put into a tub of sea-water. The pouts soon died, but the former, which were active, vigorous, and hardy, survived, and were landed living at the laboratory on the 6th. Specimens of both were sent to the British Museum of Natural History.

The weather hitherto had been calm and clear, but a dense fog came on which made it difficult to find the land, and then the vessel returned to Aberdeen Bay, where four hauls were taken in from $5\frac{1}{2}$ to 20 fathoms on 4th and 5th July with much better results than on the previous occasion, and contrasting also with the hauls in the Moray Firth. One of the four-hour drags yielded 5829 fishes, of which 2735 were marketable—or more than double the number obtained in the eight drags in the Dornoch Firth a few days before—and in the four drags, representing twelve hours and fifty-five minutes' trawling, 14,075 fishes were caught, of which 6818 were marketable and 7257 unmarketable. The particulars are as follows:—

	Cod.	Codling.	Haddock.	Whiting.	Hake.	Saithe.	Gurnard.
I.	10	.	4,217	899	2	1	.
II.	.	28	3,554	448	.	1	178
	10	28	7,771	1,347	2	2	178
	Turbot.	**Brill.**	**Plaice.**	**Lemons.**	**Common Dab.**	**Flounder.**	**Long Rough Dab.**
I.	2	4	745	7	931	1	.
II.	.	.	32	2	2,785	1	92
	2	4	777	9	3,716	2	92

There were also caught in these hauls 98 herrings, one sprat, two sandy rays, one starry ray, ten grey skates, three thornbacks, and twenty anglers, of which the starry ray alone was taken to market. The number of herrings was unusually large for the ordinary otter net, and they were all got in one haul. During almost every summer trawlers working in the deep water to the north-east capture considerable quantities of herrings.

It is evident from the above figures that the fishing in the bay had greatly improved from the previous occasion, and at the same time very few jellyfish were taken in the net. A shoal of haddocks had evidently come in, and the proportion of small and unmarketable among them was large. These small haddocks were fish spawned in the previous year, most of them not being yet large enough for the market. Three other hauls were made in the bay, of which the records are incomplete; but in one of them, which lasted for four hours and ten minutes, 2424 marketable haddocks were taken, and 224 plaice, and there were $7\frac{3}{4}$ basketfuls of "offal," composed chiefly of small haddocks, but also containing many whitings and dabs.

The quantity, in cwts., landed as a result of the week's fishing was as follows:—

Cod.	Codling.	Saithe.	Haddock.	Whiting.	Turbot.	Brill.	Lemon.	Plaice.	Skate.
$9\frac{1}{2}$	$1\frac{1}{2}$	1	83	5	$\frac{1}{2}$	$\frac{1}{4}$	1	$48\frac{1}{2}$	1

Although the total catch thus amounted to $151\frac{1}{4}$ cwts., the sum realised for the fish was only £86 0s. 1d. The trip was therefore scarcely profitable.

IV.

The next voyage was made on the steam-trawler "Strathclyde," from 30th July to 6th August. The first shot was made in the "Dog Hole," eleven miles S.E. by S. $\frac{1}{2}$ S. from Aberdeen, in 62 fathoms for one hour and six minutes, and the catch was a good one, 533 fishes being taken, of which 344 were marketable. The marketable fish comprised five cod, twenty-nine codling, seven ling, 188 haddocks, eighteen whitings, one saithe, 83 lemon soles, ten megrims, two grey skates, and one starry ray. The unmarketable fishes consisted chiefly of small haddocks. The small-meshed net, which had been put around the cod-end, was found to have a hole worn in it when hauled, from which many fishes escaped. It contained 107 haddocks—the smaller spawned in the spring—31 whiting, 26 codling (one $2\frac{1}{2}$ inches long), eleven bibs (*Gadus luscus*), 350 Norway pouts ($4\frac{3}{4}$ to $7\frac{1}{4}$ inches), three lemon soles (smallest $4\frac{1}{2}$ inches), 49 common dabs, and 218 long rough dabs. This haul was so productive that on returning to port I informed the skippers of some of the smaller trawlers about it, and several of them for a week or more got very profitable catches on this ground.

The vessel then steamed to Aberdeen Bay, where a number of hauls were made. The trawl was first shot off Belhelvie in eight fathoms, but it was almost immediately afterwards brought up owing to the enormous number of jellyfish which soon filled it, and burst some parts of it. It sometimes happens, I was informed, that the vessel is brought to a standstill from the immense quantities that get into the net and impede its movement, the vessel being unable to drag it. The weather was calm, and as the jellyfish are drifted in masses into certain places according to the tides and currents, we steamed further north, watching for the comparative absence of jellyfish, and the net was shot off the mouth of the Ythan, and dragged for a little over four hours in from six to ten fathoms. The catch was extremely good, comprising 6924 fishes, of which 1704 were marketable.

Three drags made here, occupying nine hours and six minutes of actual trawling, yielded 15,061 fishes, of which 3753 were marketable and 11,308 (chiefly dabs) unmarketable, as follows :—

	Cod.	Codling.	Haddock.	Whiting.	Hake.	Gurnard.
I.	1	4	1,461	339	1	46
II.	.	79	410	325	.	386
	1	83	1,871	664	1	432

	Turbot.	Brill.	Plaice.	Lemons.	Common Dab.	Flounder.	Long Rough Dab.
I.	7	3	1,213	22	652	.	.
II.	.	.	65	20	9,928	3	47
	7	3	1,278	42	10,580	3	47

There were also taken in these hauls five thornback rays, of which four were marketable, three sand-eels, one herring, and thirty-three anglers. The number of anglers is large, but it has been observed as a rule that when the other fishes are abundant the anglers are numerous; they seem to follow them. They were all opened, and in twelve the stomach was empty, five contained fish pulp, one contained six small plaice and three flounders, one a dab, one a flounder, other two the remains of flat-fishes, one a weever, one a whiting, and eleven contained sand-eels alone or with other fish, the number of sand-eels varying from two to twenty-three. The small-meshed net which was used in one of the drags (for 45 minutes) contained 1005 fishes—viz., 382 whitings, 28 haddocks, 15 codling, 35 gurnards, 451 common dabs, five lemon soles (smallest 5 inches), three herrings, four dragonets (*C. lyra*), and 82 specimens of the lesser weever (*Trachinus vipera*). The latter, consisting of 15 females and 67 males, were all ripe and spawning, the former measuring from 110 to 147 mm., and the latter from 91 to 138 mm.

Besides the recorded hauls two others were made during night, of which no record was taken.

On the 1st August the vessel landed the fish caught, amounting to 91·8 cwts., which realised £101 4s. 9d. The quantities in cwts. were as follows :—

Cod.	Codling.	Ling.	Haddock.	Whiting.	Turbot.	Brill.	Lemon.	Plaice.	Dabs.	Skate.
$1\frac{1}{2}$	$\frac{1}{2}$	1	37	4	$\frac{1}{2}$	$\frac{5}{8}$	$1\frac{1}{4}$	35	10	$\frac{1}{2}$

Late on the same night the vessel began operations in the Moray Firth. The first haul was made on the witch grounds off Lossiemouth, and yielded 1½ baskets of witches, nine cod, one ling, and a few haddocks. Five hauls in Burghead Bay, further to the west, in from five to twenty-five fathoms, gave good results. In one case the net, when brought to deck, was found to have been torn, and the catch was relatively small, but in the other four hauls, representing twelve hours and fifty minutes of actual trawling, 5010 fishes were caught, of which 1382 (chiefly plaice) were marketable and 3628 were unmarketable. The particulars are as follow :—

	Cod.	Codling.	Haddock.	Whiting.	Saithe.	Hake.	Gurnard.
I.	6	.	277	37	.	3	.
II.	.	12	393	55	2	.	873
	6	12	670	92	2	3	873
	Brill.	Plaice.	Lemon.	Common Dab.	Witches.	Long Rough Dab.	Thorn-back.
I.	6	727	13	236	.	.	74
II.	.	48	21	2,097	4	47	5
	6	775	34	2,333	4	47	79

There were also taken six red gurnards, three solenettes, one sandy ray, one grey skate, one catfish, and 62 anglers, the catfish being marketable, and two of the anglers were also included in this category. Here it may be said that while the anglers, as a rule, are killed and thrown overboard, in some cases, especially when they are large, the head is cut off and the remainder skinned and taken to market. They are sold under the name of "John Dory," and the flesh is palatable—the men, indeed, on board the "Garland" relished it. The practice depends mainly on the inclination of the skipper or mate, and I have observed that English skippers are most prone to preserve such "offal." The same remark applies to the preservation for market of small fish, *e.g.*, plaice, and of gurnards, although in the latter case the state of the market (as to prices), the season, and the general productiveness of the hauls, affect the practice. When good hauls are being got little attention is paid to gurnards. Gurnards, however, along with dabs, codling, and haddocks, form the main part of the fish used on board by the crew.

Steaming further north a series of hauls were begun in the Dornoch Firth on 3rd August, where the conditions were found to have very much improved, plaice, especially, being much more numerous than on the previous occasions. In nine hauls, representing 26¼ hours' actual trawling, in from five to twelve fathoms, 15,932 fishes were secured, of which 15,032 were flat-fishes. The number marketable was 6291 and the number unmarketable 9641, as follows :—

[Table.

	Cod.	Cod-ling.	Had-dock.	Whit-ing.	Gur-nard.	Plaice.	Lemon.	Common Dab.	Floun-der.	Thorn-back.
I.	18	3	22	1	.	5,921	1	276	.	45
II.	.	7	5	1	760	4,910	3	3,720	194	11
	18	10	27	2	760	10,831	4	3,996	194	56

There were also taken in these hauls seven solenettes, four starry rays (marketable), one gemmeous dragonet, and twenty-two anglers. Plaice, it will be seen, formed the bulk of the catch, while haddocks and whiting were very scarce. Much of the fishing was made, however, in shallow water (five to seven fathoms), and this mostly accounts for the very large proportion of small plaice which were taken on this occasion. It also perhaps explains the exceptional number of flounders captured, some of the males of which were ripe, the spermatic fluid oozing from them on slight pressure. A stiff breeze was also blowing offshore (from the westward) during the fishing in the Dornoch, and this condition was considered to be favourable. A number of other unrecorded hauls were taken, and the quantity of fish landed on the morning of the 7th August, as the result of the fishing in the Moray Firth, amounted to $149\frac{1}{2}$ cwts., as follows:—

Cod.	Haddock.	Whit-ing.	Hake.	Brill.	Plaice.	Dabs.	Witches.	Skate.
5	$3\frac{1}{4}$	$\frac{1}{2}$	1	$\frac{1}{2}$	$117\frac{1}{4}$	$3\frac{1}{2}$	$1\frac{1}{2}$	17

The amount realised for the fish was £255 17s. 9d., owing to the quantity of plaice and the high prices ruling at the time.

V.

On 21st August the "Star of Hope" was employed to make a haul at the "Dog Hole," off Aberdeen, and a few hauls in Aberdeen Bay. The haul at the former place, about ten miles off, in 58 fathoms, lasted one hour and twenty-three minutes, and the otter trawl contained 1058 fishes, of which 735 were marketable and 323 unmarketable, as follows:—

	Cod.	Codling.	Ling.	Haddock.	Whiting.	Hake.	Gurnard.	Catfish.
I.	1	22	2	554	51	1	.	1
II.	.	47	.	12	7	.	13	.
	1	69	2	566	58	1	13	1

	Plaice.	Lemon Sole.	Common Dab.	Long Rough Dab.	Megrim.	Grey Skate.	Starry Ray.
I.	1	87	.	.	8	1	6
II.	.	8	131	104	.	.	.
	1	95	131	104	8	1	6

One angler was also caught. The small-meshed net, which was used around the cod-end on this occasion, contained 52 codlings, 280 haddocks, 79 whitings, two ling, seventeen lemon soles (smallest 107 mm., or $4\frac{1}{4}$ inches), 553 long rough dabs, seven bibs, twenty-eight common dabs, 218 Norway pouts (smallest 67 mm., or $2\frac{5}{8}$ inches), one pogge (*Agonus*), and one specimen of the silvery pout (*Gadus argenteus*).

In Aberdeen Bay the net was shot in the evening, in $8\frac{1}{2}$ fathoms, between Belhelvie and the Black Dog, and towed mostly in six and seven fathoms. It was hauled in four hours, and the bag presented an extraordinary appearance as it was swung on board, being filled with jelly-fishes (large specimens of *Cyanea*), which protruded from the meshes. The contents overflowed the fish-pound, and the only fish present were 120 plaice and a few haddocks. The net was so slimy that it took five hours towing through the water to make it anything like clean. Another haul was attempted further north, in Cruden Bay, with the same result, a bag of jelly-fishes and two or three haddocks, and the fishing had to be abandoned. The fish landed on the 22nd, amounting to 6 cwts., realised £5 4s. 9d.; they were chiefly from the offshore haul.

VI.

The first haul on the next expedition, which was made on board the "Ocean King," was in 58 fathoms, twelve miles S. by E. $\frac{1}{2}$ E. from Aberdeen, on 3rd September, and it lasted for one hour and seven minutes. Owing to the somewhat rough sea and the rolling and pitching of the vessel this shot was only partially recorded, but it included a considerable catch of haddocks, 107 codlings, some lemons, and one angler. The small-meshed net, which was used, was damaged; its contents comprised 103 whitings, 21 haddocks, two codlings, two bibs, 46 long rough dabs, and fifteen Norway pouts.

In the three hauls in Aberdeen Bay, off Collieston, Newburgh, and Belhelvie, in from eight to ten fathoms, the actual time of trawling being only four hours and forty-six minutes, the catch amounted to 9345 fishes, of which 6731 were marketable and 9245 unmarketable. The totals for the three drags were as follow:—

	Codling.	Haddock.	Whiting.	Gurnard.	Turbot.	Brill.	Plaice.	Lemon.	Common Dab.	Flounder.
I.	.	5,194	111	.	5	1	608	7	795	10
II.	63	162	141	79	.	.	45	1	2,116	.
	63	5,356	252	79	5	1	653	8	2,911	10

There were also two thornback and one starry ray and four anglers, all unmarketable. This was very good fishing; only a few jelly-fishes were found in the net. In two of the hauls the small-meshed net was around the cod-end; in the first, which lasted 34 minutes, the cod-end contained 881 fishes, included above, and the small-meshed net 596, viz., 535 whitings, 18 haddocks, one codling, one lemon sole, one sprat, one lesser weever, and 39 common dabs. The second drag lasted 42 minutes, and was much more productive. The cod-end of the trawl contained 2649 fishes, included above, of which 1759 (1032 haddocks) were marketable. The small-meshed net contained a large quantity of small fishes, chiefly whitings and dabs, only part of which were enumerated, and 31 haddocks, four codling, two lesser weevers, seven gemmeous dragonets, two herrings, and one sprat. Some unrecorded hauls were also taken, and on the morning of the 5th September 78 cwts. of fish were landed, which realised £63 3s. 3d. The particulars are as follow :—

Cod.	Codling.	Haddock.	Whiting.	Turbot.	Lemon.	Plaice.	Dabs.
$\frac{1}{2}$	$\frac{1}{2}$	$47\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$19\frac{1}{2}$	8

In the Moray Firth a haul was made for one hour in Spey Bay, in seven to nine fathoms, on the 6th September. The net was torn and the catch was poor, consisting of 352 fishes, of which only 54 were marketable, the bulk of the unmarketable consisting of gurnards. Six lythe were among the marketable fishes. A haul in Burghead Bay, also for one hour, with the small-meshed net around a cod-end with $1\frac{3}{4}$ meshes, yielded only 214 fishes, of which 93 were marketable (including 44 plaice and 38 dabs) and 121 unmarketable. The fish in the small-meshed net were also few, numbering only sixty-three.

The catches on the south coast of the Firth at this time being so unsatisfactory, the vessel steamed to the Dornoch Firth, where better results were anticipated. Here, however, the hauls were still less productive. The first drag was made for three hours around a "dan," anchored in ten fathoms, and only 61 fishes were caught, namely, four haddocks, and 57 plaice. Another drag was made in from six to ten fathoms for four hours and fifteen minutes, and 132 fishes were taken, viz., two haddocks, 128 plaice, and two brill. The contrast with the catches a month before was thus remarkable. The jelly-fish trouble was absent; but, on the other hand, the wind on this occasion was blowing—and had been for a day or two—pretty strongly from the south-east, that is, right into the Firth, and not from the west, off the land, as it was at the beginning of August.

Returning to Burghead Bay on the morning of the 7th, six hauls were made in from $5\frac{1}{2}$ to 8 fathoms, the time occupied in actual trawling being twenty-five hours and twenty minutes. The number of fishes caught amounted to 4694, of which 2374 were marketable and 2320 unmarketable. The particulars are as follow :—

	Cod.	Codling.	Haddock.	Whiting.	Gurnard.	Turbot.	Brill.	Plaice.	Lemon.	Common Dab.
I.	14	1	682	.	.	1	9	1,062	6	589
II.	.	156	6	32	580	.	.	29	. .	1,504
	14	157	688	32	580	1	9	1,091	6	2,093

Eight marketable thornbacks and two grey skates were also taken, as well as one solenette and twelve anglers.

On returning two drags were made off Newburgh in Aberdeen Bay on the 10th, in from six to nine fathoms, the time of trawling occupying five hours eight minutes, and 2971 fishes were taken, of which 2673 were marketable, as follows :—

	Cod.	Codling	Had-dock.	Whit-ing.	Gur-nard.	Plaice.	Lemon.	Common Dab.	Grey Skate.
I.	4	9	2,241	118	. .	167	16	117	1
II.	.	9	160	45	12	8	3	61	.
	4	18	2,401	163	12	175	19	178	1

One of these hauls, for one hour and five minutes, was made with the small-meshed net around the cod-end, and a very large number of fishes, which had passed through the otter trawl, were taken in it, viz., 143 haddocks, 42 codlings, about 7200 whitings, eight saithe ($5\frac{1}{2}$-$6\frac{3}{4}$ inches), eight Norway pouts (3-$3\frac{1}{4}$ inches), two pogges, three plaice, three lemon dabs, and 37 common dabs. Of the whitings, 2369 were enumerated; the others were computed from the gross weight, three three-pound lots giving an average of 46 per lb., and the weight of the remainder was $105\frac{1}{2}$ lbs.

The quantity of fish caught in the Moray Firth and in the two hauls in Aberdeen Bay amounted to 115 cwts., as follows, the price realised being £177 16s. 10d.

Cod.	Saithe.	Had-dock.	Whit-ing.	Turbot.	Brill.	Lemon.	Plaice.	Dabs.	Skate.
$6\frac{3}{4}$	3	$50\frac{1}{2}$	$2\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$44\frac{1}{2}$	6	1

VII.

On 18th October two hauls were made in Aberdeen Bay by the "Lochryan." The first occupied an hour and a half, and was taken in from seven to ten fathoms, to the southward of the Black Dog, a $1\frac{1}{2}$-inch cod-end being used with the small-meshed net around it. The surface temperature was 11·3 deg. C., and the bottom temperature 11·6 deg. C. The cod-end contained 311 fishes, viz., 22 codling, 22 haddocks, eight whitings, three gurnards, 143 plaice, one lemon sole, 102 common dabs, and ten long rough dabs. The small-meshed net contained 3574 whitings, 794 haddocks, 89 young cod, nine plaice, one lemon dab, 248 common dabs, three long rough dabs, one gurnard, one solenette, twelve pogges (*Agonus*), two Norway pouts, herrings, sprats, and two anchovies—a rare visitor to our waters.

The second haul was made in from nine to fifteen fathoms between the Black Dog and the mouth of the Don for $2\frac{3}{4}$ hours. The marketable fishes numbered 179, comprising 113 plaice, 38 common dabs, nine codling, 18 gurnards, and one grey skate; the offal amounted to about half a basketful. The ground-rope was found to be broken, and fishing had to be suspended owing to the heavy sea from E.S.E. The quantity of fish landed amounted to $2\frac{1}{2}$ cwts., which realised £2 14s. 9d.

VIII.

The same vessel was employed on the next expedition, and the first haul was made on 5th November $12\frac{3}{4}$ miles S.E. from Girdleness in 70 fathoms, and lasted for one hour and thirty-five minutes. The small-meshed net was around the $1\frac{1}{2}$-inch cod-end, and the latter contained

543 fishes, of which 348 were marketable, viz., 25 codling, 212 haddocks, two turbot, one plaice, 42 lemon soles, eighteen megrims, 22 witches, 22 common dabs, and four grey skates. The unmarketable fishes consisted chiefly of haddocks, whitings, gurnards, and long rough dabs. The small-meshed net was torn; it contained 96 whitings, sixteen haddocks, two codlings, two four-bearded rocklings, 44 long rough dabs, one pogge, one *Liparis*, fourteen common dabs, and one lemon dab.

In Aberdeen Bay five hauls were made in from six to twenty fathoms, the actual time of trawling occupying thirteen hours and five minutes. The number of fishes caught was large, viz., 15,453, of which 10,724 were marketable and 4729 unmarketable, as follows:—

	Cod.	Codling.	Haddock.	Whiting.	Gurnard.	Starry Ray.	Thorn-back.
I.	1	93	3,340	964	68	.	.
II.	.	27	355	998	65	36	3
	1	120	3,695	1,962	133	36	3
	Turbot.	**Brill.**	**Plaice.**	**Lemon.**	**Common Dab.**	**Flounder.**	**Long Rough Dab.**
I.	15	3	4,144	1	1,953	142	.
II.	.	.	262	5	2,880	.	75
	15	3	4,406	6	4,833	142	75

There were also in these hauls one spotted ray, ten pogges, one gemmeous dragonet, ten anglers, and one solenette.

One of the drags was made for one hour and thirty-five minutes with the small-meshed net around the cod-end, and six basketfuls of small fish were taken, chiefly whitings and common dabs. Only part of these were enumerated and measured.

The fish landed on the morning of the 7th November from the hauls mentioned amounted to $102\frac{1}{8}$ cwts., and realised £83 12s. 10d. The quantities, in cwts., were as follows:—

Cod.	Codling.	Haddock.	Whiting.	Turbot.	Plaice.	Dabs.	Gurnard.
$\frac{1}{4}$	2	34	$3\frac{1}{4}$	$\frac{5}{8}$	$47\frac{3}{4}$	14	$\frac{1}{4}$

The first of the hauls in the Moray Firth was made in 23 to 24 fathoms, off Lybster on 8th November, for four hours, and 1922 fishes were caught, of which 546 were marketable, mostly whiting, codling, and lemon soles. The unmarketable fishes consisted chiefly of dabs, gurnards, and haddocks, and included 36 anglers. A haul for an hour and five minutes was then made on Smith Bank in 26 fathoms; but only 150 fishes were taken in the otter-trawl, of which 94 were marketable, viz., six cod, fifteen codling, six haddocks, thirteen plaice, twenty lemon soles, and thirty-four common dabs; the unmarketable fishes consisted almost entirely of gurnards and common dabs.

The vessel then steamed to the Dornoch Firth, where, in seven hauls in from seven to thirteen fathoms, the time occupied in actual trawling being twenty-six hours, 19,176 fishes were caught, of which 13,743 were marketable and 5433 unmarketable, as follow:—

	Cod.	Cod-ling.	Haddock.	Whiting.	Hake.	Gurnard.	Thorn-back.	Grey Skate.
I.	28	94	52	66	1	111	47	10
II.	.	46	1	159	.	68	.	20
	28	140	53	225	1	179	47	30
	Hali-but.	**Brill.**	**Plaice.**	**Common Sole.**	**Lemon.**	**Common Dab.**	**Megrim.**	**Witch.**
I.	1	39	11,123	1	87	2,080	2	1
II.	.	.	283	.	24	4,791	.	.
	1	39	11,406	1	111	6,871	2	1

There were also taken in these hauls three solenettes, five herrings, eleven pogges, two gemmeous dragonets, one goby, and nineteen angler . Other unrecorded hauls were made in the same area.

The fishing is noteworthy from the number of plaice taken; in one haul of four hours and ten minutes 2921 were caught, of which 2650 were marketable. On this occasion, however, the small "offal" plaice were taken to market, the fish being assorted into four classes, including one of "very small," as well as the usual "large," "medium," and "small." The proportion of the plaice thrown overboard (*i.e.*, "unmarketable") was thus unimportant, being only 2½ per cent., whereas in the hauls made at the beginning of August the proportion not taken to market was nearly 50 per cent. In the same way on this occasion about 30 per cent. of the dabs were taken to market, while in August the proportion was scarcely seven per cent., and while no gurnards were marketed in August, 62 per cent. were "marketable" in November. The proportion depends upon several considerations, and very largely on the inclination of the skipper; and the facts stated illustrate the fallaciousness of using the term "marketable" as indicative of a particular size of fish, as is sometimes done.

The question whether it is right that such small plaice should be taken to market after they have been caught, depends upon whether or not it is practicable to return them living to the sea. If it is not practicable, it is clearly better that they should be used as food than thrown away dead; if it is practicable it is better they should be returned, and thus have a chance of growing to maturity. The difficulties in practice of returning them living are considerable. With a big catch of fish, it often takes a long time to get the net aboard, especially if the weather is very rough or very calm—in the latter case because the net tends to get under the vessel, and there is no roll to facilitate pulling in the slack of the net with each dip of the gunwale. And when the bag has been emptied in the pound on deck, the first requirement is to get the net again shot, and if repairs are required the delay may be considerable. Moreover, with a large catch filling the pound and comprising some thousands of fishes, the separation and selection of the different kinds of fish take a long time, and the small ones are not reached until the pound is nearly emptied, and most of them may be dead.

FIG. 2.—Showing a Good Catch in the Fish-pound.

The men then "turn in" for sleep before the net is again ready to be hauled. There is not time, in practice, to pickout the young fishes first, even if it were possible. If any areas of the territorial waters (to the shallower parts of which the small plaice are confined) were opened for trawling for plaice, the best way to protect the small individuals would be to use a net with large meshes as described in last year's Report (p. 66). The same remark applies to the use of seines, so largely used on the Continent, under appropriate regulations, for the capture of flat fishes.

The November hauls in the Dornoch differed from those in August also in the entire absence of flounders from the catches.

The vessel then steamed to the deep water off Troup Head, and shot the trawl, with the small-meshed net around the cod-end, in 95 fathoms. Owing to the bad weather which had come on the haul was quite unsuccessful, the trawl-net being almost destroyed and the ground-rope broken, probably owing to the heavy sea and the tide drifting the vessel so that the trawl dragged against the hard edge of the south side of the deep hole.

The total quantity of fish from the Moray Firth landed from this trip amounted to $150\frac{1}{8}$ cwts., which realised £194 6s. 6d. The particulars are these :—

Cod.	Cod-ling.	Had-dock.	Whit-ing.	Turbot.	Brill.	Lemon.	Plaice.	Dab.	Conger.
$9\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{8}$	2	$\frac{3}{4}$	$122\frac{1}{2}$	10	$\frac{3}{4}$

IX.

On 28th and 29th November several hauls were made by the "Star of Hope." The first was in 68 fathoms, nine miles S.E. by E. from Girdleness, and lasted for one hour and a quarter, in a heavy sea from the northward. Only 141 fishes were taken, of which 69 were marketable, viz., four cod, five lemon soles, three witches, fifty-two haddocks, and five whitings. The unmarketable consisted mostly of haddocks and long rough dabs. The small-meshed net, which was placed around the cod-end, contained 103 haddocks, 889 whitings, five codling, fourteen sprats, three four-bearded rocklings, one pogge, 22 Norway pouts, and three anchovies.

Some hauls were then taken in Aberdeen Bay, also with unsatisfactory results, the catches being very small. For a day or two before the wind had been blowing pretty strong from the north, and on the 27th and 28th there was almost a gale from the north-west. Two hauls, occupying five hours, in eleven to eighteen fathoms, gave only 633 fishes, of which 269 were marketable, viz., nine cod, sixty-two codling, 122 haddocks, eleven plaice, six common dabs, eleven lemon dabs, one grey skate, and forty-seven starry rays. The marketable fishes were chiefly whitings and starry rays. One of these hauls, with the small-meshed net around the cod-end, lasted one hour and twenty minutes, and in the latter were 3256 young whitings, seven haddocks, 33 codlings, one saithe, one sprat, one plaice, one long rough dab, 172 common dabs, and one armed-bullhead (*Agonus*). A few other hauls were made with the otter with no more success, and the quantity of fish landed on the 30th November amounted to 18¼ cwts., which realised £13 5s., as follows :—

Cod.	Codling.	Haddock.	Lemon.	Plaice.	Skate.
8	3	2½	½	1¼	3

X.

On 16th December, in a smooth sea, after a N.E. storm, the first haul made by the "Star of Peace" was in 57 fathoms, nine miles S.E. from Aberdeen, and it lasted for one hour. The fish caught numbered 1238, of which 583 were marketable, as follows :—

	Codling.	Ling.	Haddock.	Whiting.	Plaice.	Lemon.	Megrim.	Witch.	Common Dab.	Long Rough Dab.
I.	59	2	430	24	1	62	4	1	.	.
II.	5	.	207	37	.	14	.	.	114	267
	64	2	637	61	1	76	4	1	114	267

There were also taken in the otter net one red gurnard (no grey gurnards), four Norway pouts, one grey skate, and three spotted dragonets (*C. maculata*).

The small-meshed net, which had been around the cod-end, contained about nine basketful of small fishes, all of which had passed through the meshes of the cod-end in the hour's drag. They were enumerated as follows :—

Whiting, - - -	5,117	Grey Gurnard, -	3	Armed Bullhead, -	8
Haddock, - -	2,446	Lemon Sole, - -	6	Gemmeous Dragonet,	3
Codling, - - -	11	Plaice, - - - -	2	Spotted Dragonet, -	1
Bib, - - - -	1	Long Rough Dab, -	1,562	Red Mullet, - -	1
Norway Pout, - -	54	Common Dab, - -	392	Total, - -	9,607

The total catch of the combined nets in an hour was thus 10,845 fishes, contrasting with the haul at the end of November.

Four hauls were then made in Aberdeen Bay, but the records of three were incomplete. The haul of which the record is complete lasted one hour, and was made in from $9\frac{1}{2}$ to 15 fathoms. The otter-net contained 137 fishes, of which 45 were marketable, viz., one codling, five haddocks, six whitings, thirteen plaice, ten lemon soles, seven common dabs, and three starry rays. The unmarketable consisted chiefly of whitings, and included three herrings. The small-meshed net around the cod-end contained 757 whitings, twelve haddocks, thirteen codling, 45 herrings, seven sprats, fifteen common dabs, 57 long rough dabs, one lemon sole, three armed-bullheads, and one starry ray ($2\frac{7}{8}$ inches broad), or a total of 911 fishes. The inshore grounds at this time were thus much less productive than those offshore in deeper water.

The quantity of fish landed on the 17th December, the product of the five hauls, was $26\frac{1}{4}$ cwts., which realised £34 19s. 9d., mainly for the cod, of which 114 were taken. The details are as follow :—

Cod.	Codling.	Haddock.	Lemon.	Plaice.	Dabs.
17	$2\frac{1}{4}$	$2\frac{1}{2}$	$\frac{1}{4}$	$3\frac{3}{4}$	$\frac{1}{2}$

The work in the Moray Firth was begun on 19th December. On the 18th a strong wind from N.W., and afterwards a snowstorm from N.E., and a heavy sea prevented any hauls being taken offshore, and the vessel took shelter in the Cromarty Firth, where some foreign trawlers were also lying. On the 19th, a strong wind still blowing, with a swell from N.E., several hauls were taken in Dornoch Firth, with comparatively poor results, and in one haul the net was badly damaged and the ground-rope broken. Four hauls in from six to twelve fathoms, occupying sixteen hours and fifty-five minutes, yielded only 1398 fish, of which 1249 were marketable, as follows :—

	Cod.	Codling.	Haddock.	Whiting.	Brill.	Plaice.	Lemon.	Witch.	Flounder.	Common Dab.
I.	46	97	180	1	12	850	5	10	1	46
II.	.	7	.	28	.	5	2	.	.	41
	46	104	180	29	12	855	7	10	1	87

There were also taken 22 thornbacks (one marketable), eight starry rays, 22 herrings, three sprats, eight armed-bullheads, and four anglers

Steaming to the south coast of the Firth, a number of hauls were then taken in Burghead Bay with much better results. The wind was N.E., but the swell had much abated. In eleven hauls, of which complete records were made, representing 49 hours 5 minutes actual trawling, and in depths varying from seven to twenty-four fathoms, 10,202 fishes were caught, of which 8399 were marketable. The catches were noteworthy for the number of fine cod taken, and for the brill and turbot, and also for the number of anglers and herrings.

	Cod.	Cod-ling.	Had-dock.	Whit-ing.	Saithe.	Ling.	Gur-nard.	Her-ring.	Thorn-back.	Angler.
I.	333	329	217	244	3	1	.	.	18	.
II.	.	48	27	155	.	.	40	107	22	161
	333	377	244	399	3	1	40	107	40	161

	Turbot.	Brill.	Hali-but.	Plaice.	Lemon.	Witch.	Common Dab.	Floun-der.	Long Rough Dab.
I.	17	157	1	5,468	42	39	1,522	1	.
II.	.	.	.	1	.	.	919	.	327
	17	157	1	5,469	42	39	2,441	1	327

Three marketable catfishes were also taken. The cod were feeding on the herrings, and herrings, as well as whitings, were found in the stomachs of the anglers opened. It will be observed that in these hauls forty gurnards were caught, this fish being rare inshore in winter. Some hundreds of the plaice enumerated above were brought alive to the hatchery pond in tubs, on the 24th and 26th December, the vessel returning to Aberdeen for the purpose. Their weight, which is not included below, was estimated at about 10 cwts. The total catch from the Moray Firth on this trip, with the above exception, between the 19th and 25th, amounted to $206\frac{1}{2}$ cwts., which realised the large total of £457 15s. The "live" cod were very fine fish, and brought a high price. The particulars (in cwts.) are these:—

Cod.	Codling.	Ling.	Saithe.	Haddock.	Whiting.	Turbot.
$61\frac{1}{2}$	$4\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{2}$	$4\frac{1}{4}$	$1\frac{1}{4}$	$3\frac{3}{4}$
Brill.	**Lemon.**	**Plaice.**	**Dab.**	**Witches.**	**Skate.**	**Catfish.**
6	$\frac{1}{2}$	$109\frac{1}{4}$	11	1	$1\frac{1}{2}$	$1\frac{1}{4}$

In one of the hauls in Burghead Bay, which was made for an hour in $7\frac{1}{2}$ to 18 fathoms, the small-meshed net was placed around the cod-end, and 1336 small fishes were taken, namely, 610 whitings, 75 young cod, 87 herrings, 536 sprats, 25 common dabs, and three long rough dabs.

XI.

Another trip was made on the "Lochnagar" from 15th to 21st January. The first haul was made on the 15th off Aberdeen, in 57 fathoms, Tod Head bearing W. by S., and Girdleness nearly N.W., and it lasted for one hour and five minutes, there being a breeze from S.W. and a slight swell. The otter-trawl contained only 245 fishes, of which 83 were marketable, namely, two cod, six codlings, 37 haddocks, seven whiting, two plaice, one lemon dab, four witches, one megrim, 22 common dabs, and one grey skate. The unmarketable consisted chiefly of common dabs and haddocks. The small-meshed net contained 1571 small fishes, as follows:—

Haddock.	Whiting.	Cod.	Bib.	Grey Gurnard.	Norway Pout.	Sprat.	Armed Bullhead.	Common Dab.	Long Rough Dab.	*Gobius minutus.*
703	604	15	4	1	17	14	2	112	97	2

On this occasion the small-meshed net had meshes 6 mm. square.

The fishing in Aberdeen Bay was also very poor. Three hauls were taken. The first was shot in 16 fathoms and ended in seven fathoms, off the Black Dog, and lasted an hour. The catch was extremely small, there being only six whitings in the otter-net, with a considerable quantity of weed. In the small-meshed (6 mm.) net there were 914 small whitings, 214 common dabs, three haddocks, one bib (*Gadus luscus*), six codling, one sprat, 27 armed-bullheads, 36 *Gobius minutus*, one solenette, three long rough dabs, and six common pipe-fishes (*S. acus*). The other two hauls were made in from seven to fourteen fathoms, and lasted altogether eight hours. The number of fishes caught was 451, of which 53 were marketable. The particulars are as follow:—

	Cod.	Codling.	Haddock.	Whiting.	Saithe.	Gurnard.	Brill.	Plaice.	Common Dab.	Starry Ray.
I.	36	2	3	.	1	.	1	9	1	.
II.	.	2	.	220	.	1	.	1	1	167
	34	4	3	220	1	1	1	10	2	167

There were also taken one bib or brassie, four grey skates, and one picked dog-fish. The haul was remarkable, in the general paucity of fish, for the unusually large numbers of the starry ray. They are most numerous in Aberdeen Bay in the winter. The fish landed the next day amounted to $4\frac{1}{2}$ cwts. of cod and $\frac{1}{10}$ cwt. of saithe, which brought £5 10s. 3d.

The vessel then proceeded to the Moray Firth, and arrived on the Caithness coast at 11 p.m. on the 17th, but found the coast lined with herring drifters, and was unable to shoot the trawl until 8.30 next morning. It was towed for three hours in sixteen to twenty fathoms off Lybster, and the net was found to have been badly torn from the hard ground there. The catch comprised only 142 marketable fishes and six unmarketable, the former being three cod, 29 codling, 102 haddocks, one whiting, one plaice, and six lemon soles. The wind was light, from

S. to N.W., the sea smooth, and the weather mild. Four shots were then made off Dunbeath in from eighteen to twenty-four fathoms, the time occupied in trawling being sixteen hours and twenty minutes. The number of fishes taken was 4695, of which 2979 were marketable, as follows:—

	Cod.	Codling.	Haddock.	Whiting.	Ling.	Saithe.	Catfish.	Starry Ray.	Turbot.
I.	73	149	1,920	162	1	3	.	.	1
II.	.	119	290	228	.	.	2	32	.
	73	268	2,210	390	1	3	2	32	1

	Brill.	Halibut.	Plaice.	Lemon Sole.	Common Dab.	Witch.	Megrim.	Long Rough Dab.
I.	5	1	418	209	24	6	7	.
II.	.	.	.	23	725	10	1	262
	5	1	418	232	749	16	8	262

There were also taken four herrings, one sprat, seven bibs, two armed-bullheads, one red gurnard, and nine anglers.

Another haul off Lybster on the 18th, for four hours, in about 26 fathoms, yielded 694 fishes, of which 382 were marketable, including 18 cod, 101 codlings, 72 haddocks, one ling, 114 plaice, and 28 lemon soles. The unmarketable consisted mostly of common dabs, long rough dabs, codling, and whiting.

The vessel then steamed to Burghead Bay, on the south coast, where three hauls were made in $7\frac{1}{2}$ to 25 fathoms. In one, the net was torn and only 135 fishes were taken, including 48 marketable plaice and 19 marketable witches. The other two hauls, lasting eight hours, yielded 847 fishes, of which 591 were marketable. The particulars are these:—

	Cod.	Codling.	Haddock.	Whiting.	Saithe.	Catfish.	Starry Ray.	Thornback.
I.	51	16	11	1	2	3	.	1
II.	.	60	17	64	.	.	1	.
	51	76	28	65	2	3	1	1

	Turbot.	Brill.	Plaice.	Lemon.	Common Dab.	Witch.	Long Rough Dab.
I.	1	19	411	9	56	10	.
II.	.	.	2	.	70	.	24
	1	19	413	9	126	19	24

There were also taken five herrings and thirteen anglers.

The fishing was thus poor, and the vessel returned to the north coast, where a number of other hauls were taken. Off Helmsdale, in 27 fathoms, where several foreign trawlers were working around a "dan," three hauls were made, each of four hours' duration. The records are not complete, but the marketable fishes consisted of $2\frac{1}{4}$ baskets of plaice, about a dozen cod, and a few codling and haddocks; the net was torn, and there was a strong wind from W.S.W., with a choppy sea. Going north to off Dunbeath another haul was made, in 33 fathoms, for four hours, the catch consisting of twelve cod, one basket of plaice, one of large codling, and six haddocks. The trawl was again dropped off Lybster in 24 fathoms, and 229 fishes were taken as a result of four hours' fishing, the marketable numbering 100, including 36 plaice, 25 common dabs, four cod, nine haddocks, and 19 whitings. The unmarketable consisted chiefly of whitings and common dabs.

The vessel then went to Smith Bank, and dragged for an hour and a half, on the east edge, in 24 fathoms. The catch amounted to 57 fishes, of which 47 were marketable, comprising seven cod, two haddocks, fifteen whiting, one halibut, fifteen plaice, and seven common dabs. The small-meshed net, which was placed around the cod-end, was lost.

The vessel then returned to Aberdeen, and as a result of the fishing in the Moray Firth, $64\frac{5}{8}$ cwts. of fish were landed, which realised £89 4s. 1d. The quantities, in cwts., are these :—

Cod.	Codling.	Ling.	Saithe.	Haddock.	Whiting.	Catfish.
22	$4\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{2}$	$11\frac{1}{4}$	$1\frac{1}{2}$	$\frac{1}{2}$
Turbot.	**Brill.**	**Lemons.**	**Plaice.**	**Dabs.**	**Witches.**	**Megrims.**
$\frac{1}{8}$	1	3	$16\frac{1}{4}$	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{4}$

The fishing in January was thus much less productive than it was in December, although the weather was not so stormy, and more profitable catches were being obtained by the vessels working in the deep sea.

The Deep-Sea Grounds.

One trip was made to the deep-sea grounds by Mr. Dannevig in May, on board the "Star of Peace." The first shot was made on 15th May after the vessel had run (by log) 209 miles north-east from Buchanness, and was then about 60 miles S.E. by E. $\frac{1}{4}$ E. of Flugga Light, Shetland. The depth was 75 to 78 fathoms, and the drag lasted for one hour, the small-meshed net being used. The otter-trawl contained 167 fishes, of which 115 were marketable; the small-meshed net, which was torn, contained no fish. Another haul for 4 hours 50 minutes in the same place yielded 803 fishes, of which 619 were marketable, the particulars of the two hauls being as follows :—

[TABLE.

	Cod.	Codling.	Haddock.	Whiting.	Tusk.	Gurnard.	Sandy Ray.	Shagreen Ray.
I.	.	2	574	.	.	.	.	4
II.	.	.	7	23	1	116	2	3
	.	2	591	23	1	116	2	7

	Starry Ray.	Halibut.	Plaice.	Lemon Sole.	Megrim.	Witch.	Common Dab.	Long Rough Dabs.
I.	.	4	.	1	149	.	.	.
II.	1	.	.	.	43	4	2	12
	1	.	.	1	192	4	2	12

There were also taken one thornback ray, two picked dogfish, three anglers, and six argentines (probably *A. silus*). Another haul was made in the same place, the record of which is incomplete, there being a very heavy sea which made working difficult. It lasted five hours, and the catch consisted of four baskets of large haddocks, half a basket of seconds (or medium), and one of small, one basket of whitings, and two of megrims and witches.

The vessel then steamed on the 16th forty miles further north-east, making about 250 miles from Buchanness, and midway between the coast of Norway and the north of Shetland. The shot consisted of two baskets of large haddocks, $\frac{1}{4}$ of seconds, $\frac{1}{4}$ of thirds, two of whitings, and three of "flats" (megrims and witches), and also 145 picked dogfishes.

As the fishing thus continued to be unsatisfactory, about fifty-seven miles were run to the westward, and the trawl dropped in 85 fathoms, twenty-two miles (afterwards determined by log) E. of Flugga Light. A four hours' drag yielded two baskets of large haddocks, two of seconds, and $\frac{1}{4}$ of thirds, and also 113 marketable megrims; the "offal" was not enumerated. Another drag for an hour (with the small-meshed net around the cod-end), yielded 128 fishes, of which 99 were marketable, viz., four cod, 36 haddocks, six whitings, one ling, six saithe, eight grey gurnards, and 38 megrims. The unmarketable comprised one lemon sole, 21 megrims, three long rough dabs, and four sandy rays. The contents of the small-meshed net, which were preserved in formaline, were as follows, and I give the sizes:—

Haddock, - -	2 (169 and 146 mm.)	Megrims, - - -	33 (114–206 mm.)
Whiting, - -	1 - (275 mm.)	Witches, - - - -	1 (200 mm.)
Gadus Esmarkii, -	9 (108–127 mm.)	*Argentina sphyræna*, -	9 (88–215 mm.)
Long Rough Dabs, -	5 (103–183 mm.)	*Scyllium canicula*, - -	1 (178 mm.)
Lemon Dabs, - -	2 (113, 117 mm.)		

Outside the small-meshed net, enveloping its end, was a net with still smaller meshes (6 mm.) which contained nothing.

Among the "offal" from the hauls on 15th, 16th, and 17th (which were mixed) were the following:—70 gurnards, 18 haddocks, sixteen whiting, three hake, one bib (female, 227 mm., ripe), 106 megrims, eight lemon dabs, eight witches, one common dab, two anglers, two argentines, fifteen sandy rays, one shagreen ray, and two starry rays.

The scarcity of fish caused the vessel to again shift its ground. The skipper was trying to strike a place where haddocks were abundant—this fish forming the great staple of the north-eastern fishing—and had not yet succeeded. As I stated in last year's Report, grounds which may furnish good fishing for many months during winter, and to which the trawlers go back again and again, may be practically deserted after the spawning season, the haddocks dispersing, some think, to deeper water, or rising from the bottom, and it is often only after a good deal of "hunting" that a place is struck where the fish are abundant. After touching at Shetland, the vessel on 19th May steamed 53 miles by log S.E. by S. $\frac{1}{4}$ S. from the south point of Fetlar Island, Shetland, and trawled in this locality, in about 63 fathoms, until the 22nd. It was found afterwards (by log to Buchanness) that during these days the vessel had gradually drifted northwards while fishing, so that, on the 22nd, it was about sixteen or seventeen miles further north than on the 19th. A large number of hauls were taken on this ground, and much better catches obtained, but only two hauls were completely recorded. They represented $5\frac{3}{4}$ hours' actual trawling, and the fishes taken numbered 2510, of which 2005 were marketable, as follows:—

	Cod.	Cod-ling.	Had-dock.	Whiting.	Ling.	Tusk.	Gurnard.	Catfish.
I.	2	152	1,763	64	3	1	.	5
II.	.	14	43	128	.	.	8	.
	2	166	1,806	192	3	1	8	.

	Hali-but.	Brill.	Plaice.	Lemons.	Megrim.	Witches.	Common Dabs.	Long Rough Dabs.
I.	1	.	.	.	2	12	.	.
II.	.	.	.	2	2	.	219	82
	1	.	.	2	4	12	219	82

There were also taken two starry rays, two Norway pouts, two anglers, and one great silver smelt (*Argentina silus*). In one of the drags—for three-quarters of an hour—the small-meshed net was around the cod-end, and it was found to contain 48 haddocks, four whitings, 27 long rough dabs, fifteen common dabs, Norway pouts, and one Norway haddock (136 mm.). There was a hole in the net on this occasion. The common dabs were found to be ripe.

The quantity of fish landed on 24th May as the result of this trip amounted to 236 cwts., which realised £78 17s 7d. The particulars are as follows:—

Cod.	Codling.	Ling.	Saithe.	Haddock.	Whiting.	Gurnard.	Hake.
$12\frac{1}{4}$	13	7	10	114	49	2	3
Catfish.	**Turbot.**	**Halibut.**	**Plaice.**	**Lemons.**	**Witches.**	**Megrims.**	**Skate.**
6	$\frac{1}{4}$	3	$\frac{1}{4}$	$\frac{1}{4}$	$6\frac{1}{2}$	$6\frac{1}{2}$	3

Comparison with Inshore Grounds.

It will be observed that the proportion between the different kinds of fish from the deep-sea grounds differs very much from what obtains in the Moray Firth and inshore waters, as indicated in the foregoing pages. In order to make this clearer I subjoin the numbers of four series of six hauls taken respectively —(1) In 65-68 fathoms, 65 miles S.E. by E. of Sumburgh Head, Shetland, on 3rd-4th September, 1900; (2) 34 miles S. by W. from Bressay Lighthouse (about sixteen miles from Fair Isle) in 65 fathoms, on 17th and 18th October, 1900; (3) in Aberdeen Bay, in from seven to eighteen fathoms, on 31st October and 1st November, 1900; and (4) in Dornoch Firth, in eight to ten fathoms, on 6th November. The comparison is limited to the fish which were preserved for market, since it is, of course, only these that are included in the official statistics of fish landed. The catch under No. 1 represents 27 hours and 10 minutes actual trawling, under No. 2, $29\frac{1}{2}$ hours, under No. 3, $11\frac{1}{2}$ hours, under No. 4, 21 hours 15 minutes.

Round Fishes.										
	Cod.	Codling.	Haddock.	Whiting.	Ling.	Saithe.	Hake.	Tusk.	Catfish.	Lythe.
I.	24	185	10,785	680	3	4	5	3	2	.
II.	47	326	6,198	896	45	19	145	15	4	1
III.	3	49	9,238	766	.	.	1	.	.	.
IV.	19	46	482	33	.	.	.	.	.	.
Flat Fishes.										
	Halibut.	Turbot.	Brill.	Plaice.	Lemons.	Common Dabs.	Megrim.	Witches.	Flounders.	Skate.
I.	5	.	.	.	3	.	39	518	.	6
II.	12	.	.	102	77	.	203	251	.	39
III.	1	1	.	1,288	9	4,191	.	.	79	.
IV.	1	.	23	7,305	13	347	.	.	.	9

These represent only a proportion of the hauls made on the particular trips, but they show the different proportion of certain species on the different grounds. The abundance of cod, codling, haddock, and whiting may be as great at certain times in inshore waters as offshore;

but in the deep water the larger round fishes as ling, hake, &c., are always more numerous, and haddocks more steadily abundant. The difference among the flatfish is more marked and permanent. Plaice, for example, were scarce sixteen miles off Fair Isle, and almost quite absent sixty miles from Sumburgh Head, while in Aberdeen Bay and Dornoch Firth they abound. Witches and megrims, on the other hand, are by far the most abundant flat fishes in the deep water. By looking over the Tables appended to this Report it will be seen that the differences in the proportion of the species that exist on a particular ground, and the presence of some or the absence of others, depend rather upon the depth of the water than the distance from the coast. In the deeper parts of the Moray Firth and in the depression off Aberdeen (the so-called "Dog Hole") the catches approximate to those obtained off the Shetlands; but such deep-water areas near the coast are very limited in extent.

I have been able to obtain the statistics showing the total quantities (in cwts.) of the fish landed from each of the trips referred to above, and they are as follow :—

	Cod.	Cod-ling.	Had-dock.	Whit-ing.	Ling.	Saithe.	Hake.	Tusk.	Lythe.
I.	8	6	176	9	2½	2	$\frac{1}{5}$	1	.
II.	20	10	129½	16	34	8	32	2	.
III.	½	.	34	5	.	.	$\frac{1}{10}$	.	.
IV.	33	3	22	.	.	.	.	.	1½
	Hali-but.	**Turbot.**	**Brill.**	**Plaice.**	**Lemons.**	**Common Dabs.**	**Megrim**	**Witches.**	**Skate.**
I.	1½	.	.	.	.	.	2½	9½	2
II.	2½	.	.	5¾	1¼	.	8½	6	4
III.	.	⅛	.	8	.	15	.	.	.
IV.	.	⅛	1½	116¾	1	10	.	2	3

II.—The Comparative Efficiency of the Otter-Trawl and the Beam-Trawl.

Until a few years ago the net universally used by trawlers was the beam-trawl, an apparatus which remained essentially the same from the time trawling was introduced, except that it gradually increased in dimensions. In 1894 the otter-trawl, which was much favoured by yachtsmen,* was modified by Mr. Scott of Granton to adapt it for deep-sea fishing, one of the principal changes being the re-arrangement of the net so that the head-line, to which the upper part of the net was attached, was made much shorter than the ground-rope, whereas in the ordinary otter-trawl they were of the same length, and the net was towed by two separate warps. The new method was so much more successful than the beam-trawl that it rapidly replaced the latter, and this change appears to have been accomplished sooner in England than

* Holdsworth, Deep-Sea Fishing and Fishing Boats, p. 372.

in Scotland.* By the end of 1896 most of the deep-sea Scottish trawlers were equipped with the new gear; a year later the beam-trawl was employed only by the small paddle-boats that worked near the coast, and in 1898 the otter-net had entirely replaced the beam-trawl. In 1899, when I desired to make comparative experimental hauls with both nets, I found that beam-trawl gear could not be obtained.

Experience showed that the new net not only was more efficient than the beam-trawl in capturing a larger aggregate quantity of fish, but that its success was more marked in taking round fish than flat fish. It was therefore desirable to determine, if possible, the relative efficiency of the two apparatus, in order to aid in interpreting the official statistics of the quantities of fish landed by steam-trawlers over a series of years. These statistics showed, concurrently with an increase in the number of steam-trawlers, a rapid rise in the quantities of cod and haddocks in the years following the introduction of the otter-trawl, and a relatively slight aggregate increase in the quantity of flatfishes. It is obvious that these changes might not be due entirely to the use of the otter-trawl, but might be also caused by the fishing being conducted to a large extent on different grounds in the years compared.

The methods adopted in order to ascertain the comparative action of the otter-trawl were partly experimental and partly statistical. The experiments aimed at determining the distance between the boards when the net was working on the bottom by (1) measuring the angle of the diverging warps at the towing-block, (2) stretching a measured and varying length of net-twine between the boards before shooting the gear, and noting whether it came up ruptured or intact, (3) tying surface-bladders to each board when fishing in shallow water and measuring the distance between them.

Theoretical considerations make it clear that the distance between the otter-boards must vary under different conditions. The boards act in a kite-like manner, diverging from one another as they are drawn through the water, and thus opening and keeping open the mouth of the net. An increase in the vessel's speed may cause the boards to move further apart, or diminished speed may cause them to come closer together. They will also move closer when the net offers increased resistance, as by a heavy bag of fish, the presence of boulders, much mud, weed or jelly-fishes, &c., or when the ground-rope or the net catches on the bottom. The action of the net depends upon a balance of forces and the distance between the boards, that is, the width of the mouth of the net varies with variations in the equilibrium. In the beam-trawl, on the other hand, the width of the mouth of the net is constant, and is determined by the length of the beam between the irons. The distance between the otter-boards, while varying as indicated, is, moreover, normally much less than the length of the headline extending between the boards, and to which the upper part of the net is attached. At first it appears to have been thought that the headline would be drawn taut, or almost taut, by the lateral pull of the boards, and the net was then made square at the top on this assumption. But it was found that the square of the net fell back and hung slack, and within a year after the introduction of the otter-trawl, the net, instead of being made square at the top, was made semi-circular or crescentic by the introduction of top wings on either side. The net-makers allow about one-third of the headline as forming the semi-circle between the boards, so that on this supposition in an otter-trawl with a headline of 120 feet the distance between the boards (the width of the mouth of

*Compare, Cunningham, *Jour. Mar. Biol. Assoc.*, iv., 117. *Annual Reports Fishery Board for Scotland*, xiii., p. 143; xiv., pp. vii., 32, 33; xv., pp. 39, 155, 162; xvi., pp. iv., 41, 185; xvii., p. 183.

the net) when fishing would be normally 80 feet. At Aberdeen five sizes of otter-trawl are in use, the size being determined mainly by the size of the vessel, as follows:—

	Length of Headline.	Length of Ground-Rope.
1.	140 feet.	190 feet.
2.	130 ,,	170 ,,
3.	120 ,,	160 ,,
4.	110 ,,	140 ,,
5.	90 ,,	130 ,,

The last, which is used by a few of the smaller boats, is larger than the otter-trawl as originally introduced, in which the headline was 75 feet in length and the ground-rope 120 feet. There has thus been a considerable increase in the dimensions of the mouth of the net during the seven or eight years it has been in use. The length of the net has not increased in the same ratio; the largest measure about 145 feet in length, viz., 90 feet for the square and top wings, 30 feet for the belly and baitings, and 25 feet for the cod-end. The length of the large beam-trawl nets (with a beam of 52 or 54 feet long) was about 115 or 118 feet, viz., 66 for the square, 25 for belly and baitings, and 24 for cod-end, while the ground-rope was 120 or 124 feet in length. The size and power of the trawling vessels have also increased; it requires more power to drag the otter than the beam-trawl.

The attempts made to ascertain the distance between the boards, when the net was fishing, by measuring the angle between the warps as they diverged from the towing block, gave variable results. Some of the cases may be referred to. In fishing in from 6 to 8½ fathoms with a net having a headline 102 feet in length, and with 37 fathoms of warp from the towing block to the boards, the distance between the warps at a point 22 feet 6 inches from the block was 5 feet 7 inches, indicating an apparent distance between the boards of about 55½ feet. On this occasion a cord 80 feet long, stretched between the boards, came up unbroken. Another trial with the same net in eight fathoms indicated an apparent distance between the boards of a little over 47 feet; and on this occasion a cord 70 feet long, stretching between the boards, was found to be ruptured when the net was hauled, but this might have occurred while shooting the net, or accidentally. On another occasion, with a net having a headline of 108 feet and with 56 fathoms of warp out while fishing in eight fathoms, the divergence of the warps indicated a distance between the boards of 46½ feet.

Experiments were also made on board the "Garland," in January 1901, with a small otter-trawl having a headline 64 feet in length, the otter-boards measuring 4 feet 6 inches by 3 feet 1 inch. In these cases a bladder was tied to each board with a string sufficiently long to allow it to float on the surface. Two row-boats were then stationed one on each side of the course with a string between them, and the distance between the bladders as they passed was measured. The particulars are as follows:—

I. Depth, 13½ fathoms. Length of warp, 373 feet.
  (1) Ordinary speed.
    a Apparent distance between boards, calculated from divergence of warps, 50·8 feet.
    b Distance between bladders attached to boards, 35 feet 1 inch.
    c String between boards, 45 feet, came up unbroken.
  (2) Full speed.
    a Apparent distance between boards calculated from divergence of warps, 26·6 feet.
    b Distance between bladders, 32 feet, 7 inches.
    c String between boards, 40 feet, unbroken.
  (3 Full speed.
    a Apparent distance between boards, calculated from divergence of warps, 36 feet.
    b Distance between bladders, 32 feet 7 inches.
      ,, ,, ,, (again tried), 34 feet 5 inches.
      ,, ,, ,, ,, 34 feet 7 inches.

II. Depths $5\frac{1}{4}$ to $9\frac{3}{4}$ fathoms. Length of warp, 240 feet.
(1) Speed at 71 revolutions.
a Apparent distance between boards, calculated from divergence of warps, 36 feet 6 inches.
b Distance between bladders, 41 feet.
c String between boards, 34 feet 6 inches, broken.
,, ,, ,, 36 feet, unbroken.
(2) Speed at 109 revolutions.
a Apparent distance between boards, calculated from divergence of warps, 35·1 feet.
b Distance between bladders, 37 feet 2 inches.

III. $5\frac{1}{2}$ to $9\frac{1}{2}$ fathoms. One hour's ordinary drag.
b Distance between bladders, (1) 26 feet 8 inches.
,, ,, ,, (2) 28 ,, 9 ,,
,, ,, ,, (3) 35 ,, 10 ,,
c Strings between boards.
(1) 35 feet long, came up unbroken.
(2) 38 feet long, reduced by a running hitch to 31 feet 6 inches, came up with hitch partly run, and measured 33 feet 2 inches.

In order to test the value of the data obtained a beam trawl with 25 feet beam was also used. The bladders were tied to the ends of the beam and three measurements were taken of their distance apart on the surface during the drag; they were as follows—22 feet 6 inches, 23 feet $11\frac{1}{2}$ inches, 23 feet $3\frac{1}{2}$ inches, the mean being 23 feet 3 inches. This experiment showed that the bladders slightly converged. The trawl was towed at ordinary speed, and two warps were used, one at either end, as with the otter-trawl, in order to test the data obtained from measuring the angle between the warps. At ordinary speed this indicated 18·3 feet, or 6·7 feet less than it really was; at full speed the indicated distance apart at the beam was 19·1 feet, or 5·9 feet less than the real distance.

The data obtained by the above experiments in regard to the spread of the otter-trawl vary to some extent, but they show, I think, that the distance between the boards when the net is fishing on the bottom is less than is usually supposed. According to the calculation assumed by the net-makers (*i.e.*, the deduction of one-third of the length of the headline), the spread in the above experiments ought to have been about 42·7 feet. The check experiment with the beam-trawl proves, as one might expect, that the distance as calculated from the angle between the warps is unreliable, and that the distance is usually greater than this method indicates, and anomalies occur. The bladder tests gave better results, and if we add to the measurements the amount which the beam-trawl experiment showed was lost by convergence, viz., one foot 9 inches, the mean distance indicated would be at ordinary speeds 33 feet 4 inches, and at full speed 34 feet 3 inches. But in some cases the bladders diverged, *e.g.*, the experiments in which the distance between them was 41 feet, while a string between the boards, 36 feet long, remained unbroken. The most reliable results are, I think, obtained by the string tests. The string used was the ordinary hemp twine of which the trawl-nets are made, and while it is strong enough to resist rupture from pressure by the water, it is, of course, much too slender to bear a strain from the boards. Cases in which it is broken are not alone convincing, since its rupture may happen accidentally, but when it comes up intact it proves that the boards have not been further apart than its length. In the experiments above described it remained unbroken when 45, 40, 36, and 35 feet long; it was broken when 34 feet 6 inches long, and in the experiment with a hitch on it it measured 33 feet 2 inches.

It may be fairly concluded that in these experiments the width of the mouth of the net when fishing was, as a rule, between 33 and 35 feet, although the headline was 64 feet. This would indicate the ratio of the width between the boards to the length of the headline to be as 1 to 1·9. If the same ratio were applied to the large otter-trawls used for commercial purposes, then the distance between the boards when fishing would for the five sizes previously mentioned range about 74 feet, 68½ feet, 63 feet, 58 feet, and 47¼ feet. That this ratio does apply is, however, uncertain, since the spread of the net depends upon the size of the boards in relation to the resistance offered by the net. The boards used by the steam trawlers usually measure from 10 to 10½ feet in length by 4 to 4½ feet high.

Observations were also made to determine the speed at which the trawl is towed during ordinary fishing. The patent logs on board were, as a rule, unable to indicate this owing to the slow movement of the vessel, and the old-fashioned log with a reel and time-glass was employed. The mean of six observations on one vessel was 3·46 knots per hour; the mean of eight observations on another vessel was 2·62 knots, and the mean of three observations on a third 2·21 knots, the mean of the seventeen observations being 2·64 knots, or about $2\frac{2}{3}$ knots per hour. At this rate the extent of bottom trawled over in an ordinary five hours' drag would be a little over thirteen ($13\frac{1}{5}$) nautical miles, and if the results of the experiments on the spread of the otter-net of the "Garland" are applied, the largest nets would in that time sweep an area of about 661,540 square yards, or 136·7 acres. Under ordinary circumstances four such drags are made in the twenty-four hours, and in an ordinary weekly trip to the north-eastern grounds fishing operations are carried on for about five-and-a-half days. During this time, therefore, the extent of bottom fished over with the otter-trawl would be approximately 4½ (4·7) square (statute) miles; but as trawling is carried on in circles or sweeps, and sometimes around an anchored "Dan" (a buoy with a flag and lamp) the same ground may be repeatedly trawled over and the real extent is less.

The bearing of the conclusions as to the width of the otter-trawl when fishing on the nature of the catch is evident. If the distance between the boards, or the extent of bottom over which the ground-rope moves, is but little greater than the width of one of the largest beam-trawls, then the quantity of flatfishes taken ought not to be much greater, since the otter-trawl has no other special advantages so far as concerns flatfishes. With large round fishes it is different. They are active in their movements and not so strictly confined to the bottom, and the thick, conspicuous beam of the beam-trawl, moving 3½ or 4 feet above the bottom, must disturb a proportion of them and enable them to escape capture. The small headline which replaces the beam is much less visible and will disturb them to a less extent. It is probable, moreover, that the arc formed by the headline does not lie in a horizontal plane, but slopes obliquely upwards as well as backwards, and that the otter-net fishes higher above the bottom than does the beam-trawl.

The statistical evidence in regard to the relative efficiency of the beam-trawl and the otter-trawl is derived from the particulars given in Table II., which shows the detailed catches of a number of steam-trawlers for a series of years. I have been able to ascertain the dates on which the otter-trawl was substituted for the beam-trawl on five of these vessels, and, omitting the month in which their substitution took place, I have tabulated the catches for the preceding and succeeding three months and twelve months, in the first of which the beam-trawl was used, and in the last the otter-trawl. The results are as follow. In the three months during which the otter-trawl was used four vessels showed an increased gross catch, and one a slight decrease, compared with the preceding three months in which the beam-trawl was used. In the twelve months all the vessels showed an increased gross catch with the use of the otter-trawl, compared with the previous twelve months.

	Three Months.		Twelve Months.	
	Beam-Trawl.	Otter-Trawl.	Beam-Trawl.	Otter-Trawl.
No. I.	909¾	1,206½	3,014⅙	4,185¼
No. II.	603⅞	1,185⅞	3,806¾	4,574¼
No. III.	1,026	1,605¾	4,918 1/12	5,304
No. IV.	1,459⅛	1,377¼	4,543½	6,308
No. V.	1,108	1,355¾	3,266½	6,512½
	5,106¾	6,731⅛	19,549	26,884

The increased gross catch with the otter-trawl in the three months thus amounted to 31·8 per cent., and in the twelve months to 37·5 per cent, the relative efficiency of the otter as compared with the beam-trawl being 1·32 and 1·37 respectively. The twelve months comparison is better, not only because the period is four times longer, but because it embraces all the months in the year,* and it is remarkable that the percentage of increase and the relative efficiency of the two nets correspond exactly with the figures deduced by Mr. W. Garstang from a comparison of the gross catches of steam trawlers in Scotland in the years 1893-94, and 1896-97.†

The detailed statistics show that the gross increase referred to was made up entirely of round fishes. In the three months when the otter-net was first used two of the vessels showed an increase in the quantity of flatfishes taken, and three a decrease, while in the twelve months following its introduction all the vessels exhibited a decreased catch of flatfishes, as shown by the following figures, in which round fishes include cod, ling, saithe, haddock, whiting, hake, and gurnard, and flatfishes include turbot, brill, halibut, lemon soles, plaice, dabs, witches, and megrims.

Trawler.	Round Fish.				Flat Fish.			
	Three Months.		Twelve Months.		Three Months.		Twelve Months.	
	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.
No. I.	788⅛	1,037¾	2,436½	3,604¼	118¼	155	555¾	468½
No. II.	503⅞	884¼	2,945¾	3,783⅞	82⅛	277⅝	796¼	698½
No. III.	825	1,514½	4,243	4,767¼	182⅛	90¼	617⅝	499½
No. IV.	1,004½	950⅞	3,032¾	4,874½	403½	366⅝	1,347¼	1,222½
No. V.	992¼	1,281¼	2,747	5,902¼	92¼	57¾	484	475¼
	4,113¾	5,668⅝	15,405	22,932⅛	878¼	947¼	3,800⅞	3,364¼

* The otter-trawl was substituted for the beam-trawl in the various vessels in the following months:—No. I. May 1897 (headline, 95 feet); No. II. February 1897; No. III. July 1896; No. IV., November 1897; No. V., December 1896 (headline, 95 feet); the three months on either side of the month named (and omitted) thus varied in the different cases.

† *Journ. M.B.A.*, vi., 50.

The percentage of increase in the case of round fish is for the three months 37·8, and for the twelve months 48·9 per cent., and the relative indicated efficiency of the otter-trawl in catching round fishes, as compared with the beam-trawl, is therefore 1·38 for the three months and 1·49 for the twelve months.

The decrease in flatfishes, amounting to over 11 per cent. in the year, might be ascribed (1) to the lesser efficiency of the otter-trawl in capturing flatfishes—an opinion which some trawlers maintain—(2) to an actual diminution in their numbers on the fishing grounds, or (3) to a change of the fishing ground in the periods contrasted. The first supposition is, I think, scarcely tenable, because although the horizontal spread of the otter-net appears to be less than is generally believed, it is no doubt somewhat greater, even with the smaller nets used in 1896-98, than the width of the beam-trawl which it displaced. Moreover, Mr. Cunningham, who was at Hull in the summer of 1895 when the transition from the one net to the other had begun, states that the otter-trawl "certainly brings in an increased number of plaice."*

The second supposition that the statistics may show an actual diminution in the number of flatfishes on the same grounds is probably true with regard to some of the species, but in order to make this certain one would require to know what grounds were fished over in the periods under comparison, and this information, unfortunately, cannot now be obtained. That the decrease in the quantity of flatfishes taken by the otter-trawl in the above cases is, at all events to some extent, due to different grounds having been fished over is evident from what follows.

The more important round fishes are given in the following Table for the twelve-month period :—

	Cod.		Ling.		Haddock.		Whiting.	
	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.
No. I.	726	1,196½	43⅞	82⅞	1,563¼	2,035¼	56¾	125
No. II.	1,046	1,022¾	196½	95¾	1,656¾	2,495½	20¾	61
No. III.	753¼	1,174¼	50½	62½	3,335½	3,389¾	23	52½
No. IV.	1,066¼	2,539¾	93	70½	1,714	1,937	105¼	105½
No. V.	599	869¼	74½	104¼	2,016½	4,579½	15½	93¼
	4,190½	6,802½	458⅜	415⅞	10,286	14,437	221¼	437¼

The increase in the take of cod was thus 62·3 per cent., of haddock 40·4 per cent., and of whiting 97·7 per cent. There was an increased take of ling by three of the vessels, and a decreased take by the other two. The increased take of saithe—which was common to all the vessels—amounted to 423 per cent., but the quantities were small, viz., 85½ and 445½ cwts. An increased catch of hake was made by four vessels, and a decreased catch by the other, the total increase amounting to 345 per cent.; the quantities were small, viz., 53 and 236 cwts. Gurnards were landed in larger numbers by four vessels and in smaller numbers by one, the total increase being 56·3 per cent. (110½ and 172½ cwts.); this fish, however, is not always, or even usually, brought ashore.

* *Journ. M.B.A.*, iv., 118.

The greatest increases, it will be observed, took place among the larger and predaceous kinds of fish, cod, saithe, hake, and whitings, while the increase in haddocks, which was by far the most abundant fish, was considerably less. The substitution of a comparatively slender, inconspicuous headline in the otter-trawl for the thick beam of the beam-trawl is no doubt responsible to some extent for the greater captures of cod, saithe, and hake, even if the headline of the latter were in a horizontal plane with the top of the boards, *i.e.*, about the same height as the beam in the beam-trawl. But the increase is too great to be explained in this way alone, and it does not, moreover, explain the much larger percentage increase in whitings compared with haddocks, although the latter are larger fishes. The fishes named—cod, saithe, hake, and whiting—are predaceous, and are not so strictly confined to the bottom as the more purely bottom-feeding haddock. They roam about above the bottom, and are not infrequently caught in herring drift or seine-nets, and their capture in relatively greater numbers by the otter-trawl lends support to the view that the headline in this net rises towards the centre and forms more or less of an arch. Here again, however, one is met with the difficulty as tc the place of fishing in the years compared. The increase in cod—which may be as abundant near shore as in the deep water—is moderate compared with the increase in hake and saithe, which are more abundant in the latter region.

Among flatfishes, turbot were caught by the otter-trawl in greater numbers than by the beam-trawl by three vessels and in less numbers by two, the total by the beam-trawl for the year being 185 cwts., and by the otter $188\frac{5}{8}$, an increase of about $1\frac{1}{2}$ per cent. The quantity of halibut was small, viz., $83\frac{7}{8}$ cwts. by the beam-trawl and $76\frac{3}{8}$ cwts. by the otter-trawl, showing thus a decrease. Brill also declined from $44\frac{1}{4}$ cwts. by the beam-trawl to $19\frac{7}{8}$ cwts. by the otter-trawl, while dabs increased from 94 cwts. to $103\frac{3}{4}$; the selection of this fish for the market is, however, arbitrary and imperfect. The particulars for lemon soles, plaice, witches, and megrims for the two yearly periods are as follow :—

	Lemons.		Plaice.		Witches.		Megrims.	
	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.	Beam.	Otter.
No. I.	237	$125\frac{1}{4}$	$220\frac{7}{8}$	$213\frac{5}{8}$	$8\frac{1}{4}$	35	$12\frac{3}{8}$	$30\frac{1}{4}$
No. II.	$157\frac{1}{4}$	$72\frac{1}{4}$	$388\frac{1}{4}$	$230\frac{3}{8}$	66	277	$31\frac{1}{4}$	$47\frac{3}{4}$
No. III.	$107\frac{7}{8}$	159	$411\frac{5}{8}$	$229\frac{3}{8}$	62	$43\frac{1}{2}$	$11\frac{1}{2}$	$13\frac{1}{8}$
No. IV.	$38\frac{1}{8}$	$33\frac{3}{8}$	682	$786\frac{7}{8}$	$482\frac{1}{8}$	$233\frac{1}{2}$	46	$20\frac{5}{8}$
No. V.	$138\frac{1}{4}$	$113\frac{1}{2}$	$246\frac{1}{4}$	$231\frac{1}{4}$	$38\frac{1}{4}$	$35\frac{1}{4}$	$8\frac{1}{2}$	$45\frac{1}{4}$
	$678\frac{1}{2}$	$503\frac{3}{8}$	1949	$1691\frac{1}{2}$	$656\frac{5}{8}$	$624\frac{1}{4}$	$109\frac{5}{8}$	157

Lemon soles thus diminished by 26 per cent., plaice by 13·2 per cent., witches by 4·9 per cent., while there was an increase in the catch of megrims to the extent of 44 per cent. The variations in these percentages shows at once that we are dealing with different grounds in the two cases, unless it were to be maintained that it indicates an actual diminution of lemon soles, plaice, and witches on the grounds and an increase in the numbers of megrims.

The evidence on the subject is as follows. The greater part of the Moray Firth, all of which was closed to trawlers in 1892, was, through a legal decision, opened to trawling from 7th January to 1st March 1896, and many Aberdeen vessels fished there during the period stated. Of the five vessels comprised in my Tables, the statistics referring to Nos. I. and IV. could not be affected by this circumstance, since the period in these instances is not included within either of the years under comparison. No. II. might have fished during February in the Moray Firth, and Nos. III. and V. during all the time it was open. Although the whole of the territorial waters within the Moray Firth remained closed, trawlers fishing just beyond the limit on the south coast and at Smith Bank and neighbourhood would be likely to catch more plaice than outside the Firth. An examination of the detailed Tables (showing each landing of fish) suggests that in February 1896 No. II. was fishing in the Moray Firth, and No. III. in January and February, and that No. I. was not. The quantity of plaice taken in the former cases was the largest of any month in the year, and the catch of this fish by the beam-trawl in these instances is probably unduly increased by the fishing having taken place on a very favourable fishing ground.

But besides this temporary fishing in the Moray Firth, it is very probable that during the first year in which the otter-trawl was employed some of the vessels fished further to the north-east in deeper water than they did in the previous year when equipped with the beam-trawl. It was at this time the extension to the northern waters off the Shetlands took place, and the increased catches of megrims, a deep-water fish, may be thus explained, as well as, to some extent at least, the diminished takes of plaice and lemon soles, which are scarcer there. The degree to which the change of ground affected the result cannot be ascertained, but it is certain that it was an important factor. In this connection it is noteworthy that the catch of skates and rays increased in the year in which the otter-trawl was used by 57 per cent. ($457\frac{1}{2}$ cwts. against 291 cwts.), and marketable forms are not much more abundant in deep water than nearer shore.

It is evident from the above considerations that the calculations as to the comparative efficiency of the otter and beam trawls deduced from the statistics is unreliable in the absence of information as to the place of fishing in the two periods. The same objection applies to the calculations of Mr. Garstang founded upon the Scottish statistics. The best method of ascertaining the relative efficiency of the two nets is to employ them simultaneously in a large series of hauls on the same grounds and to register the results, which I hope to be able to do.

III.—Statistics of the Catches of Six Steam-Trawlers Over a Period of Years.

When I ascertained that there existed at Aberdeen continuous records of the individual landings of a number of steam-trawlers over a considerable period of years, I felt that the information contained in them was likely to afford valuable evidence on a question which has been so long and so much discussed, namely, the impoverishment of the fishing grounds in recent years. Two of these records went back to 1885, and others to 1890, and I therefore had the records of six vessels, including the two referred to, tabulated, so as to show in each case the number of landings and the quantities of the different kinds of fish brought to market, per month and per year, throughout the whole period. This information is contained in the appended Tables (p. 175).

One of the vessels (No. I.) was engaged in trawling in each month throughout the sixteen years, the total number of landings being 1004, and the aggregate quantity of fish landed amounting to 61,232 cwts. In several of the other cases, however, the trawling was in some years interrupted, the vessel being engaged for some months in line-fishing (*e.g.*, No. II., from April-August, 1892, and March-May, 1893), or in fishing from English ports; in such cases the fish are not included in the Tables. With regard to the differentiation of the kinds of fish it has to be noted that gradually a greater distinction was made according to the relative quantities of the different kinds and sizes brought to market as the industry developed. Thus hake are included under "saithe" until September 1888; brill under "turbot" until February 1886; dabs under "plaice" until May 1892; witches under "plaice" until April 1889, and megrims under "plaice" until July 1892. The quantity of megrims landed in the early years was comparatively small. Codling, moreover, appears to have been included under "other kinds of fish" until August 1887. The classification of the fishes according to sizes has also become more exact, according to the market requirements. Plaice of all sizes were grouped together until April 1899, when a distinction was made between "large" and "small,"; in June 1892 an intermediate class, "mediums," was introduced. Lemon soles were first divided into large and small in August 1893; witches into large and small in April 1889; megrims into the same groups in January 1895. Haddocks were slumped until April 1888, when they were classified as large and small, the "medium" group ("seconds") being introduced in June 1892; recently, it may be said, a fourth class of "extra-large" has been adopted. Whitings were divided into large and small in June 1888.

It is greatly to be regretted that these statistics of the takes of trawlers are of little or no value so far as concerns the more important subject, whether or not, and if so, to what extent, and in what way impoverishment of the fishing grounds has occurred since steam-trawling was so greatly developed. Their inutility in this respect is owing to the fact that information is not available as to the grounds on which the fish were caught in the various months and years; and in a minor degree to the use of the beam-trawl in the earlier years and the otter-trawl in the later years. The latter difficulty would be removed if the relative efficiency of the two nets in the capture of the various species included in the Tables was determined.

With regard to the place of fishing, enquiries which have been made among trawling skippers show in a general way that the fishing was at first conducted in the bays, the Moray Firth, and the inshore waters along the coast, and gradually extended further from shore, first in a southerly and easterly direction, and then to the north and north-east, and to the west coast. Precise information in regard to the fishing grounds frequented by the Aberdeen trawlers exists, by a fortunate chance, for the first three months of 1891, and I have obtained similar information regarding a large number of trawlers during last year, which shows, as described elsewhere (p. 140), that the area of fishing has greatly changed in the interval. Moreover, when the trawlers with whose catches I am dealing began to fish, the greater part of the Moray Firth, and in the case of two of the vessels the whole of the territorial waters, were open to them, and there is no doubt that a considerable proportion of the fish, especially of the flatfish, was obtained on grounds which were afterwards closed. It is elsewhere shown how greatly the proportion of the different fishes included in the Tables may vary on different grounds (pp. 81, 117), and it would be probably but little less fallacious to deduce conclusions as to the impoverishment of the grounds from comparison of the aggregate landings from unspecified areas than from comparison of the detailed catches from the inshore and offshore respectively.

But while these statistics cannot be used for the purpose mentioned, they afford information of interest, irrespective of the grounds on which the fish were obtained. The trawler No. I., as stated, trawled in each month throughout the sixteen years, and as it is one of the smaller class of vessels, its sphere of operations has not extended to a great distance from the coast. During the whole period the quantity of fish landed amounted to 61,232 cwts., and of this quantity more than half was landed in the first eight years, from 1885 to 1891, viz., 32,662 cwts., the quantity landed in the second eight years, 1893-1900, being 28,570½ cwts., notwithstanding the fact that after May 1897 the otter-trawl was employed instead of the beam-trawl. In the early years, when trawling had not been very long carried on, and when the Moray Firth and the territorial waters were still open, the largest catches were obtained, the highest aggregate being 5136 cwts. in 1887.*

The total quantity of fish landed in each of the sixteen years by this vessel was as follows (in cwts.):—

1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.
3773¼	4197½	5136	4705¾	5018	4027	2762¼	3042¼
1893.	**1894.**	**1895.**	**1896.**	**1897.**	**1898.**	**1899.**	**1900.**
3328¼	3616	2376	3168¾	3633⅙	4966⅔	4340¼	3141¼

An examination of the detailed statistics of the various kinds of fish landed shows that among round fishes there was a general increase in the second eight years of the period as compared with the first eight years, viz., from 18,050 cwts. to 21,681 cwts., and that the largest quantity was in 1898, the year following the introduction of the otter-trawl. Cod (including codling) aggregated 3649 cwts. in the first and 6098¼ cwts. in the last eight years, while the quantity of haddocks was almost the same, 13,698¾ cwts. and 13,571 cwts. Whiting showed a considerable increase, from 262½ cwts. to 770¾ cwts. The quantity of ling also increased from 110½ cwts. to 606¾ cwts., the greatest increase occurring after the introduction of the otter-trawl.

* The particulars in regard to the closure of the waters to trawlers are as follows:—(1) Aberdeen Bay, inside a line from Cruden Scars rocks to 1½ miles east of Girdleness Lighthouse, was closed between 5th April 1886 and 4th July 1887. (2) The territorial waters (within 3 miles and bays) in the Moray Firth were closed from Brora to Kinnaird Hesd on 4th July 1887. (3) The territorial waters from Red Head to Kinnaird Head (including Aberdeen Bay) were closed on 28th February 1889. (4) The Moray Firth, inside a line between Ord of Caithness and Craighead, Buckie, was closed on 19th November 1900. (5) The whole of the Moray Firth from Duncansby Head to Rattray Point was closed on 22nd November 1892. As previously mentioned, from 7th January to 1st March 1896 the Moray Firth was open.

[TABLE.

I.—ROUND FISHES.

Year.	No. of Landings.	Cod.	Ling.	Saithe.	Hake.	Haddock.	Whiting.	Gurnard.	Cat-fish.	Total.
1885	75	411	17	33	.	1,225	119¾	.	.	1,805¾
1886	86	275	18½	41	.	1,560½	40½	.	.	1,935½
1887	82	457½	4	90	.	1,646	6½	.	.	2,204
1888	85	515	2½	17	2	1,800	22	.	.	2,358½
1889	82	636	3	.	23	2,399	9	.	.	3,070
1890	56	464½	13½	.	79	2,081	17	.	.	2,655
1891	41	383	16	.	2	1,581	28	.	.	2,010
1892	48	507	36	6	20¼	1,406¼	19¾	16	.	2,011¼
Tl.	555	3,649	110½	187	126¼	13,698¾	262½	16	.	18,050
1893	60	453¼	23	½	26	1,135¼	37¾	17	8	1,700¾
1894	52	697	21	8	9¼	1,570¼	14½	15	13	2,348
1895	37	447½	30	.	14	1,025¾	13¼	4	.	1,534½
1896	72	783¼	45	6	7	1,496¾	52½	36	.	2,426½
1897	61	1,025	69⅛	79	38	1,745¾	101¼	45	.	3,103⅛
1898	69	1,257¼	148¾	39	43½	2,501	253¼	10	7	4,259¾
1899	47	822	195¼	28½	31⅗	2,201¾	216	6	26	3,527
1900	51	613	74⅝	34	58⅕	1,894½	82¼	12½	12¼	2,781⅝
Tl.	449	6,098¼	606¾	195	227½	13,571	770¾	145½	66¼	21,681

Among flat-fishes there was a considerable decrease in the quantity, viz., from 13,307¾ cwts. in the first eight years to 6290½ in the second eight years. Turbot diminished from 411⅝ cwts. to 215¾ cwts., but in one of the former years, as already stated, brill were included with turbot. Brill declined from 99 cwts. (for seven years) to 67⅝ cwts., and lemon soles from 2046¾ cwts. to 1126⅜ cwts. The most marked decline was in plaice, and although other flatfish were included among them in the early years (p. 127) this circumstance does not account for the diminution. In the first eight years the quantity was 10,041 cwts., and in the second eight years 4026⅝ cwts.; if the other flatfishes which were combined with plaice in the early years are included in both periods (dabs, witches, megrims) the respective totals are 10,741 cwts. and 4815½ cwts. On the other hand, halibut, always separately recorded, increased from 6⅝ cwts. to 65¾ cwts.; megrims, as far as indicated, also increased, while the quantity of witches in the four years, 1889-1892, amounted to 683½ cwts., and in the last eight years to 307⅝ cwts. The diminution in witches was most probably due to the closure of the Moray Firth at the end of 1892, since they are abundant in certain parts there, and the quantities in the years immediately following fell to a few cwts. The increase in the quantities of witches in 1897 and the succeeding years, and the increase in halibut, ling, hake, and megrims points to the grounds having been generally very different in

II.—Flat Fishes and Skates.

Year.	Turbot.	Halibut.	Brill.	Lemons.	Plaice.	Dabs.	Witches.	Megrims	Total.	Skates
1885	74¾	.	.	257½	1,523½	.	.	.	1,855¾	73
1886	36½	⅜	31	149½	1,863	.	.	.	2,080⅜	45
1887	70¼	¾	28	372½	2,063½	.	.	.	2,535	60
1888	71¼	2½	7	290	1,783	.	.	.	2,153¾	28
1889	79	2	13	375	1,012	.	300	.	1,781	11
1890	43½	.	3½	269	860	.	140	.	1,316	10
1891	24¼	.	4	162½	319½	.	164	.	674¼	53
1892	12⅛	1	12½	170¾	616½	14¾	79½	4½	911⅝	32
Tl.	411⅝	6⅝	99	2,046¾	10,041	14¾	683½	4½	13,307¾	312
1893	33	⅝	1¼	150¾	1,353¼	48¾	2	11½	1,601⅛	10
1894	18¾	6	13¾	90⅞	1,111⅜	11¾	1¾	3	1,257¼	4
1895	14⅝	13⅛	10¾	124¾	640¾	.	6¾	19⅛	829⅞	5
1896	26⅞	7	27¾	268	353⅜	13½	9¼	7½	713¼	26
1897	32⅜	3½	7	135⅝	224	14	34⅞	25⅛	476½	52
1898	45½	8⅜	5⅜	137⅜	158⅝	6⅝	68	85⅝	515½	150½
1899	21¾	23⅜	1⅜	133⅞	73	2¼	173¼	198	626⅞	172½
1900	22⅞	3¾	⅜	85⅛	112¼	2¾	11¾	31½	270⅜	55
T	215¾	65¾	67⅝	1,126⅜	4,026⅝	99⅝	307⅝	381⅝	6,290½	475

the two periods. The falling off in plaice, turbot, brill, and lemon soles, may not be due at all to diminished abundance of these fishes on the grounds which they habitually frequent, but merely to other grounds where they are naturally scarce having been fished over in the second period. No deduction can, therefore, be drawn from them as to the impoverishment of the fishing grounds. The figures showing the gross catches of fish indicate that the aggregate quantity taken has rather diminished than increased, notwithstanding the employment of the otter-trawl in recent years; but, on the other hand, a vessel which has fished continuously for so long a period as sixteen years is from its age unlikely to fish as well as it used to do.

I have given the number of landings in each of the years, but it may be said that they could not be well used as a divisor even if the position of the fishing grounds was known, since they represent unequal periods —from one day to ten days.

The steam-trawler No. II. is a larger boat than No. I., but the statistics of its catches show the same general features. In this case the aggregate for the second period of eight years is somewhat greater than for the first eight years—viz., 33,522 cwts., as compared with 32,102 cwts., and the highest gross catch (with the otter-trawl) was in 1900, the next highest being in 1888 (with the beam-trawl). But the two periods are not equal, since the vessel was engaged in line-fishing for part of the year in 1892 and 1893, and was not landing fish at Aberdeen in January 1885, and January and February 1890. The second period comprises five months more than the first period, and this would more than account for the increase in the gross catch. Omitting the years 1890, 1892, and 1893, the annual quantities of flat-fishes, round fishes, and the gross catches (which include skates, congers, and "other fish") are as follow:—

	1885.*	1886.	1887.	1888.	1889.	1891.
Flat, - - - -	1,653$\frac{1}{2}$	1,222$\frac{1}{4}$	2,431$\frac{1}{4}$	1,696	1,459$\frac{1}{2}$	1,054$\frac{1}{2}$
Round, - - -	1,901$\frac{1}{2}$	3,059$\frac{1}{4}$	2,407$\frac{1}{2}$	3,163	3,184	2,569
Total, - -	3,670	4,488$\frac{1}{2}$	5,107$\frac{3}{4}$	5,181	4,805$\frac{1}{2}$	3,683$\frac{1}{2}$

	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Flat, - - -	1,534$\frac{1}{2}$	1,450$\frac{3}{4}$	783$\frac{3}{4}$	698$\frac{1}{4}$	383$\frac{3}{4}$	424$\frac{7}{8}$	611$\frac{1}{2}$
Round, - - -	2,711$\frac{3}{8}$	2,465$\frac{3}{4}$	3,129$\frac{1}{4}$	3,746$\frac{1}{4}$	4,004$\frac{1}{2}$	3,738$\frac{1}{4}$	4,686$\frac{1}{4}$
Total, - -	4,258$\frac{3}{4}$	4,004$\frac{5}{8}$	3,968$\frac{1}{4}$	4,515$\frac{1}{3}$	4,471$\frac{1}{2}$	4,259$\frac{1}{2}$	5,479

* Eleven months.

Comparing the four years 1886-89, and the last four years, 1897-1900, cod increased from 1683 cwts. to 3591 cwts., ling from 37$\frac{1}{2}$ cwts. to 681 cwts., saithe and hake from 114 cwts. to 758 cwts., haddocks from 9780 cwts. to 10,406 cwts., whitings from 173$\frac{3}{4}$ cwts. to 516 cwts. Turbot diminished from 268$\frac{3}{4}$ cwts. to 89$\frac{1}{2}$ cwts., brill from 97$\frac{3}{4}$ cwts. to 4 cwts., lemon soles from 770$\frac{1}{4}$ cwts. to 314$\frac{1}{4}$ cwts., plaice (including dabs, witches, and megrims) from 5639 cwts. to 1700$\frac{1}{4}$ cwts.—and the decrease was undoubtedly mostly in plaice, witches and megrims having increased in recent years—while halibut increased from 16$\frac{1}{4}$ cwts. to 90$\frac{3}{4}$ cwts. The difference in the proportions of the various kinds of fishes is well brought out by a contrast of the extreme years, the above remarks as to the classification in the former year being kept in view.

	Cod.	Ling.	Saithe.	Hake.	Tusk.	Haddock.	Whiting.	Gurnard.	Catfish.	Other Fish.
1886	322$\frac{1}{2}$	24$\frac{1}{2}$	71$\frac{1}{2}$	.	.	2,620	20$\frac{3}{4}$	.	.	160
1890	769$\frac{1}{2}$	353$\frac{2}{3}$	181	316	24	2,696$\frac{1}{2}$	316$\frac{1}{4}$	9	20$\frac{1}{2}$	14

	Turbot.	Halibut.	Brill.	Lemons.	Plaice.	Dabs.	Witches.	Megrims.	Skates.
1886	43$\frac{3}{4}$	12	15	118$\frac{1}{2}$	1033	.	.	.	45
1890	12$\frac{3}{8}$	33$\frac{3}{8}$	.	9$\frac{1}{2}$	8	8	415$\frac{3}{4}$	124$\frac{1}{2}$	131$\frac{1}{2}$

The intrinsic features of the statistics clearly demonstrate that the vessel in the later years was working for the most part in the deep sea, and in the absence of particulars as to the places where the fish were caught in the various years no conclusions can be drawn as to the impoverishment of the fishing grounds.

The other four steam-trawlers whose catches are included in the tables began fishing in 1890 and 1891.

Trawler No. III. is also a large deep-sea-going boat, which commenced fishing in October 1890, and continued trawling in each month of the following years, except December 1896, when it was landing its fish at an English port, and August 1898. This vessel in the ten years 1891-1900 landed a gross quantity of 48,558 cwts. of fish —viz., 22,038¾ cwts. in 1891-1895, and 26,519⅔ cwts. in 1896-1900. The former period represents 60 months, and the latter 58 months, and the quantity caught in the second period was greater by 4481 cwts. The beam-trawl was employed throughout the whole of the first period, and the otter-trawl in nearly the whole of the second period, it having been put on board in July 1896.

The aggregate quantities (including skates, &c.) and the proportion of flat-fishes and round fishes in the various years are as follows :—

	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Flat, -	614½	524	910	742⅜	337¼	613⅜	548¼	514½	576½	454¼
Round, -	3,157	3,047⅔	3,720½	4,087⅛	4,744¾	4,027⅙	4,807¼	5,043¼	4,926⅔	4,528⅓
Total,	3,810½	3,622	4,653¾	4,836¼	5,116⅜	4,683⅓	5,415⅝	5,635⅜	5,624⅚	5,160½

The total quantity of round fish landed in the first five years was 18,757 cwts., and in the second five years 23,332 9/3 cwts., while the corresponding quantities of flat-fishes were 3128⅛ cwts. and 2706⅞ cwts. The decrease in flat-fishes was therefore not so great as in the case of the trawlers No. I. and No. II., a circumstance no doubt in great part due to the territorial waters and the greater part of the Moray Firth having been closed before the vessel began fishing, and to the greater regularity of the fishing offshore.

Comparing the two periods of five years (60 and 58 months) with regard to the quantities of the various kinds of fish taken, it appears that cod increased from 2789 to 5537 cwts., ling from 241 to 676 cwts., saithe from 167 to 450 cwts., hake from 106 to 144 cwts., and whitings from 129 to 557 cwts. Haddocks showed only a slight increase, from 15,250 to 15,548 cwts. Amongst flat-fishes, the quantity of turbot in this case increased from 74⅛ to 193⅜ cwts., halibut from 49¼ to 67 cwts., and lemon soles from 388⅜ to 737⅛ cwts.; brill decreased from ¾ to 3 cwts., plaice from 2304 to 1088⅜, while witches increased from 280¼ to 377¼ cwts., and megrims (included under plaice in 1891 and first half of 1892) increased from 31 cwts. to 205⅛ cwts. The increase in skates and rays was considerable—from 88½ cwts. to 401⅛ cwts.

The trawler No. IV is one of the smaller class of vessels, and most of its fishing is carried on near the coast. It has, moreover, a reputation for landing more flat-fish than fall to the lot of most trawlers, caught to a large extent, it is said, in the neighbourhood of the Shetlands and Orkneys. It began fishing in December 1890, and was not landing trawled fish at Aberdeen in July 1895 and August and September 1899. The first period of five years in this case is a month short, and the second two months short. The total quantity of fish landed in the ten years was 51,123½ cwts.—viz., 25,872 from 1890-95, and 25,251½ from 1896-1900. There was a month's less fishing in the latter period, so that the quantities in the two periods in this case, notwithstanding the use of the otter-trawl after November 1897, must have been very nearly equal. The quantity of round fishes taken in the first five years was 15,358 cwts., and in the second five years 16,695$\frac{1}{2}$ cwts, the totals of flat-fishes in the corresponding periods being 9947$\frac{1}{8}$ cwts. and 7417$\frac{3}{4}$ cwts. Skates were more than doubled, rising from 454$\frac{1}{2}$ cwts. to 1048 cwts.

The proportion of flat-fishes and round fishes and the aggregate catches in the various years are as follows :—

	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Flat, -	1,605$\frac{1}{2}$	1,508$\frac{1}{4}$	2,916$\frac{1}{2}$	1,791	2,125$\frac{7}{8}$	1,884$\frac{5}{8}$	1,498	1,148$\frac{1}{8}$	1,087	1,800
Round, -	3,192$\frac{1}{2}$	3,262$\frac{1}{8}$	3,359$\frac{5}{6}$	2,680$\frac{3}{4}$	2,926$\frac{1}{2}$	2,826	3,108$\frac{3}{4}$	4,962$\frac{1}{6}$	2,655$\frac{3}{4}$	3,142$\frac{3}{4}$
Total,	4,864	4,906$\frac{1}{8}$	6,360	4,560$\frac{1}{2}$	5,181$\frac{3}{8}$	4,812	4,805$\frac{7}{8}$	6,302$\frac{1}{6}$	3,923$\frac{7}{8}$	5,407$\frac{1}{2}$

The largest aggregate quantity, it will be observed, was landed in 1893, when the Moray Firth and the territorial waters were closed, and the beam-trawl employed, and the next largest in 1898, when the otter-trawl was in use.

Among round fishes we find the same general features as in the preceding cases, with some variations. The quantity of cod taken in the first five years was 3026$\frac{3}{4}$ cwts., and in the second five years 6230; ling increased from 184$\frac{1}{2}$ to 476$\frac{1}{6}$ cwts., saithe from 25 to 264$\frac{1}{2}$, hake from 74$\frac{1}{2}$ to 230$\frac{7}{10}$, and whitings from 43$\frac{1}{2}$ cwts. to 413$\frac{1}{4}$ cwts. The quantity of haddocks, on the other hand, diminished from 11,862$\frac{1}{4}$ cwts. to 8887 cwts. The smallest catch of cod was in 1891, and the largest in 1898; the smallest of haddocks was in 1897, and the largest in 1893. The largest catch of ling, whiting, and hake was in 1900.

Among flatfishes, turbot, halibut, brill, witches, and megrims increased, while plaice, dabs, and lemon soles diminished. Turbot increased from 126$\frac{1}{4}$ to 194$\frac{1}{4}$ cwts., halibut from 82$\frac{1}{4}$ to 125$\frac{1}{2}$, brill from 36$\frac{7}{8}$ to 64$\frac{1}{4}$ cwts., witches from 441 to 929$\frac{1}{8}$, and megrims from 23$\frac{1}{2}$ to 187$\frac{3}{8}$. The decrease in lemon soles was from 836$\frac{5}{8}$ to 467$\frac{1}{8}$, in plaice from 8126$\frac{1}{2}$ to 5175$\frac{5}{8}$, and in dabs from 374$\frac{1}{4}$ cwts. to 264$\frac{1}{2}$ cwts. The largest catch of plaice was in 1893 and the smallest in 1898.

The steam-trawler No. V. commenced to fish in September 1890, and continued trawling each month thereafter. In the ten years 1891-1900 it landed an aggregate quantity of fish amounting to 43,573 cwts., of which 20,223 was landed in the first five years, and 23,350 in the second five years. The quantity of round fishes in the two periods was 16,196 cwts. and 19,520 cwts. respectively, and the corresponding quantities of flat-fishes 3820$\frac{7}{8}$ and 3298$\frac{1}{2}$ cwts., showing the usual feature, an increase in round fish and a decrease in flat-fish.

The proportion of each and the aggregate catches in each of the ten years are these :—

	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Flat, -	1,040$\frac{1}{4}$	776$\frac{1}{2}$	607$\frac{3}{8}$	592	804$\frac{3}{4}$	841	706$\frac{1}{2}$	690$\frac{1}{2}$	493$\frac{1}{4}$	567$\frac{1}{4}$
Round, -	2,980$\frac{1}{2}$	2,816$\frac{3}{4}$	3,781$\frac{3}{4}$	3,271$\frac{3}{4}$	3,345$\frac{1}{4}$	2,897$\frac{1}{2}$	4,959	4,167$\frac{1}{2}$	3,755$\frac{1}{2}$	3,740$\frac{1}{2}$
Total, -	4,060$\frac{3}{4}$	3,707$\frac{1}{2}$	4,410$\frac{5}{8}$	3,875$\frac{1}{2}$	4,168$\frac{1}{2}$	3,794$\frac{1}{4}$	5,742$\frac{3}{4}$	4,976	4,334	4,503$\frac{1}{4}$

The otter-trawl was introduced on this vessel in December 1896, and the aggregate catch in 1897, it will be observed, was the highest of any year, owing to the increased quantity of round fishes taken; but the catches in the following years did not reach the same high standard. The average catch in the six years when the beam-trawl was employed (1891-1896) was 4003 cwts., and in the four years when the otter-trawl was used (1897-1900) it was 4889 cwts., showing an increase in the latter period of 22·1 per cent. There is, however, no information to determine how much of this increase was due to the greater efficiency of the otter-net, how much to difference in the place of fishing, and how much to change in the abundance of fishes on the grounds.

Among round fishes, an increase took place in cod from 3130¼ to 6248¼ cwts., in ling from 196¾ to 537¼, in saithe from 26½ to 311¼, in hake from 132¾ to 355¾, and in whitings from 230 to 326 cwts. Haddocks decreased, the total for the first five years being 12,321¼ cwts., and for the second five years 11,496 cwts.

Among the flat-fishes, turbot, halibut, brill, dabs, witches, and megrims increased, and plaice and lemon soles diminished. The increase in the quantity of turbots landed was from 163¼ to 225¼ cwts., the increase in halibut was from 30⅜ to 68¼ cwts., brill increased from 4½ to 44¼ cwts., dabs from 71¼ to 88¾ cwts., witches from 135¾ to 186¼ cwts., and megrims from 17 to 344½ cwts. The diminution in the quantity of lemon soles was from 1508½ to 826 cwts., and the decrease in plaice from 1892¼ to 1515¼ cwts.

The steam-trawler No. VI. began to fish in December 1890, and continued trawling in each month of the ten years except in January 1896. The first term of five years thus contains one month of fishing more than the second term. The aggregate catch of this vessel in the ten years amounted to 52,040⅝ cwts., the quantity in the period 1891-1895 being 23,553⅜ cwts., and in the period 1896-1900, 28,487¼ cwts. In the first term 19,601¾ cwts. of round fish were landed, and in the second term 24,541¼ cwts., the corresponding quantities of flat-fishes being 3785⅞ and 3130 cwts. respectively. There is intrinsic evidence from the statistics that this vessel fished mostly in the deep water.

The totals for each year and the quantities of flat-fishes and round fishes respectively are as follows:—

	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
Flat, -	1,001½	909¼	441	504	930⅛	435¼	475¼	651	818	750½
Round -	3,767½	3,349	5,432¾	4,298½	2,754	2,998	5,902¼	5,749	4,948¼	4,943¾
Total,	4,810	4,288¼	5,890	4,819	3,746⅛	3,481¾	6,512½	6,623½	6,054¼	5,815¼

This trawler also replaced the beam-trawl by the otter-trawl in December 1896, and the catch in the following year rose very considerably, and it was still greater in 1898. The average gross catch in the six years when the beam-trawl was employed amounted to 4506 cwts., and in the four years following the use of the otter-trawl to 6251 cwts., showing an increase in the later period of 38·7 per cent. If comparison be limited to the two years 1895-96 and 1897-98, the increase after the introduction of the otter-net amounted to no less than 81·7 per cent. But, as formerly stated, in the absence of information as to the places of fishing in the two periods it is impossible to say how much of this increase is due to the direct action of the net.

The increase in cod was from $2843\frac{1}{2}$ cwts. in the first five years to $4383\frac{3}{4}$ cwts. in the second five years; ling increased from 230 to $1051\frac{3}{4}$ cwts., saithe from 140 to $578\frac{1}{2}$, hake from 68 to 850, and whitings from 186 to $627\frac{3}{4}$. Haddocks also showed a small increase from $16{,}063\frac{1}{4}$ cwts. to $16{,}880\frac{1}{4}$ cwts.

Among flat-fishes, turbot increased from $78\frac{1}{2}$ to $154\frac{3}{4}$ cwts., halibut from $16\frac{7}{8}$ to 118, brill from $3\frac{1}{2}$ to $8\frac{1}{4}$, dabs from $19\frac{3}{4}$ to 41, witches from $377\frac{1}{4}$ to $798\frac{3}{4}$, and megrims from $27\frac{1}{4}$ to $617\frac{1}{4}$. Lemon soles decreased slightly, from $576\frac{1}{2}$ to 536, and plaice decreased from $2686\frac{1}{4}$ to 856 cwts.

It has been already stated that without information as to the places where the fish were caught in the various years, these statistics cannot be used in connection with the question of the impoverishment of fishing grounds. But, putting this aside, and regarding merely the quantity of fish landed by these steam-trawlers irrespective of the place of capture or the nature of the trawl used, it will be found that the aggregate quantity was greater in recent years than earlier. In the four years 1891-94 the four steam-trawlers Nos. III.-VI. landed an aggregrate of 72,409 cwts. of fish, while in the four years 1897-1900 they landed 86,837 cwts., or 14,428 cwts. more. To those who look upon the gross supply as the best test of the prosperity of the fisheries, irrespective of how or where the fish are obtained, these results must appear satisfactory. Besides the employment of more efficient apparatus and the opening up of new grounds, another factor has helped to swell the total. It is now customary, as the detailed tables show, to bring to market the smaller fishes of several kinds, *e.g.* haddocks, which in previous years used to be thrown overboard.

IV.—Comparison of the Catches of Steam Trawlers from Different Areas in the North Sea.

With the view of ascertaining the areas in which the fish were caught, particulars as to the places of fishing were obtained throughout last year from a number of Aberdeen trawlers, as explained in the foregoing pages. The number of vessels which furnished this information was 105, but some of them did so only during a part of the year, while from others it was obtained during the whole year. The number of voyages or landings recorded was 1846, out of a total number for the port of 8390—the percentage thus being 22. Of these 1846 records, fifty-five were omitted, 22 because the fish were caught outside the limits of the North Sea (12 Iceland, 2 Faröe, 1 Bay of Biscay, 7 North or West Coast);* 25 because the fish were caught at places in two or more

* In order to furnish an indication of how the Icelandic catches affect the statistics, I append here five consecutive landings in July (in cwts).

	Hours Fishing.	Cod.	C'dling.	Ling.	H'dock.	Whit'g	Catfish.	H'but.	Lem'ns.	Plaice.	Witch's.	Meg'ms.	Skate.	Total.
I.	†	142	3	$4\frac{1}{2}$	227	$10\frac{1}{2}$	5	70	$4\frac{1}{2}$	18	$8\frac{3}{4}$	2	1	$496\frac{1}{4}$
II.	50	970	..	..	204	..	..	21	$\frac{3}{4}$	$15\frac{1}{2}$	..	..	..	$1211\frac{1}{4}$
III.	40	41	8	10	$214\frac{1}{2}$	$4\frac{1}{2}$	21	30	12	$11\frac{1}{4}$	$5\frac{1}{2}$	$17\frac{1}{4}$	3	378
IV.	31‡	631	..	..	$181\frac{1}{2}$	..	..	26	$\frac{3}{4}$	$18\frac{3}{4}$	..	..	..	858
V.	42	1125	..	..	137	..	..	$41\frac{1}{2}$	9	$9\frac{1}{2}$	61	16	..	1399
		2909	11	$14\frac{1}{2}$	964	15	26	$188\frac{1}{2}$	27	73	$75\frac{1}{4}$	$35\frac{1}{4}$	4	$4342\frac{1}{2}$

† The vessel was seven days on the ground; hours fishing not given.

‡ Three weeks' voyage; the actual fishing was said to be 31 hours, the vessel lying to in order to split and salt the cod.

The percentage of cod in these Iceland shots is thus 67, of haddocks 22, whiting and ling 0·3 each, halibut 4·3, and plaice and witches each 1·7.

The landing from the Bay of Biscay, representing 48 hours' fishing, consisted of 282 cwts., comprising 271 cwts. of hake, 8 cwts. of rays, $\frac{1}{2}$ cwt. conger eels, $\frac{1}{4}$ cwt. black soles, $\frac{3}{4}$ cwt. turbot, 2 cwts. John Dory, 6 mullets, 17 bream, and 1 electric ray.

of the areas selected, as explained below, and eight because there was reason to believe that a mistake had been made in regard to the place of capture. The twenty-two landings omitted because the fish were caught in more than one area were all from the North Sea, so that of the 1838 landings, when the place of fishing was ascertained, 1813, or 98·6 per cent., were from the North Sea. This may be taken approximately as the proportion of North Sea shots at Aberdeen in 1901, because although the records were obtained from certain vessels habitually fishing at Iceland—and the proportion of Iceland shots is not therefore duly represented—those regarded (and omitted) as doubtful were mostly from the North Sea. In the present year (1902) the proportion is probably less, because of the greater development of the fishing at Iceland, and apparently also on the West Coast.

An endeavour was made to procure the information as to the place of capture from a due proportion of the smaller and larger vessels, *i.e.*, those fishing mostly near the coast and those fishing principally at a distance, and that this proportion was approximately represented is shown by the fact that the percentage of landings recorded to the total landings, and the percentage of the fish caught by the vessels in question to the total fish caught are nearly the same—viz., 21·3 and 21·6. The total quantity of fish landed by trawlers at Aberdeen in 1901 was 992,167 cwts., and the quantity landed by the vessels included in the special return was 214,174 cwts.; the average quantity per landing in the latter case was 119·6 cwts., and among the remaining vessels 117·6 cwts.

Both from the quantity of fish taken and the number of voyages it is, I think, evident that the information obtained as to the productiveness of different fishing grounds is likely to be of considerable value if continued for a series of years, since particulars of the duration of the fishing operations are at the same time recorded. Moreover, the percentage of vessels from which the returns are obtained—although it would be better if it were higher—is, I think, sufficiently high to show substantially the operations of the whole fleet of trawlers landing fish at the port.

The particulars of the place of fishing was ascertained for me by the collector of the fishery statistics, Mr. James Robb, usually in the form of the course steered and the distance run by the vessel from port or from Buchan Ness, this information being placed on a form opposite the detailed record of the catch, with the date, number of hours fishing, and the name of the vessel. The entries for each month were then numbered consecutively; those which showed the place of fishing to be beyond the limits of the North Sea, *e.g.*, the North or West Coast, Faröes or Iceland, were omitted, as were also those in which the fish were caught at more than one place, if the places were not within the same area selected as a unit (*see* below) and those about which any doubt existed as to whether the place of fishing had been correctly ascertained. With regard to the latter, reliance was chiefly placed on Mr. Robb's great experience both of the catches and of the trawlers, a query being placed against all entries that appeared in the least doubtful.

In arranging the information on charts it was at first supposed that the number of the entry on the form might be placed on the chart at the place where the fish were caught, and the forms showing the detailed catches published. It was, however, found to be impossible, even with the largest charts procurable, to find room for the numbers in some areas, and the publication of the detailed landings would occupy a great deal of space; while, on the other hand, the information in regard to any particular area would not be very clearly exhibited. It was therefore decided to divide the North Sea into areas, and to tabulate the particulars in a condensed, but distinct and separate, form for each month and each area. The areas selected coincide with the lines of latitude and longitude on the chart, each equalling one degree of latitude and two of longitude, the superficial extent thus varying slightly in different parts of the North Sea, but averaging about 3600 square (geographical) miles or a little more. The limits of the North Sea as defined in the International Convention of 1882 have not been strictly adhered to, since on the north and north-west the boundary line is arbitrary. The real boundary, so far as trawl fishing is concerned, may be placed at the hundred-fathom line, and this, between 2° W. and 2° 40′ E., extends further north than 61° N., which is the northern limit under the Convention. The area within the hundred fathom line to the west of the Shetlands and Orkneys is also included as far as 3° 30′ W. (*see* charts). Beyond the hundred-fathom line the water rapidly deepens and a physical barrier to trawling is thus introduced. These areas have been found convenient, and on the whole they correspond fairly well with the variations in depth; but inasmuch as the original records contain the place of fishing, apart from its relation to any area, it will be possible to exhibit the results comparatively for any larger or smaller area, or for any bank, should experience show that that would be desirable.

Within the areas assigned it must not be supposed that the fishing was evenly distributed, because in some parts the ground may not be favourable for trawling, and in certain places, as on the slopes of banks, fish may be more abundant and fishing operations more extensive. It may sometimes happen, moreover, that the place of fishing is near the boundary of an area and in such cases part of the fish may have been caught in the adjoining area, although this irregularity tends to equalise itself. Further, a trawler when fishing for a number of days in one locality and getting good shots may, unless when a dan is anchored for guidance, drift fifteen or twenty miles from the place where the first drag was made. But these variations are not of importance. The object is to show the area or district of the sea where the fish were obtained, and all that is claimed is that this method shows it substantially.

In the chart on Plate I. I have represented the various areas in the North Sea in which the vessels in question caught fish in 1901 and landed them at Aberdeen. They number thirty out of about forty-four in which trawling can be carried on. Some of the areas are however of very little importance in the returns and may have been visited only on a single occasion in the course of the year, as in the case of areas XXXIII., XXXVI., XXXVIII., XLI., and XLV. These lie in the southern and eastern parts of the North Sea. In the part of the North Sea south of 56°, *i.e.*, south of a line between the Firth of Forth and Ringkjöbing, in Denmark, the Aberdeen trawlers in question made only seven voyages in 1901, and the total quantity of fish landed from these areas was 671 cwts. It is evident from this that information regarding the southern and eastern parts of the North Sea must be sought at other ports. From the six areas lying between 56° and 57° the number of landings in the course of the year was 309, the great majority of which (257) were in the two areas near the Scottish coast, most of the others being from the Fisher Bank and neighbourhood. In order to show the position of the grounds from which the great bulk of the supply was drawn, I give particulars in the following Table of the areas from which more than thirty landings were made:—

No. of Area.	No. of Landings.	No. of Months.	Quantity of Fish. cwts.
X.	42	8	5,646
XI.	111	11	22,310
XIV.	166	12	28,841
XV.	125	12	24,199
XVII.	78	9	6,533
XVIII.	198	12	31,074
XIX.	138	12	23,237
XX.	34	10	5,735
XXIII.	422	12	19,035
XXIV.	63	9	9,102
XXVIII.	35	11	934
XXIX.	222	11	11,436
XXXII.	32	6	4,861

Thus in seven of the areas the quantity of fish caught exceeded 10,000 cwts., in four it was between 20,000 and 30,000 cwts., and in one it was over 30,000 cwts. It may be noted incidentally, as previously explained when dealing with the "voyage" or "landing," that the ratio between the quantity of fish and the landing varies greatly according as to whether the grounds are distant or near. Thus each landing from the distant area XI. (East of the Shetlands) represents 201 cwts.; from areas XIX. and XX. each landing represents 169 cwts.; from XXXII. it represents 152 cwts.; from XXIII. 45 cwts.; and from XXVIII. 27 cwts. The difference in amount is owing principally to the varying length of the voyage; also, no doubt to some extent, to the greater productiveness of certain areas. More than 75 per cent. of the fish were caught in seven of the areas, viz., XI., XIV., XV., XVIII., XIX., XXIII., and XXIX, two of which lie immediately contiguous to the coast, and the others south and east of the Shetlands. The greatest quantity was obtained from the area lying opposite the Moray Firth and south-east of the Orkneys (XVIII.), and the next largest from the area north of this (XIV.) around to the east of Fair Isle and south of the Shetlands. The three areas (XI., XV., and XIX.) to the east and south-east of the Shetlands, between 0°—2° W. long. and 58°—61° N. lat., furnished the next largest amounts, totalling 69,746 cwts.

In the Tables (Table III., p. 214) are given particulars of the quantities of the various kinds of fish caught in the different areas, and since this information is tabulated according to the months, I think it will be found ultimately to furnish a considerable amount of knowledge as to the distribution and relative abundance of the food fishes in different parts of the sea and at different seasons, as well as in connection with the question of productiveness.

Taking the areas in which fishing operations were carried on in each month of the year, the percentage proportions of the various round fishes (among the total round fishes) are as follows, including among the round fishes cod, haddock, whiting, ling, saithe, tusk, hake, gurnard, and catfish.

Area.	Cod.	Haddock.	Whiting.	Ling.	Saithe.	Hake.
XIV. - -	12·3	63·9	10·6	5·0	4·0	3·3
XV. - -	13·4	64·9	10·1	4·9	3·5	2·5
XVIII. -	14·7	65·1	7·1	6·0	3·8	2·2
XIX. - -	13·8	68·3	7·7	4·1	3·3	1·9
XXIII. -	19·2	63·7	9·1	4·0	1·2	0·5
*XXIX. - -	16·9	71·5	5·7	2·0	0·8	0·3

* For eleven months.

On reference to the chart (Plate I.) it will be observed that cod are proportionally rather more numerous in the areas near the coast, and haddocks about equally numerous, while the other kinds are rather less numerous. There is unfortunately no method except that of percentages available to indicate the proportional numbers during the year, because that depending on the number of landings is, as we have seen, imperfect, and the number of hours' fishing began to be ascertained only in April. It is thus hardly worth while endeavouring to trace the varying abundance of the different species in the various areas in the different months. The percentages in regard to the two most abundant round fishes, cod and haddock, may however be given, since at the spawning time there is a relative increase of cod and a proportional decrease of haddocks in the areas near the coast compared with the off-shore areas. The percentages are as follows:—

Cod.

Area.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
XIV. -	13·4	10·2	8·8	8·5	14·7	15·4	17·1	19·5	19·5	14·6	11·2	11·5
XV. -	13·2	12·8	7·8	9·3	15·9	13·3	16·4	17·1	10·1	21·4	11·4	13·1
XVIII. -	14·6	11·1	11·1	19·4	16·4	15·0	19·0	18·4	12·8	18·0	16·0	11·8
XIX. -	14·1	13·6	9·9	13·4	26·9	16·2	11·1	22·0	27·8	10·6	12·9	15·0
XXIII. -	11·9	27·7	39·2	43·8	20·9	20·4	23·8	20·1	13·5	14·0	25·6	18·8

Haddock.

XIV. -	66·7	67·9	69·9	65·1	58·4	61·9	65·3	56·8	56·8	55·8	60·7	54·8
XV. -	67·0	64·7	73·8	67·3	61·5	70·8	64·2	68·1	59·5	57·9	58·7	62·9
XVIII. -	70·5	70·1	74·5	58·6	60·2	66·1	57·5	58·8	31·9	55·9	60·0	71·1
XIX. -	71·8	66·5	71·6	67·8	56·1	64·7	76·1	66·6	56·5	72·8	69·0	70·9
XXIII. -	73·2	54·4	40·6	31·0	61·6	51·3	63·0	59·3	58·2	72·7	55·8	64·0

The facts in regard to the proportional distribution of the various species of flat-fishes in the different areas have been already referred to (p. 82). The monthly percentages vary very considerably, *e.g.*, in area

XIV. plaice varies from 25·4 per cent. to 1·0, witches from 80·6 to 33·2, and megrims from 51·9 to 6·2; in area XV. plaice vary from 0·04 to 6·6, witches from 87·5 to 40·0, and megrims from 42·8 to 0·5; in area XXIII. plaice varies from 57·7 to 12·0, witches from 25·4 to 0·5, and megrims from 32·2 to 0·8. In order to determine the meaning of these variations and the fluctuations which occur, it would be also necessary to ascertain the quantity per haul of the net or per hour's fishing, and this information is now being obtained.

During the first three months of 1891 similar information was recorded regarding the places of fishing of the whole of the steam-trawlers then landing fish at Aberdeen—65 in number; and the comparison of the results with those in the corresponding months of 1901 is of interest. The total number of landings made in the period referred to in 1891 was 760, and the quantity of fish landed amounted to 48,969 cwts., an average of 64·4 cwts. per landing. In the three months of 1901 the number of landings or voyages of the trawlers, from which particulars were obtained, was 644, and the quantity of fish landed was 78,558 cwts., an average of 122 cwts. per landing or voyage, or very nearly double what it was ten years before.

There were, however, two differences of importance in the conditions. Firstly, in 1891 the beam-trawl was alone used, while in 1901 it was the otter-trawl; secondly, the grounds were to a very large extent different, and mostly more distant than 1891, involving longer voyages and more fishing on each voyage. It is probable, also, that the new grounds fished over in 1901 were more productive in the gross quantity of fish taken than the grounds fished over in the earlier period.

The change in the fishing grounds is of interest. The areas from which the supplies were drawn in the three months of 1891 are shown in the chart, Plate II., and the corresponding areas in 1901 in Plate III. It will be seen that in the former period thirteen areas, or parts of areas, were frequented, while in 1891 fishing was carried on in eighteen areas, or parts of areas. The extent of the grounds was thus greater in the latter period. Moreover, while in 1891 seven of the thirteen areas of fishing were south of 57° N. lat. (*i.e.*, a line between Stonehaven and Hanstholmen in Denmark), in 1901 only two were south of this line, the remaining sixteen being to the north of it. The predominant region of fishing had been shifted northwards. Only seven of the areas were frequented in both periods, and one of these (XVII.) only partly in 1901. Broadly speaking, the new grounds represent the region between the 50-fathom and the 100-fathom line, which the introduction of the otter-trawl enabled to be exploited.

The chief feature in regard to the fishing grounds in the two periods was thus the transference of trawling into the deeper water to the north and north-east. Another change that occurred between 1891 and 1901 was the closure of the Moray Firth. The territorial waters from Brora in Sutherlandshire to Kinnaird Head were closed to trawlers on 4th July 1887, and the area within a straight line between the Ord of Caithness and Craighead, near Buckie, was closed on 19th November 1900, and the whole Firth, from Duncansby Head to Rattray Point, on 22nd November 1892. In 1891 the greater part of the Firth was thus open, comprising about 1500 square (geographical) miles, most of which was excellent trawling ground, between twenty and fifty fathoms, and including Smith Bank. Thus, on the one hand, from the closure of these grounds and the abandonment of the grounds south of 57° N. lat. (areas XXX., XXXI., XXXII., XXXIV., XXXVI.), which are also in from about twenty to about fifty fathoms, and, on the other hand, from the predominant fishing between fifty and one hundred fathoms northwards, one would expect a very different representation of the fishes, and especially the flat-fishes, in the two periods. About 76 per cent. of the fish landed in the three months of 1901 were from the new grounds in which trawling had not been carried on in 1891; and about 60 per cent. of the fish landed in 1891 were from the areas not fished over in 1901, the great bulk coming from the Moray Firth.

The total quantities, and the percentages of the gross catch, of the principal kinds of fish landed in the three months of the two years are as follows:—

	Cod.	Ling.	H'dock.	Whit'g.	Turbot.	Brill.	H'but.	Lem'ns.	'Plaice.'	Witch's.	Meg'ms.
1891	5,526	201	28,848	447	489	27	3	1,715	9,191	1,296	—
	11·3	*0·4*	*58·9*	*0·9*	*1·0*	*0·06*	–	*3·5*	*18·8*	*2·6*	
1901	9,344	3,716	46,306	6,056	118	38	299	313	2,041	3,213	1,875
	11·9	*4·7*	*58·9*	*7·7*	*0·1*	*0·05*	*0·4*	*0·4*	*2·6*	*4·1*	*2·4*

It will be observed that notwithstanding the use of the otter-trawl in 1901 the percentage of haddocks and cod was the same in the two periods; in the latter period the percentage of ling and whiting was greatly increased, as were also the percentages of halibut and witches. The percentage of brill slightly diminished, those of turbot and lemon soles were much less, and the percentage of "plaice" declined from 18·8 to 2·6. In 1891 dabs and megrims were included with plaice, and in the Table the dabs (168 cwts.) are combined with plaice in 1901. From the fishing taking place so much in deeper water in the latter year the megrims are no doubt proportionately greater in quantity than in 1891; but if they are also all included the percentage of the "plaice," dabs, and megrims in 1901 becomes 5·0. There was undoubtedly a great decline in plaice, due for the most part to the transference of the predominant fishing from shallower to deeper water, and this no doubt also explains to a large extent the other changes in the proportions.

It would be of much interest if it were possible to make a comparison between the productiveness of the grounds in 1891 and 1901. The areas in which trawling took place in both years are seven in number, viz., XIII., XVII., XXIII., XXIV., XXV., XXVIII., and XXIX., but part of XVII. is included in the Moray Firth, which was closed to trawling in 1892. It may be said, however, that that area (XVII.) yielded very nearly half of the total quantity of fish landed in the first three months of 1891, viz. 20,787 cwts.; while the abbreviated part of it in 1901 yielded 6533 cwts. Omitting this area, the number of landings made from the other six areas was 453 in 1891 and 254 in 1901, and the quantity of fish was respectively 16,516 and 16,043 cwts. The average per voyage or landing in 1891 was thus 36·5 cwts., and in 1901 63·2 cwts., or 26·7 cwts. more. There are, however, two considerations which preclude these figures being taken as an indication of the productiveness of the grounds in the two years. The first is the uncertainty of the "landings" representing equal periods of fishing; it is probable from the general tendency that the voyages were longer in 1901. The second is the fact that the otter-trawl was used in 1901 and the beam-trawl in 1891, and there is not at present sufficient information to show the relative efficiency of the two nets, either in regard to the gross quantity of fish caught, or the proportion of the different kinds of fish. The otter-trawl, moreover, enabled the deeper parts of certain of the areas to be explored in 1901 where the beam-trawl could scarcely be used in 1891; and the areas were worked over in very different proportions in the two years. In both, most landings were made from XXIII., viz. 329 in 1891 and 180 in 1901; while 101 landings were made from the other inshore area, XXIX., in 1891, only 9 were from it in 1901. On the other hand, the more distant areas were more frequented in the later year; thus only one voyage was made to XIII. in 1891 as against 17 in 1901, and three to XXIV., as against 26 in 1901. As it stands, the average per landing for cod was 4·0 cwts. in 1891 and 8·3 in 1901; for haddocks, 20·3 cwts. in 1891 and 36·2 cwts. in 1901; for ling, 0·12 cwt. in 1891 and 2·3 cwts. in 1901; for whiting, 0·6 cwt. and 23·5 cwts. respectively; and for turbot in the two years, 0·7 and 0·3; lemon soles, 2·4 and 0·9; "plaice, dabs, and megrims," 6·8 and 4·8; and witches, 0·2 and 1·4 cwts.

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Over-board.	Total No.	
1. 209 miles by log N.E. from Buchan Ness, about 60 miles S.E. by E. ½ E. from Flugga Light, Shetland Isles.	1901. May 15.	..	9·3	6.9	75 to 78	3.20 p.m.	4.20 p.m.	Codling, ...	2	..	2	Steam trawler "Star of Peace." Small mesh experiments. Our net was badly split and contained nothing.
								Haddock, ...	87	2	89	
								Whiting, ...	..	1	1	
								Com. Gurnard, ..	..	25	25	
								Halibut, ...	1	..	1	
								Lemon Sole, ..	1	..	1	
								Megrim, ...	20	13	33	
								Long Rough Dab,	..	4	4	
								Thornback-ray, ..	..	1	1	
								Shagreen Ray, ..	4	..	4	
								Angler, ...	..	1	1	
								Picked Dog-fish,..	..	1	1	
								Argentine, ..	..	4	4	
									115	52	167	
2. Same Place.	"	..	"	"	..	4.30 p.m.	9.20 p.m.	Tusk, ...	..	1	1	
								Haddock, ...	487	15	502	
								Whiting, ...	..	22	22	
								Com. Gurnard, ..	..	91	91	
								Halibut, ...	3	..	3	
								Megrim, ...	129	30	159	
								Witch, ...	..	4	4	
								Com. Dab,.. ..	..	2	2	
								Long Rough Dab,	..	8	8	
								Sandy Ray, ..	..	2	2	
								Shagreen Ray, ..	..	3	3	
								Starry Ray, ..	..	1	1	
								Angler, ...	..	2	2	
								Picked Dog-fish,..	..	1	1	
								Argentine, ..	..	2	2	
									619	184	803	
3. North East from Shetland, 22 miles by log E. of Flugga Light.	May 17.	..	8·8	7·5	85	1 Hour.		Cod, ...	4	..	4	Small mesh experiment. Our net had a small hole immediately below their cod-end.
								Haddock, ...	36	..	36	
								Whiting, ...	6	..	6	
								Ling, ...	1	..	1	
								Saithe, ...	6	..	6	
								Com. Gurnard, ..	8	..	8	
								Lemon Sole, ..	..	1	1	
								Megrim, ...	38	21	59	
								Long Rough Dab,	..	3	3	
								Sandy Ray, ..	..	4	4	
									99	29	128	
4. S.E. by S. ½ S. from South Pt. of Fetlar Island, Shetland, 53 miles by log.	May 19.	..	8·1	5·3	65	¾ hour.		Cod, ...	2	..	2	Small mesh experiment. Our net had again a small hole in it.
								Codling, ...	10	..	10	
								Haddock, ...	231	5	236	
								Whiting, ...	64	43	107	
								Tusk, ...	1	..	1	
								Ling, ...	3	..	3	
								Com. Gurnard, ..	..	5	5	
								Cat-fish, ...	2	..	2	
								Megrim, ...	1	..	1	
								Witch, ...	5	..	5	
								Com. Dab,.. ..	..	34	34	
								Long Rough Dab,	..	6	6	
								Angler, ...	..	1	1	
									319	94	413	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Surface.	Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
5. Same Place.	1901. May 19.	..	..	..	65	1.0 p.m.	6.0 p.m.	Codling, ...	142	14	156	
								Haddock, ...	1532	38	1570	
								Whiting, ...	..	85	85	
								Com. Gurnard, ..	..	3	3	
								Cat-fish, ...	3	..	3	
								Halibut, ...	1	..	1	
								Lemon Sole, ..	..	2	2	
								Megrim, ...	1	2	3	
								Witch, ...	7	..	7	
								Com. Dab,.. ..	..	185	185	
								Long Rough Dab,	..	76	76	
								Starry Ray, ..	.	2	2	
								Angler, ...	..	1	1	
								Norway Pout, ..	..	2	2	
								Argentina silus,..	..	1	1	
									1686	411	2097	
6. Same Place.	May 20.	..	..	..	,,	1.0 a.m.	6.0 a.m.	Cod, ...	4	..	4	To this shot belongs also 19 baskets of Haddocks = about 1940; 6 baskets of Whiting = about 780; and 1 basket of Megrims and Witches = about 75.
								Codling, ...	51	4	55	
								Ling, ...	3	..	3	
								Haddock, ...	851	118	969	
								Whiting, ...	..	126	126	
								Saithe, ...	7	..	7	
								Tusk, ...	3	..	3	
								Com. Gurnard, ..	20	17	37	
								Halibut, ...	1	..	1	
								Lemon Sole, ..	..	5	5	
								Megrim, ...	..	3	3	
								Witch, ...	..	3	3	
								Com. Dab,.. ..	..	440	440	
								Long Rough Dab,	..	102	102	
								Cat-fish, ...	5	..	5	
								Starry Ray, ..	..	12	12	
								Shagreen Ray, ..	..	1	1	
								Angler, ...	..	5	5	
								Argentina silus,..	..	1	1	
								Norway Pout, ..	..	6	6	
								Dragonet, ...	..	1	1	
									945	844	1789	
7. Same Place.	May 20.	..	..	..	,,	6.50 a.m.	11.50 a.m.	Cod, ...	6	..	6	To this shot belongs also 18 baskets of Haddocks = about 1770; 7 baskets of Whiting = about 910; and 1¼ baskets of Megrims and Witches = about 90.
								Codling, ...	8	4	12	
								Ling, ...	1	..	1	
								Haddock, ...	..	245	245	
								Whiting, . .	..	115	115	
								Saithe, ...	5	..	5	
								Hake, ...	4	..	4	
								Com. Gurnard, ..	..	58	58	
								Cat-fish, ...	13	..	13	
								Halibut, ...	2	..	2	
								Megrim, ...	..	15	15	
								Witch, ...	..	8	8	
								Com. Dab,.. ..	..	529	529	
								Long Rough Dab,	..	378	378	
								Starry Ray, ..	..	6	6	
								Argentina silus,..	..	5	5	
								Norway Pout, ..	..	7	7	
									39	1370	1409	
8. Aberdeen Bay, off Newburgh.	May 30.	..	9·0	9·4	12 to 16	3.30 p.m.	4.30 p.m.	Haddock, ...	105	17	122	Small mesh net experiment.
								Whiting, ...	47	63	110	
								Saithe, ...	1	..	1	
								Com. Gurnard, ..	..	28	28	
								Herring, ...	..	5	5	
								Brill, ...	1	..	1	
								Com. Dab,.. ..	8	55	63	
								Long Rough Dab,	..	1	1	
								Plaice, ...	38	..	38	
									200	169	369	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
9. Aberdeen Bay, off Collieston.	1901. May 30.	..	..	..	9 to 14	5.15 p.m.	8.15 p.m.	Codling, ...	..	1	1	
								Haddock, ...	69	17	86	
								Whiting, ...	105	4	109	
								Com. Gurnard, ..	..	15	15	
								Herring, ...	..	1	1	
								Brill, ...	1	..	1	
								Plaice, ...	175	1	176	
								Lemon Sole, ..	2	..	2	
								Flounder, ...	3	..	3	
								Com. Dab, ...	289	634	923	
								Long Rough Dab,	..	1	1	
								Thornback, ..	1	1	2	
								Starry Ray, ..	..	2	2	
								Angler, ...	..	3	3	
									645	680	1325	
10. Same Place.	May 30.	..	..	..	5 to 9	9.0 p.m.	12.0 p.m.	Haddock, ...	104	..	..	Net split.
								Whiting, ...	48	..	..	¾ basket of offal.
								Plaice, ...	39	..	..	
								Com. Dab, ...	29	..	..	
								Grey Skate, ..	3	..	..	
									223	..	..	
11. Same Place.	May 31.	..	..	..	,,	1.0 a.m.	4.0 a.m.	Codling, ...	5	..	..	Only marketable fish recorded.
								Haddock, ...	15	..	..	
								Whiting, ...	127	..	..	
								Plaice, ...	313	..	..	
								Com. Dab, ...	243	..	..	
									703	..	..	
12. Same Place.	May 31.	..	..	..	,,	5.0 a.m.	8.0 a.m.	Haddock, ...	35	..	..	2 baskets of offal, Com. Dabs, Whiting, and Gurnards.
								Whiting, ...	269	..	..	
								Halibut, ...	1	..	..	
								Plaice, ...	398	..	..	
								Lemon Sole, ..	12	..	..	
								Com. Dab, ...	358	..	..	
								Angler, ...	..	2	..	
									1073	..	..	
13. Moray Firth, off Lossiemo'th	June 1.	..	..	..	12 to 16	11.45 p.m.	2.45 a.m.	Cod, ...	10	..	..	8⅓ baskets offal, chiefly Gurnards.
								Haddock, ...	274	..	..	
								Brill, ...	1	..	..	
								Lemon Sole, ..	1	..	..	
								Com. Dab, ...	4	12	..	
								Angler, ...	..	7	..	
									290	..	..	
14. Same Place.	June 1.	..	10·9	7·8	24	3.25 a.m.	6.25 a.m.	Cod, ...	6	..	6	
								Haddock, ...	47	..	47	
								Whiting, ...	5	..	5	
								Saithe, ...	1	..	1	
								Com. Gurnard, ..	..	74	74	
								Plaice, ...	23	..	23	
								Com. Dab, ...	..	10	10	
								Thornback, ..	2	..	2	
									84	84	168	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
15. Burghead Bay.	1901. June 1.	..	11·6	11·7	5 to 14	8.45 a.m.	12.45 p.m.	Cod, ...	7	..	7	
								Codling, ...	..	2	2	
								Haddock, ...	..	2	2	
								Cat-fish, ...	1	..	1	
								Com. Gurnard, ..	..	110	110	
								Plaice, ...	186	7	193	
								Com. Dab, ...	27	33	60	
								Thornback, ..	8	..	8	
								Angler, ...	..	11	11	
								Lumpsucker, ..	..	2	2	
									229	167	396	
16. Cromarty Firth, Invergordon	June 1.	..	12·6	12·8	8	6.5 p.m.	7.5 p.m.	Cod, ...	1	..	1	Small mesh net experiment.
								Codling, ...	..	2	2	
								Haddock, ...	2	..	2	
								Com. Gurnard, ..	..	4	4	
								Plaice, ...	20	2	22	
								Thornback, ..	3	..	3	
									26	8	34	
17. Dornoch Firth.	June 3.	..	11·6	8·7	5 to 12½	12.5 a.m.	3.0 a.m.	Cod, ...	2	..	2	
								Codling, ...	..	1	1	
								Haddock, ...	62	..	62	
								Whiting, ...	..	3	3	
								Com. Gurnard, ..	..	31	31	
								Plaice, ...	26	4	30	
								Com. Dab, ...	..	20	20	
								Solenette, ...	..	3	3	
								Grey Skate, ..	1	..	1	
									91	62	153	
18. Same Place.	June 3.	..	..	..	5 to 12½	3.0 a.m.	6.30 a.m.	Cod, ...	2	..	2	
								Haddock, ...	18	..	18	
								Whiting, ...	3	..	3	
								Com. Gurnard, ..	..	147	147	
								Plaice, ...	61	1	62	
								Com. Dab, ...	1	8	9	
								Thornback, ..	4	..	4	
									89	156	245	
19. Off Dunbeath, Caithness.	June 3.	12·7	10·2	8·6	22	3.12 p.m.	4.12 p.m.	Com. Gurnard, ..	..	2	2	Small mesh net experiment.
								Plaice, ...	9	..	9	
								Lemon Sale, ..	4	..	4	
								Com. Dab, ...	3	5	8	
									16	7	23	
20. Sinclair's Bay, near Wick.	June 3.	10·6	9·8	8·9	8	7.5 p.m.	9·30 p.m.	Cod, ...	22	..	22	
								Codling, ...	..	2	2	
								Haddock, ...	13	3	16	
								Com. Gurnard, ..	..	142	142	
								Brill, ...	1	..	1	
								Plaice, ...	108	..	108	
								Com. Dab, ...	25	4	29	
									169	151	320	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
21. Same Place.	1901. June 3.	..	..	..	5 to 17	10.5 p.m.	2.0 a.m.	Cod, ...	1	..	1	
								Codling, ...	6	5	11	
								Haddock, ...	16	2	18	
								Com. Gurnard, ..	162	466	628	
								Brill, ...	1	..	1	
								Plaice, ...	341	14	355	
								Lemon Sole, ..	7	..	7	
								Com. Dab, ...	53	13	66	
									587	500	1087	
22. Same Place.	June 4.	..	..	..	5½ to 14 mostly 7 to 9	2.40 a.m.	5.0 a.m.	Codling, ...	7	..	7	
								Haddock, ...	28	1	29	
								Com. Gurnard, ..	25	110	135	
								Brill, ...	2	..	2	
								Plaice, ...	179	5	184	
								Lemon Sole, ..	2	..	2	
								Com. Dab, ..	34	10	44	
								Flounder, ...	3	..	3	
									280	126	406	
23. Same Place.	June 4.	..	..	..	9 to 15	5.30 a.m.	6.30 a.m.	Codling, ...	35	2	37	Small mesh net experiments; net caught on bottom and was torn.
								Haddock, ...	205	1	206	
								Com. Gurnard, ..	..	90	90	
								Turbot, ...	1	..	1	
								Plaice, ...	20	..	20	
								Com. Dab, ...	6	1	7	
									267	94	361	
24. Same Place.	June 4.	..	..	..	,,	7.40 a.m.	11.40 a.m.	Cod, ...	2	..	2	
								Codling, ...	4	..	4	
								Haddock, ...	61	3	64	
								Com. Gurnard, ..	..	432	432	
								Plaice, ...	69	..	69	
								Com. Dab, ..	..	13	13	
								Angler, ...	..	1	1	
									136	449	585	
25. Thurso Bay.	June 4.	..	..	..	10 to 25	3.50 p.m.	7.50 p.m.	Cod, ...	1	..	1	
								Haddock, ...	1	..	1	
								Cat-fish, ...	2	..	2	
								Com. Gurnard, ..	..	52	52	
								Plaice, ...	22	3	25	
								Com. Dab, ...	27	7	34	
									53	62	115	
26. Smith Bank.	June 5.	11·6	9·3	8·9	22	1.25 p.m.	2.25 p.m.	Codling, ...	3	..	3	Small mesh net experiment.
								Haddock, ...	93	1	94	
								Whiting, ...	25	7	32	
								Com. Gurnard, ..	..	81	81	
								Cat-fish, ...	1	..	1	
								Brill, ...	1	..	1	
								Plaice, ...	37	..	37	
								Lemon Sole, ..	14	2	16	
								Com. Dab, ..	7	59	66	
								Long Rough Dab,	..	1	1	
								Thornback, ..	..	1	1	
									181	152	333	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Over-board.	Total No.	Remarks.
27. Same Place, West Edge.	1901. June 5.	..	..	..	22	3.0 p.m.	7.0 p.m.	Codling, ...	2	2	4	
								Haddock, ...	222	14	236	
								Whiting, ...	26	7	33	
								Plaice, ...	87	..	87	
								Lemon Sole, ..	22	6	28	
								Com. Dab, ...	15	133	148	
								Angler, ...	..	1	1	
								Sand-eel, ...	..	1	1	
								Dragonet, ...	..	1	1	
									374	165	539	
28. Aberdeen Bay, off Stirling Quarries, N. of Cruden.	June 6.	..	..	..	12 to 16	2.0 a.m.	6.0 a.m.	Cod, ...	15	..	15	
								Codling, ...	..	6	6	
								Haddock, ...	276	99	375	
								Whiting, ...	211	53	264	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	435	435	
								Brill, ...	2	..	2	
								Plaice, ...	258	9	267	
								Lemon Sole, ..	1	..	1	
								Com. Dab, ...	647	1933	2580	
								Long Rough Dab,	..	3	3	
								Grey Skate, ..	..	2	2	
								Starry Ray, ..	..	2	2	
								Thornback, ..	..	1	1	
								Cuckoo, or Sandy Ray, ...	..	1	1	
								Angler, ...	..	4	4	
								Sand-eel, ...	..	1	1	
								Pogge, ...	..	6	6	
									1411	2555	3966	
29. Aberdeen Bay, off Collieston and Coast-guard Station.	June 6.	..	..	..	4½ to	6.20 a.m.	10.15 a.m.	Haddock, ...	195	231	426	
								Whiting, ...	..	34	34	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	789	789	
								Cat-fish, ...	1	..	1	
								Herring, ...	..	1	1	
								Brill, ...	2	..	2	
								Plaice, ...	314	4	318	
								Com. Dab, ...	1144	4231	5375	
								Grey Skate, ..	6	..	6	
								Starry Ray, ..	..	1	1	
								Thornback, ..	1	..	1	
								Cuckoo, or Sandy Ray, ...	..	1	1	
								Angler, ...	..	2	2	
								Sprat, ...	..	2	2	
								Pogge, ...	..	1	1	
									1664	5297	6961	
30. Same Place.	June 6.		..	..	15 to 16	10.45 a.m.	2.45 p.m.	Haddock, ...	98	70	..	4 full baskets of offal, viz., Com. Dab and Gurnard, mixed in proportion as before.
								Cod, ...	1	..	..	
								Whiting, ...	232	..	.	
								Herring, ...	..	4	..	
								Plaice, ...	183	..	..	
								Megrim, ...	1	..	..	
								Com. Dab, ..	242	..	..	
								Grey Skate, ..	6	..	..	
								Angler, ...	..	2	..	
									763	..	..	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Over-board.	Total No.	
31. Same Place.	1901. June 6.	..	..	..	14 to 20	3.30 p.m.	8.30 p.m.	Cod,	18	..	..	2¼ baskets of offal as before, Gurnards and Com. Dabs.
								Codling,	3	..	..	
								Haddock,	77	..	..	
								Whiting,	33	..	..	
								Saithe,	4	..	..	
								Hake,	1	..	..	
								Halibut,	3	..	..	
								Turbot,	1	..	..	
								Brill,	5	..	..	
								Plaice,	301	..	..	
								Lemon Sole,	5	..	..	
								Com. Dab,	448	..	..	
									899	..	..	
32. Aberdeen Bay, Cruden Quarries.	June 6.	..	..	..	,,	9.5 p.m.	2.5. a.m.	Cod,	47	..	..	2 baskets of offal, not enumerated.
								Whiting,	510	..	..	
								Saithe,	..	1	..	
								Hake,	..	2	..	
								Halibut,	2	..	..	
								Turbot,	1	..	..	
								Brill,	5	..	..	
								Plaice,	70	..	..	
								Lemon Sole,	3	..	..	
								Megrim,	1	..	..	
								Com. Dab,	134	..	..	
								Grey Skate,	..	5	..	
									773	8	..	
33. Same Place.	June 7.	..	..	..	,,	2.40 a.m.	7.40 a.m.	Cod,	3	..	..	2 baskets of offal, not enumerated.
								Haddock,	31	..	..	
								Whiting,	121	..	..	
								Ling,	1	..	..	
								Brill,	3	..	..	
								Plaice,	252	..	..	
								Lemon Sole,	1	..	..	
								Com. Dab,	346	..	..	
									758	..	..	
34. Same Place.	June 7.	12·2	9·6	9·4	9	8.15 a.m.	1.15 p.m.	Cod,	14	..	14	
								Codling,	1	2	3	
								Haddock,	40	106	146	
								Whiting,	50	..	50	
								Com. Gurnard,	..	152	152	
								Brill,	10	..	10	
								Black Sole,	1	..	1	
								Plaice,	92	..	92	
								Com. Dab,	141	446	587	
								Starry Ray,	..	8	8	
								Angler,	..	2	2	
									349	716	1065	
35. Aberdeen Bay, between Collieston and Black Dog.	June 7.	..	..	..	,,	2.0 p.m.	7.0 p.m.	Cod,	12	..	..	1 small basket of offal, not enumerated.
								Haddock,	56	..	..	
								Whiting,	134	..	..	
								Hake,	2	..	..	
								Brill,	1	..	..	
								Plaice,	423	..	..	
								Lemon Sole,	1	..	..	
								Flounder,	4	..	..	
								Com. Dab,	285	..	..	
								Thornback,	1	..	..	
									919	..	..	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Over-board.	Total No.	Remarks.
36. Same Place.	1901. June 7.	..	..	..	..	7.45 p.m.	11.45 p.m.	Cod, ...	10	..	..	¾ basket offal, not enumerated.
								Haddock, ...	78	..	..	
								Whiting, ...	679	..	..	
								Plaice, ...	456	..	..	
								Com. Dab, ...	230	..	..	
									1453	..	..	
37. Dog Hole, 11 miles S.S.E. off Aberdeen.	June 28.	13·0	11·4	9·0	65	1.32 p.m.	2.42 p.m.	Cod, ...	9	..	9	Steam Trawler "Strathearn." Small mesh net experiment.
								Codling, ...	..	10	10	
								Ling, ...	1	..	1	
								Haddock, ...	225	508	733	
								Whiting, ...	72	148	220	
								Saithe, ...	2	..	2	
								Com. Gurnard, ..	..	3	3	
								Plaice, ...	1	..	1	
								Lemon Sole, ..	27	..	27	
								Megrim, ...	12	..	12	
								Long Rough Dab,	..	179	179	
								Angler, ...	..	1	1	
									349	849	1198	
38. Lunan Bay.	June 28.	12·4	11·6	10·1	12½	7.20 p.m.	7.36 p.m.	Haddock, ...	..	21	21	Small mesh net experiment; trawl caught; 16 minutes down.
								Whiting, ...	..	5	5	
								Com. Gurnard, ..	..	3	3	
								Plaice, ...	19	..	19	
								Lemon Sole, ..	1	..	1	
								Com. Dab, ...	..	6	6	
								Long Rough Dab,	..	27	27	
									20	62	82	
39. Same Place.	June 28.	..	..	..	,,	8.20 p.m.	8.50 p.m.	Haddock, ...	34	..	34	
								Plaice, ...	35	..	35	
								Gemmeous Dragonet, ...	..	1	1	
								Flounder, ...	..	1	1	
									69	2	71	
40. Aberdeen Bay, off Black Dog and Newburgh.	June 29.	..	..	..	8	2.25 a.m.	6.25 a.m.	Cod, ...	1	..	1	
								Codling, ...	..	1	1	
								Haddock, ...	363	417	780	
								Whiting, ...	98	113	211	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	1	11	12	
								Plaice, ...	163	1	164	
								Com. Dab, ...	78	67	145	
								Long Rough Dab,	..	4	4	
								Flounder, ...	1	..	1	
								Angler, ...	..	2	2	
									706	616	1322	
41. Same Place, off Newburgh and Colliston.	June 29.	12·8	10·9	11·3	6 to 11	7.25 a.m.	11.25 a.m.	Cod, ...	1	..	1	
								Codling, ...	1	..	1	
								Haddock, ...	174	453	627	
								Whiting, ...	33	110	143	
								Com. Gurnard, ..	..	14	14	
								Plaice, ...	197	1	198	
								Com. Dab, ..	237	684	921	
								Long Rough Dab,	..	35	35	
								Flounder, ...	5	..	5	
								Red Gurnard, ..	..	1	1	
									648	1298	1946	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
	1901.											
42. Smith Bank, East Edge.	June 29.	11·3	11·2	10·6	30	9.40 p.m.	1.40 a.m.	Cod, ...	1		1	
								Codling, ...	1	..	1	
								Haddock, ...	1	4	5	
								Whiting, ...	..	23	23	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	40	40	
								Halibut, ...	1	..	1	
								Plaice, ...	9	..	9	
								Lemon Sole, ..	7	1	8	
								Com. Dab, ..	..	49	49	
								Long Rough Dab,	..	6	6	
									21	123	144	
43. Same Place, West Edge.	June 29.	9·10	10·0	10·3	31½	4.0 a.m.	8.0 a.m.	Codling, ...	3	2	5	
								Haddock, ...	288	117	405	
								Whiting, ...	8	19	27	
								Saithe, ...	2	..	2	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	165	165	
								Turbot, ...	1	..	1	
								Brill, ...	1	..	1	
								Plaice, ...	53	..	53	
								Lemon Sole, ..	2	..	2	
								Com. Dab, ..	..	15	15	
								Thornback, ..	2	3	5	
								Angler, ...	..	1	1	
									361	322	683	
44. Same Place.	June 29.	11·6	10·9	10·4	31½	9.5 a.m.	1.40 p.m.	Cod, ...	1	..	1	
								Codling, ...	..	3	3	
								Haddock, ...	238	87	325	
								Whiting, ...	11	8	19	
								Com. Gurnard, ..	..	110	110	
								Plaice, ...	65	..	65	
								Lemon Sole, ..	4	1	5	
								Com. Dab, ..	..	8	8	
								Long Rough Dab,	..	1	1	
								Thornback, ..	1	2	3	
								Pogge, ...	..	1	1	
									320	221	541	
45. Between Burghead and Hopeman.	July 1.	12·0	12·1	10·1	8 to 11	2.0 a.m.	6.0 a.m.	Cod, ...	5	..	5	
								Haddock, ...	51	81	132	
								Whiting, ...	..	38	38	
								Hake, ...	2	..	2	
								Com. Gurnard, ..	..	99	99	
								Plaice, ...	61	..	61	
								Lemon Sole, ..	5	2	7	
								Com. Dab, ...	3	40	43	
								Long Rough Dab,	..	2	2	
								Angler, ...	..	7	7	
									127	269	396	
46. Same Place.	July 1.	11·3	11·8	10·4	6 to 10	6.45 a.m.	10.45 a.m.	Cod, ...	2	..	2	
								Codling, ...	..	1	1	
								Haddock, ...	2	1	3	
								Com. Gurnard, ..	..	122	122	
								Plaice, ...	94	..	94	
								Com. Dab, ..	..	22	22	
								Thornback, ..	1	..	1	
								Angler, ...	..	3	3	
									99	149	248	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
47. Same Place.	1901. July 1.	11·5	11·4	10·6	7 to 12	11.35 a.m.	3.35 p.m.	Cod,	3	..	3	
								Codling,	1	2	3	
								Haddock,	54	91	145	
								Whiting,	..	23	23	
								Hake,	1	..	1	
								Com. Gurnard,	..	119	119	
								Cat-fish,	2	..	2	
								Brill,	1	..	1	
								Plaice,	61	..	61	
								Com. Dab,	..	33	33	
								Thornback,	3	..	3	
								Angler,	..	8	8	
									126	276	402	
48. Same Place.	July 1	10·7	11·0	10·6	7 to 15	4.10 p.m.	8.25 p.m.	Cod,	1	..	1	
								Codling,	..	1	1	
								Haddock,	87	151	238	
								Whiting,	5	20	25	
								Com. Gurnard,	..	49	49	
								Red Gurnard,	..	1	1	
								Herring,	..	1	1	
								Turbot,	2	..	2	
								Plaice,	86	3	89	
								Com. Dab,	4	53	57	
								Long Rough Dab,	..	2	2	
								Thornback,	5	..	5	
								Angler,	..	5	5	
									190	286	476	
49. Same Place.	July 1.	..	..	..	,,	8.45 p.m.	12.50 a.m.	Cod,	4	..	4	
								Codling,	..	3	3	
								Haddock,	42	70	112	
								Whiting,	20	32	52	
								Saithe,	..	1	1	
								Hake,	..	1	1	
								Com. Gurnard,	..	86	86	
								Plaice,	223	..	223	
								Lemon Sole,	5	..	5	
								Witch,	6	..	6	
								Com. Dab,	26	..	26	
								Thornback,	7	2	9	
								Angler,	..	14	14	
									333	209	542	
50. Same Place.	July 2.	10·0	10·8	10·4	7 to 10	1.50 a.m.	5.50 a.m.	Cod,	3	..	3	
								Codling,	..	1	1	
								Haddock,	26	37	63	
								Whiting,	7	6	13	
								Saithe,	1	..	1	
								Hake,	1	..	1	
								Herring,	..	2	2	
								Com. Gurnard,	..	50	50	
								Plaice,	64	7	71	
								Witch,	1	2	3	
								Com. Dab,	6	163	169	
								Long Rough Dab,	..	4	4	
								Thornback,	..	1	1	
								Pogge,	..	1	1	
								Dragonet,	..	1	1	
								Angler,	..	2	2	
								Norway Pout,	..	1	1	
									109	278	387	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
51. Off Dunrobin, Dornoch Firth.	1901. July 2.	11·4	12·0	12·5	10	9.0 a.m.	1.0 p.m.	Cod, ...	1	..	1	
								Haddock, ...	13	..	13	
								Com. Gurnard, ..	..	13	13	
								Plaice, ...	80	4	84	
								Thornback, ..	1	..	1	
								Angler, ...	..	1	1	
								Herring, ...	..	1	1	
								Sprat, ...	..	1	1	
									95	20	115	
52. Same Place.	July 2.	10·3	12·6	10·0	12 to 7	3.0 p.m.	7.0 p.m.	Cod, ...	1	..	1	
								Haddock, ...	41	..	41	
								Com. Gurnard, ..	..	21	21	
								Plaice, ...	89	5	94	
								Flounder, ...	..	1	1	
								Com. Dab, ...	2	13	15	
								Thornback, ..	1	..	1	
									134	40	174	
53. Same Place.	July 2.	..	..	..	,,	7.50 p.m.	12.2 a.m.	Cod, ...	1	..	1	
								Haddock, ...	153	11	164	
								Whiting, ...	..	1	1	
								Com. Gurnard, ..	..	27	27	
								Plaice, ...	126	13	139	
								Lemon Sole, ..	1	..	1	
								Flounder, ...	1	..	1	
								Com. Dab, ...	2	31	33	
								Grey Skate, ..	1	..	1	
								Thornback, ..	2	..	2	
								Angler, ...	..	1	1	
									287	84	371	
54. Same Place.	July 3.	..	..	..	,,	12.30 a.m.	4.30 a.m.	Haddock, ...	141	67	208	
								Whiting, ...	..	3	3	
								Com. Gurnard, ..	..	13	13	
								Plaice, ...	122	2	124	
								Com. Dab, ...	3	18	21	
								Angler, ...	..	3	3	
									266	106	372	
55. Same Place.	July 3.	..	..	..	10 to 12	5.10 a.m.	9.10 a.m.	Cod, ...	1	..	1	
								Codling, ...	..	1	1	
								Haddock, ...	44	13	57	
								Com. Gurnard, ..	..	17	17	
								Herring, ...	..	9	9	
								Sprat, ...	..	23	23	
								Plaice, ...	153	8	161	
								Flounder, ...	2	2	4	
								Com. Dab, ..	6	34	40	
								Thornback, ..	3	..	3	
								Angler, ...	..	3	3	
									209	110	319	
56. Same Place.	July 3.	10·8	12·2	11·6	10 to 12	10.20 a.m.	10.41 a.m.	Com. Gurnard, ..	..	1	1	Small mesh net experiment.
								Sprat, ...	..	2	2	
								Plaice, ...	6	..	6	
								Com. Dab, ..	..	9	9	
									6	12	18	

NORTH SEA INVESTIGATIONS—TABLE I.

Place	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
57. Same Place.	1901. July 3.	..	..	..	6½ to 12	11.15 a.m.	3.30 p.m.	Cod, ...	1	..	1	
								Haddock, ...	4	..	4	
								Com. Gurnard, ..	..	35	35	
								Sprat, ...	..	3	3	
								Plaice, ...	183	68	251	
								Flounder, ...	1	4	5	
								Com. Dab, ...	2	12	14	
								Thornback, ..	4	1	5	
								Angler, ...	..	2	2	
									195	125	320	
58. Same Place.	July 3.	..	..	..	5 to 12	4.0 p.m.	8.5 p.m.	Cod, ...	2	..	2	
								Haddock, ...	22	..	22	
								Com. Gurnard, ..	..	14	14	
								Plaice, ...	68	4	72	
								Com. Dab, ...	3	3	6	
								Thornback, ..	1	..	1	
								Angler, ...	..	3	3	
									96	24	120	
59. Deep Hole, off Kinnaird Head.	July 4.	10·1	11·4	9·7	83 to 85	8.3 a.m.	8.53 a.m.	Cod, ...	3	..	3	Small mesh net experiment.
								Codling, ...	2	1	3	
								Haddock, ...	111	92	203	
								Whiting, ...	48	66	114	
								Cat-fish, ...	1	..	1	
								Lemon Sole, ..	..	4	4	
								Megrim, ...	2	..	2	
								Witch, ...	25	..	25	
								Long Rough Dab,	..	41	41	
									192	204	396	
60. Aberdeen Bay, Cruden Skerries to the Black Dog.	July 4.	..	..	..	5½ to 20	9.10 p.m.	1.10 a.m.	Cod, ...	3	..	3	
								Codling, ...	..	4	4	
								Haddock, ...	239	595	834	
								Whiting, ...	722	363	1085	
								Saithe, ...	1	1	2	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	87	87	
								Plaice, ...	97	4	101	
								Lemon Sole, ..	5	1	6	
								Com. Dab, ...	209	713	922	
								Long Rough Dab,	..	82	82	
								Cuckoo, or Sandy Ray, ...	..	1	1	
								Starry Ray, ..	..	1	1	
								Angler, ...	..	6	6	
									1277	1858	3135	
61. Same Place.	July 5.	12·4	12·0	11·9	8 to 15	2.15 a.m.	6.30 a.m.	Cod, ...	4	..	4	
								Codling, ...	..	14	14	
								Haddock, ...	1824	831	2655	
								Whiting, ...	47	34	81	
								Com. Gurnard, ..	..	63	63	
								Herring, ...	..	88	88	
								Sprat, ...	..	1	1	
								Brill, ...	1	..	1	
								Plaice, ...	307	24	331	
								Flounder, ...	..	1	1	
								Com. Dab, ..	572	1030	1602	
								Long Rough Dab,	..	10	10	
								Grey Skate, ..	..	2	2	
								Thornback, ..	..	1	1	
								Angler, ...	..	8	8	
									2755	2107	4862	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Over-board.	Total No.	
62. Aberdeen Bay, off Collieston.	1901. July 5.	..	..	..	10	11.40 a.m.	12.20 p.m.	Cod, ...	2	..	2	Small mesh net experiment.
								Codling, ...	..	6	6	
								Haddock, ...	10	3	13	
								Whiting, ...	1	11	12	
								Com. Gurnard, ..	..	12	12	
								Brill, ...	1	..	1	
								Plaice, ...	19	..	19	
								Com. Dab, ...	18	158	176	
								Grey Skate, ..	..	4	4	
								Angler, ...	..	4	4	
									51	198	249	
63. Same Place.	July 5.	..	..	..	8 to 12	1.5 p.m.	5.5 p.m.	Cod, ...	1	..	1	
								Codling, ...	..	4	4	
								Haddock, ...	2144	2125	4269	
								Whiting, ...	129	40	169	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	16	16	
								Herring, ...	..	10	10	
								Turbot, ...	2	..	2	
								Brill, ...	2	..	2	
								Plaice, ...	322	4	326	
								Lemon Sole, ..	2	1	3	
								Flounder, ...	..	1	1	
								Com. Dab, ...	132	884	1016	
								Grey Skate, ..	..	4	4	
								Thornback, ..	..	2	2	
								Sandy Ray, ..	..	1	1	
								Angler, ...	..	2	2	
									2735	3094	5829	
64. Dog Hole, 11 miles S.E. by S. ½-S. from Aberdeen.	July 30.	16·8	14·8	13·9	62	1.30 p.m.	2.36 p.m.	Cod, ...	5	..	5	Steam Trawler "Strathclyde." Small mesh net experiment.
								Codling, ...	29	17	46	
								Ling, ...	7	..	7	
								Haddock, ...	188	139	327	
								Whiting, ...	18	17	35	
								Saithe, ...	1	..	1	
								Com. Gurnard, ..	..	8	8	
								Lemon Sole, ..	83	3	86	
								Megrim, ...	10	..	10	
								Grey Skate, ..	2	..	2	
								Starry Ray, ..	1	..	1	
								Angler, ...	..	5	5	
									344	189	533	
65. Aberdeen Bay, off Newburgh.	July 30.	12·2	12·8	13·4	6 to 10	7·15 p.m.	11.26 p.m.	Cod, ...	1	..	1	
								Codling, ...	..	22	22	
								Haddock, ...	684	309	993	
								Whiting, ...	42	..	42	
								Com. Gurnard, ..	25	266	291	
								Turbot, ...	4	..	4	
								Brill, ...	2	..	2	
								Plaice, ...	696	55	751	
								Lemon Sole, ..	7	15	22	
								Flounder, ...	..	1	1	
								Com. Dab, ...	239	4480	4719	
								Long Rough Dab,	..	35	35	
								Thornback, ..	4	1	5	
								Sand-eel, ...	..	3	3	
								Angler, ...	..	33	33	
									1704	5220	6924	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Over-board.	Total No.	Remarks.
66. Opposite Ythan.	1901. July 31.	14·6	13·4	14·1	11 to 13	11.52 a.m.	12.37 p.m.	Codling, ...	2	16	18	Small mesh net experiment.
								Haddock, ...	94	20	114	
								Whiting, ...	59	132	191	
								Com. Gurnard, ..	8	17	25	
								Plaice, ...	49	1	50	
								Lemon Sole, ..	4	..	4	
								Com. Dab, ...	75	70	145	
								Long Rough Dab,	..	8	8	
								Angler, ...	..	1	1	
									291	265	556	
67. Same Place.	July 31.	..	..	..	8 to 12	2·0 p.m.	6.10 p.m.	Codling, ...	2	41	43	
								Haddock, ...	683	81	764	
								Whiting, ...	238	193	431	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	13	103	116	
								Herring, ...	..	1	1	
								Brill, ...	1	..	1	
								Turbot, ...	3	..	3	
								Plaice, ...	468	9	477	
								Lemon Sole, ..	11	5	16	
								Flounder, ...	..	2	2	
								Com. Dab, ..	338	5378	5716	
								Long Rough Dab,	..	4	4	
								Angler, ...	..	6	6	
									1758	5823	7581	
68. Burghead Bay, Moray Firth.	Aug. 2.	14	14·7	11·4	5½ to 15	5.15 a.m.	8.15 a.m.	Codling, ...	..	1	1	
								Haddock, ...	143	144	287	
								Whiting, ...	19	17	36	
								Com. Gurnard, ..	..	235	235	
								Red Gurnard, ..	..	1	1	
								Brill, ...	1	..	1	
								Plaice, ...	165	1	166	
								Lemon Sole, ..	3	7	10	
								Witch, ...	..	2	2	
								Com. Dab, ..	65	386	451	
								Long Rough Dab,	..	32	32	
								Thornback, ..	25	..	25	
								Solenette, ...	..	1	1	
								Angler, ...	..	19	19	
									421	846	1267	
69. Same Place.	Aug. 2.	..	..	..	5 to 25	8.45 a.m.	12.20 p.m.	Cod, ...	1	..	1	
								Codling, ...	..	2	2	
								Haddock, ...	44	59	103	
								Whiting, ...	5	6	11	
								Saithe, ...	..	2	2	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	..	182	182	
								Brill, ...	4	..	4	
								Plaice, ...	157	23	180	
								Lemon Sole, ..	2	..	2	
								Witch, ...	..	2	2	
								Com. Dab, ..	32	296	328	
								Long Rough Dab,	..	10	10	
								Thornback, ..	11	1	12	
								Angler, ...	..	9	9	
									257	592	849	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
70. Same Place.	1901. Aug. 2.	14·9	14.6	15·5	5 to 25	1.0 p.m.	4.15 p.m.	Cod, ...	2		2	Net split.
								Codling, ...	..	1	1	
								Haddock, ...	124	181	305	
								Whiting, ...	40	17	57	
								Hake, ...	13	..	13	
								Com. Gurnard, ..	..	23	23	
								Plaice, ...	25	2	27	
								Witch, ...	11	1	12	
								Com. Dab, ...	..	117	117	
								Long Rough Dab,	..	3	3	
								Angler, ...	..	3	3	
									215	348	563	
71. Same Place.	Aug. 2.	..	..	..	,,	5.0 p.m.	8.10 p.m.	Cod, ...	5	..	5	
								Codling, ...	..	3	3	
								Haddock, ...	74	131	205	
								Whiting, ...	7	13	20	
								Hake, ...	2	..	2	
								Com. Gurnard, ..	..	201	201	
								Red Gurnard, ..	..	4	4	
								Plaice, ...	142	11	153	
								Lemon Sole, ..	3	8	11	
								Com. Dab, ...	41	534	575	
								Long Rough Dab,	..	3	3	
								Thornback, ..	16	..	16	
								Sandy Ray, ..	..	1	1	
								Grey Skate, ..	..	1	1	
								Solenette, ...	..	1	1	
								Angler, ...	2	12	14	
									292	923	1215	
72. Same Place.	Aug. 3.	..	..	..	,,	12.55 a.m.	4.0 a.m.	Codling, ...	..	6	6	
								Haddock, ...	16	59	75	
								Whiting, ...	6	19	25	
								Com. Gurnard, ..	..	255	255	
								Red Gurnard, ..	..	1	1	
								Cat-fish, ...	1	..	1	
								Brill, ...	1	..	1	
								Plaice, ...	263	13	276	
								Lemon Sole, ..	5	6	11	
								Com. Dab, ...	98	881	979	
								Long Rough Dab,	..	2	2	
								Thornback, ..	22	4	26	
								Solenette, ...	..	1	1	
								Angler, ...	..	20	20	
									412	1267	1679	
73. Off Dunrobin, Dornoch Firth.	Aug. 3.	14·9	13·7	12·1	5 to 11	10.10 a.m.	1.15 p.m.	Cod, ...	5	..	5	
								Codling, ...	1	1	2	
								Haddock, ...	7	..	7	
								Com. Gurnard, ..	..	61	61	
								Plaice, ...	780	1197	1977	
								Flounder, ...	..	24	24	
								Com. Dab, ...	23	461	484	
								Solenette, ...	..	2	2	
								Thornback, ..	8	2	10	
									824	1748	2572	
74. Same Place.	Aug. 3.	..	..	..	,,	9.45 p.m.	1.0 a.m.	Cod, ...	3	..	3	
								Codling, ...	..	1	1	
								Haddock, ...	1	2	3	
								Whiting, ...	1	..	1	
								Com. Gurnard, ..	..	41	41	
								Plaice, ...	343	229	572	
								Flounder, ...	..	19	19	
								Com. Dab, ...	3	259	262	
								Thornback, ..	..	1	1	
								Starry Ray, ..	4	..	4	
								Angler, ...	..	2	2	
									355	554	909	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
75. Same Place.	1901. Aug. 5.	..	..	..	5 to 11	2.35 a.m.	5.45 a.m.	Cod, ...	6	..	6	
								Codling, ...	..	2	2	
								Haddock, ...	6	1	7	
								Com. Gurnard, ..	..	121	121	
								Plaice, ...	811	538	1349	
								Lemon Sole, ..	..	1	1	
								Flounder, ...	..	35	35	
								Com. Dab, ...	24	862	886	
								Solenette, ...	..	3	3	
								Thornback, ..	4	2	6	
								Angler, ...	..	4	4	
									851	1569	2420	
76. Same Place.	Aug. 5.	12·2	13·2	13·8	,,	6.15 a.m.	7·5 a.m.	Haddock, ...	1	..	1	Small mesh net experiment.
								Com. Gurnard, ..	..	19	19	
								Plaice, ...	68	19	87	
								Flounder, ...	..	7	7	
								Com. Dab, ...	2	31	33	
								Thornback, ..	1	1	2	
								Angler, ...	..	1	1	
									72	78	150	
77. Same Place.	Aug. 5.	..	..	..	,,	12.30 p.m.	3.40 p.m.	Cod, ...	1	..	1	
								Codling, ...	..	2	2	
								Haddock, ...	2	..	2	
								Com. Gurnard, ..	..	96	96	
								Plaice, ...	1330	1021	2351	
								Flounder, ...	..	21	21	
								Com. Dab, ...	66	317	383	
								Thornback, ..	11	1	12	
								Angler, ...	..	1	1	
									1410	1459	2869	
78. Same Place.	Aug. 6.	..	..	..	,,	11.55 p.m.	3.5 a.m.	Codling, ...	..	1	1	
								Haddock, ...	2	1	3	
								Whiting, ...	..	1	1	
								Com. Gurnard, ..	..	123	123	
								Plaice, ...	659	669	1328	
								Lemon Sole, ..	1	2	3	
								Flounder, ...	..	27	27	
								Com. Dab, ...	52	814	866	
								Solenette, ...	..	1	1	
								Thornback, ..	7	4	11	
								Angler, ...	..	6	6	
									721	1649	2370	
79. Same Place.	Aug. 6.	11·9	12·8	12·1	,,	3.50 a.m.	7.5 a.m.	Cod, ...	2	..	2	
								Haddock, ...	1	1	2	
								Com. Gurnard, ..	..	139	139	
								Plaice, ...	705	368	1073	
								Flounder, ...	..	27	27	
								Com. Dab, ...	50	455	505	
								Solenette, ...	..	1	1	
								Thornback, ..	5	..	5	
								Angler, ...	..	1	1	
								Dragonet, ...	..	1	1	
									763	993	1756	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
80. Same Place.	1901. Aug. 6.	.	..	.	5 to 11	7.45 a.m.	10.55 a.m.	Cod, ...	3	..	3	
								Haddock, ...	2	..	2	
								Com. Gurnard, ..	..	102	102	
								Plaice, ...	482	327	809	
								Flounder, ...	..	17	17	
								Com. Dab, ...	24	301	325	
								Angler, ...	..	3	3	
									511	750	1261	
81. Same Place.	Aug. 6.	..	..	..	,,	11.10 a.m.	2.20 p.m.	Com. Gurnard, ..	..	58	58	
								Plaice, ...	743	542	1285	
								Flounder, ...	..	17	17	
								Com. Dab, ...	32	220	252	
								Thornback, ..	9	..	9	
								Angler, ...	..	4	4	
									784	841	1625	
82. Dog Hole, about 10 miles off Aberdeen.	Aug. 21.	15·6	13·3	..	58	2.10 p.m.	3.33 p.m.	Cod, ...	1	..	1	S.T. "Star of Hope." Small-mesh net experiment.
								Codling, ...	22	47	69	
								Ling, ...	2	..	2	
								Haddock, ...	554	12	566	
								Whiting, ...	51	7	58	
								Hake, ...	1	..	1	
								Cat-fish, ...	1	..	1	
								Com. Gurnard, ..	..	13	13	
								Plaice, ...	1	..	1	
								Lemon Sole, ..	87	8	95	
								Com. Dab, ...	..	131	131	
								Long Rough Dab,	..	104	104	
								Megrim, ...	8	..	8	
								Grey Skate, ..	1	..	1	
								Starry Ray, .	6	..	6	
								Angler, ...	..	1	1	
									735	323	1058	
83. Aberdeen Bay, off Colliston.	Sept. 4.	11·4	12·4	55	8 to 9	6.15 a.m.	9.45 a.m.	Codling, ...	..	14	14	S.T. "Ocean King."
								Haddock, ...	3669	51	3720	
								Whiting, ...	110	93	203	
								Com. Gurnard, ..	..	38	38	
								Flounder, ...	9	..	9	
								Com. Dab, ...	219	1142	1361	
								Plaice, ...	420	36	466	
								Turbot, ...	4	..	4	
								Brill, ...	1	..	1	
								Lemon Sole, ..	3	1	4	
								Angler, ...	..	3	3	
								Thornback Ray, ..	..	2	2	
									4435	1380	5815	
84. Aberdeen Bay, off Newburgh.	Sept. 4.	..	..	..	10	12.12 p.m.	12.46 p.m.	Codling, ...	..	23	23	Small-mesh net experiment.
								Haddock, ...	493	57	550	
								Whiting, ...	1	12	13	
								Com. Gurnard, ..	..	6	6	
								Plaice, ...	40	2	42	
								Flounder, ...	1	..	1	
								Com. Dab, ...	1	243	244	
								Lemon Sole, ..	1	..	1	
								Angler, ...	..	1	1	
									537	344	881	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard	Total No.	
85. Aberdeen Bay, off Belhelvie	1901. Sept. 4.	..	..	..	9 to 10	1.28 p.m.	2.10 p.m.	Codling, ...	..	26	26	Small-mesh net experiment.
								Haddock, ...	1032	54	1086	
								Whiting, ...	..	36	36	
								Com. Gurnard, ..	..	35	35	
								Com. Dab, ...	575	731	1306	
								Plaice, ...	148	7	155	
								Turbot, ...	1	..	1	
								Lemon Sole, ..	3	..	3	
								Starry Ray, ..	..	1	1	
									1759	890	2649	
86. Spey Bay, Moray Firth.	Sept. 6.	..	..	..	7 to 9	10.55 a.m.	11.55 a.m.	Codling, ...	4	..	4	Net damaged.
								Haddock, ...	16	..	16	
								Lythe, ...	6	..	6	
								Plaice, ...	10	..	10	
								Com. Dab, ...	18	..	18	
								Com. Gurnard, ..	..	298	298	
									54	298	352	
87. Burghead Bay.	Sept. 6.	..	..	..	7½	2.5 p.m.	3.5 p.m.	Haddock, ...	9	..	9	Small-mesh net experiment.
								Whiting, ...	1	..	1	
								Plaice, ...	44	..	44	A 1¾-inch cod end was used on the Otter Trawl.
								Com. Dab, ...	38	117	155	
								Turbot, ...	1	..	1	
								Com. Gurnard, ..	..	2	2	
								Angler, ...	..	1	1	
								Thornback Ray, ..	..	1	1	
									93	121	214	
88. Dornoch Firth, off Dunrobin Castle.	Sept. 6.	..	..	..	10	6.5 p.m.	9.5 p.m.	Haddock, ...	4	..	4	
								Plaice, ...	57	..	57	
									61	..	61	
89. Same Place.	Sept. 6.	..	..	.	6 to 10	9.55 p.m.	2.10 a.m.	Haddock, ...	2	..	2	
								Plaice, ...	128	..	128	
								Brill, ...	2	..	2	
									132	..	132	
90. Burghead Bay.	Sept. 7.	..	..	..	6 to 8	6.15 a.m.	10.15 a.m.	Cod, ...	2	..	2	
								Codling, ...	..	14	14	
								Haddock, ...	423	..	423	
								Whiting, ...	..	14	14	
								Plaice, ...	147	..	147	
								Com. Dab, ...	88	219	307	
								Brill, ...	1	..	1	
								Com. Gurnard, ..	..	97		
								Thornback Ray, ..	2	..	2	
									663	344	1007	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Air.	Surface.	Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
91. Burghead Bay.	1901.	..	..	..	7	10.20 a.m.	4.20 p.m.	Codling, ...	1	20	21	
								Haddock, ...	132	..	132	
								Plaice, ...	257	1	258	
								Com. Dab, ...	109	228	337	
								Solenette, ...	..	1	1	
								Com. Gurnard, ..	..	118	118	
								Thornback, ..	2	..	2	
								Angler, ...	..	4	4	
									501	372	873	
92. Same Place.	Sept. 7.	..	..	..	5½ to 8	4.45 p.m.	8.8 p.m.	Cod, ...	10	..	10	
								Codling, ...	..	3	3	
								Haddock, ...	64	2	66	
								Whiting, ...	..	4	4	
								Plaice, ...	128	6	134	
								Com. Dab, ...	69	207	276	
								Brill, ...	1	..	1	
								Lemon Sole, ..	5	..	5	
								Com. Gurnard, ..	..	114	114	
								Angler, ...	..	5	5	
									277	341	618	
93. Same Place.	Sept. 9.	..	..	..	6 to 8	5.0 a.m.	9.5 a.m.	Cod, ...	1	..	1	
								Codling, ...	..	117	117	
								Haddock, ...	23	..	23	
								Whiting, ...	..	4	4	
								Plaice, ...	191	..	191	
								Com. Dab, ...	100	398	498	
								Brill, ...	1	..	1	
								Com. Gurnard, ..	..	100	100	
								Thornback Ray, ..	4	..	4	
									320	619	939	
94. Same Place.	Sept. 9.	..	..	..	6 to 8	9.30 a.m.	1.30 p.m.	Haddock, ...	3	4	7	
								Cod, ...	1	..	1	
								Whiting, ...	..	7	7	
								Plaice	276	17	293	
								Com. Dab, ...	210	375	585	
								Lemon Sole, ..	1	..	1	
								Turbot, ...	1	..	1	
								Brill, ...	6	..	6	
								Com. Gurnard, ..	..	136	136	
								Angler, ...	..	3	3	
								Grey Skate, ..	2	..	2	
									500	542	1042	
95. Same Place.	Sept. 9.	..	..	..	,,	2.0 p.m.	6.0 p.m.	Codling, ...	..	2	2	
								Haddock, ...	37	..	37	
								Whiting, ...	..	3	3	
								Plaice, ...	63	5	68	
								Com. Dab, ..	13	77	90	
								Com. Gurnard, ..	..	15	15	
									113	102	215	
96. Aberdeen Bay, off Newburgh.	Sept. 10.	..	..	..	7 to 9	9.50 a.m.	10.55 a.m.	Codling, ...	..	4	4	Small-mesh net experiment, with 1¾-inch cod end.
								Haddock, ...	133	160	293	
								Whiting, ...	..	26	26	
								Plaice, ...	62	8	70	
								Com. Dab, ..	37	3	40	
								Lemon Sole, ..	7	..	7	
									239	201	440	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market	No. thrown Over-board.	Total No.	
97. Aberdeen Bay, off Newburgh.	1901. Sept. 10.	..	..	..	6 to 9	4.0 p.m.	8.3 p.m.	Cod,	4	..	4	
								Codling,	9	5	14	
								Haddock,	2108	..	2108	
								Whiting,	118	19	137	
								Plaice,	105	..	105	
								Com. Dab,	80	58	138	
								Lemon Sole,	9	3	12	
								Com. Gurnard,	..	12	12	
								Grey Skate,	1	..	1	
									2434	97	2531	
98. Dog Hole, $12\frac{3}{4}$ miles S.E. from Girdleness.	Nov. 5.	10·4	11·1	11·1	70	2.15 p.m.	3.50 p.m.	Codling,	25	..	25	S. T. "Loch Ryan." Small-mesh net experiment.
								Haddock,	212	43	255	
								Whiting,	..	50	50	
								Com. Gurnard,	..	35	35	
								Turbot,	2	..	2	
								Plaice,	1	..	1	
								Lemon Sole,	42	..	42	
								Megrim,	18	..	18	
								Witch,	22	..	22	
								Com. Dab,	22	..	22	
								Long Rough Dab,	..	52	52	
								Grey Skate,	4	4	8	
								Starry Ray,	..	7	7	
								Angler,	..	5	5	
									348	196	544	
99. Aberdeen Bay, off Newburgh.	Nov. 5.	..	..	..	7 to 20	6.0 p.m.	10.10 p.m.	Cod,	1	..	1	
								Codling,	34	5	39	
								Haddock,	878	42	920	
								Whiting,	377	85	462	
								Com. Gurnard,	44	27	71	
								Turbot,	1	..	1	
								Plaice,	345	29	374	
								Lemon Sole,	1	4	5	
								Com. Dab,	405	1339	1744	
								Long Rough Dab,	..	57	57	
								Solenette,	..	1	1	
								Thornback,	..	1	1	
								Spotted Ray,	..	1	1	
								Starry Ray,	..	8	8	
								Pogge,	..	5	5	
								Dragonet,	..	1	1	
								Angler,	..	8	8	
									2086	1613	3699	
100. Same Place.	Nov. 6.	..	..	..	8 to 13	2.55 a.m.	6.55 a.m.	Codling,	14	..	14	
								Haddock,	1863	71	1934	
								Whiting,	550	108	658	
								Com. Gurnard,	3	11	14	
								Turbot,	2	..	2	
								Plaice,	44	1	45	
								Com. Dab,	173	565	738	
								Long Rough Dab,	..	12	12	
								Thornback,	..	1	1	
								Starry Ray,	..	11	11	
								Pogge,	..	5	5	
								Angler,	..	2	2	
									2649	787	3436	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
101. Aberdeen Bay, off Newburgh.	1901. Nov. 6.	..	..	..	7 to 10	8.0 a.m.	12.20 p.m.	Codling, ...	11	13	24	
								Haddock, ...	254	59	313	
								Whiting, ...	..	661	661	
								Com. Gurnard, ..	13	20	33	
								Turbot, ...	1	..	1	
								Brill, ...	3	..	3	
								Plaice, ...	1712	106	1818	
								Flounder, ...	97	..	97	
								Com. Dab, ...	566	423	989	
								Long Rough Dab,	..	6	6	
								Thornback, ..	..	1	1	
								Starry Ray, ..	..	16	16	
									2657	1305	3962	
102. Same Place.	Nov. 6.	11·2	10·6	10·4	6 to 13	1.0 p.m.	1.35 p.m.	Haddock, ...	2	..	2	Small-mesh net experiment.
								Plaice, ...	789	..	789	
								Flounder, ...	12	..	12	
									803	..	803	
103. B'tween Coastguard and Black Dog.	Nov. 6.	..	..	..	6 to 7	2.45 p.m.	6.45 p.m.	Codling, ...	34	9	43	
								Whiting, ...	37	144	181	
								Haddock, ...	343	183	526	
								Com. Gurnard, ..	8	7	15	
								Turbot, ...	11	..	11	
								Plaice, ...	1254	126	1380	
								Lemon Sole, ..	..	1	1	
								Flounder, ...	33	..	33	
								Com. Dab, ...	809	553	1362	
								Pogge, ...	..	1	1	
									2529	1024	3553	
104. Off Lybster, Caithness.	Nov. 8.	..	..	..	23 to 31	1.0 a.m.	5.0 a.m.	Cod, ...	5	..	5	
								Codling, ...	111	3	114	
								Haddock, ...	60	115	175	
								Whiting, ...	242	63	305	
								Brassie, ...	..	54	54	
								Com. Gurnard, ..	12	194	206	
								Red Gurnard, ..	..	7	7	
								Brill, ...	2	..	2	
								Plaice, ...	12	..	12	
								Lemon Sole, ..	84	95	179	
								Com. Dab, ...	7	685	692	
								Long Rough Dab,	..	57	57	
								Solenette, ...	..	3	3	
								Sandy Ray, ..	..	1	1	
								Grey Skate, ..	7	..	7	
								Starry Ray, ..	..	12	12	
								Thornback, ..	..	28	28	
								Angler, ...	..	36	36	
								Pogge, ...	..	15	15	
								Dragonet, ...	..	7	7	
								Conger Eel, ..	4	..	4	
								Norway Pout, ..	..	1	1	
									546	1376	1922	
105. Smith Bank.	Nov. 8.	10·2	10·3	10·2	26	9.10 a.m.	10.15 a.m.	Cod, ...	6	..	6	Small-mesh net experiment.
								Codling, ...	15	..	15	
								Haddock, ...	6	..	6	
								Com. Gurnard, ..	..	37	37	
								Plaice, ...	13	..	13	
								Lemon Sole, ..	20	..	20	
								Com. Dab, ...	34	17	51	
								Starry Ray, ..	..	1	1	
								Angler, ...	..	1	1	
									94	56	150	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
106. Off Golspie, Dornoch Firth.	1901. Nov. 8.	..	..	..	7 to 10	3.10 p.m.	7.20 p.m.	Cod, ...	4	..	4	
								Codling, ...	18	22	40	
								Haddock, ...	2	..	2	
								Whiting, ...	8	66	74	
								Hake, ...	1	..	1	
								Com. Gurnard, ..	53	29	82	
								Brill, ...	9	..	9	
								Plaice, ...	2650	271	2921	
								Lemon Sole, ..	9	4	13	
								Megrim, ...	1	..	1	
								Com. Dab, ...	494	1407	1901	
								Solenette, ...	..	2	2	
								Grey Skate, ..	..	3	3	
								Thornback, ..	17	..	17	
								Angler, ...	..	3	3	
								Pogge, ...	..	8	8	
								Dragonet, ...	..	2	2	
									3266	1817	5083	
107. Same Place.	Nov. 9.	10·2	10·0	10·1	7 to 10	5.45 a.m.	9.50 a.m.	Codling, ...	9	7	16	
								Haddock, ...	1	..	1	
								Whiting, ...	2	13	15	
								Com. Gurnard, ..	..	11	11	
								Herring, ...	..	1	1	
								Plaice, ...	2019	..	2019	
								Lemon Sole, ..	35	14	49	
								Com. Dab, ..	428	1371	1799	
								Grey Skate, ..	..	8	8	
								Thornback, ..	18	..	18	
								Angler, ...	..	6	6	
								Pogge, ...	..	1	1	
									2512	1432	3944	
108. Same Place.	Nov. 9.	..	..	..	9 to 13	10.50 a.m.	3.0 p.m.	Cod, ...	1	..	1	
								Codling, ...	45	1	46	
								Haddock, ...	17	..	17	
								Whiting, ...	20	1	21	
								Com. Gurnard, ..	27	..	27	
								Herring, ...	..	1	1	
								Halibut, ...	1	..	1	
								Brill, ...	6	..	6	
								Plaice, ...	2126	..	2126	
								Black Sole, ..	1	..	1	
								Lemon Sole, ..	12	..	12	
								Megrim, ...	1	..	1	
								Com. Dab, ..	260	596	856	
								Grey Skate, ..	4	..	4	
								Angler, ...	..	2	2	
									2521	601	3122	
109. Same Place, off Dunrobin Castle.	Nov. 9.	..	..	..	"	3.30 p.m.	7.15 p.m.	Cod, ...	15	..	15	
								Codling, ...	22	5	27	
								Haddock, ...	31	..	31	
								Whiting, ...	31	27	58	
								Com. Gurnard, ..	10	11	21	
								Brill, ...	13	..	13	
								Plaice, ...	1769	..	1769	
								Lemon Sole, ..	14	5	19	
								Com. Dab, ...	443	885	1328	
								Grey Skate, ..	..	4	4	
								Thornback, ..	12	..	12	
								Angler, ...	..	4	4	
								Pogge, ...	..	1	1	
									2360	942	3302	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Over-board.	Total No.	Remarks.
110. Dornoch.	1901. Nov. 10.	..	..	..	9 to 13	6.0 p.m.	10.30 p.m.	Cod, ...	6	..	6	
								Codling, ...	..	10	10	
								Haddock, ...	1	..	1	
								Whiting, ...	5	9	14	
								Com. Gurnard, ..	12	5	17	
								Brill, ...	3	..	3	
								Plaice, ...	1493	..	1493	
								Lemon Sole, ..	5	1	6	
								Witch, ...	1	..	1	
								Com. Dab, ...	268	228	496	
								Grey Skate, ..	6	..	6	
								Angler, ...	..	4	4	
								Pogge, ...	..	1	1	
								Gobius minutus, ..	..	1	1	
									1800	259	2059	
111. Same Place.	Nov. 11.	..	..	..	,,	5.30 a.m.	9.40 a.m.	Codling, ...	10	..	10	
								Whiting, ...	49	..	49	
								Com. Gurnard, ..	7	..	7	
								Brill, ...	3	..	3	
								Plaice, ...	437	..	437	Net split.
								Lemon Sole, ..	4	..	4	
								Black Sole, ..	1	..	1	
								Megrim, ...	1	..	1	
								Com. Dab, ...	177	..	177	
								Grey Skate, ..	..	2	2	
								Angler, ...	..	2	2	
									689	4	693	
112. Same Place.	Nov. 11.	..	..	..	,,	11.40 a.m.	3.15 p.m.	Codling, ...	2	1	3	
								Whiting, ...	..	9	9	
								Com. Gurnard, ..	9	5	14	
								Herring, ...	..	3	3	
								Brill, ...	7	..	7	
								Plaice, ...	849	..	849	
								Lemon Sole, ..	6	..	6	
								Com. Dab, ..	164	269	433	
								Grey Skate, ..	..	4	4	
									1037	291	1328	
113. Same Place.	Nov. 11.	6·2	8·4	9·8	8	4.30 p.m.	5.45 p.m.	Haddock, ...	..	1	1	Small-mesh net experiment.
								Whiting, ...	..	33	33	
								Com. Gurnard, ..	..	7	7	
								Brill, ...	1	..	1	
								Plaice, ...	217	12	229	
								Lemon Sole, ..	6	..	6	
								Com. Dab, ..	23	36	59	
								Solenette, ...	..	1	1	
								Grey Skate, ..	..	1	1	
									247	91	338	
114. Dog Hole, 9 miles S.E. by E. from Girdleness.	Nov. 28.	10·2	9·1	9·8	68	3.15 p.m.	4.30 p.m.	Cod, ...	4	..	4	S.T. "Star of Hope." Small-mesh net experiment.
								Codling, ...	..	4	4	
								Haddock, ...	52	21	73	
								Whiting, ...	5	7	12	
								Com. Dab, ..	..	12	12	
								Lemon Sole, ..	5	..	5	
								Long Rough Dab,	..	18	18	
								Witch, ...	3	..	3	
								Gurnard, ...	..	1	1	
								Angler, ...	..	1	1	
								Starry Ray, ..	..	7	7	
								Grey Skate, ..	..	1	1	
									69	72	141	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
115. Aberdeen Bay.	1901. Nov. 28.	..	..	..	7 to 12	7.15 p.m.	11.20 p.m.	Cod, ...	10	..	10	
								Codling, ...	56	..	56	
								Haddock, ...	186	..	186	
								Whiting, ...	170	..	170	
								Plaice, ...	54	..	54	
								Com. Dab, ...	63	..	63	
								Starry Ray, ..	122	..	122	
									661	..	661	
117. Aberdeen Bay, between Black Dog and Belhelvie.	Nov. 29.	..	..	..	18 to 11	4.30 p.m.	5.50 p.m.	Cod, ...	5	..	5	
								Codling, ...	3	..	3	
								Haddock, ...	3	..	3	
								Whiting, ...	..	5	5	
								Plaice, ...	1	..	1	
								Long Rough Dab,	..	3	3	
								Starry Ray, ..	..	12	12	
									12	20	32	
118. Aberdeen Bay. Shot off Belhelvie, proceeded to near Cruden Scars and back.	Nov. 29.	8·2	7·6	7·7	13 to 15	6.20 p.m.	10.20 p.m.	Cod, ...	4	..	4	
								Codling, ...	59	55	114	
								Haddock, ...	119	..	119	
								Whiting, ...	..	217	217	
								Plaice, ...	10	..	10	
								Com. Dab, ...	6	10	16	
								Lemon Sole, ..	11	5	16	
								Angler, ...	..	2	2	
								Grey Skate, ..	1	..	1	
								Starry Ray, ..	47	55	102	
									257	344	601	
119. Dog Hole, 9 miles S.E. from Aberdeen.	Dec. 16.	12·2	..	7·9	57	1.25 p.m.	2.25 p.m.	Codling, ...	59	5	64	S.T. "Star of Peace." Small-mesh net experiment.
								Ling, ...	2	..	2	
								Haddock, ...	430	207	637	
								Whiting, ...	24	37	61	
								Red Gurnard, ..	..	1	1	
								Plaice, ...	1	..	1	
								Lemon Sole, ..	62	14	76	
								Megrim, ...	4	..	4	
								Witch, ...	1	..	1	
								Com. Dab, ...	..	114	114	
								Long Rough Dab,	..	267	267	
								Norway Pout, ..	..	4	4	
								Grey Skate, ..	..	1	1	
								Dragonet, ...	..	1	1	
								C. maculata, ..	..	1	1	
								Angler, ...	..	3	3	
									583	655	1238	
120. Aberdeen Bay.	Dec. 16.	..	..	..	7 to 14	4.30 p.m.	8.35 p.m.	Cod, ...	32	..	32	Marketable fish only enumerated.
								Codling, ...	19	..	19	
								Haddock, ...	32	..	32	
								Plaice, ...	79	..	79	
								Lemon Sole, ..	6	..	6	
									168	..	168	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Overboard.	Total No.	
121. Aberdeen Bay.	1901. Dec. 16.	..	..	..	9 to 6½	9.10 p.m.	2.10 a.m.	Cod, ...	37	..	37	The unmarketable fish were not separated, and total only recorded.
								Codling, ...	38	..	38	
								Haddock, ...	25	..	25	
								Ling, ...	1	..	1	
								Saithe, ...	1	..	1	
								Turbot, ...	1	..	1	
								Plaice, ...	125	..	125	
								Lemon Sole, ..	1	..	1	
								Com. Dab, ...	25	..	25	
								Skate, ...	71	..	71	
								Offal, ...	..	42	42	
									325	42	367	
122. Same Place.	Dec. 17.	..	..	..	,,	2.25 a.m.	7.55 a.m.	Cod, ...	45	..	45	Same as above.
								Codling, ...	29	..	29	
								Haddock, ...	6	..	6	
								Brill, ...	1	..	1	
								Plaice, ...	108	..	108	
								Lemon Sole, ..	7	..	7	
								Com. Dab, ...	45	..	45	
								Skate, ...	51	..	51	
								Angler, ...	1	..	1	
								Offal, ...	..	17	17	
									293	17	310	
123. Same Place.	Dec. 17.	..	..	..	9½to15	8.48 a.m.	9.48 a.m.	Codling, ...	1	..	1	Small-mesh net experiment.
								Haddock, ...	5	4	9	
								Whiting, ...	6	59	65	
								Com. Gurnard, ..	..	1	1	
								Herring, ...	..	3	3	
								Plaice, ...	13	2	15	
								Lemon Sole, ..	10	6	16	
								Com. Dab, ..	7	5	12	
								Long Rough Dab,	..	12	12	
								Starry Ray, ..	3	..	3	
									45	92	137	
124. Dornoch Firth, off Dunrobin.	Dec. 19.	3·2	5·6	6·1	9 to 10	7.10 a.m.	11.10 a.m.	Cod, ...	14	..	14	
								Codling, ...	47	..	47	
								Haddock, ...	72	..	72	
								Whiting, ...	1	9	10	
								Herring, ...	..	19	19	
								Sprat, ...	..	3	3	
								Brill, ...	1	..	1	
								Plaice, ...	313	1	314	
								Lemon Sole, ..	5	1	6	
								Witch, ...	2	..	2	
								Flounder, ...	1	..	1	
								Com. Dab, ...	14	13	27	
								Starry Ray, ..	..	3	3	
									470	49	519	
125. Same Place.	Dec. 19.	..	..	..	6 to 10	11.55 a.m.	3.50 p.m.	Cod, ...	7	..	7	
								Codling, ...	10	..	10	
								Haddock, ...	13	..	13	
								Whiting, ...	..	13	13	
								Herring, ...	..	3	3	
								Brill, ...	3	..	3	
								Plaice, ...	256	3	259	
								Com. Dab... ..	13	9	22	
								Starry Ray, ..	..	2	2	
								Pogge, ...	..	6	6	
									302	36	338	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Over-board.	Total No.	
126. Dornoch Firth, off Dunrobin.	1901. Dec. 19.	..	..	.	7 to 12	4.20 p.m.	9.20 p.m.	Cod,	12	..	12	
								Codling,	26	1	27	
								Haddock,	73	..	73	
								Brill,	2	..	2	
								Plaice,	171	..	171	
								Witch,	2	..	2	
								Com. Dab,	17	6	23	
								Starry Ray,	..	3	3	
								Pogge,	..	1	1	
								Angler,	..	2	2	
									303	13	316	
127. Same Place.	Dec. 19.	..	..	..	,,	11.30 p.m.	4.30 a.m.	Cod,	13	..	13	
								Codling,	14	6	20	
								Haddock,	22	..	22	
								Whiting,	..	6	6	
								Brill,	6	..	6	
								Lemon Sole,	..	1	1	
								Plaice,	110	1	111	
								Witch,	6	..	6	
								Com. Dab,	2	13	15	
								Thornback,	1	21	22	
								Angler,	..	2	2	
								Pogge,	..	1	1	
									174	51	225	
128. Burghead Bay.	Dec. 20.	..	..	..	7 to 24	8 a.m.	12 noon.	Cod,	59	..	59	
								Codling,	40	5	45	
								Haddock,	9	5	14	
								Whiting,	17	9	26	
								Com. Gurnard,	..	2	2	
								Herring,	..	44	44	
								Turbot,	2	..	2	
								Brill,	16	..	16	
								Plaice,	458	..	458	
								Lemon Sole,	3	..	3	
								Com. Dab,	35	17	52	
								Long Rough Dab,	..	12	12	
								Thornback,	..	3	3	
								Angler,	..	18	18	
									639	115	754	
129. Same Place.	Dec. 20.	5·6	5·1	5·3	10 to 20	12.45 p.m.	5.45 p.m.	Cod,	62	..	62	
								Codling,	40	12	52	
								Haddock,	6	3	9	
								Whiting,	1	18	19	
								Saithe,	1	..	1	
								Com. Gurnard,	..	12	12	
								Herring,	..	46	46	
								Turbot,	4	..	4	
								Brill,	22	..	22	
								Plaice,	579	.	579	
								Lemon Sole,	5	..	5	
								Com. Dab,	85	44	129	
								Long Rough Dab,	..	41	41	
								Thornback,	..	3	3	
								Angler,	...	4	4	
									805	183	988	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Notal No.	Remarks.
130. Burghead Bay.	1901. Dec. 20.	..	..	..	15 to 24	6.15 p.m.	11.20 p.m.	Cod,	67	..	67	
								Codling,	17	4	21	
								Haddock,	25	7	32	
								Whiting,	41	36	77	
								Com. Gurnard,	..	5	5	
								Cat-fish,	3	..	3	
								Turbot,	2	..	2	
								Brill,	23	..	23	
								Lemon Sole,	3	..	3	
								Witch,	4	.	4	
								Plaice,	654	..	654	
								Com. Dab,	52	82	134	
								Long Rough Dab,	..	100	100	
								Thornback,	2	..	2	
								Angler,	..	42	42	
									893	276	1169	
131. Same Place.	Dec. 21.	4·6	5·3	6·6	22	5.30 a.m.	10.30 a.m.	Cod,	32	..	32	
								Codling,	22	16	38	
								Haddock,	11	2	13	
								Whiting,	7	9	16	
								Com. Gurnard,	..	1	1	
								Herring,	..	1	1	
								Brill,	17	..	17	
								Plaice,	526	1	527	
								Lemon Sole,	2	..	2	
								Witch,	6	..	6	
								Com. Dab,	46	63	109	
								Long Rough Dab,	..	20	20	
								Thornback,	..	2	2	
									669	115	784	
132. Same Place.	Dec. 21.	..	..	..	10 to 14	11.10 a.m.	4.10 p.m.	Cod,	15	..	15	Other unmarketable fish not enumerated: ½ basket of Com. Dab and Long Rough Dab.
								Codling,	35	..	35	
								Ling,	1	..	1	
								Haddock,	8	..	8	
								Whiting,	..	7	7	
								Com. Gurnard,	..	19	19	
								Herring,	..	4	4	
								Turbot,	5	..	5	
								Brill,	12	..	12	
								Plaice,	602	..	602	
								Com. Dab,	41	..	41	
								Thornback,	..	5	5	
								Angler,	..	21	21	
									719	56	775	
133. Same Place.	Dec. 21.	..	..	..	,,	10.55 p.m.	2.55 a.m.	Cod,	8	..	8	Other unmarketable fish not enumerated: ¼ basket of Com. Dab, and Long Rough Dab, and Whiting.
								Codling,	17	..	17	
								Haddock,	45	..	45	
								Whiting,	28	..	28	
								Saithe,	1	..	1	
								Turbot,	2	..	2	
								Brill,	6	..	6	
								Plaice,	305	..	305	
								Lemon Sole,	4	..	4	
								Witch,	4	..	4	
								Com. Dab,	45	..	45	
								Angler,	..	29	29	
									465	29	494	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Traw Down. Shot.	Time Traw Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
134. Burghead Bay.	1901. Dec. 22.	..	..	..	10 to 14	3.30 a.m.	7.30 a.m.	Cod, ...	4	..	4	
								Codling, ...	28	..	28	
								Haddock, ...	38	5	43	
								Whiting, ...	76	39	115	
								Com. Gurnard, ..	..	15	15	
								Turbot, ...	1	..	1	
								Brill, ...	12	..	12	
								Plaice, ...	473	..	473	
								Lemon Sole, ..	5	..	5	
								Witch, ...	6	..	6	
								Com. Dab, ...	128	88	216	
								Long Rough Dab,	..	9	9	
								Thornback, ..	2	..	2	
								Angler, ...	..	18	18	
									773	174	947	
135. Same Place.	Dec. 24.	..	..	..	8 to 14	1.15 a.m.	6.15 a.m.	Cod, ...	24	..	24	All offal lost except Angler.
								Codling, ...	24	..	24	
								Haddock, .. (about)	21	..	21	
								Whiting, .. do.	40	..	40	
								Cat-fish, ...	2	..	2	
								Turbot, ...	2	..	2	
								Brill, ...	18	..	18	
								Plaice, ...	677	..	677	
								Lemon Sole, ..	5	..	5	
								Witch, ...	12	..	12	
								Com. Dab, ..	181	..	181	
								Angler, ...	..	22	22	
									1006	22	1028	
136. Same Place. Chiefly between Burghead and Hopeman village to the east.	Dec. 24.	4·9	4·8	6·6	10	6.45 a.m.	11.45 a.m.	Cod, ...	18	..	18	
								Codling, ...	30	..	30	
								Haddock, ...	20	..	20	
								Whiting, ...	10	..	10	
								Com. Gurnard, ..	..	5	5	
								Turbot, ...	1	..	1	
								Brill, ...	14	..	14	
								Plaice, ...	568	..	568	
								Lemon Sole, ..	3	..	3	
								Witch, ...	14	..	14	
								Com. Dab, ..	114	74	188	
								Long Rough Dab,	..	37	37	
								Thornback, ..	7	5	12	
								Angler, ...	..	23	23	
									799	144	943	
137. Same Place.	Dec. 24.	..	..	..	,,	12.30 p.m.	5.30 p.m.	Cod, ...	38	..	38	
								Codling, ...	51	5	56	
								Ling, ...	1	..	1	
								Haddock, ...	30	1	31	
								Whiting, ...	28	36	64	
								Saithe, ...	1	..	1	
								Herring, ...	..	15	15	
								Turbot, ...	3	..	3	
								Brill, ...	9	..	9	
								Plaice, ...	492	..	492	
								Lemon Sole, ..	4	..	4	
								Witch, ...	4	..	4	
								Com. Dab, ..	266	105	371	
								Long Rough Dab,	..	44	44	
								Angler, ...	..	26	26	
									927	232	1159	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
138. Burghead Bay.	1901. Dec. 24.	..	..	..	10	6.30 p.m.	11.30 p.m.	Cod, ...	13	..	13	
								Codling, ...	30	..	30	
								Haddock, ...	14	1	15	
								Whiting, ...	10	1	11	
								Herring, ...	..	1	1	
								Turbot, ...	2	..	2	
								Brill, ...	13	..	13	
								Plaice, ...	470	..	470	
								Lemon Sole, ..	4	..	4	
								Witch, ...	4	..	4	
								Com. Dab, ...	184	35	219	
								Long Rough Dab,	..	8	8	
								Thornback, ..	5	..	5	
								Angler, ...	..	18	18	
									749	64	813	
139. Same Place.	Dec. 24.	..	..	..	,,	11.55 p.m.	5.0 a.m.	Cod, ...	27	..	27	
								Codling, ...	28	4	32	
								Haddock, ...	41	1	42	
								Whiting, ...	27	3	30	
								Saithe, ...	1	..	1	
								Turbot, ...	2	..	2	
								Brill, ...	9	..	9	
								Plaice, ...	550	..	550	
								Lemon Sole, ..	7	..	7	
								Com. Dab, ..	369	190	559	
								Long Rough Dab,	..	31	31	
								Thornback, ..	..	5	5	
								Angler, ...	..	12	12	
									1061	246	1307	
140. Same Place.	Dec. 25.	..	..	..	,,	5.40 a.m.	10.30 a.m.	Cod, ...	11	..	11	
								Codling, ...	44	2	46	
								Haddock, ...	20	2	22	
								Whiting, ...	27	4	31	
								Halibut, ...	1	..	1	
								Brill, ...	21	..	21	
								Plaice, ...	575	..	575	
								Lemon Sole, ..	6	..	6	
								Witch, ...	1	..	1	
								Com. Dab, ..	225	210	435	
								Long Rough Dab,	..	25	25	
								Thornback, ..	4	..	4	
									935	243	1178	
141. Same Place.	Dec. 25.	4·8	6·1	6·6	7½ to 18	11.20 a.m.	12.20 p.m.	Cod, ...	2	..	2	Small-mesh net experiment.
								Codling, ...	1	..	2	
								Haddock, ...	3	..	3	
								Brill, ...	1	..	1	
								Plaice, ...	123	..	123	
								Flounder, ...	1	..	1	
								Com. Dab, ..	18	11	29	
									149	11	160	
142. Dog Hole, off Aberdeen.	1902. Jan. 15.	7·1	6·2	6·2	57	4.50 p.m.	5.50 p.m.	Cod, ...	2	..	2	S. T. "Lochnagar." Small-mesh net experiment.
								Codling, ...	6	2	8	
								Haddock, ...	37	46	83	
								Whiting, ...	7	16	23	
								Sprat, ...	..	1	1	
								Plaice, ...	2	..	2	
								Lemon Sole, ..	1	..	1	
								Witch, ...	4	..	4	
								Megrim, ...	1	2	3	
								Com. Dab, ..	22	80	102	
								Long Rough Dab,	..	8	8	
								Grey Skate, ..	1	2	3	
								Starry Ray, ..	..	4	4	
								Angler, ...	..	1	1	
									83	162	245	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature.			Depth in Fms.	Time Trawl Down.		Fish Caught.				Remarks.
		Air.	Surface.	Bottom.		Shot.	Hauled.	Name.	No. taken to Market.	No. thrown Over-board.	Total No.	
143. Aberdeen Bay.	1902. Jan. 15.	..	..		7 to 14	10.45 p.m.	2.45 a.m.	Cod, ...	15	..	15	
								Codling, ...	1	..	1	
								Whiting, ...	..	85	85	
								Com. Gurnard, ..	..	1	1	
								Plaice, ...	6	..	6	
								Com. Dab, ..	1	1	2	
								Starry Ray, ..	..	94	94	
									23	181	204	
144. Same Place.	Jan. 16.	8·5	4·7	5·6	10	3.30 a.m.	7.30 a.m.	Cod, ...	21	..	21	
								Codling, ...	1	2	3	
								Haddock, ...	3	..	3	
								Whiting, ...	..	135	135	
								Saithe, ...	1	..	1	
								Brassie, ...	..	1	1	
								Brill, ...	1	..	1	
								Plaice, ...	3	1	4	
								Grey Skate, ..	..	4	4	
								Starry Ray, ..	..	73	73	
								Picked Dog-fish,..	..	1	1	
									30	217	247	
145. Off Lybster.	Jan. 17.	7·8	6·1	6·1	16 to 20	8.30 a.m.	11.30 a.m.	Cod, ...	3	..	3	Net badly torn.
								Codling, ..	29	..	29	
								Haddock, ...	102	1	103	
								Whiting, ...	1	3	4	
								Plaice, ...	1	..	1	
								Lemon Sole, ..	6	..	6	
								Starry Ray, ..	..	2	2	
									142	6	148	
146. Off Dunbeath.	Jan. 17.	..	..	..	24	12.30 p.m.	4.40 p.m.	Cod, ...	21	..	21	
								Codling, ...	86	38	124	
								Haddock, ...	699	15	714	
								Whiting, ...	9	19	28	
								Saithe, ...	2	..	2	
								Brassie, ...	..	7	7	
								Herring, ...	..	4	4	
								Sprat, ...	..	1	1	
								Brill, ...	1	..	1	
								Plaice, ...	95	.	95	
								Lemon Sole, ..	29	7	36	
								Megrim, ...	4	1	5	
								Com. Dab, ..	24	220	244	
								Long Rough Dab,	..	36	36	
									970	348	1318	
147. Same Place.	Jan. 17	..	..	..	18 to 25	5.20 p.m.	9.20 p.m.	Cod, ...	27	..	27	
								Codling, ...	41	41	82	
								Haddock, ...	628	70	698	
								Whiting, . ..	60	78	138	
								Cat-fish, ...	..	2	2	
								Turbot, ...	1	..	1	
								Brill, ...	1	..	1	
								Plaice, ...	112	..	112	
								Lemon Sole, ..	56	13	69	
								Megrim, ...	3	..	3	
								Witch, ...	6	6	12	
								Com. Dab,.. ..	..	418	418	
								Long Rough Dab,	..	104	104	
								Starry Ray, ..	..	9	9	
								Pogge, ...	..	1	1	
								Angler, ...	..	4	4	
									935	746	1681	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
148. Same Place.	1902. Jan 17.	..	..	..	18 to 25	9.50 p.m.	2.0 a.m.	Cod, ...	22	..	22	
								Codling, ...	11	4	15	
								Ling, ...	1	..	1	
								Haddock, ...	351	21	372	
								Whiting, ...	39	47	86	
								Halibut, ...	1	..	1	
								Brill, ...	1	..	1	
								Plaice, ...	67	..	67	
								Lemon Sole, ..	78	..	78	
								Com. Dab, ..	..	29	29	
								Long Rough Dab,	..	35	35	
								Starry Ray, ..	..	11	11	
									571	147	718	
149. Same Place.	Jan. 18.	..	..	..	,,	2.45 a.m.	6.45 a.m.	Cod, ...	3	..	3	
								Codling, ...	11	36	47	
								Haddock, ...	242	184	426	
								Whiting, ...	54	84	138	
								Saithe, ...	1	..	1	
								Red Gurnard, ..	..	1	1	
								Brill, ...	2	..	2	
								Plaice, ...	144	..	144	
								Lemon Sole, ..	46	3	49	
								Witch, ...	..	4	4	
								Com. Dab, ..	..	58	58	
								Long Rough Dab,	..	87	87	
								Starry Ray, ..	..	12	12	
								Angler, ...	..	5	5	
								Pogge, ...	..	1	1	
									503	475	978	
150. Off Lybster.	Jan. 18.	6·1	6·0	6·1	26	8.15 a.m.	12.15 p.m.	Cod, ...	18	..	18	
								Codling, ...	101	79	180	
								Ling, ...	1	..	1	
								Haddock, ...	72	13	85	
								Whiting, ...	6	36	42	
								Saithe, ...	4	..	4	
								Hake, ...	..	1	1	
								Red Gurnard, ..	..	1	1	
								Brassie, ...	..	4	4	
								Cat-fish, ...	2	..	2	
								Brill, ...	2	..	2	
								Plaice, ...	114	..	114	
								Lemon Sole, ..	28	3	31	
								Witch, ...	10	..	10	
								Com. Dab, ...	24	107	131	
								Long Rough Dab,	..	67	67	
								Starry Ray, ..	..	1	1	
									382	312	694	
151. Burghead Bay.	Jan. 18.	..	..	..	$7\frac{1}{2}$ to 22	5.30 p.m.	9.30 p.m.	Cod, ...	37	..	37	
								Codling, ...	9	11	20	
								Haddock, ...	8	10	18	
								Whiting, ...	1	27	28	
								Saithe, ...	1	..	1	
								Cat-fish, ...	1	..	1	
								Herring, ...	..	5	5	
								Turbot, ...	1	..	1	
								Brill, ...	10	..	10	
								Plaice, ...	235	2	237	
								Lemon Sole, ..	6	..	6	
								Com. Dab, ..	33	55	88	
								Long Rough Dab,	..	20	20	
								Thornback, ..	1	..	1	
								Angler, ...	..	3	3	
									343	133	476	

NORTH SEA INVESTIGATIONS—TABLE I.

Place.	Date.	Temperature. Air.	Temperature. Surface.	Temperature. Bottom.	Depth in Fms.	Time Trawl Down. Shot.	Time Trawl Down. Hauled.	Fish Caught. Name.	No. taken to Market.	No. thrown Overboard.	Total No.	Remarks.
152. Burghead Bay.	1902. Jan. 18.	..	..	..	18 to 25	10.15 p.m.	2.15 a.m.	Cod, ...	4	..	4	Net split.
								Codling, ...	..	2	2	
								Haddock, ...	..	5	5	
								Whiting, ...	..	6	6	
								Brassie, ...	..	1	1	
								Plaice, ...	48	..	48	
								Lemon Sole, ..	2	..	2	
								Witch, ...	19	10	29	
								Com. Dab, ..	..	28	28	
								Long Rough Dab,	..	10	10	
									73	62	135	
153. Same Place.	Jan. 19.	..	..	..	,,	3.10 a.m.	7.10 a.m.	Cod, ...	14	..	14	
								Codling, ...	7	49	56	
								Haddock, ...	3	7	10	
								Whiting, ...	..	37	37	
								Saithe, ...	1	..	1	
								Cat-fish, ...	2	..	2	
								Brill, ...	9	..	9	
								Plaice, ...	176	..	176	
								Lemon Sole, ..	3	..	3	
								Witch, ...	10	..	10	
								Com. Dab, ..	23	15	38	
								Long Rough Dab,	..	4	4	
								Starry Ray, ..	..	1	1	
								Angler, ...	..	10	10	
									248	123	371	
154. Off Lybster.	Jan. 21.	5·1	6·7	6·4	24	10.15 a.m.	2.15 p.m.	Cod, ...	4	..	4	
								Codling, ...	..	7	7	
								Haddock, ...	9	15	24	
								Whiting, ...	19	37	56	
								Brill, ...	1	..	1	
								Plaice, ...	36	..	36	
								Lemon Sole, ..	4	..	4	
								Megrim, ...	2	..	2	
								Com. Dab, ..	25	55	80	
								Long Rough Dab,	..	15	15	
									100	129	229	
155. Smith Bank.	Jan. 21.	6·5	6·8	7·2	24	4.5 p.m.	5.35 p.m.	Codling, ...	7	..	7	Small - mesh net experiment.
								Haddock, ...	2	..	2	
								Whiting, ...	15	..	15	
								Brassie, ...	..	7	7	
								Com. Gurnard, ..	..	2	2	
								Halibut, ...	1	..	1	
								Plaice, ...	15	..	15	
								Com. Dab, ..	7	..	7	
								Angler, ...	..	1	1	
									47	10	57	

NORTH SEA INVESTIGATIONS.*—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		†Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1885. Jan.	3	64	4	½	2	..	23	..	¼	..	3¼	..	..	4½	..	..	140	..	..	..	..	..	..	..	5	..	..	..	..	..	..
Feb.	5	51	1	3½	..	..	45	..	..	..	4¼	..	..	11	..	..	122½	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Mar.	2	66	1	3	1	..	27	..	..	..	8	..	..	8	..	..	197	..	..	..	..	..	..	..	3	..	..	..	..	..	..
April	3	61	..	2	..	..	65	..	..	..	11	..	..	75½	..	..	148	..	..	..	..	..	..	..	11	..	..	..	2	..	2
May	4	54	..	1	1	..	178	..	..	..	27	..	..	41	..	..	87	..	..	..	..	..	..	..	26	..	..	..	..	..	5
June	19	41	..	3	7	..	283	..	63½	..	5¼	..	..	1	..	..	86½	..	..	..	..	..	..	..	3	..	..	..	..	..	4½
July	19	5	..	1	2	..	152½	..	34	..	1¼	..	..	4½	..	..	30½	..	..	..	..	..	..	..	1	..	..	..	..	..	4
Aug.	9	11	..	1	7	..	219½	..	14	..	2¾	..	..	60½	..	..	71	..	..	..	..	..	..	..	8	..	..	..	..	..	2
Sept.	2	3	..	..	8	..	39	..	1	..	..	..	..	5	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct.	5	36	..	..	2	..	132	..	1	..	7	..	..	43	..	..	123	..	..	..	..	..	..	..	10	..	..	..	..	..	5
Nov.	3	8	..	1	1	..	43	..	6	..	2	..	..	3	..	..	109	..	..	..	..	..	..	..	2	..	..	..	..	..	4
Dec.	3	5	..	1	2	..	18	..	..	..	3	..	..	½	..	..	369	..	..	..	..	..	..	..	3	..	..	..	..	..	11
Totals	75	405	6	17	33	..	1225	..	119¾	..	74¾	..	..	257½	..	..	1523½	..	..	..	..	..	..	..	73	..	..	..	2	..	37½
1886. Jan.	6	26	..	2	..	..	12	..	1	..	2½	..	..	2	..	..	202	..	..	..	..	..	..	..	1	..	..	..	..	..	7
Feb.	4	22	..	2	..	..	22½	..	..	..	2	..	4½	3½	..	..	443	..	..	..	..	..	..	..	4	..	..	..	..	..	6
Mar.	4	79	..	7	1	..	95	..	..	..	1¼	..	3	3	..	..	186	..	..	..	..	..	..	..	10	..	..	..	..	..	4
April	3	57	..	3	1	..	70	..	..	..	3	..	2	44	..	..	64	..	..	..	..	..	..	..	10	..	..	..	..	..	14
May.	3	37	..	1	2	..	85	..	2	..	2	..	19	20	..	..	68½	..	..	..	..	..	..	2	..	..	..	..	..	..	2
June	19	11	..	½	14	..	227	..	12½	..	3¼	..	..	7	..	..	97½	..	..	..	..	..	..	1	15	..	..	..	..	..	59
July	12	3	..	1	12	..	209	..	22	..	3	..	..	6	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..	5
Aug.	10	6	..	..	5	..	191	..	3	..	2½	..	..	21½	..	..	47	..	..	..	..	..	..	..	..	..	..	..	..	..	12
Sept.	9	9	..	..	4	..	173	..	..	..	7½	..	1	14	..	..	162	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Oct.	9	12	..	1	2	..	301	..	..	..	5	..	..	20½	..	..	58	..	..	..	..	..	..	..	2	..	..	..	..	..	7
Nov.	4	6	..	1	..	..	143	..	..	..	3¾	⅛	1½	5	..	..	152	..	..	..	..	..	..	1	1	..	..	..	..	..	6
Dec.	3	7	..	..	..	..	32	..	..	..	¾	¼	..	3	..	..	343	..	..	..	..	..	..	..	2	..	..	..	..	..	7
Totals	86	275	..	18½	41	..	1560½	..	40½	..	36½	⅜	31	149½	..	..	1863	..	..	..	..	..	..	4	45	..	..	..	..	..	133

* For particulars in regard to the classification of the fish, *see* page 127.

† Includes Brill for 1885.

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1887. Jan.	3	10	..	..	..	..	8	..	..	..	½	..	¾	½	..	..	319	..	..	..	..	..	..	..	4	..	..	..	..	..	3½
Feb.	3	52½	..	1½	..	..	85	..	..	..	5	¼	2	7	..	..	229	..	..	..	..	..	..	..	3	..	..	..	..	..	5
Mar.	4	112	..	..	..	..	167	..	..	..	4¾	..	2¼	19	..	..	212	..	..	..	..	..	..	..	2	..	..	..	..	..	20
April	4	35	..	½	..	..	164	..	..	..	2¼	..	2	71½	..	..	48	..	..	..	..	..	..	..	9	..	..	..	..	..	7
May	7	37	..	..	8½	..	208	..	..	..	4¼	..	½	96	..	..	84¼	..	..	..	..	..	..	..	5	..	..	..	..	..	46
June	5	8	..	..	72	..	183	..	..	..	1¼	¼	18	46	..	..	84	..	..	..	..	..	..	..	4	..	..	..	..	..	28
July	12	8½	..	..	3	..	151	..	1½	..	4	..	½	33	..	..	65	..	..	..	..	..	..	..	1	..	..	..	..	..	38
Aug.	13	17½	27	1	4	..	127	..	..	..	7¾	¼	1½	55	..	..	90	..	..	..	..	..	..	2½	27	..	..	..	..	..	78
Sept.	12	14	48	..	..	..	283	..	1	..	11¼	..	..	30	..	..	50	..	..	..	..	..	..	1	2	..	..	..	..	..	70
Oct.	11	7½	22½	..	½	..	166	..	4	..	22¼	..	..	7½	..	..	339	..	..	..	..	..	..	..	3	..	..	..	..	..	13
Nov.	3	14	9	..	..	..	49	..	..	..	5	..	½	3	..	..	233	..	..	..	..	..	..	..	..	..	..	..	..	..	9
Dec.	5	23	12	1	2	..	55	..	..	..	2	..	..	4	..	..	310	..	..	..	..	..	..	..	..	..	..	..	..	..	16
Totals	82	339	118½	4	90	..	1646	..	6½	..	70¼	¾	28	372½	..	..	2063½	..	..	..	..	..	..	3½	60	..	..	..	..	..	333½
1888. Jan.	4	13	15	1	..	..	46	..	..	..	5	..	½	2	..	..	325	..	..	..	..	..	..	..	..	..	..	..	..	..	9
Feb.	4	30	9	½	..	..	34	..	..	..	2½	..	1½	4	..	..	297	..	..	..	..	..	..	..	3	..	..	..	..	..	14
Mar.	8	113	10	..	..	..	105	..	..	..	4	..	..	14	..	..	154	..	..	..	..	..	..	..	..	..	..	..	..	..	7
April	4	33	9	..	..	55	45	2	1	..	3	..	3	73	..	2	72	..	..	..	..	..	..	..	5	..	..	..	..	..	5
May	4	16	7	..	2	92	..	22	..	..	1¾	1½	2	48	..	76	..	12	..	..	..	..	..	4	6	..	..	..	..	..	4
June	6	19	21	..	2	105	..	30	6	2	4½	1	..	15	..	91	..	26	..	..	..	..	..	½	2	..	..	..	..	..	11
July	9	19	34	..	2	73	..	76	2	..	4	..	..	37	..	45	..	..	..	..	..	..	..	..	3	..	..	..	..	..	17
Aug.	7	15	17	1	10	43	..	73	..	..	5	..	..	26	..	35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22
Sept.	13	15	24	..	1	114	..	242	2	..	14½	..	..	31	..	103	..	..	..	..	..	..	..	..	3	2	..	..	..	..	25
Oct.	13	14	28	..	..	109	..	179	3	..	15½	..	..	29	..	37	..	..	..	..	..	..	..	..	4	..	..	..	..	..	34
Nov.	8	15	9	..	..	48	..	121	6	..	7½	..	..	5	..	26	..	..	..	..	..	..	..	..	..	..	..	..	..	..	7
Dec.	5	20	10	..	..	90	..	96	..	..	4	..	..	6	..	472	..	10	..	..	..	..	..	..	2	..	..	..	..	..	6
Totals	85	322	193	2½	17	729	230	841	20	2	71¼	2½	7	290	..	887	848	48	..	..	..	..	..	4½	28	2	..	..	..	..	161

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1889. Jan.	4	12	8	..	..	42	..	45	..	..	4	..	..	1	..	266	..	..	..	..	..	..	..	..	3	1	..	..	..	..	6
Feb.	5	21	9	1	..	56	..	130	..	..	3	..	..	3	..	140	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
Mar.	3	55	6	..	..	148	..	149	..	..	3	..	1	27	..	62	..	7	..	..	..	..	..	..	..	..	..	..	..	..	..
April	8	92	11	..	..	198	..	163	7	..	7	1	..	24	..	42	..	..	..	42	16	..	..	..	2	..	..	..	..	..	7
May	3	22	4	..	..	25	..	14	..	..	6	..	..	12	..	32	..	29	..	156	18	..	..	..	..	..	..	..	..	..	..
June	7	20	38	..	..	69	..	79	..	..	6	1	12	60	..	34	..	6	..	36	4	..	..	..	..	7	..	..	..	..	8
July	12	33	74	..	..	96	..	111	..	..	9	..	..	62	..	35	..	..	..	6	1	..	..	..	4	12	..	..	..	..	38
Aug.	13	15	55	1	..	156	..	106	..	..	14	..	..	68	..	40	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..
Sept.	11	18	47	1	..	166	..	172	2	..	13	..	..	58	..	29	..	..	..	2	..	..	..	..	2	..	..	..	..	..	41
Oct.	9	12	38	..	..	139	..	80	..	..	8	..	..	42	..	33	..	..	..	6	..	..	..	..	..	..	..	..	..	..	24
Nov	3	9	7	..	..	88	..	55	..	..	3	..	..	14	..	38	..	..	..	10	2	..	..	..	..	..	..	..	..	..	9
Dec.	4	22	3	.	..	83	..	29	..	..	3	..	..	4	..	219	..	..	..	1	..	..	..	..	.	..	..	..	..	..	14
Totals	82	331	305	3	..	1266	..	1133	9	..	79	2	13	375	..	970	..	42	..	259	41	..	..	.	11	23	..	..	..	..	156
1890. Jan.	4	27	10	3	..	59	..	51	..	..	4	..	1	4	..	169	..	..	..	6	2	..	.	..	1	..	..	..	..	..	15
Feb.	5	20	16	..	..	138	..	97	..	..	3	..	2	9	..	133	..	1	..	21	2	..	..	..	..	..	..	..	..	..	6
Mar.	3	53	6	..	..	116	..	91	5	..	3	..	..	4	..	62	..	..	..	10	5	..	..	..	5	..	..	..	..	..	..
April	5	84	8	1	..	106	..	104	..	..	3½	..	..	12	..	95	..	2	..	8	2	..	..	..	..	..	..	..	..	..	4
May	4	21	10	..	..	54	..	37	3½	..	5½	..	1	27½	..	21	..	..	..	31	2	..	..	..	..	..	..	..	..	..	..
June	6	21	11	2	..	202	..	89	4½	..	3¼	..	..	68½	..	33	..	..	..	19	5	..	..	..	..	56	..	..	..	..	17
July	7	43	39	3	..	89	..	67	2	..	4¼	..	½	44	..	17	..	..	..	16	..	..	..	1	3	23	..	..	..	..	..
Aug.	2	7	1	1	..	29	..	16	..	..	1	..	..	20	..	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sept.	6	5	8½	..	..	162	..	70	1	..	6	..	..	44	..	63	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Oct.	5	8	6	3½	..	168	..	58	..	..	3	..	..	16	..	50	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	17	4	..	..	98	..	20	1	..	1	..	..	3	..	111	..	..	..	..	..	..	..	..	..	.	..	..	..	..	3
Dec.	6	19	20	..	..	110	..	50	..	..	6	..	..	17	..	91	..	..	..	7	..	..	..	..	..	..	..	..	..	..	..
Totals	56	325	139½	13½	..	1331	..	750	17	..	43½	..	4½	269	..	857	..	3	..	122	18	..	..	1	10	79	..	..	..	..	45

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1891. Jan.	5	16	4	1	..	52	..	19	4	..	1¾	..	..	4	..	12	..	..	..	6	2	..	..	..	..	..	..	..	..	..	2
Feb.	4	26	8	7	..	130	..	65	13	..	1½	..	..	10½	..	49½	..	..	..	84	14	..	..	..	14	..	..	..	..	..	..
Mar.	4	60	4	..	..	251	..	124	3	..	1	..	..	5	..	19	..	..	..	5	1	..	..	..	11	..	..	..	..	..	..
April	4	28	5	1	..	55	..	58	3	..	1	..	..	37	..	4	..	..	..	24	5	..	..	..	4	..	..	..	..	..	..
May	1	3	2	..	..	18	..	15	..	..	1	..	..	7	..	5	..	..	..	..	..	..	..	..	5	..	..	..	..	..	..
June	1	4	2	..	..	60	..	30	..	..	..	..	..	3	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
July	5	82	18	..	..	89	..	31	..	..	3	..	3	18	..	58	..	..	..	..	..	..	..	..	7	..	..	..	..	..	..
Aug.	5	38	13	..	..	123	..	94	..	..	4½	..	..	40	..	47	..	..	..	..	..	..	..	..	11	..	..	..	..	..	..
Sept.	3	10	9	..	..	51	..	30	..	..	1½	..	..	10	..	29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	12	7	1	..	56	..	27	..	..	2	..	..	16	..	14	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	9	8	2	..	56	..	67	2	..	7	..	..	7	..	22	..	2	..	4	..	..	..	..	..	1	..	..	..	..	1
Dec.	3	11	4	4	..	76	..	4	3	..	..	..	1	5	..	26	..	2	..	19	..	..	..	..	1	1	..	..	..	..	22
Totals	41	299	84	16	..	1017	..	564	28	..	24¼	..	4	162½	..	315½	..	4	..	142	22	..	..	..	53	2	..	..	..	..	25
1892. Jan.	2	17	4	1	..	21	..	..	1½	..	½	..	1½	3	..	40½	..	1½	..	10½	1	..	..	..	3	..	..	..	..	..	..
Feb.	5	63	4	7	4	96	..	4	..	..	½	..	..	7½	..	96	..	..	..	8½	1	..	..	..	3	..	..	..	..	..	52
Mar.	3	93	4	2	..	75	..	3	1	..	..	..	..	10	..	71	..	..	..	½	..	..	..	..	..	..	..	..	..	..	2
April	4	26	11	10	..	254	..	..	1	..	..	..	..	19	..	13¾	..	..	..	3¾	..	..	..	..	1	..	..	..	..	..	15
May	4	35	11	1	..	130	..	..	1½	..	..	..	..	25	..	32¾	..	1½	1	21	6	..	..	..	1	..	..	..	..	..	12
June	5	43	15½	4	..	65	28	8	4½	..	2½	..	1¼	21¾	..	45½	10	1	3½	12¾	4¼	..	..	..	3	1	..	..	..	..	1
July	4	19	11	1	..	113	58	..	1	..	2	1	7¾	13	..	25½	40	..	..	1¾	..	¼	..	..	7	..	..	..	..	..	..
Aug.	4	14	8½	1	2	80	23	4	1½	..	2¼	..	..	38¾	..	12	29	½	1	..	..	½	..	1	4	..	..	..	..	..	..
Sept.	5	12	10¼	2½	..	84	24	..	3	..	1½	..	..	15	..	11	30	..	¾	3¾	..	2	..	1	..	16	..	..	..	2½	..
Oct.	6	26½	25¾	2	..	134	37	..	4½	..	⅞	..	½	8½	..	5¾	12¾	..	½	2¼	..	¾	..	..	..	$1\frac{8}{10}$	7	..	..	1	2
Nov.	3	10	6	1	..	82	25	1	¼	..	1¼	..	¾	5	..	18	38½	..	5	2½	..	¼	..	1	2	$1\frac{3}{10}$	2	..	..	5	..
Dec.	3	9½	28	3½	..	43	11½	2¾	..	..	¾	..	¾	4¼	..	46	34	..	3	..	..	¾	..	½	8	$\frac{2}{10}$	7	..	..	5¾	..
Totals	48	368	139	36	6	1177	206½	22¾	19¾	..	12⅛	1	12½	170¾	..	417¾	194¼	4½	14¾	67¼	12¼	4½	..	3½	32	$20\frac{3}{10}$	16	..	..	14¼	84

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1893. Jan.	3	13	9	6	..	19	5	..	½	..	3½	½	¾	4¼	..	72	61½	..	1½	..	..	2	..	..	8	..	..	..	..	1	5
Feb.	3	16	8	½	..	41	8½	..	..	..	1¼	..	..	6	..	16½	19	..	3½	½	..	1	..	..	1	..	..	8	..	1	4
Mar.	8	44	7¾	1⅝	..	153	40	..	2	..	3	..	..	16	..	12¼	29¼	..	1	..	..	1¼	..	..	..	..	1	..	..	..	..
April	7	59½	21	1½	..	128	44	1	11	..	6½	..	..	27¼	..	63¾	36	½	2	1	..	..	..	..	..	..	..	..	..	..	..
May	4	59	11	1	..	81	21	..	2	..	2¾	..	..	8½	..	70¼	47	..	1	½	..	6	..	..	..	..	..	..	..	..	..
June	4	9	2	4½	..	37	35	2½	2½	..	¾	..	..	21	..	12¼	36¼	..	..	..	..	..	..	..	..	13	..	..	..	..	..
July	3	5½	3	..	..	8	3	..	..	..	¼	..	..	3	..	101½	101	..	11	..	..	..	..	1	..	3	1	..	..	..	..
Aug.	8	35¼	23	3	..	120½	58½	9	11¼	..	2	..	..	19¾	1	37	37½	..	5½	..	..	..	..	..	..	7 8/16	1	..	..	..	..
Sept.	10	16¼	27	1½	..	49½	19½	11	7½	..	7¼	..	..	28	1	5	8¼	1	3¾	..	..	½	..	..	..	1 6/16	5	..	..	..	5
Oct.	3	9¾	15½	½	..	85	33½	..	..	..	⅛	..	½	10½	..	32½	51	..	7	..	..	..	..	¾	..	..	8	..	..	4½	..
Nov.	4	20½	22½	1	½	54½	9¼	10	1	..	4¼	..	..	3½	..	2½	Mixed 347½	..	8½	..	..	½	..	½	1	½	1	..	..	5¼	..
Dec.	3	10¾	5	1½	..	20½	7½	..	..	..	1¼	⅛	..	1	..	82½	69½	..	4	..	..	¼	..	¼	..	..	..	..	..	1½	..
Totals	60	298½	154¾	22⅝	½	817	284¾	33½	37¾	..	32⅞	⅝	1¼	148¾	2	508	843¾	1½	48¾	2	..	11½	..	2½	10	25 9/16	17	8	..	13¼	14
1894. Jan.	2	8	1½	3	2	10	2	3	..	..	1¼	..	¼	2¼	..	46½	57¼	..	2½	..	..	..	..	¼	3	..	2	..	..	1	..
Feb.	7	21¾	11¾	½	..	68½	7	¾	..	..	1¾	..	1	8	..	10½	28¾	..	¼	..	..	..	..	..	..	..	..	..	..	1¼	..
Mar.	4	98½	6	..	1	53½	14	13½	..	..	3⅛	⅛	3	4¼	..	46½	40¼	..	6½	½	..	..	..	..	..	..	2	..	..	..	..
April	4	53	14¼	5	5	69½	24½	1	9¾	..	⅞	1⅛	1¼	7	..	58	56¾	..	2	..	..	1	..	..	..	½	2	..	..	3	..
May	4	85	16	½	..	101½	12½	..	..	..	½	1	..	9	¼	13	36	..	½	..	..	..	..	..	..	..	..	..	..	..	..
June	4	17½	46½	2⅔	..	174½	3½	..	..	..	1¼	2	..	¾	..	61½	75	10	..	..	..	..	..	..	1	2 8/16	6	13	4	..	..
July	4	50	11¾	2⅙	..	54	18	..	1¾	..	1⅜	..	6⅜	33¼	½	25¾	45½	1	..	..	..	1¼	..	⅜	..	5	..	..	..	..	..
Aug.	9	62¾	32½	3⅔	..	145¾	144¾	23½	1¾	..	3⅛	..	¼	13½	½	22¼	23¾	1	..	..	..	¼	..	..	..	1	..	..	..	..	..
Sept.	3	6½	13½	½	..	60½	114	11½	½	..	2	½	½	5½	¼	28½	17¾	6¾	..	..	..	..	..	¼	..	..	2	..	..	..	..
Oct.	3	3¾	15½	1⅓	..	127	56	..	..	..	⅞	⅛	½	..	..	59½	73½	20¾	..	..	..	..	..	¾	..	..	1	..	..	..	..
Nov.	2	4¼	6¼	⅓	..	57	7	..	¾	..	½	¼	..	..	..	27½	71½	17½	..	..	..	..	..	½	..	..	..	..	..	..	..
Dec.	6	67	43½	1⅔	..	94	98	..	..	..	2⅛	¾	⅝	5⅞	..	42	79⅞	7	..	1¼	..	½	..	⅜	..	..	..	..	..	1¾	..
Totals	52	478	219	21	8	1015¾	501¼	53¼	14½	..	18¾	5⅞	13¾	89⅝	1½	441½	605⅞	64	11¾	1¾	..	3	..	2½	4	9 6/16	15	13	4	7	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1895. Jan.	3	85	10	..	..	25½	20½	35½	¼	..	⅝	¼	⅛	1¼	..	12	13½	1½	..	4¼	..	¾	½		..	..	..	..	..		
Feb.	3	13	15¼	1⅓	..	25½	8¾	6	⅛	..	¼	2	½	5	..	9¾	14	2½	..	..	..	..	..	..	..	..	..	..	..		
Mar.	3	19	12	2⅔	..	22	30½	..	¾	..	1½	½	3	7½	⅛	10½	19¾	2¼	..	⅛	..	¼	..	..	..	12	..	..	..		..
April	2	12½	9¼	9⅓	..	6¼	7½	10	¼	..	⅛	½	..	10	¼	10½	32¾	1¾	..	1½	..	15½	¼	..	..	..	2	..	..	..	..
May	6	56¾	29	3⅓	..	33	102¾	59¾	6¾	..	6¼	½	4¼	44¾	1¾	10¼	14	..	..	..	..	¾	..	⅛	..	..	..	..	..	..	..
June	5	26¼	15	3⅓	..	34½	25½	57½	3¼	¼	½	4⅞	⅝	26¼	1¼	8½	25	1½	..	¾	..	¾	..	4	..	..	..	..	..	..	..
July	2	21	8	⅔	..	48	41	..	..	..	¾	⅛	⅝	13¾	1¼	14	17¾	1	..	..	..	½	..	..	..	½	..	..	..	..	..
Aug.	3	21½	8	3	..	64½	29¼	..	1½	..	2⅝	..	..	6¼	1¾	20¼	52½	35¼	..	..	..	..	..	¾	..	1	..	..	..	..	..
Sept.	3	2	1½	1⅔	..	113¾	56	..	..	..	½	1	..	1	..	13½	47½	56¼	..	..	..	..	..	1⅜	..	..	..	..	..	..	..
Oct.	3	6¾	2	2⅓	..	56½	5¼	..	¼	..	⅞	½	½	..	¼	13	23½	6¾	..	⅛	..	..	..	⅛	..	1/16	2	..	..	..	..
Nov.	1	5½	2	⅓	..	23	16¼	..	..	..	⅜	¾	1⅛	1¼	..	8	14	9½	..	..	..	..	..	⅛	..	..	..	..	..	¾	..
Dec.	3	54½	11¾	2⅓	..	44¾	14½	2	..	..	¼	2⅛	..	½	⅝	67¼	32¼	18¾	..	..	..	¼	..	..	5	3/16	..	..	..	⅛	..
Totals	37	323¾	123¾	29⅔	..	497¼	357¾	170¾	13⅛	¼	14⅝	13⅛	10¾	117½	7¼	197¼	306½	137		6¾	..	18¾	¾	6½	5	13 7/16	4	..	..	⅞	
1896. Jan.	3	82	13¼	1⅓	..	12¾	14¾	..	..	..	1	¾	5¼	6¼	..	40	50¼	5	..	1¾	..	½	¾	..	10	..	..	..	..	1½	..
Feb.	3	19	5¼	6⅓	..	20½	21	..	..	..	1⅛	1¼	⅜	5¾	..	20¼	43½	2	4	..	..	..	..	..	2	..	..	..	..	..	..
Mar.	7	82	16½	5⅓	..	117¾	70¾	32½	5½	..	1½	..	⅛	21¾	⅛	6	20	..	¼	5	¾	2	..	⅛	4	..	2	..	..	..	..
April	7	55	13½	1⅓	..	70¾	66	50¾	2½	..	2⅝	½	..	45¾	⅜	¾	6½	..	..	..	..	1	..	..	..	..	3	..	..	..	..
May	3	32	14	1	..	30¾	22½	7	½	..	1⅝	¾	½	23	¾	7¼	10½	..	..	..	..	½	..	..	..	..	2	..	..	..	..
June	5	79¼	14½	8½	1	58	50	17½	4½	..	1¼	2⅞	4⅜	49	⅞	7¼	27¼	..	..	½	..	¼	..	¼	9	1 5/16	..	..	..	..	..
July	8	41	27½	2½	..	94¼	39¼	35¾	1¾	..	4¼	⅜	5	30	1½	4¾	18¼	..	½	..	..	..	..	½	..	1 9/16	1	..	..	..	..
Aug.	6	37¾	9¼	3½	..	58½	44½	14½	2¾	..	3¼	..	11¾	21	1⅜	6	21¾	1	1½	½	..	..	..	1⅝	..	1 1/16	1	..	..	..	..
Sept.	9	19¾	28	6	..	96¼	40¼	65¼	12¾	..	1⅜	..	..	11⅞	1½	..	5¾	¼	1¼	..	..	½	..	..	..	8/16	2	..	..	⅞	..
Oct.	12	35¼	55¾	7½	..	62½	49¾	64½	10½	1	2½	..	..	21½	3½	..	6¼	..	2¾	..	..	¾	..	⅜	1	1 2/16	16	..	..	2½	..
Nov.	6	11¾	41½	⅓	..	38¾	37¾	61¾	7¼	2	4½	..	..	14¾	2⅛	1¼	4¼	.	1¼	..	..	1¼	..	..	..	2/16	8	..	..	2⅛	..
Dec.	3	37½	10½	1	5	12¼	9¼	9¼	1½	..	1¼	½	⅜	4½	¾	8⅛	29	¼	2	¾	..	..	..	⅛	..	..	1	..	..	⅛	..
Totals	72	532¼	250½	44⅔	6	673	465¾	358	49½	3	26⅞	7	27¾	255⅛	12⅞	101⅝	243¼	8½	13½	8½	¾	6¾	¾	3	26	6 7/16	36	..	..	7⅛	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1897. Jan.	5	23	18¾	2⅔	..	12¼	16½	20½	1	..	¾	¼	½	7⅛	¼	5	14½	½	¼	..	..	½	..	..	..	..	..	..	..	.	..
Feb.	5	36	27¾	3	..	78	36¼	83½	6½	..	4½	..	1	11¼	½	1¾	10½	..	¼	1½	..	2¼	1	⅛	.	..	1	..	.	..	..
Mar.	7	22	18½	4	1	51¼	21½	28¼	1¾	..	6⅜	⅜	1½	11½	1⅛	1½	13¼	..	1	..	..	1⅝	..	..	..	..	..	..	..	..	..
April	4	73	10¾	4	..	90½	55½	86	3	..	1¼	¼	3¼	16¼	1	2½	12¼	..	..	3	2	2½	1¼	⅛	3	1/16	1	..	..	..	..
May	3	48	6¾	3½	1	33	24	33½	½	..	½	1½	⅜	17¼	1½	2½	21	¾	1¼	1¼	..	2¼	..	..	3	1/16	5	..	..	.	..
June	3	85	20½	4⅓	..	46¾	26	67½	4¾	..	3⅜	¼	..	24	½	7¼	20½	..	..	..	..	..	..	..	..	..	..	..	..	.	..
July	6	52½	17½	5½	1	57¼	41	73¼	13½	..	4¾	⅜	¼	20¼	¼	7	28½	..	..	½	2¼	1¼	..	¾	4	21 6/16	3	..	..	..	..
Aug.	8	152½	23	15⅓	41	56¾	47¼	106½	21½	10	2⅞	½	..	12⅞	1	3	5½	..	..	3¼	1¼	2½	1	..	9	2	4	..	..	.	..
Sept.	8	189¾	14¾	13⅚	11	52¾	43¼	66½	17½	..	4⅜	..	..	4¼	¼	3¾	10¼	1¾	1¼	..	..	½	..	..	16	5 6/16	17	..	..	¼	.
Oct.	4	47½	11½	7	..	74	135	62	15½	..	1⅜	..	..	1	½	6	13	..	3½	5½	..	5½	¼	⅜	6	5 2/16	..	..	..	1⅝	..
Nov.	2	22½	7	2⅓	18	16	20	21½	4¼	..	1⅛	..	⅛	¾	..	¼	5¼	9¼	2½	3⅛	½	¾	..	..	1	8/16	1	.	..	⅝	..
Dec.	6	72	24½	3⅔	6	18½	26½	17	1½	..	1⅛	.	..	1¾	¼	5¾	11	..	4	10¾	..	2	..	⅛	10	2 9/16	13	..	..	4¼	..
Totals	61	823¾	201¼	69⅙	79	587	492¾	666	91¼	10	32⅜	3½	7	128½	7⅛	46¼	165½	12¼	14	28⅞	6	21⅝	3½	1½	52	38	45	..	..	6¾	..
1898. Jan.	3	45¼	8	6⅙	4	34½	23¾	36	1¼	..	⅞	⅜	⅛	1¼	..	1¾	2¾	..	1½	1¾	..	3½	1½	⅛	5	1	2	..	..	2¾	..
Feb.	7	45	28½	3⅙	2½	61¼	21½	21¾	2¾	..	2¾	½	¼	9¼	..	1	6¼	¾	⅜	⅜	..	1⅜	..	⅛	4½	..	..	..	..	1	..
Mar.	5	68	10½	9⅙	4	175	80½	100½	6¾	..	4	1⅝	..	10½	..	⅜	2½	..	½	4¼	..	5½	1½	..	3½	2/16	..	..	..	⅝	..
April	5	111½	12¼	3⅔	7½	115¼	53	64½	7¼	..	3⅜	1¼	4⅜	9¾	⅜	5½	15½	..	1½	1	..	⅞	..	¼	7	2/16	..	..	13	..	..
May	5	95¾	31¼	8⅔	9	63¼	34½	74¾	18½	..	7	1¾	½	25½	1	11	28¼	..	..	½	..	2¼	..	⅛	½	4 5/16	7	..	20	.	..
June	6	96½	23	18	10	36¼	79	105¾	48¾	13	9¾	⅝	⅛	27½	..	1½	10¾	..	..	15½	..	3½	4	⅛	22	1 8/16	..	2	6	..	1
July	5	90½	11	46⅓	..	15¾	35¾	120½	57½	..	3¾	⅛	..	..	..	¼	4¼	¼	..	14½	10	23¾	7½	..	31	7 4/16	..	..	..	..	..
Aug.	7	233¼	42¼	21	..	42¼	40¾	53	42	..	4⅛	1⅞	..	20	1⅛	¾	7	..	..	7¼	..	7½	2¼	..	46	4	1	..	..	..	.
Sept.	5	49	26¾	12	..	31	37	68	30	..	2⅝	..	..	8½	1½	2½	4¾	..	..	8	..	4½	2¼	..	22	7 1/16	..	..	..	⅛	..
Oct.	7	45¾	17	18	..	177½	86½	70¼	6	..	⅞	¼	..	5½	⅜	4	24¾	..	..	3¼	1¼	8½	1¾	¼	6½	16 4/16	..	..	..	2	..
Nov.	5	31¼	30	½	1	96½	49	129¾	7¾	..	2⅞	..	⅛	4⅜	⅜	1½	6½	3¼	2¼	..	..	..	..	..	1	4/16	..	5	..	3¼	..
Dec.	9	47½	57½	2	1	63½	29¼	173¾	11¾	..	3½	..	⅛	9½	1	1½	9½	..	½	..	..	3⅝	..	..	1½	3/16	..	..	..	5¾	..
Totals	69	959¼	298	148⅚	39	912	570½	1018½	240¼	13	45½	8⅜	5⅜	131⅝	5¾	31⅝	122¾	4¼	6⅝	56¾	11¼	64⅞	20¾	1	150½	43 4/16	10	7	39	15⅜	1

NORTH SEA INVESTIGATIONS.—Table II.—No. 1.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1899. Jan.	8	25¾	32	1⅓	1	32¾	20½	132¼	12¾	..	3½	..	..	4½	..	½	5½	..	..	⅛	⅛	2¾	¼	..	..	1/1	..	..	..	1	..
Feb.	3	25	6½	6⅙	1½	60	31	91	2½	.	⅝	⅜	¼	1	..	½	1¾	..	..	5	½	6¼	1¼	¼	¼	5/10	..	..	..	1	..
Mar.	5	58½	7¼	14½	4	99	39	91	1¾	..	2⅝	⅜	⅜	4¾	⅛	2	4¼	..	..	4¾	2½	3	..	¼	5	3/10	3	2	1	..	..
April	3	70	4¼	½	4	24¾	13	41	¾	..	⅞	¼	¾	6	..	2	15	..	..	½	..	1	..	..	1¼	1/10	..	12	..	..	..
May	1	10	2½	..	..	22½	12½	30	1½	..	..	1¼	..	5	..	¾	2	..	..	..	..	..	..	..	..	..	..	4	..	..	..
June	4	87¼	8½	75	..	21¼	27	185	10½	..	2¼	6⅛	..	11½	⅜	..	1	..	..	65	11	114½	4½	..	19	9 6/10	..	4	..	..	..
July	5	144¼	20½	51⅓	..	57½	46½	226	27½	..	1⅞	9⅝	..	25¾	..	¼	4¼	..	1	15	¼	6	..	¼	35	4 3/10	..	..	..	..	..
Aug.	6	96½	38	35	12	68	36	126½	38¼	..	4	1⅜	..	22½	2¾	1¾	7	..	..	15	6¾	15⅓	2¼	⅛	21	1 5/10	..	3	..	..	..
Sept.	4	69	9½	28⅔	1	33	24	177	77½	..	⅝	2½	..	16¼	..	2½	5¾	..	..	21½	10½	21	2½	..	52	5 4/10	1	1	..	.	..
Oct.	3	51½	7¼	24⅔	5	48¼	29	100	40½	..	1½	1½	..	17	..	2¾	7¼	..	1¼	11¼	..	9¼	2	..	30	7 9/10	..	..	..	⅝	..
Nov.	1	4½	9	..	..	55	20	28	..	..	1¼	..	..	9½	¾	1½	1	..	..	..	..	..	..	..	1	..	..	..	2	3	..
Dec.	4	20½	14	4	..	25	17	111½	2½	..	2⅝	..	..	6½	..	..	3¾	..	..	2	1½	6½	..	..	8	1 9/10	2	..	10	6¼	..
Totals	47	662¾	159¼	195⅙	28½	547	315½	1339¼	216	..	21¾	23⅜	1⅜	129⅞	4	14½	58½	..	2¼	140⅜	33⅜	185¾	12¼	⅞	172½	31 6/10	6	26	13	11⅞	..
1900. Jan.	7	21¼	18½	4⅓	1	44¾	27	199	14¾	..	2½	⅛	..	7½	⅜	¾	7¾	..	..	2	..	7⅜	¾	..	6¼	4/10	1	1	13	9¾	..
Feb.	4	18¾	4¾	17½	4	72¼	35¼	148⅓	9½	..	3½	½	..	1¾	..	..	1	..	..	1	..	2¾	2	..	2½	6/10	..	½	7	4¼	..
Mar.	3	64	3	7⅙	5	63	18½	55½	13½	..	1¾	⅛	..	4½	..	..	2¼	..	..	2¼	¾	3	..	..	5½	1 1/10	1	2	6	..	..
April	2	94	3½	3⅓	½	34½	23	43	..	..	2¼	½	..	4¼	..	3	10	..	..	..	..	½	..	..	1½	1/10	..	½	..	..	..
May	2	29	4	2	..	13	26¾	31½	2	..	1¼	..	..	3½	..	½	6½	..	..	3½	..	9½	..	3½	9	2 7/10	10	7	3	..	..
June	6	40¾	13¼	3⅔	7	104	49¼	75¾	1¾	..	3⅜	⅜	..	17	½	1¼	10	½	..	..	..	..	⅛	..	..	1/10	..	¼	..	..	..
July	5	50	13	4⅔	..	87	74	123	2½	..	2¼	⅝	⅛	13¼	½	2¼	8	..	..	..	..	..	¾	..	4	29	..	..	..	½	..
Aug.	5	58¼	15¼	5⅙	3	45¾	16¾	20¼	4	..	2⅝	..	..	15	2	1¾	6¾	..	..	¼	..	¼	..	..	..	1 4/10	..	..	..	..	..
Sept.	4	29½	13	5⅚	..	97	37½	47¾	2¼	..	1⅛	½	..	9¾	½	2½	10¼	..	..	..	..	¼	½	⅜	6	1 1/10	..	1	..	..	..
Oct.	3	54½	25½	7⅔	2½	65	13	½	10½	..	½	½	¼	¼	..	3	24¾	¼	1½	..	..	..	..		8	21 1/10	..	..	..	½	..
Nov.	4	8¼	5½	½	..	47	24½	59½	5¾	..	⅛	½	..	1¼	..	1½	6¼	..	..	..	..	..	..	¼	2¾	..	..	..	..	1	..
Dec.	6	22½	13	13	11	66½	27	78	16	..	1⅝	..	..	3¼	..	..	1½	..	1¼	1½	¼	3	¾	..	9½	8/10	½	..	1	3⅛	..
Totals	51	480¾	132¼	74⅚	34	639¾	372½	882¼	82¼	..	22⅞	3¾	⅜	81¼	3⅞	16½	95	¾	2¾	10¾	1	26⅝	4⅞	4¼	55	58 4/10	12½	12¼	30	19⅛	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L	M.	S.		L.	S.	L.	S.								
1885. Feb.	1	11	..	..	..	..	35	..	1½	..	1	..	..	1	..	..	30	..	..	..	..	..	..	..	.	..	..	..	..	..	..
Mar.	4	183	2	5½	..	..	153	..	..	..	4¾	..	..	18	..	..	167	..	..	..	..	..	..	..	2	..	..	..	..	..	..
April	3	125	6	5½	2	..	198½	..	..	..	15	..	..	8	..	..	87	..	..	..	..	..	..	..	14	..	..	..	..	..	11
May	3	56	..	2	6	..	152	..	..	..	31½	..	..	18	..	..	100	..	..	..	..	..	..	..	19	..	..	..	..	..	7
June	5	7½	..	½	½	..	242	..	9	..	¾	..	..	1	..	..	16½	..	..	..	..	..	..	..	2	..	..	..	..	..	2
Aug.	4	11	..	..	4	..	304	..	3	..	1	..	..	..	..	..	45	..	..	..	..	..	..	..	1	..	..	..	..	..	3
Sept.	1	..	..	..	..	..	50	..	..	..	½	..	..	3	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Oct.	4	10	..	2	..	..	215½	..	..	..	2	..	..	4	..	..	108	..	..	..	..	..	..	..	8	..	..	..	..	..	11
Nov.	3	9	..	2	..	..	31	..	..	..	2	..	..	3½	..	..	411	..	..	..	..	..	..	..	10	..	..	..	..	..	7
Dec.	5	12	..	..	2	..	42	..	½	..	3	..	..	3	..	..	529	..	..	..	..	..	..	..	4	..	..	..	..	..	13
Totals	33	424½	8	17½	14½	..	1423	..	14	..	61½	..	..	59½	..	..	1532½	..	..	..	..	..	..	..	60	..	..	..	..	..	55
1886. Jan.	5	46	..	1	1	..	104	..	..	..	4½	..	..	..	..	..	188	..	..	..	..	..	..	..	11	..	..	..	..	..	9
Feb.	3	51	..	2	3	..	16	..	..	..	2	..	6	7	..	..	170	..	..		..	..	..	..	3	..	..	..	..	..	3
Mar.	3	84	..	4	..	..	453	..	..	..	2	1	..	1½	..	..	18	..	..	..	..	..	..	..	5	..	..	..	..	..	2
April	4	32	..	6½	..	..	126	..	..	..	4	.	2	6½	..	..	23	..	..	..	..	..	..	..	4	..	..	..	..	..	9
May	3	36	.	1	3	..	201	..	1	..	2½	9	..	6½	..	..	52	..	..	..	..	..	..	..	2	..	..	..	..	..	3
June	6	6	.	1	11½	..	111	..	7½	..	1¼	..	4	13	..	..	50	..	..	..	..	..	..	..	5	..	..	..	..	..	58
July	6	9		2	9	..	231	..	4	..	8	..	..	9	..	..	51	..	..	..	..	..	..	..	7	..	..	..	..	..	7
Aug	6	6	.	..	16	..	500	..	..	..	2½	..	..	1	..	..	60	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Sept.	9	4	..	2	6	..	339	..	1	..	6	¼	1	26½	..	..	67	..	..	..	..	..	..	..	1	..	..	..	..	..	22
Oct.	8	11	..		..	..	241	..	3	..	6	..	1	17	..	..	64	..	..	..	..	..	..	..	2	..	..	..	..	..	17
Nov.	6	7½	..	1	..	..	129	..	3	..	3	¼	..	13½	..	..	216	..	..	..	..	..	..	..	2	..	..	..	..	..	7
Dec.	5	10	..	1	22	..	169	..	1¼	..	2	1½	1	17	..	..	74	..	..	..	..	..	..	2	3	..	..	..	..	..	19
Total	64	322½	..	24½	71½	..	2620	..	20¾	..	43¾	12	15	118½	..	..	1033	..	..	..	..	..	..	2	45	..	..	..	..	..	160

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1887. Jan.	3	18	..	½	..	..	28	..	..	..	1¾	..	1½	1¾	..	..	394	..	..	..	..	..	..	..	3	..	..	..	..	..	9
Feb.	3	42½	..	..	1	..	100	..	..	..	4	..	1	4	..	..	178	..	..	..	..	..	..	..	8	..	..	..	..	..	12
Mar.	5	102	..	..	..	..	169	..	..	..	4¾	..	8¾	65½	..	..	241	..	..	..	..	..	..	..	3	..	..	..	..	..	15
April	5	11	..	..	½	..	159	..	..	..	4½	½	1	3	..	..	151	..	..	..	..	..	..	..	7	..	..	..	..	..	15
May	6	19	..	3	1½	..	202	..	8	..	1¾	½	¼	12	..	..	52	..	..	..	..	..	..	1	7	..	..	..	..	..	30
June	6	10½	..	2½	4½	..	222	..	6	..	7¾	..	¾	36	..	..	87	..	..	..	..	..	..	..	6	..	..	..	..	..	45
July	6	21	..	..	10	..	175	..	15	..	4	..	..	13	..	..	96	..	..	..	..	..	..	..	1	..	..	..	..	..	28
Aug.	4	9½	1	..	13	..	330	..	..	..	2¼	¼	1	3	..	..	132	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Sept.	6	3	4	2	..	..	265	..	6	..	7	..	..	13	..	..	83	..	..	..	..	..	..	..	..	..	..	..	..	..	30
Oct.	7	25	16	..	..	..	151	..	3	..	6½	1	1	11	..	..	287	..	..	..	..	..	..	..	12	..	..	..	..	..	9
Nov.	3	10	22	..	..	..	123	..	..	..	1	..	..	½	..	..	157	..	..	..	..	..	..	..	..	..	..	..	..	..	8
Dec.	4	19	16½	..	..	..	56	..	1	..	3¾	..	..	5	..	..	339	..	..	..	..	..	..	..	3	..	..	..	..	..	13
Totals	58	290½	59½	8	30½	..	1980	..	39	..	49	2¼	15¼	167¾	..	..	2197	..	..	..	..	..	..	1	50	..	..	..	..	..	218
1888. Jan.	1	2	10	..	..	..	80	..	..	..	½	..	..	1	..	..	50	..	..	..	..	..	..	..	4	..	..	..	..	..	3
Feb.	3	22	4	..	..	..	45	..	..	..	1½	..	½	10	..	..	257	..	..	..	..	..	..	..	1	..	..	..	..	..	10
Mar.	5	90	7	1	..	..	235	..	..	..	2¼	..	..	27	..	..	170	..	..	..	..	..	..	..	..	..	..	..	..	..	28
April	4	52	6	..	..	49	47	7	9	..	3½	..	3	40	..	17	65	..	..	..	..	..	..	..	2	..	..	..	..	..	10
May	3	8	11	..	..	148	..	10	1	..	4½	..	1	1	..	49	..	9	..	..	..	..	..	..	1	..	..	..	..	..	3
June	2	3	1	..	..	46	..	..	..	..	19	..	..	..	..	93	..	21	..	..	..	..	..	..	..	..	..	..	..	..	1
July	8	28	29	2	3	184	..	186	67	..	4½	..	..	10	..	95	..	7	..	..	..	..	..	½	1½	..	..	..	..	..	52
Aug.	6	12	19	..	5	46	..	98	..	..	5	..	..	20	..	31	..	1	..	..	..	..	..	..	..	..	..	..	..	..	29
Sept.	12	14	32	1	½	189	..	298	..	..	19¼	..	..	34	..	59	..	..	..	..	..	..	..	..	1½	2	..	..	..	..	76
Oct.	13	17	34	1	1	225	..	243	10	..	19	..	..	39	..	36	..	11	..	..	..	..	..	..	14	½	..	..	..	..	60½
Nov.	7	12	13	..	..	149	..	109	..	..	6½	..	..	16	..	72	..	..	..	..	..	..	..	..	4	..	..	..	..	..	11
Dec.	5	12	9	..	..	130	..	87	1	..	4	..	..	10	..	361	..	..	..	..	..	..	..	..	..	..	..	..	..	..	9
Totals	69	272	175	5	9½	1166	407	1038	88	..	89½	..	4½	208	..	813	542	39	..	..	..	..	..	½	29	2½	..	..	..	..	292½

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1889. Jan.	4	10	6	..	..	121	..	63	..	..	4	..	..	1	..	341	..	..	..	..	..	..	..	..	..	..	..	..	..	..	15
Feb.	4	9	6	..	.	47	..	71	..	..	4	..	..	12	..	106	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Mar.	5	41	8	..	..	49	..	82	2	..	5½	..	..	18	..	126	..	..	..	6	..	..	..	..	..	..	..	..	..	..	4
April	7	73	17	..	..	100	..	112	10	3	6½	1	..	35	..	34	..	..	..	6	4	..	..	..	..	..	..	..	..	..	6
May	3	8	17	..	..	43	..	32	8	..	3	..	..	16	..	15	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..
June	5	29	9	..	..	375	..	10	..	..	9	..	20	10	..	16	..	55	..	..	..	..	..	..	..	4	..	..	..	..	4
July	7	94	28	..	..	56	..	66	..	..	6½	..	37	40	.	62	..	..	..	..	..	..	..	..	3	10	..	..	..	..	21
Aug.	10	16	23	..	..	173	..	154	..	..	12	1	6	38	..	25		..	.	1	..	..		..	..	11	..	..	..	..	..
Sept.	12	14	32	..	..	133	..	96	3	..	14	..	..	41	..	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	36
Oct.	11	16	19	..	..	213	..	143	..	..	13	..	..	20	..	62	..	..	..	..	..	..	..	..	3	..	..	..	..	..	28
Nov.	5	17	16	..	..	195	..	125	..	..	5	..	..	36	..	51	..	..	..	..	..	..	..	..	..	..	..	..	..	..	16
Dec.	4	40	16	..	..	70	..	40	..	..	4	..	..	9	..	91	..	..	..	..	..	..	..	..	..	..	..	..	..	..	22
Totals	77	367	197	..	..	1575	..	994	23	3	86½	2	63	276	..	956	..	59	..	13	4	..	..	..	6	25	..	..	..	..	156
1890. Mar.	1	15	2	..	..	28	..	18	..	..	1	..	..	2	..	28	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..
April	4	59	7	1	..	89	..	73	..	..	3	..	..	38	..	77	..	..	..	2	1	..	..	..	..	..	..	..	..	..	3
May	4	11	3	1	..	124	..	20	1½	..	3½	1	..	7	6	14½	..	7	..	11	3	..	..	..	7	1	..	..	..	..	7
June	3	11	2	1	..	221	..	63	..	..	1	..	21½	16	..	26	..	9	..	1	..	..	..	..	..	35	..	1	..	..	..
July	7	32	36	2	..	95	..	63	..	..	5	..	..	59	..	59	..	..	..	2	..	..	..	..	..	20	..	..	..	..	..
Aug.	7	18	5	4	..	141	..	58	1	..	10	..	4	24	..	62	..	..	..	4	..	..	..	..	..	7	..	..	..	..	..
Sept.	3	19	4	1	..	197	..	23	..	..	2	1	1½	9	..	50	..	..	..	..	..	..	..	1	..	1	..	..	..	..	2
Oct.	3	32	6	..	..	119	..	59	..	..	3	..	..	14	..	52	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	13	3	4	..	152	..	40	..	..	3½	..	..	5	..	111	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..
Dec.	4	15	5	..	..	83	..	29	..	..	2	..	..	17	..	102	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Totals	39	225	73	14	..	1249	..	446	2½	..	34	2	27	191	6	581½	..	16	..	25	4	..	..	2	7	64	..	1	..	..	12

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1891. Jan.	3	22	4	1	..	162	..	68	.	..	3	1	..	3	..	41	..	..	..	3	..	..	..	..	..	1	..	..	..	..	9
Feb.	4	24	6	3	..	210	..	32	3	..	3	..	..	12	..	154	..	..	..	6	2	..	..	..	14	..	..	..	..	..	..
Mar.	4	29	4	..	..	282	..	87	1	..	..	..	..	9	..	10	..	..	..	12	4	..	..	..	9	..	..	..	..	..	..
April	3	25	..	1	..	29	..	19	2	..	12½	..	1½	11	..	30	..	..	..	23	4	..	..	..	10	..	..	..	..	..	..
May	4	27	5	2	..	101	..	38	..	..	2	..	1	47	..	44	..	..	..	..	..	..	..	..	6	5	..	..	..	..	..
June	4	24	2	..	..	176	..	10	..	..	2	..	2	12	..	85	..	..	..	16	..	..	..	..	3	6	..	..	..	..	..
July	4	9	5	..	..	85	..	3	..	..	1½	..	..	19	..	28	..	..	..	5	..	..	..	..	3	15	..	..	..	..	..
Aug.	4	9	7	..	..	61	..	57	..	..	2	..	..	20	..	33	..	..	..	4	..	..	..	..	..	7	..	..	..	..	..
Sept.	3	17	11	1	..	116	..	53	..	..	1	..	..	15	..	43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	8	3	7	..	247	..	29	..	..	1	..	..	6	..	23	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	9	3	1	..	104	..	12	..	..	..	..	..	10	..	192	..	36	..	..	..	..	..	..	..	..	..	..	..	..	..
Dec.	2	13	2	2	..	190	..	37	..	..	..	..	..	5	..	48	..	..	2	4	..	..	..	..	2	..	..	..	..	..	4
Totals	41	216	52	18	..	1763	..	480	6	..	28	1	4½	169	..	731	..	36	2	73	10	..	..	..	47	34	..	..	..	..	13
1892. Jan.	3	15	6	2	..	81	..	..	..	..	¾	..	..	..	..	2	..	..	..	2	½	..	..	..	1	..	..	..	..	..	1
Feb.	4	50⅓	4	1	..	204	..	11	..	..	..	..	..	5½	..	67	..	2	..	2	..	..	..	..	1	..	..	..	..	..	5
Mar.	5	29	2	..	..	334	..	5	..	..	3	..	..	25¾	..	5½	..	..	..	6	..	..	..	..	11	..	..	..	..	..	5
Sept.	3	11	9	1	..	68	36	14	2	..	¾	..	..	30¾	..	4	19	..	1	..	..	..	..	..	3	..	..	..	..	..	2
Oct.	5	26	36	⅔	..	144	49	15	9	..	1¾	..	..	49	..	8¼	19¼	½	..	2	..	..	..	..	5	..	7	7	..	4½	5
Nov.	3	70	33	2⅓	..	191	52	12	3½	..	1	..	..	23	..	5	25	..	..	9½	..	..	..	..	8	½	5	1	..	2	..
Dec.	4	23	15½	1⅓	..	103	42	29½	6	..	1½	..	..	25½	..	..	1½	..	1½	2¼	..	..	..	..	6	..	5	2	..	3½	..
Totals	27	224½	105½	8⅓	..	1125	179	86½	20½	..	8¾	..	..	159½	..	91¾	64¾	2½	2½	23¾	½	..	..	..	35	½	17	10	..	10	18

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock. L.	Haddock. M.	Haddock. S.	Whiting. L.	Whiting. S.	Turbot.	Halibut	Brill.	Lemons. L.	Lemons. S.	Plaice. L.	Plaice. M.	Plaice. S.	Common Dab.	Witch. L.	Witch. S.	Sail Fluke. L.	Sail Fluke. S.	Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
1893. Jan.	2	25	16	⅔	..	154	49	5	1	..	..	..	..	4	..	..	..	..	½	8½	..	..	..	..	11	..	4	..	..	¾	..
Feb.	2	21	13	7	..	135	60	3	2	..	..	..	..	1	..	..	¼	..	½	7	..	..	..	..	3	..	3	..	..	..	..
June	3	29	16	14	..	32½	47	6	13½	..	2¼	¼	..	32	..	9	9¼	..	2½	5¾	..	7¼	..	..	..	53	..	..	..	..	..
July	2	13	5	2½	1	84	34	..	..	..	1	1	..	9	..	6½	31	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Aug.	5	23½	19	..	..	138	43	..	5½	..	9¼	..	..	41½	..	3¾	17½	2	..	1½	..	2	..	..	..	½	..	..	..	..	..
Sept.	2	30	24½	⅔	..	130	23	..	.	..	..	1	..	4	..	¼	5½	..	..	2¾	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	53	29	3½	..	143	22	..	4	..	..	..	..	4¼	..	9	15¼	..	..	2½	..	..	..	..	..	..	..	..	..	¼	..
Nov.	3	24	59½	3	..	277½	64	..	3	..	½	¾	..	3¼	..	39	60	..	..	1½	..	..	..	..	..	2	11	..	..	1	..
Dec.	2	3¼	13½	⅝	..	121	25	..	¾	..	..	..	..	¾	..	13¼	13	..	..	¼	..	..	..	..	..	..	7	..	..	1½	..
Totals	24	221¾	195½	32⅛	1	1215	367	14	29¾	..	13	3	..	99¾	..	80¾	151¾	2	3½	31¾	..	9¼	..	..	14	55½	25	..	..	3½	..
1894. Jan.	4	30½	17	3½	..	202	55	..	4½	..	¼	⅛	..	3½	..	12	9¼	..	..	2½	..	..	..	..	..	..	5	..	..	2	..
Feb.	2	25	7½	4½	½	161	26½	1½	3	..	⅛	..	..	1½	..	2½	6	..	..	8	..	..	..	..	..	..	7	..	..	..	..
Mar.	5	62½	4½	9½	..	155¾	31	4	4	..	1½	⅛	..	15¾	..	1	4½	..	1¾	4¼	..	⅛	..	..	2	..	7	..	..	½	..
April	3	40½	7½	1½	..	69	21	..	5	..	3	¾	1	12¾	..	18¼	42	..	2½	7	2	1	..	..	2	..	2	..	..	..	..
May	4	43¾	8¼	4⅓	..	235	36	6	..	..	2¾	4¾	¾	6¼	..	11¾	78	..	1¾	3¼	..	..	..	..	..	..	..	..	..	..	..
June	2	14	6	6	..	132	17½	1	..	..	..	1½	..	1¾	..	6	30	..	..	2½	..	..	..	..	..	..	..	..	..	..	..
July	4	16½	11½	2⅓	..	212	39	7	..	..	¾	1¼	..	6½	¼	5¼	27¼	..	..	4¾	..	..	..	..	..	..	..	..	..	..	..
Aug.	5	34	20½	1½	..	302	81	1¼	..	..	3½	⅞	¾	18¾	1¼	21¾	24¾	..	4	1¾	..	..	..	¼	1	½	3	..	..	..	..
Sept.	2	8	6	..	..	48	15½	1⅛	..	..	..	2	¼	1¾	½	32½	139	14	13½	..	..	..	..	¾	..	..	4	..	..	..	..
Oct.	3	1	..	..	..	176	28	4¼	..	..	⅜	1⅝	..	2½	½	32¾	206	7	10¼	¼	..	..	..	⅝	..	1	1	..	..	..	..
Nov.	3	15¾	5½	2⅓	..	69	6	..	¼	..	1	1¾	..	1¼	¼	21¾	226½	7½	8	..	..	1½	..	⅜	2	½	2	..	..	..	..
Dec.	2	1¾	3	⅛	..	2½	..	..	..	..	2½	¼	¼	2⅛	..	28	246	56¼	16½	..	..	..	..	1⅞	2	..	..	..	..	..	..
Totals	39	293¼	97¼	35⅔	½	1854¼	356½	26⅜	16¾	..	15¾	15	3	74⅜	2¾	193½	1048¼	84¾	58¼	34¼	2	2⅝	..	3⅞	9	2	29	..	..	2½	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1895. Jan.	2	5½	5¾	..	..	..	..	..	..	..	1	¾	¼	¼	..	18½	247	4½	13	..	..	..	..	..	..	..	..	..	..	¼	..
Feb.	3	6½	1½	1	..	2½	2	6	..	..	¼	..	⅛	3	¾	5	78	4	5	..	..	1	..	..	2	8/10	..	..	..	..	.
Mar.	5	39½	14½	24½	1	94½	34	12	3¾	..	¼	⅜	..	7½	..	1	2¾	..	3½	6¼	..	9	1½	..	4	5/10	4	..	..	..	..
April	7	71½	43¾	22¼	5	38½	75	46½	6¼	..	1	1¾	..	31¾	2⅞	1	4½	..	..	16½	¾	6	..	..	1	..	9	..	..	..	..
May	3	44	5	3	3	267	40	7	..	..	2⅞	1¾	..	7½	..	..	4½	..	7	..	..	..	..	..	..	..	..	..	..	..	..
June	3	45½	21	3⅛	..	27	12	..	..	..	2	2½	¼	11¼	½	32	56½	4	4½	..	..	1	..	..	13	..	2	..	..	..	..
July	4	44	19½	3⅛	..	148	33	6	..	..	2¼	5½	..	14½	4¼	30¾	69½	..	12	..	..	..	..	..	7	10 5/10	..	..	..	..	..
Aug.	5	100	22¼	22½	..	265	47½	8	..	..	1½	9¾	..	18¼	2	41	67½	..	27½	..	½	1¾	..	..	5	..	..	..	..	..	..
Sept.	3	27	14¾	14	..	100	53	..	..	..	2½	5¾	..	18¼	1	34½	69	..	20	..	..	1½	..	..	14	5/10	..	..	..	..	..
Oct.	3	26½	4	10	..	79	36	..	..	..	7	3½	..	1	1	58	76	..	23	..	..	1	..	½	12	..	..	..	..	..	..
Nov.	3	22	6½	4	..	73	45	..	..	..	2	1	..	3¾	..	28¾	39	..	8	4¼	..	..	..	⅛	6	2/10	5	..	..	⅛	..
Dec.	3	12¼	2	1	..	74	57	10	1	..	..	5½	..	7	3	14	51	18¾	14½	..	..	..	..	..	23½	5/10	1	..	..	¾	..
Totals	44	444¼	160½	108½	9	1168½	434½	95½	11	..	22⅝	38½	⅝	124	15⅜	264½	765¼	31¼	138	27	1¼	21¼	1½	⅝	87½	13	21	..	..	1⅛	..
1896. Jan.	3	24½	14	4	..	112	112	12½	..	..	⅞	⅛	..	12	½	¼	2	..	..	¼	..	..	..	..	1	..	1	..	..	4⅛	..
Feb.	4	98	4	4⅔	..	56¼	79	2	..	..	1	⅜	¼	1⅝	..	20	75¾	..	2½	11¼	2½	¼	..	⅜	..	½	..	..	..	½	..
Mar.	7	86½	25½	8⅔	..	172	107	36½	6¾	..	1¾	..	⅛	21½	½	½	4	..	..	..	..	2½	..	..	2	..	..	..	..	¼	..
April	6	77	14¾	8	9	70	52	19	8½	..	2¼	3⅛	..	11¼	⅛	2	3½	..	..	42¼	1¾	7¼	..	..	6	4/10	1	..	..	..	..
May	3	75	11¾	3	..	56¼	29	..	..	..	2¾	⅞	4¼	40½	¼	7¾	11¾	..	..	..	..	..	..	¾	..	2/10	..	..	..	..	..
June	3	117	7¾	21	..	62½	14¼	..	..	..	1½	6¼	1½	1¾	¼	15¾	25	..	¾	..	..	4	½	⅜	1	..	..	..	..	..	.
July	7	42¼	21¾	4⅓	..	44¼	35	11½	..	..	5⅜	⅞	..	45½	1⅛	8¼	17¼	..	..	..	..	..	..	¼	1	8/10	..	..	..	..	..
Aug.	4	72½	7½	13	..	183	41	..	..	..	4⅛	13	3	16¼	½	30¼	58½	..	12½	..	..	5	..	½	11	..	1	..	..	..	..
Sept.	3	91½	2¼	82½	..	108	25	..	..	..	37⅝	8½	..	3	1½	8½	26	5	5	..	..	1¾	..	¼	5	..	4	..	..	..	..
Oct.	4	144	9½	40	..	96	14	2	..	..	18⅝	1¼	½	1¼	..	12	14½	..	3¾	..	..	¾	..	4⅝	9	..	1	..	..	2¼	..
Nov.	3	43½	10	4½	1	141	80	19	1¼	..	⅜	¼	..	3	..	1¼	11	..	..	5½	..	..	..	..	2	2/10	..	..	..	..	..
Dec.	3	54½	4	3⅔	½	26¼	14	..	¼	..	1⅜	⅜	..	1¼	¼	6¼	14¼	..		1	..	2	½	⅛	10	..	4	..	..	1½	..
Totals	50	926¼	132¼	197⅓	10½	1127½	602¼	102½	16¾	..	77⅝	35	9⅝	158⅞	4⅞	110¾	263½	5	29½	60¼	4¼	23½	1	7¼	48	2 1/10	12	..	..	8⅝	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock. L.	Haddock. M.	Haddock. S.	Whiting. L.	Whiting. S.	Turbot.	Halibut.	Brill.	Lemons. L.	Lemons. S.	Plaice. L.	Plaice. M.	Plaice. S.	Common Dab.	Witch. L.	Witch. S.	Sail Fluke. L.	Sail Fluke. S.	Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
1897. Jan.	4	18¼	7¾	3⅓	1	22½	18	20¼	2	2	2⅛	⅛	..	6	..	3	8¼	..	½	1¾	..	5	1¾	..	3½	..	1	..	..	¼	..
Feb.	4	119½	9¾	7⅔	..	114	61	34½	3	..	1	¼	⅛	2¾	⅛	1½	4	..	1	2¼	½	2	½	..	3	..	..	..	..	..	..
Mar.	4	84½	½	7⅔	4	146	79½	77½	4¾	..	¾	¾	..	4	..	¾	2½	..	¾	13	1¾	2	½	..	5	$\frac{2}{10}$	1	..	..	.	
April	5	43	22½	9	26	26½	33½	73¼	16¾	..	¼	1⅛	..	10¼	..	..	2¾	..	..	63¾	12¼	10	..	..	10	$1\frac{3}{10}$	5	..	..	..	
May	4	76	12½	21½	6	16¼	22	52	11½	..	1½	2	..	8½	..	¾	5½	..	¾	101¾	23½	5½	¼	..	9	$1\frac{9}{10}$	2	..	..	..	
June	3	67½	16	5	1	41	22½	28	5¾	..	2⅝	1⅝	⅞	7½	..	4¾	13	1	..	33½	8¼	7½	..	..	8	$2\frac{4}{10}$	2	..	..	..	
July	1	33	5	6	..	27	7	..	..	..	⅞	4	..	1¼	..	6	23	..	2¼	..	..	..	..	..	3	..	1	..	..	..	..
Aug.	4	247	14¾	16½	..	204	50	..	..	..	3⅞	11	..	9¼	⅛	18	70	..	7¾	..	..	4	..	..	5	..	1	..	..	..	
Sept.	4	67	6	12	1	157½	39	20½	..	..	1⅜	..	..	4½	..	8¾	22¾	..	1¼	¾	..	2½	..	⅛	4	$\frac{9}{10}$	4	..	..	.	
Oct.	4	33½	17¼	4⅓	10	213½	105½	72½	2¾	..	1⅛	..	..	1¼	..	4¼	12¼	..	4½	4¼	.	2½	..	..	3	$9\frac{2}{10}$	..	..	..	..	
Nov.	4	70	25¾	5½	7	180	98	111½	7	..	1⅜	⅛	..	4¾	..	½	3¼	..	4¾	9	¼	..	..	..	2	4	1	..	5	¼	..
Dec.	7	79½	25¼	1½	½	85	42	77½	2¾	..	3⅝	..	⅞	9⅞	..	2¼	11	..	..	..	..	1½	..	..	10	$\frac{6}{10}$	13	..	..	5½	..
Totals	48	938¼	163	100	56½	1233¼	578	567½	56¼	2	21	21	1⅞	69⅞	¼	50½	178¼	1	23½	230	46½	42½	3	⅛	65½	$20\frac{5}{10}$	31	..	5	6	..
1898. Jan.	5	26¾	10	1⅓	..	118	99	146	9¼	..	4¾	..	..	3	.	2	6⅜	..	..	3¾	..	7	¾	..	12	$1\frac{9}{10}$	1	..	4	2¼	.
Feb.	6	21½	18	5½	..	62	32	30	½	..	3⅝	⅜	⅛	8	..	..	9	..	..	1¼	..	3¾	..	⅜	4	..	..	..	..	..	
Mar.	4	102½	4	9⅓	2	129	70	61	2¼	..	2⅞	2½	⅛	5¾	..	15¼	34	¼	..	3½	..	7	..	..	2	$\frac{3}{10}$	..	..	..	⅛	
April	4	77	11½	6	..	67	39	24½	1¾	..	3⅝	1	¼	9¾	1	3½	7	..	..	¾	..	¾	4	⅛	1¼	$\frac{5}{10}$	..	..	8	..	
May	3	57½	17	3⅓	..	86¾	55½	41½	1¼	..	½	3⅝	..	5½	¼	2½	12½	..	..	2⅞	..	1½	¾	..	..	$\frac{2}{10}$	..	..	4	..	
June	4	45½	25½	2⅔	2	117	76½	58	3¼	..	4⅛	1⅛	..	13	..	3¼	18½	..	..	4½	..	..	..	..	..	$\frac{3}{10}$	..	..	2	..	..
July	3	69	35½	4	..	45½	20	29	4	..	1⅜	..	⅝	9¼	¾	3½	6½	..	..	¾	..	1½	1	..	..	$8\frac{4}{10}$	..	..	.	..	.
Aug.	5	43¾	28¼	5⅓	..	117	59	39¼	1¾	..	7⅛	⅝	..	16¼	..	1½	6¼	..	..	¾	..	..	..	..	1	$\frac{5}{10}$	..	..	..	..	.
Sept.	5	95¼	25	10	..	270¾	82	44½	9¼	..	2⅛	1⅜	..	7¾	⅜	5	18	..	..	1¼	..	1	..	..	9	$3\frac{9}{10}$	6	..	..	3¾	Bream 5
Oct.	4	45	20	5⅔	..	216¼	79	104	9	..	3⅝	..	⅛	10½	½	2½	8½	..	..	¼	..	..	..	..	3½	..	4	..	..	8¼	..
Nov.	3	28	15	7⅔	..	134	73¼	125¼	5¼	..	⅞	..	..	6¾	¼	¼	3	..	1	½	..	..	..	..	3½	$\frac{7}{10}$	..	..	..	3¼	.
Dec.	6	37½	25½	2½	..	160	35½	20½	8	..	5¾	⅝	..	2	..	¾	1⅞	..	..	5½	..	3½	¾	..	23½	2	..	..	..	2⅜	..
Totals	52	649¼	235¼	63⅓	4	1523¼	720¾	723½	55½	..	40	11¼	1¼	97½	3⅛	40	132½	¼	1	25⅝	..	26	7¼	½	59¾	$18\frac{7}{10}$	11	..	18	20	

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 2.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock. L.	Haddock. M.	Haddock. S.	Whiting. L.	Whiting. S.	Turbot.	Halibut.	Brill.	Lemons. L.	Lemons. S.	Plaice. L.	Plaice. M.	Plaice. S.	Common Dab.	Witch. L.	Witch. S.	Sail Fluke. L.	Sail Fluke. S.	Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
1899. Jan.	4	39½	9¼	3½	½	61	34	44	5	..	⅞	⅜	..	1⅜	..	3	9¾	..	..	4	½	6½	½	..	8½	1 6/16	..	3	..	2⅛	..
Feb.	4	43½	16¼	34½	1	195½	113	134	7½	..	1	4¾	¼	¾	..	1	6	..	..	18¼	2	17¾	2¼	..	26	1 11/16	5	7	..	1⅜	..
Mar.	5	81¼	24	30	9	162	68	84½	19¾	..	2¼	1⅜	¼	10	..	1	9¼	..	3½	7	¾	5¼	..	..	4¼	2/16	2½	5	..	..	..
April	4	51	15½	29⅙	9	70¾	51	68¼	18¾	..	1⅝	1⅜	..	4¼	..	1	3	..	..	27¼	4	21	2¾	..	8	9 1/16	1	8	9	..	..
May	2	22	17¾	5⅝	1	58¼	20½	18	7	..	2¼	1¾	..	1¼	..	1¼	8¾	..	..	31	7	4¾	..	..	7	9/16	..	..	..	..	..
June	4	55½	52½	20⅝	..	186½	63¾	54	10¼	..	¾	6½	..	3¾	..	4	4½	..	..	15¼	¾	¾	..	..	..	5/16	..	11	..	..	..
July	4	27¼	22¼	25½	..	106	58½	59	7	..	1⅝	7⅝	..	9¼	..	1¼	8¾	..	..	9¾	¾	5¼	1	..	3	127	..	2	..	..	..
Aug.	5	121½	19½	8	6	150¼	45¼	72	8½	..	3	¾	..	5¾	..	2	14¾	..	..	¾	..	3¼	½	..	4	22 1/16	..	1	..	..	..
Sept.	2	91½	12	½	..	103	31½	47	¼	..	..	..	..	¼	..	..	9	..	..	..	..	2	..	¼	5	17 4/16	..	..	..	..	..
Oct.	2	48½	7⅓	1⅝	1	24	5½	5	¼	..	⅝	⅛	..	¼	..	¼	4	..	..	..	..	1	..	..	6	9	..	..	..	½	..
Nov.	4	24½	11	3⅔	14	35	16¼	26	1½	..	¾	½	¼	4	..	½	9¼	..	1	10¼	1½	2⅛	..	..	11¼	2 5/16	6½	..	1	⅜	..
Dec.	3	13¼	9	1	..	41½	13¾	36¾	¼	..	1⅜	..	..	3	⅛	1	9½	..	..	..	..	2½	1	..	4	2	2	..	..	2⅜	..
Totals	43	619¼	216½	164⅓	41½	1193¾	521	648½	86	..	16⅛	25⅛	¾	43⅞	⅛	16¼	96½	..	4½	123½	17¼	72⅛	8	¼	87	193 4/16	17	37	10	6¾	..
1900. Jan.	5	28¼	13½	8⅚	1½	78	50	98½	8¼	1	5½	⅛	..	2	..	½	1½	..	2	3	¼	10½	1¼	..	10½	1 4/16	3	..	7½	10¼	..
Feb.	2	25	3¾	7½	6½	41	28	54	3¼	..	¼	⅛	..	2⅛	½	..	¾	..	1½	6	4	11	..	..	18	4 3/16	..	..	12	1½	..
Mar.	3	27½	1	21	6½	110	27	46½	20¼	..	¼	1⅞	..	¾	..	..	¼	..	3	25½	3½	18	7½	..	23	3 1/16	..	1½	8	⅜	..
April	2	37	8	18	*Tu. 9 (1)	139	41	49	24	..	¼	2¼	..	..	..	..	¾	..	1½	19½	5¼	1¼	..	..	2	1 2/16	..	5	4	..	..
May	2	30	11¼	14⅓	24 (1)	85	44	38	15	..	5⅜	3	..	¼	..	..	1¼	..	..	16¼	7¼	½	..	..	2	4	..	3	4	..	..
June	4	99¼	43	30½	90 (4)	131	89¼	62	78	..	¼	5¼	..	1¼	..	¼	2	..	..	42½	25	2	1½	..	6	4 8/16	..	8	..	..	..
July	2	54	22½	37⅝	.. (4)	103½	78	72	62	..	..	4¼	..	..	..	..	..	..	..	26½	13	4	5	..	11	24 2/16	..	..	..	..	Shark 14
Aug.	4	54	19½	42⅝	1 (3)	118¼	93¾	105½	25	..	..	5⅝	..	½	..	..	..	..	..	32½	20¾	8½	..	..	11	2 2/16	..	..	..	..	..
Sept.	3	62½	26	73	25 (5)	121	56	54½	26½	..	..	6½	..	1¾	..	..	½	..	..	36½	20½	7½	..	..	15	30 5/16	6	3	..	..	..
Oct.	4	85½	37	67½	9 (3)	236	65	67½	24½	..	..	2⅝	..	⅜	..	..	..	..	..	36¾	13	18¾	8	..	17	150 7/16	..	..	..	..	..
Nov.	1	21¼	9½	14⅙	1 (1)	55	11½	7	11	..	..	..	..	..	..	..	..	..	..	11	4	6	3	..	6	76 5/16	..	..	..	..	..
Dec.	4	37	13¼	18⅙	7½ (2)	133	44¼	63½	17½	..	½	1¾	..	..	..	¼	..	..	..	25	18¼	6¼	4	..	10	13	..	..	..	1¾	..
Totals	36	561¼	208¼	353⅔	181(24)	1350¾	627¾	718	315¼	1	12⅜	33⅜	..	9	½	1	7	..	8	281	134¾	94¼	30¼	..	131½	315 9/16	9	20½	35½	13⅞	14

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1890. Oct.	1	1	2	..	..	55	..	18	..	..	1	..	..	11	..	30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	9	5	2	..	135	..	52	..	..	3	..	..	10	..	70	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dec.	3	19	7	2	..	357	..	28	..	..	1	..	..	4	..	13	..	..	..	10	..	..	..	..	..	..	..	..	..	..	..
Totals	7	29	14	4	..	547	..	98	..	..	5	..	..	25	..	113	..	..	..	10	..	..	..								
1891. Jan.	1	3	9	..	..	112	..	9	2	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Feb.	4	33	21	5	..	609	..	63	..	..	..	..	..	4	..	92	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..
Mar.	3	65	4	..	..	301	..	37	..	..	..	..	..	2	..	21	..	..	..	8	1	..	..	..	7	..	..	..	..	..	..
April	3	33	32	3	56	177	..	26	..	..	2	..	..	5	..	22	..	..	..	6	..	..	..	..	4	..	..	..	..	..	..
May	1	1	2	..	..	125	..	18	..	..	1	..	..	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
June	3	14	15	..	..	218	..	54	..	..	2	..	..	1	..	58	..	40	..	..	..	..	..	..	2	6	..	..	..	..	6
July	4	39	5	..	..	111	..	41	..	..	3	..	..	29	..	56	..	..	..	..	..	..	..	..	..	19	..	..	..	..	..
Aug.	3	17	3	..	..	29	..	5	..	..	1	..	..	12		12	..	..	..	..	..	..	..	..	..	9	..	..	..	..	..
Sept.	3	12	3	..	..	112	..	40	..	..	1½	..	..	12	..	25	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..
Oct.	4	26	9	3	..	165	..	53	..	..	2	..	..	18	..	62	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	16	5	4	..	93	..	22	4	..	5	..	..	2	..	64	..	..	..	12	..	..	..	..	7	2	..	..	..	..	10
Dec.	4	18	24	5	..	190	..	12	..	..	..	..	..	1	..	12	..	..	..	11	..	..	..	..	..	..	..	..	..	..	..
Totals	36	277	132	20	56	2242	..	380	6	..	17½	..	..	87	..	430	..	42	..	37	1	..	..	..	23	44	..	..	..	..	16

NORTH SEA INVESTIGATIONS.—Table II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1892. Jan.	2	20	7	1	..	155	..	4	..	..	..	..	..	1	..	7	..	..	..	2	..	..	..	..	..	..	..	..	..	..	3
Feb.	2	27	9	3	..	138	..	..	..	..	..	..	..	2	..	28	..	..	..	6	..	..	..	..	..	..	..	..	..	..	..
Mar.	3	17	13	4	..	224	..	..	..	..	..	..	..	14	..	4	..	..	..	3	..	..	..	..	3	..	..	..	..	.	12
April	4	43	36	3	..	248	..	..	..	..	2	..	..	6½	..	42	..	3	..	3½	..	..	..	..	2	..	..	..	..	..	6
May	2	19	10½	10	..	93	..	..	..	..	4½	..	..	6	..	25	..	1	..	2	..	..	..	..	4	..	..	..	..	..	..
June	3	11	16	2	..	145	..	37	..	..	2	..	..	1½	..	5½	12	..	..	..	..	..	..	..	..	1	..	..	..	..	..
July	6	12½	15	13	..	94	72	..	..	..	1	..	..	23½	..	1½	22½	1	..	..	..	7	..	..	5	1	..	..	..	..	4
Aug.	5	17	4	3	..	80½	88	..	5½	..	2½	..	..	47	..	2¼	21¾	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sept.	6	20	16½	1⅔	..	217	52	3	3¾	..	2	..	..	16½	..	9½	61	..	..	..	..	..	..	..	1	3	..	..	..	..	4
Oct.	5	27	7½	2	..	222	77	..	6¼	..	½	..	..	19	..	¾	14	..	..	2	..	1	..	..	..	..	..	..	..	..	1
Nov.	3	73	12	½	..	271	50	..	..	..	..	..	..	1½	..	9	51	..	..	¾	..	..	..	..	..	..	..	..	..	..	..
Dec.	4	25	27	3	..	176	46	..	3½	..	1	1	..	6	..	1	8	..	..	5	..	..	..	..	5	..	..	..	..	¼	..
Totals	45	311½	173½	46⅙	..	2063½	385	44	19	..	15½	1	..	144½	..	135½	190¼	5	..	24¼	..	8	..	..	20	5	..	..	..	¼	30
1893. Jan.	3	38	20½	6½	2	219	109	7	..	..	¼	¾	..	2	..	..	2½	..	..	1¾	..	..	..	..	1	..	..	..	..	..	..
Feb.	3	37	18½	12½	3½	215	64	4	3	..	¼	..	..	1¼	..	4½	1¾	..	.	7¼	..	1	..	..	2	..	3	..	..	..	..
Mar.	4	54½	2½	9	..	331	65	..	3	..	3	½	..	11¾	..	1	1	½	..	7¼	..	½	..	..	1	..	..	1	..	..	..
April	2	28	8¾	4	..	122	19	..	2	..	6	3	..	14½	..	3½	11	3	..	..	..	..	..	..	..	..	1	..	..	..	..
May	3	12	7½	18	..	155	27	6	..	..	6	4½	..	4	..	7	29½	2	..	4	..	..	..	..	..	..	..	..	..	..	5
June	3	5	7½	7	..	152	37	4	21½	..	¼	7	..	14	..	147½	13½	..	..	1½	..	..	..	..	..	30	..	..	..	..	..
July	4	18	13	1	..	121	26½	..	9½	..	4	..	¼	16	¼	6½	27½	..	..	¾	.	1¼	..	..	3	1	..	..	..	..	.
Aug.	4	57	19	⅓	..	282	61	..	1½	..	1¼	¾	..	7	..	5¾	13	..	..	3	..	..	..	..	..	11	..	..	..	..	..
Sept.	4	50½	10½	5	..	382	148½	..	2	..	3	¼	..	9¼	¼	7½	13¼	..	..	2½	..	½	..	½	2	$\frac{8}{10}$	1	..	..	..	..
Oct.	3	42	26½	2½	..	120	61½	..	1½	..	½	..	..	2¾	½	8¾	11½	1	..	3	..	¼	..	..	2	..	1	..	..		..
Nov.	4	36	24	6	..	155	54	..	½	..	1½	⅝	..	1¼	..	54	87¾	2	..	4½	..	..	..	..	..	1	4	..	..	..	..
Dec.	3	17	12½	1⅔	..	29	..	..	..	..	1⅛	¼	½	1½	..	121	147	4½	..	..	..	..	..	½	5	..	..	..	..	1	..
Totals	40	395	170¾	73½	5½	2283	672½	21	44½	..	27⅛	17⅝	¾	85¼	1	367	359¼	13	..	35½	..	3½	..	1	16	43$\frac{8}{10}$	10	1	..	1¼	5

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L	S.								
1894. Jan.	2	8	1½	3⅚	..	29½	15	..	¼	..	¾	1	..	1	..	81	213	20	..	½	..	..	..	..	..	..	2	..	..	..	..
Feb.	2	56½	6½	1½	..	131	46	..	1½	..	¼	..	..	¼	..	..	1¼	6	..	4	..	..	..	..	2	..	2	..	..	..	..
Mar.	3	66	11	4⅔	3½	212	98½	..	..	..	½	⅛	..	3¼	..	3	8½	1½	..	5	..	..	..	..	2	..	5	..	..	..	..
April	4	43	48½	10⅓	1	71	33	..	6¾	..	1⅞	1⅛	..	6¾	..	6	23¾	2½	..	80½	..	6½	7	..	1	7/10	..	20	..	..	..
May	2	20	4	1⅔	..	54¼	16	6	..	..	½	1	..	2½	¼	4½	14	..	½	2	..	..	..	..	..	..	..	..	..	..	..
June	4	25	6½	9⅔	4	194	38	½	..	..	1⅝	1¾	..	4	..	6¼	31¼	..	..	4½	..	½	..	..	..	2	..	..	..	..	..
July	3	22	5¼	2½	..	201	27	..	..	..	1	¼	..	2¾	..	6¾	19½	..	..	2½	..	..	..	..	..	..	..	..	..	..	..
Aug.	4	45½	13½	1⅙	..	334	55	..	..	..	⅛	2¼	..	3¾	..	13¾	43½	..	..	1½	..	..	..	⅛	..	..	..	..	..	..	..
Sept.	4	46¼	21	⅙	..	402	95	..	..	..	..	⅜	..	2¾	..	4¾	11	..	..	1¾	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	44	4	1⅓	12	343	108	2	..	..	..	..	..	¾	..	5	11½	..	..	4	..	..	..	..	..	..	..	..	..	..	..
Nov.	4	47½	29	3⅔	7	332½	108½	..	1½	..	..	¼	..	4¾	..	2¼	7¼	..	..	10	..	..	..	..	1	1 3/10	1	..	..	..	..
Dec.	3	56½	57½	4⅓	27	255½	44	..	1¼	..	⅞	..	..	5½	..	..	1¼	..	..	7¾	..	1	..	..	..	1 2/10	1	..	..	⅝	..
Totals	38	480¼	208¼	44⅚	54½	2559¾	684	8½	11¼	..	7½	8⅝	..	38	¼	133¼	385¾	30	½	124	..	8	7	⅛	6	4 8/10	11	20	..	⅝	..
1895. Jan.	3	81	16	6	4	289	104½	..	3¾	..	..	⅛	..	2	..	..	..	..	..	1¾	..	..	..	..	1	4/10	12	..	..	¾	..
Feb.	4	49	9	7⅙	32	500	64	..	¾	..	¼	1⅛	..	2½	..	..	½	..	..	2⅜	..	..	..	..	3	..	7	..	..	..	..
Mar.	1	12½	4	6	..	50	16	..	5¾	..	⅛	⅛	..	¼	..	½	3	..	..	¼	..	¾	..	..	..	..	..	..	..	..	..
April	3	52	11¼	3	2	97	61	34	21	..	⅛	4⅞	..	1	..	3½	9¾	½	..	27¾	..	½	3	..	6	7/10	4	..	..	..	..
May	4	112½	7	18⅙	5	264½	42	16	..	..	1	8⅞	..	4½	..	8¼	30	3	..	2½	..	..	..	..	3	..	1	..	..	..	..
June	5	20½	5	7	..	207½	73	..	6	..	2⅝	4½	..	3⅞	..	11	35½	2½	..	¾	..	..	..	..	4	5/10	..	..	..	..	..
July	3	17½	4	2	..	186	84½	..	..	..	⅝	1	..	3¼	..	5	21¼	..	..	1¾	..	..	..	..	..	..	..	..	..	..	..
Aug.	1	11	3	⅓	..	109½	59	..	..	..	..	½	..	½	..	1	3¼	..	..	2¼	..	..	..	..	..	..	..	..	..	..	.
Sept.	4	45¾	14	3	3	332½	169½	½	¼	..	1½	⅛	..	3½	..	9¼	26	2	..	4¼	..	..	..	..	..	1	1	..	..	..	..
Oct.	4	64½	13	1	2½	404	151½	..	3	..	..	⅞	..	3½	..	6	20	..	..	4¾	..	..	..	..	½	..	1½	..	½	..	..
Nov.	3	31¼	7	2	2	211	151	..	5¼	..	..	¼	..	2¼	..	2	7¼	..	..	5	..	..	..	..	2	3	3	..	8	..	..
Dec.	6	32¾	17½	1⅚	1	128½	94½	6½	3	..	1	⅛	..	4⅞	⅜	..	2	..	..	5	..	1	..	.	4	2 8/10	1	..	..	1⅝	..
Totals	39	530¼	110¼	57⅔	51½	2779½	1070½	57	48¾	..	6½	22½	..	32	⅜	46½	158½	8	..	58¾	..	1½	3	..	23½	8 7/10	30½		8½	2⅜	.

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L	S.	L.	S.								
1896. Jan.	5	73½	3¾	7½	11	183½	186¼	..	1½	..	1⅛	2¼	..	8¾	⅛	8½	30½	..	..	4½	..	⅜	1½	⅛	5	5/16	14	..	3	1⅛	..
Feb.	3	145	3½	1½	..	25¼	30½	32	..	..	⅛	⅛	¾	7½	..	36½	120½	..	..	3⅛	..	4¼	.	½	4	4/16	2	..	..	..	..
Mar.	6	95½	7¼	9⅙	12	92¾	76¼	1	4½	..	2¾	⅛	..	18¾	⅝	5½	12	1¼	..	6⅝	2½	3⅛	..	..	8	1/16	5	..	..	..	..
April	6	60	15¼	10½	7½	43½	42½	17	5	..	2¾	⅝	..	34½	⅜	1⅛	6¾	..	..	13½	..	2	..	..	17	..	6	..	..	..	..
May	4	49½	11	5⅙	..	197	63½	..	..	..	1¼	4⅜	..	9¾	1¾	9½	49	..	½	5¼	..	..	..	..	2	2/16	..	..	..	..	..
June	3	18¾	9	6½	..	194	57	5	½	..	⅝	1½	..	7½	..	6½	19	..	½	3¼	..	..	..	..	..	5/16	..	..	..	..	..
July	3	38½	4	2	..	112	29½	..	½	..	1	⅞	..	6	..	2	22½	..	..	..	..	..	..	..	..	1/16	..	..	..	..	..
Aug.	4	23¾	8¾	1	..	364	87½	..	..	..	1⅜	..	..	2	..	6¾	19¾	..	..	3¾	..	..	..	..	..	..	..	..	..	..	..
Sept.	4	41	14	1⅓	2	346	93½	5	..	..	..	¼	..	3¼	..	6¾	8¾	..	..	5¼	..	..	..	..	1	..	1	..	..	..	..
Oct.	4	39¾	28¾	2⅙	2	281	106½	63	..	..	¼	¼	1	4	⅛	6¾	14	1	..	4¾	..	..	..	..	..	5/16	2	..	..	..	..
Nov.	4	61	11¼	2½	16	228	102½	50	1¼	..	¾	⅜	..	3¾	..	6¼	11	..	..	2¾	..	..	..	..	1	6/16	3	..	..	⅛	..
Totals	46	646¼	116½	49⅓	50½	2067	875½	173	13¼	.	12	10¾	1¾	105¾	3	96⅛	313¾	2¼	1	53¼	2½	9¾	1½	⅝	38	2 9/16	33	..	3	1¼	..
1897. Jan.	10	61	40½	4⅔	..	69¼	43	63¾	4½	..	4¾	⅜	..	13¼	..	4¾	9¾	½	1⅛	⅛	..	1⅛	..	¼	11½	2/16	5	..	½	⅝	..
Feb.	7	67	9¼	21⅚	..	166¼	131½	70½	5¾	..	2⅜	¾	¼	4⅞	..	3½	19⅛	..	..	4⅛	..	6¼	2½	..	4	..	..	..	..	..	..
Mar.	7	67¼	16	10	7	165½	54¾	71	15¾	..	2⅞	2¼	..	7⅜	..	4	15¾	..	1	15¾	2¾	2¼	¼	..	10	6/16	4	..	..	..	..
April	7	215	26½	8	11	90	53	79½	16¾	2½	15¾	½	..	26¼	..	7¼	22	..	..	3½	½	¾	..	..	3	2/16	4	..	..	..	..
May	5	47½	24½	1½	6	103½	22	32½	1¼	..	5¼	⅜	⅛	9¾	¼	3½	8	..	..	..	..	..	..	..	1	..	6	..	..	..	..
June	8	142	108¼	3⅙	5	140	56¼	59½	4¼	..	1¾	⅝	..	33¼	..	2½	17	..	..	..	..	..	..	⅛	..	..	..	..	..	..	..
July	7	71¼	50	6⅙	12	94	37½	59½	½	..	9¾	⅜	..	49½	1⅜	5¾	25	..	..	..	..	..	..	..	4	7/16	..	..	..	..	..
Aug.	5	32	19¼	1⅔	4	72	44	41	5¼	..	9⅜	⅜	..	36¼	⅞	3¾	18	..	..	..	¼	½	..	..	3	..	1	..	..	..	..
Sept.	7	74	26¼	6⅓	..	213¾	112	107¼	24½	..	5⅞	⅛	..	12½	⅝	2½	9	..	..	1¾	..	½	..	..	7	2 3/16	3	..	..	¼	..
Oct.	3	57¾	12	5⅓	..	81	57	41½	10	..	3¾	..	..	4¼	¼	1	4	..	..	..	..	1⅛	..	4	4	2 5/16	1	..	..	⅛	..
Nov.	3	86	17½	2⅙	..	223½	164	106	3¼	..	..	⅛	..	2⅞	..	5½	16	..	..	3¾	..	..	..	..	..	1	..	..	..	..	..
Dec.	5	64	36¾	1⅚	1	172	63¼	65¼	3½	..	1⅞	⅜	..	10½	..	½	3½	..	½	1	..	¾	..	..	3	6/16	1	..	..	3¾	..
Totals	74	984¾	386¾	72⅔	46	1590¾	838¼	797¼	95¼	2½	63⅜	6¼	⅜	210⅝	3⅜	44½	167⅛	½	2⅝	30	3½	13¼	2¾	4⅜	50½	8 1/16	25	..	½	4¾	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1898. Jan.	5	46¾	35¾	8⅙	22	158¼	78½	86¼	10¾	..	9¼	1	..	17¾	½	1¾	2¼	..	1	1¼	..	5⅞	1¼	..	6	$\frac{5}{10}$	20	..	..	3⅞	..
Feb.	6	34½	28	4⅔	..	192	38	38	4⅞	..	2⅛	⅛	..	9¾	..	2⅝	11¾	¼	¾	⅝	..	3⅝	..	..	4	..	..	..	..	⅜	..
Mar.	4	102	17½	7⅔	13	190	66	18½	2¼	..	7⅜	1⅜	..	14¼	..	..	1¾	..	3¼	¾	..	1⅞	..	..	6½	$\frac{2}{10}$	6	..	..	⅜	..
April	5	98	50	32	19	132	106½	166	60¼	..	1¼	6⅝	..	¾	..	..	¼	..	¼	77½	27¼	8	..	..	25	$3\frac{6}{10}$	10	4	..	..	..
May	3	50¼	10¼	5⅔	8	212	64	50	2½	..	½	3⅝	..	2¼	..	½	3¾	..	1	3	..	..	..	..	2	$1\frac{2}{10}$	..	7	..	..	..
June	6	74½	31½	16⅔	12	82	69	111½	13½	..	4¾	1	⅜	37¾	..	5	18	..	..	¾	..	..	..	⅛	..	$1\frac{4}{10}$	..	11	..	..	..
July	6	54	69½	13⅚	2½	132½	61	48	7½	..	3⅜	¾	..	25¾	1¼	5½	17¼	..	½	¾	..	½	..	¼	3	$\frac{7}{10}$	1	8	..	..	..
Sept.	2	60	18	2	19	120	40¼	42½	9	..	..	⅛	..	1½	..	1½	4	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	137½	41	18	7	229¼	108½	58	6	..	⅛	1¾	..	5	..	10¼	31¾	..	..	4¾	..	4	1	..	3	$19\frac{5}{10}$	4	4	..	..	..
Nov.	7	46	80	8½	2	119	49	114	14½	..	6½	..	¼	8¾	⅜	8	12¾	..	3	..	..	¼	..	⅛	2¾	$\frac{2}{10}$	30	½	..	8⅞	..
Dec.	15	61¾	95	6	..	115½	42	135¾	22¾	..	6¾	..	⅛	12⅛	¼	2⅞	16¼	..	2½	1⅛	..	1	..	..	5½	$8\frac{4}{10}$	..	4½	..	5⅞	..
Totals	62	765¼	476½	123⅙	104½	1682½	722¾	868½	153⅞	..	42	16⅜	¾	135⅝	2⅜	38	119¾	¼	12¼	92½	27¼	25⅛	2¼	½	57¾	$36\frac{4}{10}$	71	39	..	19⅜	..
1899. Jan.	12	61¼	68	7⅓	5½	97½	58¼	157	11	..	5⅝	1⅛	..	18⅝	1⅜	2¼	16¾	..	3	..	..	⅝	..	4	9¼	..	3	6	..	3¼	..
Feb.	4	53	10¼	13⅙	13	244	81	116½	12½	..	1⅛	4⅜	..	1⅛	..	..	1¼	..	1	11½	1⅛	12¼	¼	..	9½	$1\frac{4}{10}$	32	6	..	1¾	..
Mar.	4	311	10½	11⅙	57	184¼	26¼	39	5¾	..	8	⅞	..	2¾	..	5½	19¼	..	..	4	..	6	1	..	6	$3\frac{7}{10}$	1	3	..	¼	..
April	3	126	10	11½	10	57¼	13½	27	1¾	..	1⅜	1¼	..	6	¼	7	39¼	..	¾	½	..	9½	..	..	10	$\frac{7}{10}$	..	27	..	..	..
May	3	141½	23½	12⅙	13	83	13¼	21	1	..	1½	3⅛	..	3½	..	3½	21¼	..	¾	1⅝	..	4	..	..	10	$\frac{8}{10}$	..	11	..	..	..
June	5	49½	47	4½	3	93	48½	58¾	4¾	..	8⅞	⅜	..	38½	..	2¾	17½	..	..	..	..	..	..	..	..	$\frac{4}{10}$	..	9	..	..	..
July	6	44½	19½	7⅓	9	125	82	127	9¾	..	4⅜	3⅛	..	30¼	1	¼	5¼	..	..	6	..	10¼	2	..	..	$5\frac{1}{10}$	2	6	..	..	..
Aug.	4	68¼	22¾	30	7	141½	26½	46	6½	..	½	1⅞	..	5	..	1¾	6¼	..	..	3	½	6¼	¼	..	4	$14\frac{3}{10}$	5	3	..	..	..
Sept.	5	35½	40½	12⅔	1	133½	42	81	15½	..	1⅜	½	..	11¾	..	2½	18	2¼	2¾	4½	2	4¼	..	..	8	$1\frac{4}{10}$	..	1	..	..	..
Oct.	5	31	6½	30⅓	2	163½	40¼	31½	4	..	1½	2⅛	..	2⅝	..	5¾	62¼	1	½	½	1¼	1¾	¼	..	17	$42\frac{4}{10}$	1	..	..	½	..
Nov.	6	22¾	24	4⅓	1	107¾	57½	106½	6¾	..	3½	..	..	17¼	1⅛	1	3¼	..	2	..	..	½	..	..	16½	$\frac{1}{10}$	17	7½	..	2⅛	..
Dec.	7	25¾	28¾	5⅓	1	110	69¾	155½	4	..	3	⅛	..	9¼	⅝	2¼	5½	..	1¾	½	½	2½	¾	..	10½	$\frac{3}{10}$	5	8	..	9	..
Totals	64	970	311¼	149⅚	122½	1540¼	558¾	966¾	83¼	..	40¾	18⅞	..	146⅝	4⅜	34½	215¾	3¼	12½	32⅛	5⅜	57⅞	4½	4	100¾	$70\frac{6}{10}$	66	87½	..	16⅞	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 3.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1900. Jan.	4	23	6 1/4	21 5/6	3 1/2	132	52 1/2	84	2	..	3/4	1/4	..	3/4	..	..	1/2	..	..	5 1/4	1	9 1/2	3/4	..	1/8	3	6	7	..	7 1/2	..
Feb.	5	36	16 1/4	24	14	112	47 1/2	78 1/4	8	..	2 3/8	5/8	..	4	..	..	5 5/8	..	1/4	15 1/2	3 3/4	10 3/4	1 1/2	..	9 1/2	9/10	4	5 1/4	..	4 3/4	..
Mar.	5	63	5 1/4	22 5/6	5 1/2	165	50 1/4	96	10 3/4	..	1 7/8	1 7/8	..	4	..	..	7 1/2	..	4 1/4	3 1/2	3/4	6 3/4	1/4	..	14	1 1/10	8	5 1/4	..	1	..
April	4	181 1/4	5 3/4	26	6	168 1/2	95	124	27 3/4	..	1	1 3/8	..	5 1/4	..	2	5	..	1 1/4	2 1/4	..	12	2 1/4	..	13	1 6/10	12	19	..	..	..
May	1	13	2	3	6	3 1/2	2	4 1/4	..	..	3/8	1/8	..	1 1/2	1/4	2 1/4	1 1/4	..	..	..	..	..	..	..	1	1/10	..	1	..	..	..
June	3	61	25	41 1/2	19	52	40 1/2	75	25 1/2	..	17 3/8	1 5/8	..	19 1/4	1/4	2	5 1/2	..	..	10	4	7 1/4	1	..	15	3	..	9	..	..	..
July	3	71	16 1/2	65 1/2	..	53	48	121	33	..	3 5/8	1 3/4	..	14 1/4	3/4	..	7 1/2	..	1 1/4	18	..	5 1/2	..	..	24	10 3/10	..	5	..	..	..
Aug.	5	79 1/2	14 1/2	23 5/6	58	72	68 1/2	104 1/4	12 3/4	..	1	2 5/8	..	5 3/4	1/4	..	1/2	..	..	32 1/2	14 1/2	21	1	..	11	7/10	3	3 1/4	..	..	..
Sept.	6	51	15	20 2/3	2	125 1/4	54	81	20	..	2 1/4	1 1/2	..	24 1/4	1/2	1 1/4	5	..	..	4	..	3/4	..	..	17	1/10	..	2 1/4	..	2	..
Oct.	4	61 1/4	24	18 1/2	8	167	64	83	29 1/4	..	1/2	1 3/4	..	15 1/4	3/4	3/4	2	..	..	8 1/2	..	1/4	..	..	25	1 4/10	1	1/4	..	..	..
Nov.	4	29	20 1/2	9 2/3	3 1/2	144	41	67	21	..	5/8	1	..	9 1/2	5/8	..	1/4	..	..	3 1/2	1 1/2	2 3/4	..	..	15 1/2	3	1	1	..	4 3/4	..
Dec.	8	25	35 1/2	4 1/6	1	114	26	92 3/4	18 1/2	..	3 1/2	1/8	..	15 1/2	2 1/4	1/4	3 1/2	..	..	2 1/2	1/2	4 1/4	1	..	9	1 2/10	2	2 3/4	..	4 1/2	..
Totals	52	694	186 1/2	281 1/2	126 1/2	1308 1/4	589 1/4	1010 1/2	208 1/2	..	35 1/4	14 5/8	..	119 1/4	5 5/8	8 1/2	44 1/8	..	7	105 1/2	25 1/4	80 3/4	7 3/4	..	154 1/8	26 4/10	37	61	..	23 3/4	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 4.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1890. Dec.	2	9	3	2	..	98	..	31	..	..	1½	..	..	3	..	182	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..
1891. Jan.	4	27	3	3	..	112	..	22	1	..	2	1	1	9½	..	147½	..	..	..	25	3	..	..	..	13	..	..	..	..	..	..
Feb.	3	52	3	6	..	291	..	26	..	..	2	..	..	14	..	121	..	..	..	16	5	..	..	..	18	..	..	..	..	..	..
Mar.	4	65	3	..	..	391	..	65	..	..	½	..	..	13	..	20	..	..	..	20	5	..	..	..	14	..	..	..	..	..	..
April	4	55	15	..	..	113	..	35	2	..	½	..	..	59	..	28	..	..	..	8	..	..	..	..	12	..	..	..	..	..	..
May	3	26	7	1	..	177	..	29	..	..	..	..	..	64	..	30	..	..	..	..	..	..	..	..	8	1	..	..	..	..	..
June	1	3	6	..	..	30	..	2	..	..	..	..	..	..	..	22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
July	4	58	7	..	..	130	..	52	..	..	3	..	2	19	..	38	..	..	..	33	..	..	..	..	..	21	..	..	..	..	..
Aug.	5	41	10	4	..	159	..	77	..	..	4½	..	..	29	..	126	..	..	..	7	2	..	..	..	..	9	..	..	..	..	..
Sept.	4	12	12	..	..	145	..	43	..	..	3	..	..	50	..	100	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..
Oct.	5	30	7	2	..	252	..	66	..	..	3	..	..	13	..	86	..	..	..	9	..	..	..	..	..	3	..	..	..	..	..
Nov.	3	10	3	2	..	152	..	30	..	..	3	..	1	..	..	89½	..	12	..	1	..	..	..	1	5	..	..	..	..	..	2
Dec.	4	10	1	5½	..	201	..	..	..	..	1½	..	..	1	..	350	..	..	..	2	..	..	..	1	44	..	..	..	..	..	11
Totals	44	389	77	23½	..	2153	..	447	3	..	23	1	4	271½	..	1158	..	12	..	121	15	..	..	2	114	37	..	..	..	..	13
1892. Jan.	3	17½	4	½	..	171	..	..	..	..	..	..	..	¾	..	100	..	..	..	..	..	..	..	..	..	..	..	..	..	¼	..
Feb.	3	35	8	..	..	84	..	..	..	..	..	..	½	12½	..	89	..	..	2	..	1	..	..	..	2	..	..	..	..	..	22
Mar.	4	76	2	1	..	404	..	..	2	..	..	..	..	16½	..	7	..	..	2	53	4	..	..	..	..	..	..	..	..	..	..
April	4	134	2	1	..	250	..	..	3	..	..	..	..	34¾	..	8¾	..	..	2	3¾	1	..	..	..	8	..	..	..	..	..	14
May	4	47	5½	4	..	193	..	..	..	..	..	..	¼	78	..	23½	..	1	..	2	..	..	..	..	11	1	..	..	..	..	..
June	3	11	10½	2	..	133	28	..	..	..	2	..	1	29¼	..	11¼	27	..	3	..	..	¼	..	..	..	3	..	..	..	..	..
July	3	29	15½	5	..	111	18	19	2¼	..	..	..	..	36¾	..	11½	9	2	3	..	..	1½	1	..	..	12	..	..	..	..	..
Aug.	5	20¼	10½	2	..	220	44	..	..	..	..	..	..	42¼	..	64¼	84½	2	6½	..	..	..	..	1	..	16	..	..	..	..	..
Sept.	6	18½	10½	1	..	91	24	½	2	..	5¾	..	1½	33¼	..	27½	61¼	½	3	..	..	..	..	..	..	½	..	..	..	..	38½
Oct.	5	63	52¼	4⅝	..	473	56	..	..	..	1	..	..	6¾	..	..	8¾	..	2	5	..	½	..	..	..	..	..	..	..	..	4
Nov.	3	29	17½	3	..	188	20	..	..	..	1¾	..	..	3½	..	37½	136½	..	10	5¼	..	..	..	¾	15	..	10	..	..	½	..
Dec.	3	13	7	1	1	22¼	..	..	..	..	2¾	..	..	12	..	128	220½	..	9½	..	..	3	..	¾	18	..	5	..	..	..	..
Totals	46	493½	145½	25⅛	1	2340½	190	19½	9¼	..	13¼	..	3¼	306¼	..	508¼	547½	5½	43	69	6	5¼	1	2½	54	32½	15	..	..	¾	78½

NORTH SEA INVESTIGATIONS.—Table II.—No. 4.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1893. Jan.	4	26	26	5⅝	..	238	80	¼	..	..	¼	..	..	1	½	61½	59¾	..	5	9½	..	..	..	..	5	..	1	..	..	½	..
Feb.	4	14¼	3½	6	1	101	8	..	4	..	..	..	..	2	..	5	12	..	1	10½	1½	2	..	..	7	6/16	..	..	..	..	..
Mar.	5	61½	4½	11⅓	3/16	418	68	..	..	..	½	1½	..	14¼	..	½	¾	..	½	½	..	..	..	..	..	..	..	..	..	..	..
April	3	53	20½	8½	..	99	30	..	9	..	3	..	..	38	¾	3¼	2	..	..	1	½	2½	..	..	..	..	..	..	..	..	..
May	2	8	4	..	..	114	36	..	..	..	..	20	..	..	..	132¼	65½	..	5	57	..	..	..	..	..	..	..	..	..	..	..
June	3	38	17	7⅙	..	296	46	7	..	..	5	18½	..	8¾	..	89½	20½	..	..	59½	..	1	..	..	..	..	..	..	..	..	..
July	3	20½	13½	2⅔	..	80½	34½	..	½	..	2½	¼	..	6	1	73	39	..	6½	..	..	1¼	..	..	2	1½	..	..	..	..	..
Aug.	5	39	10½	1⅙	..	354	48½	..	..	..	13¼	1	..	¾	..	116½	213½	..	22	..	..	¾	..	½	8	..	6	..	..	..	..
Sept.	3	11½	7½	..	..	260	32	..	..	..	4	..	..	..	..	51¼	36½	..	15½	2	..	..	..	⅛	..	..	..	..	..	..	..
Oct.	4	28	48½	..	..	147½	15½	..	..	..	6½	¼	¼	½	..	274¾	322½	..	13	2½	..	..	..	⅜	29	..	1	..	..	1¼	..
Nov.	4	12½	35	..	..	31½	..	..	..	..	7¾	¼	⅜	½	..	176	490½	..	14	..	..	..	..	½	17	..	7	..	..	1½	..
Dec.	3	14½	35	..	..	117	..	..	..	..	1	..	..	1½	¼	146	120	5	2½	..	..	⅝	..	1½	8½	..	1	..	..	1¼	..
Totals	43	326¾	225½	42½	1 3/16	2256½	398½	7¼	13½	..	43¾	41¾	⅝	73¼	2½	1129½	1382½	5	85	142½	2	8⅛	..	3	76½	2 1/16	16	..	..	4⅛	..
1894. Jan.	2	14	3½	2½	..	49	11	..	¼	..	1	¼	¾	1½	..	96	221¾	..	19	1	..	..	..	..	2	..	..	..	..	¼	..
Feb.	3	14½	63½	..	..	198½	18	..	½	..	..	2½	..	1¼	..	6	19	½	1½	1	..	..	..	..	11	..	1	1	..	¼	..
Mar.	4	79	6½	8½	4	302	45	..	4½	..	9⅜	1½	..	10¼	¼	1	5	..	..	6	..	¾	1	..	2	..	5	..	..	..	..
April	3	47½	26	8	2	50	21	..	7	..	1¼	2⅛	..	1½	..	22	35½	..	1¼	27½	..	1¾	3	..	5	5/16	1	..	..	..	..
May	3	40	11½	3	..	163	35½	..	1	..	4	4½	..	4	..	7	55	3	..	2¼	..	..	..	..	2	..	..	..	..	..	..
June	3	30¼	8½	15⅔	..	218	19	..	..	..	1	4¼	..	4	..	16½	45	..	..	5½	..	..	..	..	..	..	..	..	..	..	..
July	3	26½	5	3⅔	..	219	25	..	..	..	½	2	..	3½	..	20	33	..	..	2¾	..	..	..	..	..	..	..	..	..	..	..
Aug.	4	44½	11½	1	..	256	42	..	..	..	⅛	1	⅛	2¾	..	20	47½	..	..	1¾	..	..	..	..	..	..	..	..	..	..	..
Sept.	3	24½	12	4⅓	..	160	83	7	..	..	1	½	¼	2½	..	28½	28	..	4	1	..	⅛	..	¼	5	..	7	..	..	..	..
Oct.	3	10¼	4	1⅙	..	36	26	9	..	..	2½	2	¾	2	..	76	149¾	13	20	¾	..	..	..	¾	16	1/16	2	..	..	..	..
Nov.	3	8	10	1⅙	..	30½	14½	..	..	..	1⅛	½	⅜	⅝	..	64	263	38½	51	..	..	..	..	¼	29	..	..	..	..	..	..
Dec.	3	17½	11	5½	..	18½	3½	..	..	..	2½	1	3¼	6¾	..	103	207	1	19	..	..	¾	..	1	14	..	..	..	..	..	..
Totals	37	356½	173	54½	6	1700½	343½	16	13¼	..	24⅜	22⅛	5½	40⅝	¼	460	1109½	56	115¾	49½	..	3⅜	4	2¼	86	6/16	16	1	..	½	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 4.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1895. Jan.	3	9	1	..	..	4½	19	..	..	..	1¼	1¼	3¾	7½	..	22	188	15	5	..	..	½	..	½	4	..	..	..	..	..	..
Feb.	3	50	11	10	15	233	24	13	..	..	..	1⅜	1⅜	¼	..	20	98¾	..	..	1¼	..	..	..	..	2	..	1	..	..	..	..
Mar.	3	85	3½	7⅓	1	155	75	..	..	..	⅜	⅞	1½	3½	..	13	45½	..	2½	10	..	⅛	..	..	2	..	3	..	..	..	..
April	6	133	25½	2	..	104	74	111	4½	..	2½	¾	5½	25¾	..	10	26⅞	..	2½	15¼	7	1	..	..	15	2/10	3	..	..	..	..
May	4	159½	31½	8⅙	1	359	71	..	..	..	3½	8⅞	6	25	..	14	51¼	..	4	..	..	..	..	..	3	2/10	..	..	..	..	..
June	3	49	5¼	3	..	10	7¼	..	..	...	3	½	3	9	..	39	118¾	6	1	..	..	..	..	⅛	..	..	..	..	..	..	..
Aug.	4	30¾	8¾	1	..	111¼	68½	..	..	..	1⅜	⅜	⅛	7½	..	25½	112½	17	13	1	..	..	..	⅜	27	..	4	..	..	..	..
Sept.	4	52	12¼	2	..	180½	145	..	..	..	2⅛	⅛	⅛	20½	1	10¼	96	..	..	1½	.	..	..	⅛	10	1 9/10	3	..	..	⅛	..
Oct.	5	53¾	14¾	⅝	..	59½	55	½	..	..	3⅝	⅞	¾	29¼	¼	53	295½	16	21½	..	..	..	..	1½	35	..	19	..	..	¾	..
Nov.	2	26½	7	..	..	26	10½	..	..	..	3	1⅛	¾	10	½	26¼	123	29½	28	..	..	⅛	..	⅛	18	..	3	..	..	⅛	..
Dec.	3	64½	6½	4⅓	..	63½	..	..	..	..	1⅛	1¼	⅝	2¼	..	92	184	4	53	..	..	..	..	1	8	..	8	..	..	¼	..
Totals	40	713	127	38⅔	17	1306¼	549¼	124½	4½	..	21⅞	17⅜	23½	140½	1¾	325	1340⅛	87½	130½	29	7	1¾	..	3¾	124	2 3/10	44	..	..	1¼	..
1896. Jan.	4	47¼	2¾	2	..	¾	29½	..	..	..	2¼	1⅝	5¾	24¼	¾	26	256½	..	1	3	2	⅝	..	⅛	3	3/10	1	..	..	4¼	..
Feb.	3	128	..	2	..	11½	18½	..	..	..	¾	..	¾	8	..	45	165¼	..	..	5½	1¾	¾	..	..	1	1/10	..	..	..	..	..
Mar.	4	139½	7¾	1	2	7¾	28½	..	1⅓	..	2¼	¾	2¼	5¾	..	12¼	75	59	10¼	7¾	2	7½	..	⅛	18	8/10	..	..	..	¼	..
April	3	49½	7½	1½	2	46	36¼	..	..	..	2⅞	2⅛	3	53	¾	7¾	16¼	..	..	..	..	..	..	..	4	..	2	..	..	..	..
May	3	70	3¼	⅙	..	21¼	50¼	..	..	..	2	1⅜	1	59½	1½	8¼	11¾	..	..	..	..	1	..	½	1	2/10	..	..	..	..	..
June	3	27	3	9	..	132¾	56	..	1¼	..	⅜	5⅝	⅛	25¾	1	84½	181	4	..	..	..	..	..	..	1	2 6/10	..	..	..	..	..
July	2	100	22½	5⅝	..	29	36¾	..	..	..	1¼	¾	1½	12¾	1	7	21	..	..	..	..	1¾	..	..	13	46 5/10	..	..	..	..	..
Aug.	4	75	9	2½	..	305	165	8	¾	..	1½	⅞	⅛	6¾	⅛	4¼	10	½	..	4¼	..	½	¼	..	2	2/10	..	..	..	..	..
Sept.	4	22	14¼	⅝	..	203¾	49¼	..	..	..	⅞	¾	¼	15¾	1½	14	104½	30	..	..	..	¼	..	½	16	2	3	..	..	¼	..
Oct.	4	97½	18¼	⅔	..	138½	32	..	..	..	3¾	⅝	⅜	14	2	25	103¼	25¾	..	..	..	..	..	1½	14	..	1	..	..	2¼	..
Nov.	3	165	7	5⅓	..	138	18½	..	..	..	2⅞	2¾	2	2¾	⅛	25	90¾	5½	5¼	⅛	..	..	..	2	11	3/10	7	..	..	1¼	..
Dec.	2	48½	7½	⅓	..	74½	..	..	..	..	1⅝	⅜	⅜	17	⅜	21	67	2¾	7½	..	..	..	..	¼	4	..	11	..	..	⅛	..
Totals	39	969¼	102¾	31⅙	4	1108¾	520½	8	3⅓	..	22⅜	17⅝	17½	245¼	9⅛	280	1102¼	127½	24	20⅝	5¾	12⅜	¼	5	82	53	25	..	..	8⅜	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 4.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1897. Jan.	3	58	29	⅔	3	172¼	½	..	..	..	¼	⅞	1⅜	3	¾	14	89¼	3	9	..	..	¼	1	2⅛	11	1/10	1	..	2	¾	..
Feb.	2	41	7	⅔	..	45	1	..	..	..	⅜	⅞	⅝	3	..	4	18	1¾	1	..	..	..	..	..	3	..	..	..	..	..	..
Mar.	3	36	6	8⅔	1	89	79	10½	27¾	..	¼	¾	..	⅞	..	¾	1¼	..	..	43¾	4¾	7¼	3	..	10	1 8/10	..	..	..	..	..
April	5	86½	22¾	24½	5	33¼	81	12	23½	..	⅞	3⅜	⅝	2	..	2¾	15	..	½	116½	23	13¾	..	..	27	2 1/10	..	..	..	..	..
May	3	57	7¾	9½	..	60¾	45¾	..	9	..	½	3¾	..	1¾	..	1	5	..	..	84¼	14½	3	..	..	8	1 4/10	..	..	..	..	..
June	3	99	18½	9½	2	8¾	61¾	..	20½	..	¼	5⅛	..	½	..	¼	¾	..	..	89½	19¼	11¼	..	..	25	1 6/10	..	..	..	..	..
July	2	34½	10	13	..	82	59	12	12½	..	1¼	1⅞	..	..	..	..	5	..	..	37	8	1½	..	..	5	..	..	..	..	..	..
Aug.	4	131	19	11½	..	133½	46	..	11	..	4	6¼	⅛	3¾	..	11¼	55½	3	5¾	33½	8	4¾	..	¼	16	..	1	..	..	..	..
Sept.	4	97½	22¼	5½	..	245¼	..	..	..	..	1⅞	⅛	..	½	¼	9½	127¾	7½	15	..	..	..	..	⅝	21	..	..	..	..	2	..
Oct.	3	34	21½	4⅙	..	165¾	34	5	1	..	4⅜	..	..	¾	½	16	76½	1½	5¼	..	..	¼	..	¼	9	12 6/10	3	..	..	2	..
Nov.	3	95	47	1⅓	..	39	..	..	..	..	9⅜	¾	1⅛	⅛	⅛	17½	113½	..	11	..	..	..	..	⅞	21	2/10	..	..	..	..	..
Dec.	4	300	4½	1⅓	15	39	1	..	3½	..	8¼	⅞	1⅜	1	..	23	205	..	12	..	½	⅜	..	¾	28	3/10	12	..	..	3½	..
Totals	39	1069½	215¼	90⅓	26	1113½	409	39½	108¾	..	31⅝	24⅝	5¼	17½	1⅝	100	712¼	16¾	59½	404½	78	42⅜	4	4⅞	184	20 1/10	17	..	2	8¼	..
1898. Jan.	3	143½	30½	2⅓	33	120½	16	9	1½	..	4½	3½	¼	4¾	..	11¾	37½	..	5¾	..	..	⅜	..	..	14	..	4	..	..	1⅝	..
Feb.	4	98¼	16½	2⅓	1½	48½	17½	24	5¼	..	⅞	2	..	1¼	..	5	17¾	2½	2	10⅛	3	⅜	..	¼	11½	4/10	..	..	..	¼	..
Mar.	5	53	15½	19⅚	7	142	73	100½	48	..	½	3⅛	..	2	..	..	¾	..	1¾	64	16	4½	..	..	7½	2 2/10	..	..	..	..	..
April	4	94	7	13½	10	90	61	90	25¾	..	2⅞	2⅛	..	7¾	..	⅛	2	..	..	105⅞	23¾	4¼	..	⅛	10	1 1/10	2	2	..	..	..
May	3	196	11½	1	27	167	42	37	1¼	..	4½	6⅞	¼	2⅜	¼	5¾	15¼	..	..	2¼	..	¼	..	..	13	7/10	..	11	..	..	..
June	4	167	64	7	14	145	14	18	1¾	..	1⅛	5⅝	..	4	..	7	19	..	¼	7¼	¾	¼	..	..	6	7/10	1½	2	3	..	..
July	4	399	109	2⅓	..	283	13	..	11½	..	3½	1⅞	3¾	1½	..	8¼	35	..	3	..	..	¼	..	½	12	5	2	½	..	..	..
Aug.	4	437	173	⅚	8	191	..	..	..	..	6⅛	1⅜	¼	¼	..	6¾	85	8	8¾	..	..	..	..	½	8	..	..	..	..	..	..
Sept.	3	17	12½	9⅓	4	162¾	67¼	..	2	..	1	¼	⅛	2¾	1	2¼	46	3	3½	..	..	3	..	¼	17	19 1/10	..	..	..	..	..
Oct.	2	102½	4	7⅔	1	120	23	..	4½	..	15½	⅜	½	1½	..	7¾	89	..	7	..	..	7	..	¼	35	21½	4	..	..	..	..
Nov.	3	65½	19	3	9	108	14	..	½	..	7½	1⅛	1¾	3	..	17½	124¼	1¾	10½	..	..	..	..	1½	36	3/10	..	..	..	½	..
Dec.	4	59	23	1⅔	20½	40½	7½	..	..	..	1⅛	2¼	2¾	3	..	16½	137½	5	9¼	..	..	⅝	..	¾	11½	1/10	..	12	..	⅞	..
Totals	43	1831¾	485½	70⅚	135	1618¼	348¼	278½	102	..	49⅛	30½	9⅝	34⅛	1¼	88⅝	609	20¼	51¾	189½	43½	20⅞	..	4⅛	181½	51 1/10	13½	27½	3	3¼	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 4.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1899. Jan.	4	71¼	12	1⅝	6½	52½	7½	26	2½	..	2¾	2⅛	2⅜	6½	..	15	117	1¾	9	1	..	1½	..	¼	10	1 1/10	..	..	8	⅞	..
Feb.	3	82	2½	1⅓	1	41	15½	36	2	..	1¾	⅝	1¾	4¾	..	13¼	83	½	3	¼	..	½	...	..	9	1/10	1	..	..	1⅝	..
Mar.	5	71	10	9½	8	81	39	49	7	..	1⅛	1½	½	9⅛	..	15¾	97½	2	3¼	9¼	4	2⅛	..	..	16	3/10	5	3½	11	..	..
April	3	33	5	37	11	119	101	100	54	..	⅛	2⅞	..	..	..	..	..	..	..	7½	3½	6¼	..	..	28	3 4/10	½	1	..	..	..
May	3	53½	6¼	2⅓	2	124½	40	23½	¼	..	4¾	7½	8⅛	3½	..	7½	32¾	2¼	..	3¾	¼	2	..	..	7	6/10	..	22	..	..	..
June	4	36½	4¾	3	..	236	71	81	¾	..	5¼	3¼	..	7	..	9¾	29½	..	..	2½	..	..	..	..	3	1/10	..	12	..	½	..
July	5	89	14¾	13	3	61	26¼	39	1½	..	8⅜	3¾	⅝	15	½	5¼	35¼	..	¾	¾	..	4½	1	⅛	20	9 4/10	1	8	..	..	..
Oct.	1	2½	..	2⅔	..	72	40	49	½	..	¼	⅜	..	2¼	..	1½	12	..	..	½	..	..	..	..	2	..	..	..	..	..	..
Nov.	5	47¼	58¼	1⅝	7	131	59¾	27	1¾	..	2¾	¾	2	12¼	⅜	9¼	88	8	12¾	..	..	..	..	⅝	2¼	..	3	..	..	6⅝	..
Dec.	3	41¼	2¾	1⅙	1	6¼	..	..	¾	..	3	1¼	1¾	4½	..	33¼	227½	..	22	..	..	⅝	..	¼	51½	3/10	1	..	..	2½	..
Totals	36	527¼	116¼	73⅔	39½	924¼	400	430½	71	..	30⅛	24	17⅛	64⅞	⅞	110½	722½	14½	50¾	25½	7¾	17½	1	1¼	148¾	15 3/10	11½	46½	19	12⅛	..
1900. Jan.	4	82½	12	6½	3	26½	36	39	2½	..	2½	1⅛	3¼	17¾	¼	13¼	130	1½	10	1½	¾	6½	¾	..	24¼	2/10	..	2¾	..	5¼	..
Feb.	3	52	8¾	4	1	10½	7½	5	½	..	½	1⅝	1	13	..	18¼	84¾	2½	1¼	¼	..	1½	..	⅞	5	2/10	..	1½	..	⅞	..
Mar.	2	34	13	36	8	94	67	114	33½	..	¼	1⅛	..	4	..	6½	13½	..	2½	4	1	10½	2	..	4	1 8/10	..	6	..	..	..
April	4	128½	8	16⅔	Tu. 14(2)	112¼	54¼	69½	51	..	½	2¼	4	31½	2	5¼	87	7½	3	5	..	4½	2½	¾	..	2	3	5	..	..	..
May	2	25	34	24	4	26½	19½	51½	10	..	¼	⅜	..	..	..	..	1¾	..	..	32	26¼	11	1	..	14	10 5/10	..	..	..	..	..
June	4	86	36½	27⅝	4	50¼	34¼	47½	7½	..	2⅝	8⅜	¼	4½	¾	18	49½	..	3¾	26	14	13¾	1½	..	35	10 6/10	..	5	4	..	..
July	3	98	32	16	12	110	19½	20	3	..	2¾	5¾	..	2¾	¾	10¼	41¾	..	1¼	4½	1	2½	..	..	12	4/10	..	3	..	..	..
Aug.	4	57¾	30	52	..(6)	248	76	55½	8¾	..	7	2⅜	¾	16¼	..	2	19	..	2¼	14¾	4½	8½	..	..	20	20 2/10	..	5	..	..	..
Sept.	3	51¾	19	19	4(1)	156½	32	27	9	..	5	3⅝	..	½	..	2	71	6	8	16	2	6¾	3¼	½	29½	4 3/10	..	½	..	..	..
Oct.	4	24¾	11	6⅝	1	53	4	1	2¼	..	17	⅜	¾	1	..	11¼	166½	5½	18¼	¼	..	6	..	⅞	132	32 1/10	..	..	..	..	..
Nov.	3	18¾	4¾	⅝	2	14¼	..	1	..	..	17½	1⅜	¼	..	½	10¼	259	..	13	..	..	5½	..	¼	115	..	5	..	..	2¾	..
Dec.	4	39¼	5¼	⅔	7	4¾	½	..	..	..	5⅛	⅜	4½	6½	½	18	204	5¾	15¼	¼	..	1	..	⅜	55	8	6	1	..	2½	..
Totals	40	698¼	214¼	210⅓	60(9)	906½	350½	431	128	..	61	28¾	14¾	97¾	4¾	115	1127¾	28¾	78½	104½	49½	78	11	3⅝	445¾	91 2/10	14	29¼	4	11⅜	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1890. Sept.	1	4	5	..	..	80	..	30	..	..	1	..	..	8	..	10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct.	4	13	17	..	..	298	..	118	..	..	3½	..	..	30	..	53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	7	8	..	..	127	..	48	..	..	3	..	..	17	..	33	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..
Dec.	3	13	11	2	..	88	..	41	..	..	1	..	..	14	..	39	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..
Totals	11	37	41	2	..	593	..	237	..	..	8½	..	..	69	..	135	..	..	..	41	..	..	..	..	..	..	..	..	..	..	..
1891. Jan.	5	15	12	4	..	186	..	33½	3	1	1½	..	..	12	..	113	..	..	..	2	..	..	..	..	12	..	4	..	..	..	4
Feb.	3	24	3	..	..	188	..	44	..	..	2	..	..	8	..	162	..	..	..	..	..	..	..	..	5	..	..	7	..	..	..
Mar.	3	100	5	..	..	157	..	58	..	..	1	..	..	3	..	120	..	..	..	..	..	..	..	..	..	..	..	4	..	..	..
April	4	74	5	..	..	156	..	81	1	..	2½	..	..	43	..	32	..	..	2	2	..	..	..	..	2	..	..	..	..	..	..
May	2	23	2	1	2	51	..	32	..	..	1	..	1	30	..	32	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
June	3	20	7	2	3	104	..	41	..	..	2	..	1	41	..	37	..	..	..	8	..	..	..	..	..	16	..	..	..	..	..
July	4	79	7	..	..	161	..	21	9	..	2	..	..	19	..	64	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..
Aug.	4	13	9	..	..	50	..	43	..	..	3	..	..	28	..	22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sept.	3	9	5	..	..	128	..	51	..	..	2	..	..	15	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Oct.	2	8	11	2	..	159	..	62	..	..	1	..	..	6	..	8	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..
Nov.	4	14	12	3	..	329	..	121	..	..	1½	..	..	12	..	16	..	..	..	3	..	..	..	..	3	1	..	..	..	..	..
Dec.	5	11	7	5	..	145	..	24	1	..	3½	..	¼	6	..	121	..	5	..	5	..	..	..	..	10	1	..	..	..	..	3
Totals	42	39 0	85	17	5	1814	..	611½	14	1	23	..	2¼	223	..	767	..	5	2	20	..	..	..	..	33	28	4	11	..	..	7

NORTH SEA INVESTIGATIONS.—Table II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock. L.	Haddock. M.	Haddock. S.	Whiting. L.	Whiting. S.	Turbot.	Halibut.	Brill.	Lemons. L.	Lemons. S.	Plaice. L.	Plaice. M.	Plaice. S.	Common Dab.	Witch. L.	Witch. S.	Sail Fluke. L.	Sail Fluke. S.	Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
1892. Jan.	6	11½	19	..	..	126	10	3	..	..	¾	..	..	9¾	..	3	..	1	1	7½	..	..	..	..	..	..	..	..	..	3	23
Feb.	4	56	10	1	..	256	..	..	..	..	..	..	..	5	..	112	..	..	2	3	..	..	..	..	3	..	..	..	..	..	18
Mar.	4	59	4	2	..	428	..	..	4½	..	½	..	..	7	2	7	..	..	9	2	..	..	..	..	..	4	..	..	..	..	5
April	4	31	7	1	..	182	..	..	4	..	1½	..	..	25	..	7	..	..	2	7¼	..	..	..	..	13	..	..	..	..	..	15
May	4	29	7	2½	..	137	..	1	2	..	2¼	..	..	31	..	19	..	1	1	7	..	..	..	..	7	1	..	..	..	..	10
June	5	21	18	..	..	87	17	37	4½	..	2¾	..	..	48½	..	19	16¾	1	..	..	..	..	..	..	..	..	..	..	..	..	1
July	4	45	14	3	..	48	56	32	8½	..	1½	..	..	25	..	10	17	1	1	16	2	..	..	..	..	..	..	..	..	..	..
Aug.	7	8	8	..	..	95	92	..	5½	..	11½	..	..	97¾	..	13	36¼	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Sept.	5	10	9	2	1	113	93	..	5	..	3¾	..	..	46	..	8	18	..	..	2¼	..	..	..	..	..	..	..	..	..	..	..
Oct.	3	12	9	1	..	114	65	1	3¼	..	..	..	..	24¼	..	3	8	..	..	..	..	..	..	..	2	..	4	..	..	1	..
Nov.	3	15	28	3	1	106	37	5	3½	..	3½	..	..	17	..	..	7	..	..	6	..	..	..	..	..	..	..	..	..	..	..
Dec.	4	12	12	1½	..	87	41	18	3½	..	1	..	..	19¾	..	2	8½	1½	..	..	..	½	..	..	11	..	3	..	..	..	1¼
Totals	53	309½	145	17	2	1779	411	97	44¼	..	29	..	..	356	2	203	111½	5½	16	51	2	½	..	..	37	5	7	..	..	4	73¼
1893. Jan.	3	14	17	4½	..	92	67	32	2½	..	¼	..	..	11¾	..	..	1	..	1	4	..	..	..	..	1	..	5	..	..	½	..
Feb.	4	48	12	9	..	390	104	3	3	..	4	..	..	5¾	..	..	..	..	3	6	..	1	..	..	5	..	10	..	..	..	..
Mar.	4	53½	11	8	..	346	81	7	4½	..	1½	1½	..	8½	..	1	2	..	1	1	..	..	..	..	3	..	4	..	..	..	..
April	4	72	10½	11	..	93	34	9½	21½	..	6¾	1	..	41¼	1	3½	2	..	3	..	3	..	..	..	..	..	..	..	..	..	..
May	3	59	15	..	..	101	58	23	..	..	2	2	½	36	..	42½	27	..	..	..	..	..	..	..	..	..	..	..	..	..	..
June	4	94	24	10	..	61	60	30	4	..	½	..	..	27¾	..	27½	19	..	..	1	½	1	..	..	..	59	1	..	..	..	..
July	6	37	15	1½	..	66	36½	4	7½	..	4½	..	..	61¼	..	10½	19	..	..	..	..	..	..	..	..	..	10	1	4	..	..
Aug.	6	15	35½	3	..	88	48½	8½	15½	..	11½	..	..	58¾	6	22	8	..	2	..	..	..	1	..	..	4	..	..	..	..	..
Sept.	6	10½	25	3½	..	60½	46½	20	6½	..	8¾	..	..	21½	1	3¼	10¾	..	3½	..	..	2	..	..	..	2½	11	..	..	..	..
Oct.	3	53	22	1½	..	199	44	1	8¼	..	..	3/8	..	9¾	..	2	5	..	..	5	..	..	..	..	3	½	5	..	..	½	..
Nov.	4	73	43	3¾	..	215½	37¾	..	9	..	..	1¼	..	2¼	..	½	2	..	..	10	..	..	..	..	..	7	..	..	..	..	..
Dec.	5	27	15½	½	2½	180½	53½	3	9	..	1½	..	..	5¼	..	¼	4	..	..	..	..	..	..	..	..	..	6	..	..	4½	..
Totals	52	556	245½	56¼	2½	1892½	670¾	141	91¼	..	41¼	6⅛	½	289¾	8	113	99¾	..	13½	27	3½	4	1	..	12	73	52	1	4	5½	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1894. Jan.	3	18	7	6½	2	169	37	1	2½	..	..	..	..	¾	..	..	..	..	1	2	..	..	..	..	..	..	11	..	..	1½	..
Feb.	4	19	5	1	..	166	30	..	½	..	1¼	..	..	2½	..	..	¼	..	3	1	..	2	..	..	..	..	3	..	..	½	.
Mar.	4	67	6	7½	..	233	48	..	5¾	..	3¼	..	..	10	..	..	2	..	4	..	..	½	..	..	2	..	9	..	..	1	..
April	5	105	12½	6½	1	53	29	7	16	..	3	¾	..	54	1	3½	3	..	3	7	..	3	..	..	1	2	4	..	..	1	..
May	3	42	3	1½	..	125	22	..	1	..	3½	¼	¼	6½	..	10	42	..	..	..	..	..	..	..	..	..	..	..	..	..	..
June	4	20	1½	2	..	175	52	1	..	..	3	3¾	..	3½	..	16	65	..	...	2	..	..	..	..	..	..	.	..	..	..	..
July	6	46	24	9	..	71	22	4	5	..	2	..	..	41¼	1¼	8½	20¼	..	..	½	..	1	..	..	1	..	..	1	..	..	..
Aug.	8	36	38	4	5	51	70	47	4	..	12	7	1¼	44¾	1½	7	21½	..	7½	..	..	1	..	..	1	7	2	..	..	..	..
Sept.	3	36	22	4	..	195	40	26	4	..	¼	..	..	19½	¼	3	6	..	..	4	..	½	..	..	..	..	5	..	..	..	..
Oct.	4	55	25	3½	..	194	95	3	7½	..	1½	..	..	10½	..	5	11	..	..	4¼	..	..	..	..	..	..	3	..	..	..	..
Nov.	3	31	11	2½	..	105	104	20	4	..	1	..	..	22½	..	8½	28	..	4	..	..	..	..	½	1	½	4	..	..	..	..
Dec.	5	34	11½	2	..	126	88	16	1	..	1¼	..	..	13¼	..	..	2	..	..	..	..	..	..	..	..	3½	7	..	..	1¼	..
Totals	52	509	166½	50	8	1663	637	125	51¼	..	32	11¾	1½	229	4	61½	201	..	22½	20¾	..	8	..	½	6	13	48	1	..	5¼	..
1895. Jan.	4	19¼	8	1½	..	30¼	34	17	½	..	¼	..	..	4¾	..	4	17	..	¼	1	..	..	..	..	..	..	1	..	..	1	..
Feb.	2	11¼	..	..	4	74	15	..	..	..	½	¼	..	1½	..	..	..	..	1	½	..	..	..	..	..	..	..	..	2	..	..
Mar.	4	57	11	6	2	328	36	..	1½	..	2	1	..	8¾	..	..	1	..	6	1¾	..	½	..	..	..	..	8	..	..	..	..
April	5	51	34	6	1	28	54	39	2½	..	3	1¼	..	40	2¾	3½	7	..	1½	2	..	½	..	..	3	..	7	..	3	..	..
May	5	50	23	..	1	33	39	49	3½	..	4¼	..	..	49	2	3½	8¾	2¼	1	1	..	½	..	..	..	..	5	..	..	..	..
June	6	46	21	8	..	57	63	43	4½	..	3½	..	..	47½	½	2¼	11½	..	..	1	..	..	..	..	..	½	..	..	..	..	..
July	6	94	43	21	..	181	119	9	1¾	..	4	7¾	..	43½	1	33¼	55	3	5½	..	.	..	..	½	..	3	1	..	..	..	..
Aug.	4	19	18	1½	..	49	167	1	4½	..	5¾	..	..	57	¾	4½	24	..	..	..	..	..	..	..	..	..	1	..	..	..	..
Sept.	7	37	12¼	5½	..	130¼	168	..	3¾	..	2¾	..	..	39	1¼	3	6¾	..	..	1½	1	..	..	..	..	6½	3	..	..	¼	..
Oct.	5	25	18	3	..	85	208	1	2¾	..	4¼	..	..	51¾	1½	3	27	..	..	..	..	..	..	¼	..	1¾	3	..	..	½	..
Nov.	5	37	13	1	1	122	124	..	1	..	3¾	2	..	29¾	¼	3	21½	1	..	1¾	..	..	..	..	1	1	3	..	..	1¼	..
Dec.	6	60	16	3	..	114¼	60½	1¼	2	..	4	¼	¼	14¼	..	22	56	1¼	2	..	..	2	..	..	3	1	3	..	..	2¾	..
Totals	59	506½	217¼	56½	9	1231¾	1087½	160¼	28¼	..	38	12½	¼	386¾	10	82	235½	7½	17¼	10½	1	3½	..	¾	7	13¾	35	..	5	5¾	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1896. Jan.	2	23	6	¼	..	109	15	..	1	..	¼	1¼	¼	1	..	12¼	57	..	..	..	..	1¼	½	..	..	..	..	..	..	¼	..
Feb.	3	260	6	4	..	189	29	..	1	..	6½	1	..		..	12½	28	..	2	..	..	..	..	..	1	..	..	..	..	..	..
Mar.	3	98	5	2	2	36	19	..	..	..	¾	2¼	..	9½	¼	15¼	35	1½	2	¼	..	1¼	..	..	12	..	..	..	..	..	..
April	5	49	15	14	..	46	70	1	1	..	6	¼	..	41¾	½	5¾	11¼	1	1¼	3	1	1¾	..	..	4	..	2	..	..	..	..
May	3	47	13	6	2	39	41	..	2	..	2¾	4½	..	37¼	1¾	4	7½	½	..	1	..	3	..	..	..	1¾	3	..	..	..	..
June	4	47	15	46	..	52	70	7	2¼	..	2	1¼	¼	17¾	3	11½	13	..	½	3	..	7	1	½	1	117¼	..	..	..	..	..
July	5	75½	15½	4	40	67	103	10	1	..	3¼	..	..	36	2	2¾	10	¼	..	1¼	..	..	..	..	2	13	..	..	..	..	..
Aug.	5	139	26	17	..	127	51	2	..	..	3½	7	1	32	3½	13½	22¾	..	5	1	½	3	..	½	1	9½	4	..	..	..	..
Sept.	2	15	4	4	..	126	20	..	6	..	2	4	..	4	½	2¼	9	2¼	2	..	..	1	..	..	..	1	..	..	..	..	..
Oct.	5	31½	12	8	..	110	31	..	..	..	9	1½	..	5½	½	4¼	32	5	1	½	..	½	..	..	2	2	4	..	..	1¾	..
Nov.	2	¾	2	..	..	57	7	..	1¼	..	1¼	3½	..	2	1½	10¼	51	7	4	..	..	2¼	½	..	13	..	..	..	..	1	..
Dec.	4	138	23	1½	..	56½	13	..	..	..	5	1	¼	3¼	¼	11¾	92½	1½	18¼	..	..	¾	..	¼	14	1	3	..	..	1½	..
Totals	43	923¾	142½	106¾	44	1014½	469	20	15½	..	42¼	27½	1¾	190½	13¾	106	369	19	36	10	1½	21¾	2	1¼	50	145½	16	..	..	4½	..
1897. Jan.	5	43	16	½	..	41	27	13	¾	..	1½	..	..	6¾	..	1¼	14¾	1½	¼	..	..	..	..	¼	5	..	..	..	..	..	..
Feb.	3	38	6	½	..	204	82	..	¼	..	¼	..	..	2	2½	..	¼	..	..	..	..	1	..	..	1	..	1	..	..	..	..
Mar.	3	84½	3	7	18	118	46	..	1	..	2¼	¼	..	1¼	..	15¼	48	..	..	..	..	2¾	..	..	2	..	2	..	..	..	..
April	4	256½	5¼	4	30	82	46	..	¼	..	2¾	½	3¼	5¼	..	8¼	53½	2½	2¼	..	..	5	..	..	9	½	6	..	..	..	..
May	5	294½	8	1½	43¼	73½	19½	..	4½	..	2	¼	5	5½	..	5¼	16½	..	..	..	..	..	..	..	1	..	2	..	..	..	..
June	5	148½	12	21½	4	551	52½	6	2	..	5	½	¾	11¼	..	9½	52	..	..	1½	..	2½	8¼	..	8	6½	1	..	..	..	..
July	4	524	23¼	17½	..	211	15	..	..	..	4½	4½	3¼	10	¼	12¼	44	..	1	..	..	11½	..	..	16	7½	..	..	..	..	..
Aug.	4	232	19	3½	..	141¼	10	..	..	..	8¾	3	10½	9½	..	6¾	34	..	7¼	¼	..	¾	..	1¼	3	1¾	8	..	..	..	..
Sept.	5	361	36	3½	..	73¾	9	..	¾	..	9¼	..	5¾	4¾	..	10	55	..	13¼	..	..	½	..	¾	7	2½	5¼	..	..	3¾	..
Oct.	3	60	36	2	..	175	14	7	7	..	2½	..	½	½	..	6½	24	..	..	1½	..	1	..	¼	5	5	3	2	..	4¼	..
Nov.	4	68	19	2¼	..	92¼	21	5½	2½	..	3¼	..	..	4¼	..	1	34¼	6½	4¾	..	..	..	..	½	1	1	4	..	..	2½	..
Dec.	3	274	9	..	3	5¼	..	..	..	..	2¾	..	8½	1	..	6¾	13¼	..	2½	..	..	..	..	¼	2	..	1	..	..	3½	..
Totals	48	2384	192½	63¾	98¼	1768	342	31½	19	..	44¾	9	37½	62	2¾	82¾	389½	10½	31¼	3¼	..	25	8¼	3¼	60	24¾	33¼	2	..	14	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1898. Jan.	5	75	20	4¼	½	120½	51	56	7¼	..	2¼	½	..	3½	¼	3	3	..	..	½	..	4	¼	..	4	2	1	..	..	3¾	..
Feb.	5	24	26	9	1	55	22	27	½	..	4½	1	½	15¼	1	1	12¾	½	..	¼	..	2	..	½	..	½	..	..	..	1¾	..
Mar.	6	54	38	4	2½	110	56	100	1½	..	8½	1¼	¼	25	2¾	10	36	¼	..	2	..	3¾	..	..	..	..	..	..	..	¼	..
April	6	185	19	10¼	10	87	44	84	5¼	..	3¼	2¾	½	18	1½	10½	51¼	2	..	6	..	10	2	..	5¾	2¼	..	2	..	..	..
May	3	58	5	10½	2	154	60	66	3	..	3	3¾	..	4	..	3½	24	..	..	..	..	3	..	..	1	2	..	2	..	..	..
June	5	56	31½	5	..	92	69	103	¼	..	7½	1¼	¼	29¾	..	7	38½	1½	1	¾	..	1	..	..	..	¾	..	..	..	..	..
July	6	19¼	11¾	1¼	..	85	49	50	8¾	..	4½	¼	..	11½	¼	2	41	8¾	..	1¼	..	1	..	..	..	2½	..	..	..	..	..
Aug.	7	44½	23½	6	21	63½	25¼	16½	2¾	..	3¼	½	¼	23¼	1	6	13¾	1¾	1	¼	..	..	..	¼	12½	1¾	½	..	1	..	..
Sept.	6	44	29½	4	2	155	44	45¼	7½	..	3½	..	..	29¼	..	2	18¾	..	..	..	..	..	..	..	5	..	15	..	17	..	..
Oct.	5	56	28	2½	..	256	67	58	9¼	..	3	¼	..	31	..	1½	22¾	..	..	..	..	..	..	..	14	¾	10	..	¼	1	..
Nov.	4	28	18¼	2	..	172	51	63¼	1½	..	6¾	..	..	19¾	..	..	10	..	..	..	..	..	..	..	10	1½	11	..	..	5½	..
Dec.	13	77	94	11¼	3½	174	51	90½	10¾	..	3¼	..	¼	19¼	½	..	5¼	..	1½	1¾	¼	5	..	..	15¼	¾	2½	..	11	8¼	..
Totals	71	720¾	344½	70	42½	1524	589¼	759½	58¼	..	53¼	11½	2	229½	7¼	46½	277¼	14¾	3½	12¾	1	29¾	2¼	¾	67½	14¾	40	4	29¼	20½	..
1899. Jan.	9	49½	42¾	7¾	1	91	34	126¾	11¾	..	3	¼	¼	8¾	..	..	5	..	1¼	1	..	8	..	..	3	..	3	..	..	1¾	..
Feb.	7	78½	7	23	11½	152¼	32½	88½	5¼	..	5	..	..	3¼	..	..	1¼	1	..	8	..	9½	1¼	..	10	1	14	4	1	..	..
Mar.	5	43¼	11	18½	12	35½	12	54	8½	..	6¾	½	..	10	..	..	2	½	1½	1	5	12	5	..	11	½	14	12	..	..	..
April	3	27	10½	9	10	28	18½	36	7½	..	3¼	1¼	..	16½	..	..	2½	..	1	15¼	1½	7	2	..	2	4	..	3	..	..	..
May	6	38¼	19½	2	6	131	53	56½	8	..	9½	½	..	43	..	1½	17½	..	..	..	..	..	..	..	2	2	..	8	..	..	..
June	6	38½	19½	1½	6	130½	53¼	56½	..	..	9¼	¼	..	43	..	1½	17½	..	..	..	..	..	..	..	1	2½	..	9	..	..	..
July	6	29½	14¼	8½	1½	124½	53½	53½	13¾	..	7	½	..	34	..	3¼	10¾	..	..	4	..	6	2	..	2	1½	2	2	1	..	..
Aug.	5	41½	19¼	5½	1½	122	56½	69	12	..	1¼	½	¼	21¼	..	2¾	11½	..	..	..	½	..	..	..	..	..	4	2	2	..	..
Sept.	6	38	17	2¼	..	157	50	62	11¼	..	¾	..	..	32¼	1	2	6¼	..	..	..	¼	..	..	..	6	..	5	4	3	..	..
Oct.	4	41	12	5¼	¼	191	40	100	7¾	..	2	..	..	7	..	3¾	1½	..	..	¼	..	4	..	..	2¼	1	3	4	4	1½	..
Nov.	5	22¼	13	6¼	8	139	35¼	81¾	5¼	..	1¼	..	..	11	..	..	1¾	..	..	..	..	¼	..	..	6	1½	4	2	4¾	1¼	..
Dec.	7	26½	24¾	6	..	84	24¼	65¼	13¾	..	3¾	..	..	6½	..	..	3¼	¼	½	..	..	3½	..	..	6½	¾	..	..	6	7¼	..
Totals	69	473¾	210½	96¼	58	1385¾	462¾	849¾	105	..	52¾	3¾	½	236½	1	14¾	80¾	1¾	4¼	29½	7¼	50¼	10¼	..	51¾	14¾	49	50	21¾	11¾	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 5.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1900. Jan.	4	12¼	16	2	6	30¾	16¾	46	11¼	..	2½	..	..	2¼	..	..	3½	..	½	½	..	2½	1	½	2	1	¼	..	6	3	..
Feb.	4	14	6¼	9	3½	71	25½	86	13¼	..	½	¼	¼	..	¼	..	..	..	2	¾	½	5	..	..	7	..	3	..	1	1½	..
Mar.	4	101	12	13	10½	117	55	88	43¼	..	..	2	..	2	..	3½	13¼	..	..	1¾	..	5½	..	..	22	1¼	2	6	8	½	..
April	3	188	5	16	11	68	32	78	5½	..	6¼	1½	2	4¾	..	5	14¼	..	..	3½	..	13	3	¼	22	5½	3	15	10	..	..
May	2	41	17	13½	6	22	12	55	1	..	½	2	..	3½	..	..	1	..	..	26¾	8	46	9	..	17	14¼	..	6	11	..	..
June	4	110	4	92½	24	51	35	138	4½	.	6¾	1¼	..	10¾	..	1	4	..	..	50¼	3	66¼	21½	..	11	117	2	5	4	..	..
July	4	61½	20¼	23½	2½	103¼	35½	40	7¼	..	2¾	4½	..	14½	½	2¼	4½	..	..	13¼	4	7¼	..	..	4	2½	2	3	..	..	..
Aug.	3	58	20	4	2	114	19	11	2¼	..	4	4½	..	13½	½	4½	13	..	..	¼	..	..	..	..	4	2½	..	..	..	..	..
Sept.	4	43	16	10	2	113	27	33	5	..	1¾	½	¼	13¼	¼	3½	15¼	..	3¾	½	.	1¼	..	..	12	9½	..	..	..	..	..
Oct.	3	14¼	7	9½	..	128	31	61	10¼	..	½	..	..	3	¾	½	2¼	..	1½	..	..	2	..	½	13	1¼	1	..	..	2	.
Nov.	8	33	33	3½	..	99¼	20½	194½	7¼	..	5¾	..	..	11½	1	½	10	..	4½	3	..	1¼	¼	..	5½	..	..	..	..	3¾	..
Dec.	6	12½	11	4	1	76	27½	120	17½	.	1	..	..	½	..	..	1	..	1½	2¼	3½	9¾	½	..	21¾	1¼	3	..	..	2¼	..
Totals	49	688½	167½	200½	68½	993¼	336¾	950	128¼	..	32¼	16½	2½	79½	3¼	20	82	..	13¾	102¾	19	159¾	35¼	1¼	141¼	156	16¼	35	40	13	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 6.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1890. Dec.	1	13	2	..	..	22	18	..	..	..	1	..	..	5	..	15	..	..	..	21	..	..	..	..	..	1	..	..	..	..	.
1891. Jan.	3	41	7	3	..	79	51	..	6	..	2	..	..	3	..	84	..	..	..	9	2	..	..	..	..	1	..	..	..	..	..
Feb.	4	52	17	2	..	159	55	..	2	1	1	1	..	13	..	254½	..	..	..	19	..	..	..	..	4	..	..	..	..	..	..
Mar.	4	54	2	1	..	352	114	..	3	..	1	..	..	13	..	15	..	..	..	13	3	..	..	..	11	..	..	..	..	..	..
April	4	23	5	2	..	130	73	..	5	..	2	..	..	90	..	20	..	..	..	20	3	..	..	..	4	..	..	..	..	..	..
May	3	8	42	1	1	322	59	..	..	..	3	..	..	1	..	49	..	..	..	..	..	..	..	..	2	2	..	..	..	..	..
June	3	20	16	1	..	237	79	..	..	..	1	..	..	20	..	75	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..
July	1	4	2	..	..	29	14	..	½	..	..	..	..	5	..	18	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Aug.	4	28	7	..	..	156	83	..	..	..	1	..	..	24	..	52	..	..	..	..	..	..	..	..	..	9	..	..	..	..	..
Sept.	4	20	9	4	..	94	44	..	..	..	1	..	..	22	..	48	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..
Oct.	4	19	9	2	..	283	74	..	..	..	7	..	..	13	..	52	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	9	24	..	..	475	70	..	..	..	2	..	..	11	..	22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4
Dec.	2	8	22	..	..	217	21	..	..	..	1	..	..	..	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	13
Totals	39	286	162	16	1	2533	737	..	16½	1	22	1	..	215	..	693½	..	1	..	61	8	..	..	..	24	15	..	..	..	..	17
1892. Jan.	4	27½	18	6	1	192	2	..	..	..	¼	..	..	3	..	92	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2
Feb.	3	52	13	..	..	62	..	..	..	..	..	..	..	15	..	167	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mar.	5	100	6	2	..	190	..	..	10	..	..	..	..	20½	..	114	4	1	..	29	13	..	..	..	3	..	..	..	..	..	..
April	3	39	23	1	..	94	.	..	6	..	3	..	..	43	.	39¼	2	..	..	3	..	..	..	..	3	..	1	..	..	..	..
May	4	23	17	2	..	187	10	..	4	1	1½	..	..	42½	..	15¼	18	..	..	6	2	..	..	..	2	..	..	..	..	..	..
June	1	2	2	..	..	33	20	..	4	1	1¼	..	..	..	..	..	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..
July	2	8	6½	1	..	35	26	..	4	..	3	..	..	5	..	2½	23½	1	..	4	2½	..	..	..	..	25	..	..	..	..	6
Aug.	3	1	10½	..	..	122	77	3	5½	..	3¼	..	..	11½	..	19¼	49	..	..	..	..	..	..	..	..	2	..	..	..	..	..
Sept.	3	17	15¼	..	..	183	76	2	..	¾	¼	..	..	8	..	7¾	18¼	1	..	1½	..	..	..	..	2	..	..	..	..	..	..
Oct.	6	37	12½	..	..	208	43	10	..	..	4¾	..	..	3½	..	¾	9¾	2	..	1½	..	..	..	..	..	2½	..	..	..	..	10
Nov.	4	64	54	2	..	347	109	2	2	..	..	..	..	6	..	12	32	..	..	7¾	..	..	..	..	..	4	..	..	..	..	..
Dec.	4	55	44½	4½	..	448	116	..	12	..	2¼	½	..	2	..	2¾	2¾	1	..	9¼	..	..	..	..	2	..	..	..	..	..	..
Total[a]	42	425½	222¼	18½	1	2101	479	17	47½	2¾	19½	½	.	160	..	472½	171¼	6	..	62	17½	..	.	..	12	33½	1	..	..	..	18

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 6.

Date.	No. of Landings.	Cod.	Codling.	Ling	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1893. Jan.	3	28	28½	9½	..	271	104	..		..	¾	..	..	1¾	..	16½	16	½	..	2½	..	..	..	..	..	..	5	..	..	..	..
Feb.	2	14	10	21	1	227	85	..	..	..	..	..	..	¼	..	17½	15½	..	..	½	..	..	..	..	2	..	8	..	..	..	..
Mar.	5	69	3	10½	..	440	110	..	2½	..	..	..	..	7	..	..	2¼	¼	..	2	..	..	..	..	1	..	..	..	..	..	..
April	3	40½	21	6	1	235	59	..	11	..	3¼	1	..	7½	..	..	½	3	..	5¼	½	¼	..	..	8	..	..	..	..	..	..
May	4	21½	30½	7	..	306	96½	..	..	..	3¾	..	..	1¼	..	7½	15	19½	..	5¾	..	..	..	..	..	..	..	..	..	..	..
June	2	7	22	5	..	171	63	..	1	..	4	..	..	6½	..	2	17½	..	..	..	..	..	..	..	..	..	..	.	.	..	..
July	4	39½	10	5½	..	238	50	..	..	..	2	1¼	..	8¼	..	42	59	2	¼	..	..	..	..	..	..	..	1	..	..	..	..
Aug.	5	60	12½	3	..	494	91	..	..	..	½	¾	..	2¾	..	6	31¾	..	¼	3¼	..	..	..	..	..	..	..	..	..	..	..
Sept.	3	18	12	1½	..	397	74	..	..	..	..	..	..	1½	..	3¾	10¼	..	..	4	..	..	..	..	..	..	..	..	..	..	..
Oct.	4	64	29	3	..	425	106	..	1¾	..	¼	..	..	5¼	..	1½	7	..	..	4½	..	..	..	..	..	..	..	..	..	..	..
Nov.	3	44	35	6	4	206	72	..	3½	..	..	..	..	2	..	6½	31½	..	..	3½	..	..	..	..	..	3	..	..	..	..	..
Dec.	3	26	18	5	..	224	79½	1	4	..	¼	½	..	¼	..	1	3	..	..	7¼	..	..	..	..	3	2	6	..	..	2¼	..
Totals	41	431½	231½	83	6	3634	990	1	30¾	..	14¾	3½	..	44¼	..	104¼	209¼	25¼	½	38½	½	¼	..	..	14	5	20	.	..	2¼	.
1894. Jan.	2	14½	12	3	..	157	44	..	..	..	..	..	..	3½	..	1	7½	..	..	5	..	..	..	..	..	..	14	..	..	1	..
Feb.	3	34	16	4	..	184	57½	..	..	..	..	..	..	½	..	..	1½	..	..	3½	..	..	..	..	..	..	7	..	..	..	..
Mar.	4	46	12	7½	1	396	117½	..	2	..	¼	..	..	3¾	..	14	18½	2	2	2	..	..	..	..	..	..	1	..	..	..	..
April	3	35	48	21	5	97	67	6	25	..	1¾	1¼	..	½	..	..	¾	..	1	65¼	5½	14	..	..	11	1	..	..	..	..	..
May	4	17	6	3	..	172	55	3	..	..	3	¾	..	3¾	..	10¼	75	..	2	½	..	..	..	..	..	..	..	..	..	..	..
June	3	12	5	2	3½	189	34	..	..	..	1¾	¼	..	3½	..	9	37	..	..	6	..	..	..	..	..	..	..	..	..	..	..
July	4	18	17	3	..	209	49	..	..	..	¾	2¾	..	7	..	24¼	18½	..	2	6	..	..	..	..	..	..	..	..	..	..	..
Aug.	3	28	6	3	..	197	34	..	..	..	½	..	..	2¾	..	8½	30	..	..	4	..	..	..	..	..	..	..	..	..	..	..
Sept.	4	48	18	2	1	356	79	7	1	..	..	..	..	2½	..	7½	15	..	..	5½	..	..	..	..	..	..	1	.	..	..	..
Oct.	3	53	20¼	1	3	225	106	8	1¾	..	..	..	..	3½	..	5	13¼	..	..	5¼	..	..	..	..	1	1	1	..	..	..	..
Nov.	4	49¼	33	1	58	209	71	40	2½	..	1	..	..	5¾	..	½	5¼	..	1	5¼	..	..	..	..	..	..	5	..	..	..	..
Dec.	3	58	41	4½	38	189	57	..	6	..	..	..		4¼	..	..	1	..	..	7¾	..	..	..	1	2	2	1	..	..	½	..
Totals	40	412¾	234	55	109½	2580	771	64	38¼	..	9	5	..	41¼	..	80	223¼	2	8	116	5½	14	..	1	14	4	30	..	..	1½	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 6.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1895. Jan.	3	35	6	4	6½	12½	12	84	..	..	1½	⅜	¼	7¼	..	27	169	..	1¼	1	..	..	..	..	2	..	..	..	..	..	..
Feb.	4	77	6	..	..	4	1	24	..	..	¼	¼	2¾	¾	..	43¼	161	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Mar.	3	50	22	29	11	290	81	..	18½	..	..	2¾	..	..	..	..	¼	..	..	19½	..	..	..	..	5	1	3	..	..	..	..
April	3	22	16	5	4	109	65	48	22¼	..	..	½	..	..	..	..	5½	3	3	23½	2	1¼	..	..	6	1	1	..	..	..	..
May	3	16	4¼	9	..	91	127	24	..	..	..	1½	½	½	..	3	27¼	..	5	..	..	..	..	..	..	..	..	..	..	..	..
June	3	13	6¼	4	..	108½	95	..	..	..	1	½	..	2½	..	4½	23¼	..	..	2	..	..	..	..	..	..	..	..	..	..	..
July	1	15	7	3	..	23	20	..	..	..	..	½	..	3¼	..	1	2½	..	..	1¼	..	..	..	..	..	..	..	..	..	..	..
Aug.	4	16	10	½	..	75	131	..	2	..	5¼	¼	..	30¼	..	¾	13¾	..	..	1	..	..	..	..	..	..	..	..	15	..	..
Sept.	8	50½	11¼	2	..	101¾	206½	8½	4¾	..	2¼	¼	..	42¾	¾	1¼	14¼	..	..	12½	..	5¼	..	..	7	6½	..	2	10	..	..
Oct.	4	11	4¼	..	..	45½	64	61	¼	..	1¾	..	..	24½	..	15	82¾	..	1	..	..	..	..	..	9	..	10	..	..	¼	..
Nov.	3	27¼	7¼	1	1	115	73	21	1½	..	½	..	..	2¼	½	7	31½	..	1	4½	..	3¼	..	..	5	1	4	..	..	1¾	..
Dec.	2	5	..	..	..	15	20	..	..	..	¾	..	..	¾	..	¼	61	..	..	1	..	3¼	..	..	..	1	..	..	..	..	..
Totals	41	337¾	100¼	57½	22½	990¼	895½	270½	49¼	..	13¼	6⅝	3½	114¾	1¼	103	592	3	11¼	66¼	2	13	..	..	35	10½	18	2	25	2	..
1896. Feb.	1	64	2	2	..	13	12	15	..	..	..	..	..	½	..	2½	7	..	..	4	..	3¼	..	2	1	..	..	..	..	..	..
Mar.	4	93½	5	7	6	126	64	69	3¾	..	1½	¾	¼	10¼	..	5¼	28¼	2	..	7½	..	¾	..	..	3	..	2	..	..	..	..
April	6	72	16¼	13	..	63	36	53	4¾	..	1¾	..	¼	33¼	¾	1	6¾	..	3	1¾	..	1	..	..	2	½	5	..	..	..	..
May	3	27½	3¼		2	98	35	4	..	..	1¼	1	..	8	¼	1½	26½	¼	..	2	..	..	..	..	1	1	..	..	..	..	..
June	4	29	13	3	2	242	104	13	4¾	..	2	1½	..	4¾	..	9	36	..	..	10¾	..	..	..	..	1	8	..	..	..	..	..
July	5	77	9½	4	..	97	70	5	½	..	5½	¼	..	29	½	3	9½	½	..	2	..	..	..	..	1	1	..	..	..	..	..
Aug.	4	9	12	4	..	40	39	..	½	..	3½	..	..	31½	½	2	9	..	..	..	..	..	..	..		..	..	..	..	..	..
Sept.	4	54	9	25½	..	38	34	19½	¼	..	26½	2	..	13½	1	3½	7½	..	..	..	..	..	..	½	20	2	1	..	..	..	..
Oct.	2	26	10	4	2	93	19	27	1	..	1	..	..	..	..	..	6½	..	..	4	..	..	..	..	1	..	..	..	..	..	..
Nov.	4	52	10	4	5	367	80	106	..	..	..	..	..	3¾	..	2	15½	..	..	5¼	..	¼	..	..	2	2	1	..	..	..	..
Dec.	3	25	13	4	..	146	37	55	10	..	4¼	2	..	4	..	..	4	..	1	3	..	..	..	..	13	1	1	..	..	..	..
Totals	40	529	103	78½	17	1323	530	366½	25½	..	47¼	7½	½	138½	3	29¾	156½	2¾	4	40¼	..	5¼	..	2½	46	15½	10	..	..	..	..

NORTH SEA INVESTIGATIONS.—TABLE II.—No. 6.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1897. Jan.	5	32	9	2½	3	134	64	135	7½	1	¾	¼	..	8¾	¼	..	2	..	..	..	..	..	..	..	5	1	5	..	..	¾	..
Feb.	3	43	6	4	..	105	53	101	5	1	3¼	½	..	7½	..	..	1	..	..	2	..	5	..	..	..	..	..	..	4	..	..
Mar.	5	42	6	8	16	286	85	100	15¼	..	1½	1½	..	¾	..	1	3	..	1	10¾	3	4	..	..	7	1	10	..	..	..	..
April	6	63	6	5	11	117	58	152	4¼	..	½	½	..	13¼	..	1	8	..	..	8¼	..	3	¼	..	2	..	3	..	28	..	..
May	4	94	12	6	7	172	30	74	2	..	2	¾	¾	7	½	1½	10	..	..	2½	..	..	..	..	2	1	3	..	..	..	..
June	5	86	11	4½	5	210	52	78	..	..	3¾	3¼	1¼	8½	¼	4¼	33½	2	¼	5½	..	..	..	½	3	4	..	..	12	..	..
July	3	62	15	4	10	230	50	92	..	..	3½	2¼	..	11	..	3	16	..	1½	3	..	2	..	..	3	1	2	..	..	..	..
Aug.	12	37	41½	1½	..	302	127	110	11¾	..	4½	..	..	19¼	1	3½	12¼	2	1	..	..	..	..	..	2	2	1	..	..	..	..
Sept.	5	54½	13	3½	23	232¼	129	79	14	..	4	..	..	5½	¼	1	4¾	..	..	¼	..	..	..	..	2	3½	2	..	..	..	..
Oct.	4	40	11	18	..	204	45	24	12	3	½	¼	..	2	..	13½	28	..	..	..	..	10½	..	..	9	33	1	..	..	..	..
Nov.	5	57½	12¼	42¾	20	428½	66	12½	4	..	..	½	.	2¾	..	9	59½	..	2¾	..	..	19	1½	..	36	70	3	..	..	¼	..
Dec.	10	58¼	57¼	4½	½	215¾	128½	98	12½	..	..	3¾	¼	24¾	¼	1½	9¾	¼	3½	..	..	..	..	..	11½	..	14	..	5	2	..
Totals	67	669¼	200	104¼	95½	2636½	887½	1055½	88¼	5	24¼	13½	2¼	111	2½	39¼	187¾	4¼	10	32¼	3	43½	1¾	½	82½	116½	44	..	49	3	..
1898. Jan.	6	43	42	4	3	247	175¼	154¾	19¼	..	1½	½	..	28¼	½	..	5½	..	2¾	1½	..	4	2	..	12	..	12	5½	..	1	..
Feb.	10	39¼	33¼	1½	1	176	65	75	9½	..	2¾	1¼	..	16	..	5¾	35½	2	3½	2	..	5¾	..	..	6	..	3	..	..	1	..
Mar.	5	111	8	7	18	295	117	98	9½	..	2¼	..	..	10	¼	..	¾	..	4½	4¼	..	6¼	1	..	7	..	5½	..	..	..	..
April	4	79	12	6	27	117	117	77	6¾	..	1½	1	..	7	¾	¼	3¾	..	..	4¾	..	3¾	..	¼	4	3	6½	2	..	..	..
May	4	54¼	17½	3	7	180	67	72	1½	..	3¼	5¼	..	12¾	1¼	6¼	34	..	½	5	..	1	..	¼	11	1	..	..	22	..	..
June	4	44	28	5	4	171	50	52	..	..	8¼	5¼	..	13½	¼	7½	35½	..	..	..	..	..	..	..	3	2	1	15	18	..	..
July	4	60	35	2	3	138	44	39	5¼	..	7½	4¼	1¼	13¼	..	2	21	..	1½	3¾	..	..	..	..	10	2	..	5	12	..	..
Aug.	4	59	34	7	2	120	40	26	6	..	9	1	..	12¾	¼	4½	17	..	¼	..	..	3	..	¼	32	5	3	..	..	..	..
Sept.	7	62	40	17	6	312	105	85	8½	..	3	2	..	10	1	14¾	50	..	..	3½	..	5	..	..	16	20½	4	..	7	..	..
Oct.	2	26	11	45	5	213	34	33	15	..	..	3½	..	3½	..	7¾	26	..	..	1	..	28	2¼	..	18	45	3	..	..	..	.
Nov.	9	24	73	5	½	152	38	149	29	..	5¼	1	..	17½	2¾	2	18½	..	6¼	..	..	1¼	..	¼	17	30	15	..	9¼	5½	..
Dec.	4	68	39	5½	2½	208	88	92	13	..	¼	½	¼	2¼	..	..	1	..	1	15¼	..	..	..	..	9	1	4	½	..	1¾	..
Totals	63	669½	372¾	108	79	2329	940¼	952¾	123¼	..	44½	25½	1½	146¾	7	50¾	248½	2	20¼	41	..	58	5¼	1	145	109½	57	28	68¾	9¼	..

NORTH SEA INVESTIGATIONS.—Table II.—No. 6.

Date.	No. of Landings.	Cod.	Codling.	Ling.	Saithe.	Haddock.			Whiting.		Turbot.	Halibut.	Brill.	Lemons.		Plaice.			Common Dab.	Witch.		Sail Fluke.		Conger.	Rays.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.
						L.	M.	S.	L.	S.				L.	S.	L.	M.	S.		L.	S.	L.	S.								
1899. Jan.	5	51	30	20½	6	214	99	90	16	..	..	2	..	¼	..	..	1	¼	..	15½	2¾	7¾	½	..	23	5	14	..	..	4	..
Feb.	3	39	22	25	7	200	82	61	24	..	..	..	1½	..	..	..	..	..	..	20	3¼	1½	..	..	9	3	1	..	..	¾	..
Mar.	5	54	18	20	19	123	55	68	22½	..	3½	2¼	..	5	..	1	2	..	4¼	18¾	2	7	..	..	36	4	4	3	..	..	..
April	3	23	22	34	1	70	24	37¼	41	..	½	3	..	1½	..	7	17	..	..	12¼	½	17¾	2	..	14	9	..	4	..	..	..
May	2	133	11	9	4	70	25	20	2	..	2½	12	..	1¼	..	1	14½	..	..	4¼	½	5	..	..	17	7	..	12	..	..	..
June	5	105	17	70	.	68	28	96	7	..	4	4½	..	13½	..	3	10	..	..	48¾	7	116	11	..	24	6½	..	3	..	..	..
July	1	24	5	12	..	30	9	17	2	..	2½	2	½	10	..	½	3	..	..	4	2	7	..	..	26	1	..	..	..	..	..
Aug.	5	58	32	62	28	131	59	117	22½	..	5	3¼	..	21¼	½	2¼	8	..	..	17¼	6¼	37¾	1	..	33	16	..	10	..	..	..
Sept.	4	134	23	51	34	94	60	105	21	..	½	6	..	¾	..	5½	13	..	..	80½	21	39	..	..	46	70	8	2	1	1¾	..
Oct.	4	76¼	28½	30	54	141	55	73	18	..	½	3¾	..	7½	..	1½	4½	..	..	17	1½	12	3	..	9	28½	1	3	4¾	1½	..
Nov.	3	33	20	9½	6	95½	50	85	13	..	1¼	¾	..	11	¼	..	½	..	..	12	3¼	2¾	..	..	13	6	4	..	4	6	..
Dec.	4	46½	51	5	2	194	89	105	17	..	..	¼	..	4¼	..	..	..	..	1	5	..	2	..	..	4¼	6	2	4¼	1	9	..
Totals	44	776¾	279½	348	161	1430½	635	874¼	206	..	20¼	39¾	2	76¼	¾	21¾	73½	¼	5¼	255¼	50	255½	17½	..	254¼	162	34	41¼	10¾	23	..
1900. Jan.	3	34	16	28	4	105	71	112	8¾	..	..	1	..	1½	..	..	..	..	1	5¼	..	4	..	..	4	2	5	2	..	2¾	..
Feb.	2	20	19	17	8	53	40	59	17	..	..	..	1½	..	..	..	..	..	..	30	11	10	..	..	2	1½	..	4	..	..	..
Mar.	1	6	8	5	6	58	34	38	7	..	..	2	..	..	..	..	..	..	..	7	1	1	..	..	1	1	..	1	..	..	..
April	3	27	12	34	16	209	88	62½	40	..	¾	3¾	..	¼	..	..	½	..	..	17¼	4	3½	1	..	6	2	8	..	..	.	..
May	2	30	11	13	6	74	34	51	5	..	3¼	4½	½	1½	..	1	3	..	½	11¼	1½	2	..	..	1	1	2	4	..	..	..
June	4	123	6	130	68	22	4	210	..	..	5¾	¾	..	1½	..	..	..	..	..	74	4	100	25	..	26	107	4	2	..	..	..
July	3	84	17	47	30	63	44	123	..	..	2½	3¼	..	9½	1	2	2½	..	..	49	5	27½	5	..	6	21	..	..	..	..	..
Aug.	6	105	25	24	8	164	71	61	13½	..	4	4	..	17	2	2	8	..	..	26	3	5	..	¼	28	3	..	3	1	..	..
Sept.	3	36	15	19	6	126	53	60	4½	..	¼	2½	..	4¼	..	4	11	..	..	16½	12	5½	..	..	9	11	..	..	..	..	..
Oct.	3	45	22	47	7	159	49	16	18	..	1¼	5	..	2½	..	2¼	9¾	..	..	27½	7	10	4	..	14	75	..	..	..	..	..
Nov.	3	39	23	32	1	174	66	6	25	..	¼	3½	..	¼	..	..	1	..	..	30½	3	16	1	..	16	185	..	..	..	..	..
Dec.	4	33	28	17	6	208	53	99	41	..	½	1½	..	9	..	1	1	..	..	28¼	3	10	..	..	4	37	..	..	..	..	..
Totals	37	582	202	413	166	1415	607	897½	179¾	..	18½	31¾	2	47¼	3	12¼	36¾	..	1½	322½	54½	194½	36	¼	117	446½	19	16	1	2¾	..

NORTH SEA INVESTIGATIONS.

TABLE III.

NORTH SEA INVESTIGATIONS—

No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling.	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot.	Halibut.
VII.	1901. April.	5	480	33·4	11·2	44·6	174·	61	5	.	980	401·2	132	1513·2	265	·2	11·6
	May.	9	688	54·	20·6	74·6	186·4	37	7	.	892·4	329	186·6	1408·2	358	·6	7·7
		14		87·4	32	119·4	360·4	98	12	.	1872·4	730·2	318·6	2921·4	623	1·0	19·5
VIII.	April.	3	110	23·6	13·4	37·2	59	34	3	.	284·4	86	43·6	414·2	113	.	4·6
	May.	1	75	2·4	1·	3·4	28·4	10	.	.	238	25·4	20·	283·4	43	.	2·
		4		26·2	14·4	40·6	87·4	44	3	.	522·4	111·4	63·6	697·6	156		6·6
IX.	Feb.	1	.	45	7½	52·4	8·3	.	.	.	65	11	10	86	9	2	3½
	July.	1	60	12·2	6·4	18·6	1	.	.	.	9	2·6	.	11·6	.	.	1·2
	Sept.	1	140	4·4	7·2	11·6	14·	4·	.	.	65·4	13·6	20	99·2	6·2	1·2	1·4
		3		61·6	21·2	83	23·3	4·		.	139·4	27·4	30	197	15·2	3·2	6·2
X.	Jan.	3	.	21	10½	31·4	16·4	⅛	.	.	75	15	33½	123·4	17	1	1⅜
	Feb.	9	.	95	49¼	144·2	67·5	57	.	.	851½	239½	146	1237·	113½	6⅜	12⅛
	March.	7	.	138½	36	174·4	51·1	24	.	.	343½	122	119¼	584·6	87¼	1⅜	5½
	April.	8	534	143·4	21·2	164·6	78	61·4	5	.	582·4	139	106	827·4	167·4	2·3	6·6
	May.	3	180	19·4	2·	21·4	29·4	.	1	.	129·6	20·6	12	162·4	62·2	·4	2·4
	June.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	July.	1	80	31·4	6·4	38·	11	.	.	.	15·2	4·4	1	20·6	3	·2	·1
	Aug.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Sept.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Oct.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Nov.	10	120	5	2·4	7·4	4·4	·4	.	2	57·4	8	86	153·4	14	1·3	·4
	Dec.	1	15	·2	.	·2	.	.	.	.	51·	7	6	64·	5·4	·5	.
		42		454·2	128	582·2	258·2	143·2	6	2	2106	555·6	509·6	3173·4	470	13·7	28·7
XI.	Jan.	5	.	38¼	19	57·2	44⅛	13	.	.	169½	58¼	83	310·6	64½	⅛	2⅜
	Feb.	12	.	131¼	88	219·2	170⅝	106½	.	.	836½	220½	174¾	1231·6	219¾	3⅛	16⅛
	March.	20	.	219¾	161	380·6	300¼	172	.	.	1613¼	408½	310¾	2332·4	391½	¼	26⅝
	April.	43	2753	324	268·6	592·6	666	277	32	.	3978	1113·6	646·4	5738·2	1339·6	1·7	62·6
	May.	20	1720	237	106·6	343·6	283	62	19	.	1444·4	485·6	290·4	2220·6	580	1·5	30·3
	June.	3	330	41·6	30·4	72·2	23	7	2	.	162·4	37·	40·4	240	78	·6	6·6
	July.	1	80	25	6·4	31·4	13·4	.	.	.	26·4	5	4	35·4	13·4	·3	2·2
	Aug.	1	60	15·1	13	28·1	5·4	6	1	.	109·	12	9	130·	8	.	1·1
	Sept.	3	205	78	38·4	116·4	29	36	1	.	214·4	21	30·4	266	48·	.	5·2
	Oct.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Nov.	1	75	12·4	7	19·4	9	2	.	.	78	16	12	106	34·	.	·6
	Dec.	2	130	33·4	27·4	61·	16	13	.	.	101	23	40·4	164·4	63·4	.	3·2
		111		1156·1	766·4	1922·5	1560·2	694·4	55	.	8733·2	2400·6	1642	12776·	2840·4	8·1	157·5

Note.—The figures after the point represent eighths, not tenths.

TABLE III.

Brill.	Lemons.		Total Lemons.	Plaice.			Total Plaice.	Dabs.	Witches.		Total Witches.	Megrims.		Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
	L.	S.		L.	M.	S.			L.	S.		L.	S.									
.	·1	1·4	1·5	.	1	.	1	.	6	2	8	64	17·2	81·2	.	56	41·4	.	3	2	.	2269·3
.	.	.	.	.	.	.	.	.	4·2	.	4·2	73	19·2	92·2	.	26	63·4	.	.	2	.	2268·1
	·1	1·4	1·5		1		1		10·2	2	12·2	137	36·4	173·4		82	105		3	4		4537·4
.	.	.	.	.	.	.	.	.	5·8	3·4	9·4	14·4	3	17·4	.	12·4	4·4	1	·6	.	.	711
.	.	.	.	.	.	.	.	.	·4	.	·4	11·2	2·4	13·6	.	7	9	.	.	.	.	400·6
									6·4	3·4	10·	25·6	5·4	31·2		19·4	13·4	1	·6			1111·6
.	½	.	·4	23¼	37¼	1	61·4	9	¼	.	·2	6½	1	7·4	.	25	1·5	10	.	.	¾	277·625
·3	6	.	6·	2·4	9	10	21·4	·6	.	.	.	.	.	.	.	8	1·4	.	3	.	.	73·7
.	1·2	1	2·2	1·4	10	.	11·4	5·	·2	.	·2	2·4	·6	3·2	·1	25	29·4	14	.	.	.	228·7
·3	7·6	1	8·6	27·2	56·2	11	94·4	14·6	·4		·4	9·	1·6	10·6	·1	58	32·5	24	3		·6	580·3
1	1	.	1	2½	16¾	.	19¼	¼	15¾	4	19¾	4½	1	5½	.	9	4·1	.	.	.	2	252·925
.	½	.	·4	52	116	3	171	1	32¾	6½	39·2	40½	11¼	51·6	.	75	32·2	4	34	11½	½	2058·616
.	2	½	2·4	15¾	59	16½	91·2	.	12⅛	¾	12·7	17¾	3¾	21·4	.	16	4⅜	3	1	¼	.	1081·5
.	3·4	·2	3·6	8·2	34·4	.	42·6	·4	10	2	12·	37·2	10·4	47·6	.	16·6	7·4	18·2	8	·4	.	1471·1
.	·4	.	·4	·4	5	.	5·4	.	1	.	1·	22	4·4	26·4	.	14·4	19·8	.	.	.	.	347·6
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	·2	.	·2	.	.	.	.	.	4·4	2·4	7·	3·2	.	3·2	.	4	22	.	.	.	.	109·5
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	4·2	.	4·2	.	·2	.	·2	6	2	8	.	18	11	25	.	.	.	248·3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	·4	.	75·7
1	7·6	·6	8·4	79	235·4	19·4	334	1·6	76·3	15·6	92·1	131·2	33	164·2		158·2	101·1	50·2	43	13	2·4	5646
.	⅞	.	·7	¼	4	¼	4·4	.	4¾	.	4·6	9	3¼	12·2	.	19	28·3	7	.	1	¾	570·6
.	⅞	.	·7	12¾	25	.	37·6	.	61¾	26	87·6	40⅜	10⅜	51·	.	57½	30·7	2	3	10	⅝	2248·53
.	1¼	1	2·2	1	5	.	6·	.	77½	36¼	113·6	63	13	76·	.	51½	40·625	6½	14¾	9	¾	3925·
1	·7	.	·7	3	10·6	.	13·6	1	69·4	22·2	91·6	244·2	66·4	310·6	.	186·6	100	44·4	21·2	2	3	9493*
·1	3·6	.	3·6	1·2	10·6	.	12·	.	48·2	22·2	70·4	128·2	35·	163·2	.	52·6	103	.	28·2	2	.	3976·1
.	.	.	.	1·2	.	.	1·2	.	18·2	9·2	27·4	3·2	1·	4·2	.	3	7·4	.	11	3	.	487·2
.	·2	.	·2	·2	3	.	3·2	.	·4	.	·4	1·2	2·4	3·6	.	12	94	.	.	.	.	209·3
.	.	.	.	6	.	.	·6	.	7·	1·	8·	·2	.	·2	.	.	·4	.	.	.	.	189·2
.	·3	.	·3	·4	1·4	.	2·	.	26·2	8·	34·2	1·6	.	1·6	.	20·2	10·	.	2·	.	.	572·3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	·2	.	·2	.	·6	.	·6	.	7·4	5·2	12·6	·4	.	·4	.	16	27	1	.	2	.	231·4
.	.	.	.	.	·4	.	·4	.	13·	3·4	16·4	1·6	.	1·6	.	12	53·4	.	·2	1	·4	407·2
1·1	8·4	1	9·4	21	61·2	·2	82·4	1	334·2	133·6	468	493·7	131·5	625·4		130·6	495·1	61	80·4	30	5·5	22310·2

* Including 6 cwts. Lythe.

NORTH SEA INVESTIGATIONS—

No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling.	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot.	Halibut.
XII.	1901. Feb.	1	.	$10\frac{3}{4}$	13	23·6	19	3	.	.	$51\frac{1}{2}$	23	$35\frac{1}{2}$	110	12	.	$2\frac{3}{4}$
	April.	2	75	7	8·4	15·4	10	3·4	3	.	66·4	23	13·2	102·6	36	.	1·7
	May.	1	75	10	5	15·	9	6	.	.	25	13·4	18	56·4	18	·3	1·6
		4		27·6	26·4	54·2	38	12·4	3		143	59·4	66·6	269·2	66	·3	6·3
XIII.	Feb.	13	.	225	$45\frac{1}{2}$	270·4	$42\frac{1}{3}$	13	.	.	$351\frac{3}{4}$	$94\frac{3}{4}$	$206\frac{3}{4}$	653·2	$129\frac{1}{4}$	$3\frac{1}{8}$	$2\frac{7}{8}$
	March.	4	.	$37\frac{1}{4}$	$15\frac{3}{4}$	53	$20\frac{1}{2}$	.	.	.	$158\frac{3}{4}$	$45\frac{1}{2}$	50	254·2	$37\frac{3}{4}$	2	$\frac{3}{8}$
	July.	2	134	88·4	.	88·4	.	3	.	.	2·4	1·4	.	4·	·4	.	·4
		19		350·6	61·2	412	62·7	16			513	141·6	256·6	911·4	167·4	5·1	3·6
XIV.	Jan.	13	.	108	90	198	$80\frac{1}{2}$	$22\frac{1}{2}$	.	.	$700\frac{3}{4}$	$125\frac{1}{4}$	$139\frac{1}{2}$	965·4	$151\frac{1}{4}$	$\frac{1}{8}$	$7\frac{1}{4}$
	Feb	38	.	$323\frac{1}{4}$	$263\frac{3}{4}$	587	$374\frac{3}{8}$	71	.	.	$2336\frac{3}{4}$	$678\frac{1}{4}$	903	3918	727	$3\frac{3}{4}$	$22\frac{3}{4}$
	March.	32	.	$303\frac{3}{4}$	$141\frac{3}{4}$	445·4	$243\frac{1}{4}$	$92\frac{1}{2}$	.	.	1948	$611\frac{1}{4}$	$1015\frac{1}{2}$	3574·6	$672\frac{1}{4}$	$1\frac{3}{8}$	13
	April.	6	315	43·2	30·2	73·4	54·4	6	5	.	351·4	103	106·4	561	152	.	7
	May.	4	295	51	36·6	87·6	46·4	33	.	.	172	78·2	98·2	348·4	39	·4	5·3
	June.	14	1210	232	161·	393	88·4	216	13	.	882·4	281·4	415·4	1579·4	246·2	4	13·4
	July.	12	1005	232·4	131·6	364·2	72·4	125	12	.	934·4	224	234·4	1393	133·4	2·3	9·7
	Aug.	6	475	121·4	73·2	194·6	47·4	135	2	.	378	113·6	74·2	566	37	1·6	8·6
	Sept.	5	310	67·	42·2	109·2	34·4	33	1	.	197·4	48·4	71·6	317·6	34·4	·2	5·4
	Oct.	12	780	192·4	109	301·4	120·4	94·4	6	.	828·2	156·	164·	1148·2	125·6	2·6	11
	Nov.	14	1100	174·4	110·4	285·	90·4	93·	3	65·4	1015·2	157·2	305·6	1543·6	247·	1	11·1
	Dec.	10	550	77·2	69·2	146·4	43·4	112	.	19·2	428·2	72·2	180·4	700·2	192·4	·3	9
		166		1926·4	1259·4	3186	1296·5	1033·4	42	84·6	10173·2	2649·2	3709·	16616·2	2758·	18·2	124·1
XV.	Jan.	10	.	$115\frac{3}{4}$	$92\frac{1}{2}$	208·2	$71\frac{7}{8}$	55	.	.	$729\frac{3}{4}$	$165\frac{1}{2}$	$163\frac{1}{4}$	1058·4	138	$1\frac{1}{4}$	$8\frac{1}{4}$
	Feb.	36	.	$343\frac{1}{2}$	$415\frac{1}{2}$	759	$404\frac{5}{8}$	140	.	.	$2418\frac{1}{2}$	660	754	3832·4	$712\frac{1}{8}$*	$3\frac{1}{4}$	$40\frac{5}{8}$
	March.	10	.	$105\frac{1}{4}$	$57\frac{1}{4}$	162·4	$98\frac{3}{4}$	54	.	.	$905\frac{3}{4}$	$250\frac{3}{4}$	$385\frac{3}{4}$	1542·2	$216\frac{1}{2}$	$\frac{1}{2}$	$10\frac{1}{2}$
	April.	5	208	38·2	21·6	60·	49	35·4	.	.	267	94·4	71·4	433·	58	·4	2·5
	May.	17	1325	261·4	174·4	436·	127·	100	10	.	1074·4	292·	314·6	1681·2	285·4	3·2	29·6
	June.	12	915	171·6	119·4	291·2	74	95	5	.	811·6	292·4	449·6	1554·	139·2	1·1	13·4
	July.	3	240	76	46	122	25·4	68	2	.	316·4	62·4	99·4	478·4	42·2	·2	5·1
	Aug.	2	225	53	36·4	89·4	27·4	13	1	.	252	54·4	49·4	356	32	·5	6·
	Sept.	2	190	22	12·2	34·2	19·4	13	2	.	148·4	26	26·6	201·2	60	.	2·
	Oct.	3	270	62·4	42·2	104·6	20·4	25	1	.	217	27·2	38·	282·2	37	.	7·6
	Nov.	13	965	245·4	147·6	393·2	89·	84	3	3	1128	191·6	184·6	1507·4	231·4	.	20·7
	Dec.	12	800	149·2	119·6	269·	64·4	76	5	12·6	846·4	128·4	305·2	1293·	254·4	.	12·2
		125		1614·2	1285·4	2929·6	1071·6	758·4	29	15·6	9115·6	2245·6	2842·6	14220·	2206·5	10·6	159·

* $\frac{1}{8}$ cwt. medium.

TABLE III.

Brill.	Lemons. L.	Lemons. S.	Total Lemons.	Plaice. L.	Plaice. M.	Plaice. S.	Total Plaice.	Dabs.	Witches. L.	Witches. S.	Total Witches.	Megrims. L.	Megrims. S.	Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
.	.	.	.	.	.	.	.	.	12	5	17·	2½	½	3·	.	3	·7	.	¼	.	.	194·5
.	.	.	.	.	.	.	.	.	4·2	1·4	5·6	6	1	7·	.	4	3	·4	1·4	.	.	194·3
.	.	.	.	.	.	.	.	.	4·4	1	5·4	7	4	11·	.	3	4	1	.	.	.	131·1
									20·6	7·4	28·2	15·4	5·4	21·		10	7·7	1·4	1·6			520
2¾	17½	.	17·4	45	143	½	188·4	1½	20¼	5½	25·6	20½	1½	22	.	27¾	8½	3	9¼	10½	1⅛	1432·4583
¼	3½	.	3·4	4¼	13	.	17·2	.	6	2	8·	12	1¼	13·2	.	2½	⅞	1	2½	6	.	423·
2·4	3·6	1·	4·6	4	5	.	9·	1·2	.	.	.	.	.	.	.	2·2	·4	2	2	.	.	120·6
5·4	24·6	1	25·6	53·2	161	·4	214·6	2·6	26·2	7·4	33·6	32·4	2·6	35·2		32·4	9·7	6	13·6	16·4	1·1	1976·2
¾	1	.	1·	¾	1	.	1·6	.	84¼	37¾	122	19½	½	20·	.	29¼	58·5	1	2½	.	3⅜	1665¼
½	4⅞	⅛	5·	6¾	33¾	.	40·4	6¼	201¼	75¾	277	122¼	15¾	138	⅛	84¼	68·5	10	12¾	35½	4¾	6386·7
¼	4⅞	¼	5·1	7	33¼	5½	45·6	3½	120	27½	147·4	169¼	60½	229·6	.	102¼	27	42	26⅛	23	⅝	5696·5
.	·5	.	·5	1·4	2	.	3·4	·6	20·0	8·2	28·2	18·4	6	24·4	.	7·4	6·4	.	3·4	3	.	941·1
.	·6	.	·6	·2	2·4	.	2·6	·4	42·6	7	49·6	39·4	8·6	48·2	.	7	21·4	1	19·	1	.	712·1
.	4	.	4	1·4	4·6	.	6·2	.	140·2	69·6	210·	28·6	3·	31·6	.	18·4	12·4	1	30	1	.	2868·6
.	2·6	.	2·6	3·2	14·4	.	17·6	·4	84·4	53	137·4	10·4	·6	11·2	.	27	16·4	1	15·4	6	.	2348·2
·1	3·	.	3·	1·6	6·4	1	9·2	3·	36·2	18·4	54·6	5·6	.	5·6	·2	10	3·4	2	8·4	1	.	1093·7
.	2·7	·2	3·1	2·6	2·4	.	5·2	.	38·6	18·6	57·4	6·2	1·	7·2	.	18·4	11·	15	1·4	2	.	656·7
.	9·2	.	9·2	8·6	45·2	.	54·	29·2	47·4	23·2	70·6	29·6	6·	35·6	·2	42·	267·	3	1·	6	·3	2318·7
.	3·5	.	3·5	5·	19·4	.	24·4	.	64·2	55·4	119·6	15·6	5·2	21·	.	37·2	271·4	7·2	·2	4	·7	2764·3
.	·7	.	·7	·4	3·2	.	3·6	·6	35·2	19·2	54·4	9·2	2·4	11·6	.	23	82·4	.	.	.	7·2	1388·4
1·5	38·4	·5	39·1	39·6	168·6	6·4	215·	44·4	915·	414·2	1329·2	475·	110·	585·	·5	406·4	846·6	83·2	120·5	82·4	17·2	28841·3
.	2¼	.	2·2	.	1	.	1	1	103¼	36½	139·6	10½	.	10·4	.	16	47·3	.	.	.	2⅝	1761½
.	3⅛	.	3·1	.	¼	.	·2	.	298¼	133½	431·6	94	12	106·	⅛	100¼	59½	3½	11	29	3½	6639·7
.	¼	.	·2	1	¼	.	1·2	8	53	6¾	59·6	18½	5¼	23·6	.	10	3⅜	1	11½	2	⅝	2206·5
·6	1·4	.	1·4	.	·2	.	·2	.	11·2	2·4	13·6	13·2	1·4	14·6	.	15·4	2·4	3	2·2	2	.	694·7
.	4·6	1·2	6·	8·2	3·6	.	12	.	122·	58·4	180·4	31·2	11·	42·2	.	28·6	43	4	45·	16	.	3050·2
.	.	.	.	.	·2	.	·2	.	94·6	49·6	144·4	22·4	5	27·4	.	4·6	14	.	22·4	.	.	2386·5
.	·2	.	·2	·2	.	.	·2	.	27	13	40·	4	.	4	.	2·4	2	.	5	2	.	799·5
.	1·	.	1·	·2	1·	.	1·2	.	20·6	12·4	33·2	5·6	.	5·6	.	3·	1·4	.	2·4	1	.	574·7
.	1·2	.	1·2	.	2·4	.	2·4	.	13·6	6·	19·6	8·2	2·4	10·6	.	17·	6·	.	2·	.	.	391·2
.	·4	.	·4	.	·4	.	·4	.	43·2	21·	64·2	·4	.	·4	.	9·	17·	.	·2	.	.	570·2
.	·5	.	·5	2·4	1·6	.	4·2	.	135·2	45·6	181	14·6	3·2	18	.	60·2	251·	1	7·	·6	.	2854
.	·3	.	·3	·2	·2	.	·4	.	104·6	58·6	163·4	9	.	9	.	24·2	94	.	1·	3·	·1	2270
·6	15·7	1·2	17·1	12·4	11·6		24·2	9	1027·2	444·4	1471·6	232·2	40·4	272·6	·1	291·2	541·2	12·4	110	55·6	6·7	24199·6

NORTH SEA INVESTIGATIONS—

No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling.	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot.	Halibut.
XVI.	1901. March.	2	.	41½	10½	52·	26	25	.	.	200½	39·	34½	274	24	.	1⅜
	April.	6	370	65·6	17·6	83·4	39·4	12·4	.	.	351·6	70·6	113	535·4	72·4	1·2	5·1
	May.	3	200	34·4	12·4	47·	18	34·	2	.	123·4	42·4	33·2	199·2	41·	·1	2·1
	Sept.	1	80	21·	8	29·	2·	20·	.	.	68	18·	13·4	99·4	8	.	2·
	Oct.	1	30	18·2	4	22·2	3·4	.	.	.	29·4	5	2	36·4	5·2	·7	.
	Nov.	8	670	167·	69·6	236·6	64·	63·4	2	1	603·4	165·	84·6	853·2	79·6	·1	4·4
	Dec.	4	280	50·6	28·4	79·2	15·4	.	.	5	335	59	88·4	482·4	48·4	.	2·7
		25		398·6	151	549·6	168·4	155	4	6	1711·6	399·2	369·4	2480·4	279	2·3	18
XVII.	Jan.	3	.	73¼	8¼	81·4	⅚	17½	.	.	3	.	.	3	¼	⅜	⅞
	Feb.	19	.	486	24	510	29⅙	14·5	.	.	111¾	52	129½	293·2	17¼	6⅞	3⅜
	March.	11	.	676	11¼	687·2	14	28	.	.	67¾	25½	46¾	140	7	⅞	2¼
	April	10	720	202	22·2	224·2	33	10	.	.	43·2	21	67·2	131·4	12·2	5·6	2·5
	May	15	1280	244	33·2	277·2	28	27	1	.	138	76·4	281·2	495·6	29·4	10·6	4·2
	June.	8	643	255·2	19·2	274·4	10·4	10	.	.	52	21	76·2	149·2	11	3·1	3·1
	July.	8	640	139·2	40·4	179·6	8·4	1	.	.	44·2	21	26	91·2	3	3·4	2·6
	Aug.	2	100	10·6	7·4	18·2	8·	.	.	.	15·6	9·6	29·4	55	1·4	1·2	.
	Sept.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Oct.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Nov.	2	125	16·4	9	25·4	7·4	2	1	.	45	26·2	89	160·2	19·	1·1	·4
	Dec.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
		78		2103	175·2	2278·2	139·4	109·1	2		520·6	253·	745·4	1519·2	100·6	33·5	19·6
XVIII.	Jan.	14	.	140¼	92	232·2	86·5	17·3	.	.	578	213½	329	1120·4	84½	⅞	8½
	Feb.	39	.	404¼	200¼	604·4	392·7	41	.	.	1746	739¼	1382¼	3867·4	391¾	3⅝	19
	March.	27	.	295	45	340·	151	40·4	.	.	973¾	400	902	2275·6	182½	2⅜	6½
	April.	11	365	88½	12½	101	32	14½	3	.	100¾	49½	154¼	304·4	38¾	2⅛	⅞
	May.	4	420	93	22¼	115·2	85	7	3	.	85	53¼	284¼	422·4	60½	1¼	2½
	June.	19	1365	321·2	172	493·2	134	245	18	.	987¾	432	753¾	2173·4	191¾	6¾	20
	July.	12	1003	259·2	89·6	349	133	156	8	.	569·6	192	290·4	1052·2	84·6	5·2	17·2
	Aug.	19	1470	391·6	132·6	524·4	220·7	206·4	8	.	776·4	380·2	523·2	1680	187	3	46·1
	Sept.	12	860	211·2	67	278·2	140·4	70·4	1	.	392·2	112·	185·6	690	88	·4	18·1
	Oct.	14	975	254·2	134·2	388·4	92·4	145	7	.	706·6	209·4	291·2	1207·4	196·6	1·4	23·1
	Nov.	8	580	134	68·4	202·4	69·4	32·4	4	3·4	434·2	101·2	218·6	757·6	119·4	1·	10·2
	Dec.	19	1095	206·2	116·2	322·4	81·4	47·4	1	4·6	672·2	320·	942·	1939·	264	·4	7·7
		198		2799·	1152·4	3951·4	1619·1	1023·5	53	8·2	8023·	3202·4	6257·	17490·6	1889·6	28·6	180·1

TABLE III.

Brill.	Lemons.		Total Lemons.	Plaice.			Total Plaice.	Dabs.	Witches.		Total Witches.	Megrims.		Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
	L.	S.		L.	M	S.			L.	S.		L.	S.									
.	1½	.	1·4	¾	7	.	7·6	.	3¾	¼	4·	3	¼	3·2	.	5	⅞	.	½	.	.	425¼
.	.	.	.	·4	.	.	·4	.	14·6	4·2	19·	3·6	.	3·6	.	8	3·4	1	4·4	.	.	790·1
.	·4	.	·4	.	·2	.	·2	.	6·4	2·2	8·6	1·2	·6	2·	.	·2	2·	.	4·	.	.	361·2
.	·4	.	·4	.	.	.	.	.	7·	2·4	9·4	·4	.	·4	.	5·	.	.	.	.	.	176·6
.	1·2	.	1·2	·4	1·4	.	2·	.	4·	1·4	5·4	4·2	.	4·2	.	3·	8·4	.	.	.	.	92·7
.	·6	.	·6	·6	2·4	.	3·2	.	60·	14·	74·	1·2	.	1·2	.	13·4	124·4	.	·2	.	.	1521·3
.	·1	.	·1	·4	·2	.	·6	.	30·	6·6	36·6	1·6	.	1·6	.	14·	19	.	.	.	.	706·
	4·5		4·5	3·0	11·4		14·4		126	31·4	157·4	15·6	1·0	16·6		47·6	158·3	1·	9·2			4073·5
⅛	1½	¼	1·6	27	103	¾	130·6	5	21	10	31	2¼	.	2·2	⅛	13	.	2	.	1	1¼	292·4
4⅞	17¾	⅜	18·1	57	200¼	.	257·2	3¼	14¼	6	20·2	25¼	8½	33·6	1⅜	68¼	3·5	1	4½	4	3⅛	1297·7
3⅜	20½	½	21	37½	173	2¼	212·6	1½	3½	.	3·4	11⅛	5½	16·5	⅛	25½	3	4	13¼	.	⅛	1183·5
36·6	69	4	73	24	107·6	·4	132·2	6·4	2·6	·2	3	6·	2·6	8·6	·2	38·4	2	14·2	24·4	2·4	.	761·5
7·3	88	4·6	92·6	23·6	104·6	1·2	129·6	3	4·6	·4	5·2	16·6	9·4	26·2	.	68	10·4	5	55	.	.	1276·3
15·2	62·6	3·6	66·4	14·2	56·6	8	79·	·4	3·2	.	8·2	2·6	2	4·6	·2	40·6	19·4	.	23	.	.	719·2
9·4	41·2	4·6	46	14·2	70·6	.	85·	1·6	·2	.	·2	·4	.	·4	4·	40	94·4	1·4	9·4	.	.	582·2
.	7·	1·2	8·2	1·	5·2	.	6·2	.	1·2	·4	1·6	·4	·6	1·2	.	9	61·4	.	2·	.	.	174·
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	·7	.	·7	.	·2	.	·2	.	1	.	1·	3·6	1·	4·6	.	12	10	.	.	.	.	245·6
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
77·2	308·5	19·5	328·2	198·6	821·6	12·6	1033·2	21·4	57	17·2	74·2	68·7	30·	98·7	6·1	315	204·5	27·6	131·6	7·4	4·4	6533·2
.	⅜	.	·3	.	1¼	.	1·2	.	115½	48	163·4	37	2¾	40	.	33½	36·6	10	2	6	4½	1848·3
¼	1⅛	.	1·1	2	5⅝	1½	9·1	3¾	198¾	80¾	279·4	215¾	64½	280·2	⅜	196½	105·4	28	9	63½	6	6303·1
.	3⅛	.	3·1	2¾	17¾	.	20·4	7½	87½	26	113·4	160	62¾	222·6	⅜	108½	30·7	10½	20½	21	¾	3558·4
3	30⅜	1	31·3	¾	6	.	6·6	.	20¾	8¾	29·4	18½	4¼	23	⅛	19¼	17½	2	6¼	6	.	641·4
.	2¼	.	2·2	½	1¼	.	1·6	.	71¼	26	97·2	108	55	163	.	6	8	.	.	.	.	975·2
.	2⅜	.	2·3	½	.	.	·4	.	161	86¼	247·2	85½	15½	101	.	10	17¼	2	10¾	2	.	3675·3
·1	9·4	·2	9·6	3	8·6	.	11·6	.	88	49·4	137·4	27·6	8	35·6	2	25·4	23·4	.	25	.	.	2076·3
.	24·5	·3	25·	.	5·6	.	5·6	.	146·2	107·2	253·4	68·	13·2	81·2	.	51·4	11·	3	11·6	.	.	3321·6‖
.	16·5	·4	17·1	·6	10·2	.	11·	2	72·4	29·4	102	39·4	10	49·4	·1	68·	39·	.	7	.	.	1583·1¶
.	4·2	·4	4·6	2·2	5·	.	7·2	.	116·	72·6	188·6	24·4	3·4	28	.	53·4	118·4	5·	1·2	9	·6	2497·1
.	1·2	.	1·2	2·	1·	.	3·	.	73·2	33·2	106·4	16·4	5·4	22	.	48	119·4	1·	·2	2	3·	1503·4
.	·6	.	·6	·4	1·4	.	2·	.	136·4	69·2	205·6	52·2	14·	66·2	.	52·4	69·4	2·	1·2	12·2	14·1	3090·2
3·3	96·5	2·5	99·2	15·	64·1	1·4	80·5	13·2	1287·2	637·2	1924·4	853·4	259·2	1112·6	3	672·6	596·7	63·4	95	121·6	29·1	31074·2

‖ Including 3 cwt. Bream. ¶ Including ½ cwt. Bream

NORTH SEA INVESTIGATIONS.—

No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling.	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot.	Halibut.
XIX.	1901. Jan.	47	.	428¾	346¼	775	230½	79½	.	.	2313¾	677	952¾	3943·4	413¼	2	30⅛
	Feb.	9	.	117¾	94	211·6	96⅝	56	.	.	568	183¾	281	1032·6	135¼	¾	6¾
	March.	14	.	215½	51¾	267·2	123¼	72½	.	.	1179½	275¼	481¾	1936·4	216	⅜	14⅜
	April.	5	250	42·4	23·2	65·6	20·4	14·	1	.	150	51·6	132·2	334	51	3·2	·3
	May.	8	845	135·6	91·	226·6	64·	42	13	.	221	92·4	158·	471·4	55·6	1·7	4·5
	June.	8	635	145·4	84·6	230·2	70	95	9	.	463·4	195·4	260·	919·	75·2	1·6	13·3
	July.	3	270	38·4	30·2	68·6	14	24	.	.	274	87	112	473	39	.	7·
	Aug.	1	95	23·	15·4	38·4	6	14	1	.	69	17·4	30	116·4	5	.	2·2
	Sept.	3	310	95·2	29·6	125	24	39	.	.	178·4	34·4	41	254	44·4	·4	5·4
	Oct.	7	585	101·2	39·2	140·4	42·4	33	.	.	674·4	169	119·4	963	116·2	·3	2·2
	Nov.	21	1715	300	172·4	472·4	107	111	4	6·2	1745·6	461	320·4	2533·4	230·6	4·	12·7
	Dec.	12	845	149·6	106·2	256	46	107	1	2·	698·6	215·4	291·2	1207·4	228·4	.	11·6
		138		1793·4	1084·4	2878	844·3	687	29	8·2	8536·2	2460·2	3180	14184·6	1610·4	14·7	111·2
XX.	Feb.	1	.	4	½	4·4	1·7	1	.	.	29	6½	15	50·4	5	.	⅛
	March.	6	.	87	17¼	104·2	99½	25	.	.	726	127½	183	1036·4	50½	½	8⅞
	April.	1	60	7	·2	7·2	3	.	.	.	47	1	5·2	53·2	2	·1	1·2
	May.	2	185	31·4	10	41·4	15·4	46	.	.	132	51	32·	215	32·4	2	10·
	June.	3	185	10	·2	10·2	3	12	.	.	172·4	15	17·4	205	·4	1·5	2
	July.	2	145	44	8·	52·	12	3	.	.	164	23·4	21·2	208·6	·6	2·5	6
	Aug.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Sept.	2	220	39	3·4	42·4	2	1	.	.	231	31	35	297	30·4	·7	1·3
	Oct.	3	270	31·4	5·	36·4	13	6	.	.	62	16·4	20	98·4	30	.	1·1
	Nov.	11	895	149·2	52·6	202	49·4	79	.	2·	877·4	207·6	150·6	1238·	191·4	·2	
	Dec.	3	185	27·	13·4	40·4	14·4	2·4	1	1·4	256·4	76·	87·2	421·2	23	.	2·
		34		430·2	111	541·2	213·7	175·4	1	3·4	2697·4	555·6	567	3823·6	366·2	8·	39·4
XXI.	March.	1	.	23	4½	27·4	24	4	.	.	180½	8	27	215·4	6	.	3
	Oct.	1	70	12	2·2	14·2	3·4	.	.	.	96	16	9·2	121·2	1·4	.	1·4
	Dec.	1	20	3·4	·2	3·6	1	.	.	.	12	2	6·	20·	.	.	·1
		3		38·4	7	45·4	28·4	4			288·4	26	42·2	356·6	7·4		4·5
XXIII.	Jan.	109	.	381¼	229⅞	611·1	202	56·7	.	.	1240¾	639¼	1891¼	3771·2	417⅛	26⅝	9⅜
	Feb.	42	.	229½	93	322·4	68	7·4	.	.	223¾	100	310½	634·2	97	13¾	4⅜
	March.	29	.	154¾	40¾	195·4	20⅝	8·4	.	.	84½	35½	82½	202·4	38¾	10⅞	2¾
	April.	52	1552	271·2	54·6	326	22·4	42·4	.	.	59	36	136	231	62·4	18·1	2·7
	May.	32	1344	137·4	49·	186·4	44·	15·4	.	.	160·2	85	305·2	550·4	51·	14·3	1·7
	June.	2	75	8	3·6	11·6	2·4	2·	.	.	4·4	4	20·4	29·	7·4	·1	·2
	July.	15	1052	163·2	42·4	205·6	66·	7·	.	.	261	114·4	169·2	544·6	23·2	21·	4·
	Aug	21	735	128·2	54·	182·2	48·4	14·	.	.	180·6	99	257·6	537·4	103·2	10·1	1·2
	Sept.	12	389	62·6	34·	96·6	46·	14·4	.	.	147	55·4	213·6	416·2	115·4	12·3	1·1
	Oct.	43	1158	137·2	117·4	254·6	37·	12·	.	.	294·6	116·4	906·6	1318	133½*	7·7	1·7
	Nov.	26	661	110·6	159·6	270·4	25·2	2·	.	.	133	57·2	398·6	589	144·	18·7	·4
	Dec	39	1014	150·4	120·4	271	31·4	8	.	·4	216·4	135·2	572·	924·2	195·2	9·1	·4
		422		1935	999·3	2934·3	613·7	190·3		·4	3005·6	1477·6	5264·2	9748·2	1388·5	163·2	30·6

* ⅝ cwt. medium

TABLE III.

Brill.	Lemons.		Total Lemons.	Plaice.			Total Plaice.	Dabs.	Witches.		Total Witches.	Megrims		Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
	L.	S.		L.	M.	S.			L.	S.		L.	S.									
.	$\frac{5}{8}$	.	.5	.	$\frac{1}{8}$	.	·4	.	$385\frac{7}{8}$	$131\frac{7}{8}$	516·4	$39\frac{1}{8}$	$\frac{1}{8}$	40	.	$80\frac{1}{4}$	41·7	$6\frac{1}{2}$	.	$31\frac{1}{2}$	$6\frac{1}{8}$	6197·575
.	$1\frac{1}{8}$	.	1.1	.	$1\frac{5}{8}$	.	1·5	$1\frac{1}{2}$	112	43	155	45	$12\frac{1}{4}$	57·2	$\frac{1}{8}$	$51\frac{1}{2}$	16·5	1	3	6	$2\frac{5}{8}$	1837·43
.	$1\frac{3}{8}$	.	1 3	2	$2\frac{1}{2}$	.	4·4	1	$44\frac{3}{4}$	$18\frac{3}{4}$	63·4	23	$2\frac{1}{2}$	25·4	.	12	$3\frac{3}{8}$	76	8	2	$\frac{1}{8}$	2827·625
·1	·2	.	·2	.	.	.	. .	.	36	16	52	4·6	·4	5·2	.	4	1·4	1·2	3·4	5	.	562·6
.	2·1	.	2·1	.	1	.	1·	.	131·2	66·4	197·6	38·4	6·0	44·4	..	42	13·4	.	10·	16	.	1206·3
.	1·	.	1·0	1	.	.	1·	.	56·6	27·6	84·4	18·4	4·2	22·6	.	5	5	.	17·	1	.	1550·7
.	.	.	.	.	.	.	.	.	23·6	18·4	42·2	2·6	.	2·6	.	·2	·4	2	.	5	.	678·4
.	.	.	.	.	.	.	.	.	19·	8·	27	3·	.	3·	.	.	.	.	.	.	.	213·
.	6·	.	6.	.	1	.	1·	.	26·	11·	37·	10·	3·2	13·2	.	5·4	5·	2·	·4	1	.	563·6
.	17·4	.	17.4	.	2	.	2·	.	39·4	23·2	62·6	1·2	.	1·2	.	27	22	5	.	1	.	1436·3
.	3·3	.	3·3	1·2	2·2	.	3·4	.	184·6	71·4	256·2	13·4	3·	16·4	.	55·2	212·4	1	1·	7·4	·5	4032·5
.	·3	.	·3	.	·2	.	·2	.	99·4	51·6	151·2	7·6	.	7·6	.	22·6	84·4	2	.	.	6·2	2130·3
·1	33·6		33·6	4·2	11·1		15·3	2·4	1158·4	487·2	1645·6	207·4	32·2	239·6	·1	305·4	406·3	96·6	43	76	15·6	23237·2
.	.	.	.	1	.	.	1·	.	1	.	1·	.	.	.	.	.	.	1	.	.	.	66·
$\frac{3}{8}$	$2\frac{1}{4}$	.	2·2	$2\frac{1}{4}$	$3\frac{1}{2}$	.	5·6	5	$10\frac{3}{4}$	3	13·6	$16\frac{3}{4}$	5	21·6	.	16	$1\frac{1}{2}$	2	$8\frac{1}{2}$	.	.	1416†
·1	.	.	.	.	1·4	.	1·4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	68·4
1·2	1·4	.	1·4	3	12·2	.	15·2	.	2	.	2·	1·4	·4	2·	.	12	7	.	45	.	.	448·4
·1	·6	.	·6	2·6	17·2	.	20·	.	1	.	1·	.	.	.	.	.	1	.	24	.	.	281·2
.	3·	.	3·	·6	14·2	.	15·	.	1·6	.	1·6	.	.	.	.	1	2·4	.	14	.		322·3
.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
.	2·4	.	2·4	1·6	12·4	.	14·2	.	2·4	.	2·4	.	.	.	.	.	.	.	.	.		394·4
.	4·	.	4·	·2	·2	.	·4	.	3·	·6	3·6	·4	.	·4	.	1	1	.	.	.	.	195·7
.	1·6	.	1·6	3·4	9·6	.	13·2	.	48·6	12·2	61·	1·	.	1·	.	39·4	120·4	.	.	.	·2	2004·2
.	.	.	.	·4	1·	.	1·4	.	11·6	2·2	14·	1·	.	1·	.	1·	15	.	.	.	·4	537·6
1·7	15·6		15·6	15·6	72·2		88·	5·	82·4	18·2	100·6	20·6	5·4	26·2		70·4	148·4	3·	91·4		·6	5735·
.	.	.	.	$\frac{3}{4}$	$2\frac{1}{4}$	.	3·	.	$\frac{1}{2}$	.	·4	.	.	.	.	3	.	.	7	.	.	$293\frac{1}{2}$
.	·2	.	·2	2·2	13·4	.	15·6	.	·2	.	·2	.	.	.	.	1	1	.	.	.	.	160·2
.	·2	.	·2	.	2·	.	2·	.	.	.	.	.	.	.	.	2	.	.	.	.	.	9·1
	·4		·4	3·	17·6		20·6		·6		·6					6	1		7			482·7
$1\frac{3}{8}$	$57\frac{7}{8}$	$6\frac{7}{8}$	64·1	$7\frac{3}{8}$	$80\frac{7}{8}$	$10\frac{1}{8}$	97·6	$31\frac{1}{8}$	$101\frac{1}{8}$	$37\frac{7}{8}$	138·3	152	23	175	$1\frac{7}{8}$	147	$27\frac{9}{10}$	$49\frac{1}{4}$	$17\frac{1}{2}$	161	$38\frac{1}{8}$	6044·55
$3\frac{1}{8}$	$43\frac{1}{8}$	$5\frac{1}{2}$	48·5	$5\frac{3}{4}$	$108\frac{1}{4}$	$11\frac{1}{2}$	125·4	10	$19\frac{1}{4}$	$4\frac{1}{4}$	23·4	$36\frac{1}{4}$	$7\frac{1}{4}$	43·4	$1\frac{7}{8}$	73	$9\frac{7}{10}$	$12\frac{1}{4}$	$13\frac{3}{4}$	$42\frac{1}{4}$	6	1560·45
$2\frac{5}{8}$	$34\frac{1}{4}$	$6\frac{5}{8}$	40·7	13	$126\frac{1}{2}$	$17\frac{1}{4}$	156·5	$19\frac{1}{2}$	$13\frac{1}{2}$	3	16·4	17	$4\frac{5}{8}$	21·5	.	$34\frac{1}{4}$	$1\frac{1}{8}$	$22\frac{1}{2}$	$9\frac{1}{4}$	$18\frac{1}{4}$	$\frac{1}{4}$	823
2·7	75·1	13·6	88·7	5·	134·4	20	159·4	25·6	3·2	·4	3·6	4	1	5·	.	34·4	·4	33·6	25·6	22·4	.	1108·2
·4	90·6	8·1	98·7	3·6	60·	3·2	67·	16·2	1·	.	1·	10·4	·2	10·6	·2	31·2	1·	8·2	36·6	20	.	1155·5
.	5·2	·6	6·	·2	2·6	.	·0	1·	1·2	.	1·2	2·6	·6	3·4	.	4	·4	.	4·2	.	.	76·5
1·5	83·4	4·7	88·3	5·6	33·	·4	39·2	2·	4·	.	4	1·2	.	1·2	·1	51·	4·4	4	9·6	12	.	1089·5
·1	59·3	9·6	69·1	1·6	14·	.	15·6	·6	8·3	4·6	13·1	17·4	3·4	21·	.	69·6	9·4	4	7·6	10·6	.	1118·4
2·7	32·	3·6	35·6	2·4	23·2	2·4	28·2	10·	3	.	3·	5·6	·6	6·4	·2	46·4	8·4	9	9·2	6·2	·2	868·7
1·5	63·7	21·4	85·3	2·	46·6	9·4	58·2	40·4	13·2	2·6	16·	22·5	1·1	23·6	·5	56·4	8·4	45·4	3·	33·6	9·4	2148·7
7·1	40	11·	51·	3·2	32·2	4·	39·4	12·2	1·6	·4	2·2	15·1	4·4	19·5	·5	49·6	4·4	19·	1·4	29·	24·	1310·2
2·	45	9·6	54·6	5·2	46·6	2·2	54·2	18·6	20·6	10·5	31·3	25·1	4·4	29·5	·6	34·4	4·4	6·4	3·	36	15·1	1730·6
25·7	630·1	101·5	731·6	55·5	708·2	80·7	844·6	188·2	190·4	63·5	254·1	309·7	51·2	361·1	5·6	632	80·6	214	141·4	391·6	93·2	19035·3

† Including 14 cwts Lythe.

NORTH SEA INVESTIGATIONS—

No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling,	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot	Halibut.
	1901. Feb.	1	.	16	2	18	6·1	14	.	.	77	15	39½	131½	4	1	¼
XXIV.	March.	25	.	321½	37¾	359·2	169	75	.	.	1457¼	408¼	1077¼	2942·6	239¼	4¾	12¾
	April.	1	40	8	3	11·	7	3	1	.	14·4	7	13·4	35	3·4	.	·6
	July.	8	422	148·2	20·2	168·4	42·4	14	.	.	254·4	75·6	116·4	446·6	23·	16·4	2·5
	Aug.	3	190	36·4	9·	45·4	19·4	3·4	.	.	97	30·2	32·2	159·4	10	1·6	·6
	Sept.	2	240	17·	8·	25	8·	.	.	.	87·4	50·4	44·	182·	8·4	·2	3·1
	Oct.	18	1285	220·6	100	320·6	88·4	29·4	.	.	902·	289·6	546·2	1738	214·2	7·2	7·4
	Nov.	4	191	61·	29·4	90·4	13·4	18·	.	.	133	43·4	107·2	283·6	26·	2·4	1·
	Dec.	1	85	18	12	30	3	·4	.	.	55	24·2	79	158·2	10	.	·4
		63		847	221·4	1068·4	357·1	157·4	1		3077·	944·2	2055·4	6076·6	533·4	34	29·2
XXV.	March.	2	.	62	8	70	54⅛	21	.	.	422	57½	58	537·4	7½	1½	6¼
	May.	4	330	91·6	11·4	103·2	13	39	1	.	166·6	37	34·6	238·4	9·6	3·4	8·1
	June.	2	200	25	2·4	27·4	4	5·4	.	.	160·	40·4	47·4	248·	1·4	3·2	1·4
	July.	4	300	23·6	3	26·6	4	1·4	.	.	265·6	45·4	61·4	372·6	14·	5·5	4
	Aug.	1	80	19	6·	25·	10·4	1·	1	.	63·	21·	14·	98·	20	·1	2·1
	Sept.	2	180	15·2	6·6	22·	1·4	2·4	.	.	149·4	35	29	213·4	47·4	·2	1·1
	Oct.	9	745	142·	34·6	176·6	21·	10·4	.	.	716·	134·6	101·4	952·2	119·4	·6	5·5
		24		378·6	72·4	451·2	108·1	81	2		1943	371·2	346·2	2660·4	219·6	15·	28·6
XXVI.	July.	1	80	8·4	1·2	9·6	2	2	.	.	54	7	5	66	.	1·1	3·2
	Nov.	2	200	27·2	3·	30·2	8·	10	.	.	226	24·2	37	287·2	16	·2	·6
		3	280	35·6	4·2	40	10	12			280	31·2	42	353·2	16	1·3	4·
XXVIII.	Jan.	5	.	12¾	14¼	27·	½	.	.	.	9½	4½	9¾	23·6	3¾	2⅛	⅜
	Feb.	8	.	48¼	39¾	88·	3	.	.	.	12	5	6¾	23·6	4¾	2⅛	½
	March.	7	.	25½	7½	33·	1⅛	.	.	.	4	¼	5¼	9·4	3¾	2	⅛
	May.	3	113	11	12·6	23·6	·4	·4	.	.	5·4	4·4	12·	22·	·4	·3	·1
	June.	1	10	3·4	3	6·4	3·	·4	.	.	2·4	3	22·4	28·	3·	.	.
	July.	3	62	28·4	27·6	56·2	1·	.	.	.	22·2	7·	14	43·2	1·6	1·6	.
	Aug.	3	21	5·4	12·	17·4	.	.	.	.	11·2	4·4	20·2	36·	2·	·2	.
	Sept.	1	18	1·4	5·2	6·6	·4	.	.	.	38	12	9	59·	6·	.	·3
	Oct.	1	8	·6	2·	2·6	.	.	.	.	1	.	4	5·	.	·2	.
	Nov.	1	50	15·	15	30·	.	.	.	.	7	3	10	20·	.	1·4	·1
	Dec.	2	44	14·4	15	29·4	.	.	.	.	8·2	2·4	8·6	19·4	·2	1·4	.
		35		166·6	154·2	321	9·5	1·0			121·2	46·2	122·2	289·6	25·6	11·7	1·5

TABLE III.

Brill.	Lemons. L.	Lemons. S.	Total Lemons.	Plaice. L.	Plaice. M.	Plaice. S.	Total Plaice.	Dabs.	Witches. L.	Witches. S.	Total Witches.	Megrims L.	Megrims S.	Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
.	1¼	.	1¼	.	.	.	.	.	½	.	½	¼	.	¼	.	3	.	.	¼	2	.	182·1
.	8⅞	.	8·7	.	.	.	.	42¾	116¼	43	159·2	85¼	10¾	96·	.	95½	4¼	9	8¼	29¼	2	4257·7
.	.	.	.	.	.	.	.	.	9	3	12·	5	2	7·	.	6	1	.	.	4	.	92·2
.	59·4	·3	59·7	2·4	14·6	.	17·2	.	6	.	6·	.	.	.	.	19	1·4	.	11·4	4	.	833
.	9·4	.	9·4	·4	8·4	.	9·	.	1	.	1·	·4	.	·4	.	10·2	.	.	2·4	.	.	7 2
.	36·2	.	36·2	·2	2·4	.	2·6	.	.	.	.	.	.	.	.	26	.	.	.	.	.	291·7
.	76·6	·6	77·4	1·2	13·2	.	14·4	.	16·6	2·2	19·	5·4	1·	6·4	.	79·4	14·4	1	2·6	.	1·2	2622·2
.	6·4	1·	7·4	·6	1·	.	1·6	1·	14·6	11·2	26·	4·6	1·	5·6	.	30	4·4	1	·6	4	3·2	520·6
.	·4	.	.	.	.	.	.	.	4	.	4	.	.	.	.	1	.	.	1·4	.	1·4	210·6
	199·1	2·1	200·6	5·2	40		45·2	43·6	168·2	59·4	227·6	101·2	14·6	116·		270·2	25·6	11	27·	43·2	8·0	9101·2
1¼	⅝	.	·5	¼	6¼	.	6·4	.	2½	.	2·4	½	.	·4	.	8	.	.	8½	.	.	725¾
·5	6	.	6·	2·2	23	.	25·2	.	8·4	1·4	10·	2·2	1	3·2	.	5·4	3·4	.	28	.	.	498·2
.	2·4	.	2·4	3·	16·4	·4	20·	.	2·	.	2·		.	.	.	1·	·4	.	16	.	.	333·2
.	7·4	.	7·4	3·2	28·	·6	32·	.	·2	.	·2	.	.	.	·2	.	.	.	5	.	.	473·5
.	1·	.	1·	2	1·	.	1·2	.	5·4	2·2	7·6	2	2	4·2	.	.	·4	.	·2	.	.	172·6
.	2·	.	2·	·6	4·2	.	5·	.	3·4	.	3·4	.	.	.	.	2	.	·4	.	.	.	301·3
.	21·6	·3	22·1	4·	7·6	.	11·6	.	6·	·2	6·2	1·	.	1·	.	3·4	.	.	1·	.	.	1329·
1·7	41·3	·3	41·6	13·6	86·6	1·2	101·6		28·2	4·	32·2	6·	3	9·	·2	20	4·4	·4	58·6			3834
·1	·6	.	·6	·4	12·4	.	13·	.	.	.	.	.	.	.	.	.	·4	.	13	.	.	111·4
.	·6	.	·6	2·	13·6	.	15·6	.	·6	.	·6	.	.	.	.	9	4·	.	.	.	.	382·6
·1	1·4		1·4	2·4	26·2		28·6		·6		·6					9	4·4		13			494·2
¾	6¼	1½	7·6	.	17¾	1	18·6	¾	.	.	.	.	.	.	.	2¼	.	.	.	3	½	91·25
2¼	18¼	3	21·2	1¼	33	2	36·2	3	¼	.	·2	2⅛	.	2·1	½	6½	.	.	6¼	8	⅞	209·625
2¼	6	1⅜	7·3	3¾	34¾	1½	40·	¼	.	.	.	¼	.	·2	.	.	.	.	½	½	.	100·75
·4	5	1·4	6·4	1	8·4	2·2	11·6	3·4	.	.	.	·6	.	·6	.	1·2	.	3	6·4	.	.	81·4
.	2	·2	2·2	.	·2	.	·2	.	.	.	.	2·4	·4	3·0	.	·2	.	.	.	·4	.	47·2
·3	4	1·2	5·2	·2	2·	.	2·2	.	.	.	.	.	.	.	·1	·4	.	.	.	.	.	112·4
.	2·4	·5	3·1	.	1·3	.	1·3	·2	.	.	.	·2	.	·2	.	·4	.	.	.	1	.	62·2
.	.	.	.	.	.	.	.	.	3·2	2·4	5·6	·2	.	·2	.	.	.	.	.	.	.	78·5
.	·4	.	·4	.	·6	.	·6	·2	.	.	.	.	.	.	.	·2	.	.	.	.	·2	10·
2	3·	·4	3·4	·4	4·2	.	4·6	·4	.	.	.	.	.	.	.	2·	.	2	.	4·	2·2	70·7
1·2	3·2	·4	3·6	·4	6·2	.	6·6	·4	.	.	.	.	.	.	.	1·	.	·2	·2	4·	1·	69·4
7·5	50·6	10·4	61·2	7·2	108·7	6·6	122 7	9·	3·4	2·4	6·0	6·1	·4	6·5	·5	14·4		5·2	13·4	21	4·7	934·1

NORTH SEA INVESTIGATIONS—

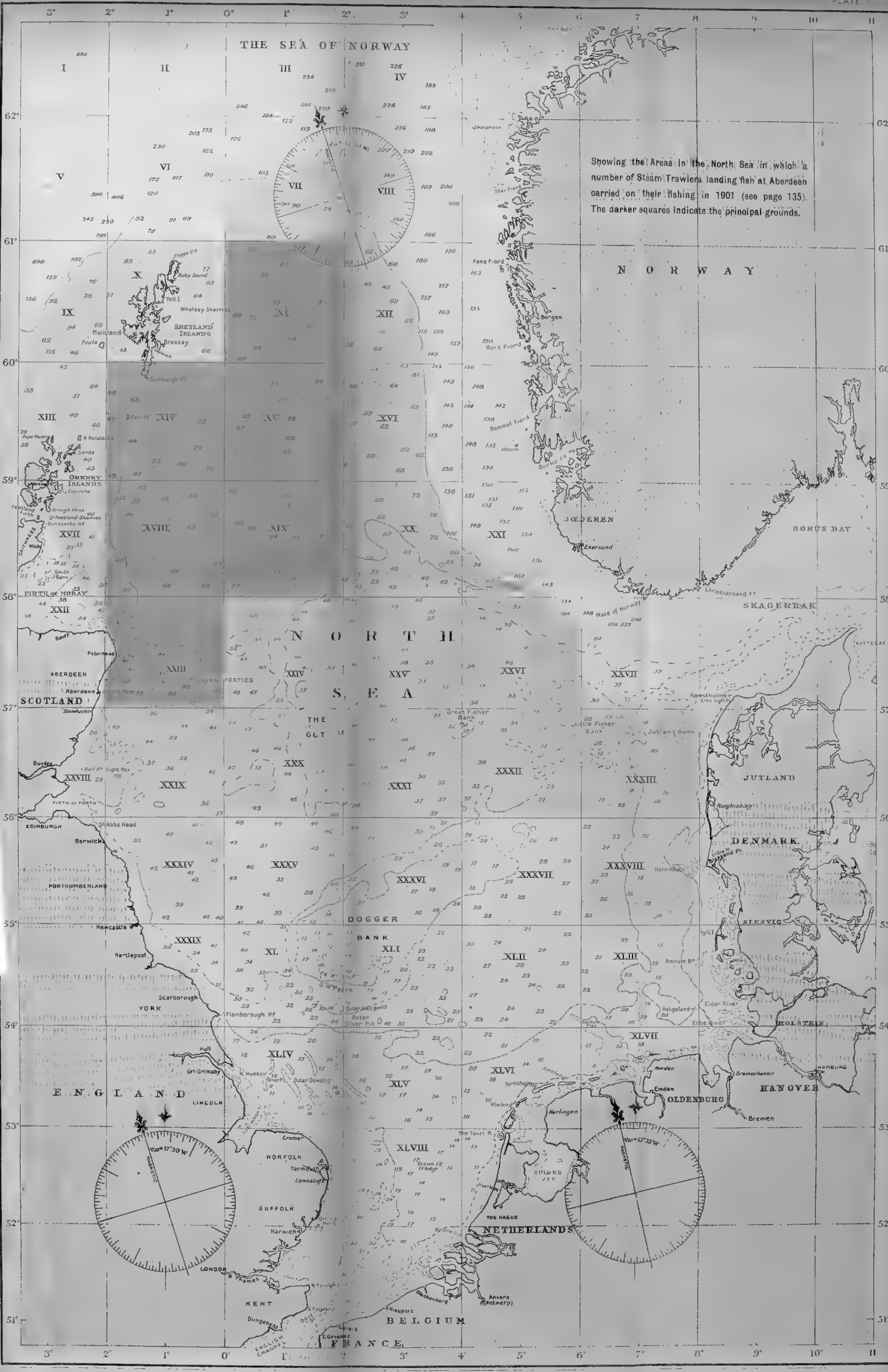
No.	Date.	No. of Landings.	No. of Hours Fishing.	Cod.	Codling.	Total Cod.	Ling.	Saithe.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. M.	Haddock. S.	Total Haddocks.	Whiting.	Turbot.	Halibut.
XXIX.	1901. Feb.	4	.	11½	6¼	17·6	⅔	.	.	.	5½	3¾	6½	15·6	4¼	1	.
	March.	5	.	32¼	8½	40·6	⅝	.	.	.	6	2	2¼	10·2	4½	3¾	.
	April.	13	539	114	21·2	135·2	14·4	7·4	.	.	24·6	14·4	42·4	81·6	27·4	15·3	·5
	May.	15	769	66·2	20·6	87·	14·	12	.	.	186	68·2	153·2	407·4	22·6	18·2	1·
	June.	29	1153	118·4	50·2	168·6	26·4	8·4	.	.	227·6	105·	194·4	527·2	23·4	22·1	2·1
	July.	37	1832	258·2	90·6	349·	34·	22	.	.	557·6	208·4	277·6	1044·	32·2	31·7	4·3
	Aug.	43	1882	179·2	104·4	283·6	43·	16·4	.	.	654·	303·6	534·4	1492·2	130·	21·6	3·1
	Sept.	28	946	94·6	79·2	174·	21·	2·	.	.	334·4	157·2	557·6	1049·4	80	14·1	2·2
	Oct.	25	1175	114·6	92·2	207·	26·4	2·	.	.	428·6	159·4	816·6	1405·	109·6	10·1	3·2
	Nov.	21	795	59·4	82·2	141·6	7·4	3·	.	·2	125·2	61	567	753·2	105·	15	.
	Dec.	2	36	3·2	5·4	8·6	2·	3	.	.	6·	3	21·4	30·4	7	·2	.
		222		1052·2	561·4	1613·6	190·2	76·4		·2	2556·2	1086·4	3174·2	6817·	546·4	153·5	16·6
XXX.	Aug.	1	75	9·4	1·2	10·6	.	1·	.	.	19·4	10	17	46·4	3	·4	·3
	Sept.	4	350	81·	29·4	110·4	23·4	11	.	.	174·6	48·2	146·	369·	56·4	1·1	1·3
	Oct.	3	275	82·6	50·	132·6	25	9·	.	.	183·	35	61·4	279·4	38·4	.	1·7
	Dec.	1	30	11·2	6	17·2	2·	.	.	.	15·4	7·	33	55·4	2·	.	·5
		9		184·4	86·6	271·2	50·4	21			392·6	100·2	257·4	750·4	100	1·5	4·2
XXXI.	May.	5	535	84	32	116	14	9	1	.	150·4	32·6	58·4	241·6	18·2	3·1	4·7
	Aug.	1	60	39·2	8	47·2	1	8	.	.	67	7·2	4	78·2	4	·3	·2
	Oct.	3	240	88·4	16	104·4	13·4	7·	.	.	350·4	50·4	36·4	437·4	78	.	1·1
	Nov.	1	120	13	3·4	16·4	4·	·4	.	.	50·4	13·4	42·	106	32	·1	·4
		10	955	224·6	59·4	282·2	32·4	24·4	1		618·4	104	141	863·4	132·2	3·5	6·6
XXXII.	May.	3	315	54·6	20·4	75·2	24	46	1	.	177·6	37·4	42·4	257·6	22·4	2·5	6·4
	June.	4	370	42·	8·6	50·6	14	6	.	.	298·4	49·	49·4	397	.	3·1	5·6
	July.	10	930	145·4	18·	163·4	33·4	10	.	.	755·	131	124·6	1010·6	38	8·4	16·6
	Aug.	5	455	63·4	40·6	104·2	7·4	16·4	.	.	265	51	46	362·	17·6	2·	3·2
	Sept.	5	435	37·2	22·4	59·6	5	2·	.	.	322·2	93	89·4	504·6	124·2	2·3	1·1
	Oct.	5	540	104·	41·2	145·2	17·4	11	.	.	467·4	74 4	121·2	663·2	92·	·4	2·2
		32		447	151·6	598·6	101·4	91·4	1		2286	436	473·4	3195·4	294·4	19·1	35·5
XXXIII.	June.	1	65	3·4	.	3·4	1	·4	.	.	116	24	23	163	2	·3	·1
XXXIV.	Sept.	2	144	12·2	14·4	26·6	1·4	2·	.	.	98·	19	59·4	176·4	11·4	·5	·1
	Oct.	1	60	7·4	9·	16·4	5·4	.	.	.	33·4	9·4	42·	85	1·	·1	·1
		3		19·6	23·4	43·2	7·	2·			131·4	28·4	101·4	261·4	12·4	·6	·2
XXXVI.	Oct.	1	80	40·4	7	47·4	2·4	2	.	.	33·4	6·4	15	55	4·4	·4	.
XXXVIII	Dec.	1	20	10·6	.	10·6	.	.	.	.	18	.	.	18	4·4	4·	.
XLI.	Aug.	1	120	12·4	14·	26·4	1·4	2·	.	.	25·6	13	17·4	56.2	2	·4	·2
XLV.	April.	1	60	5·4	2	7·4	1	·4	.	.	8·6	3·6	12·4	25	.	·2	.

TABLE LII.

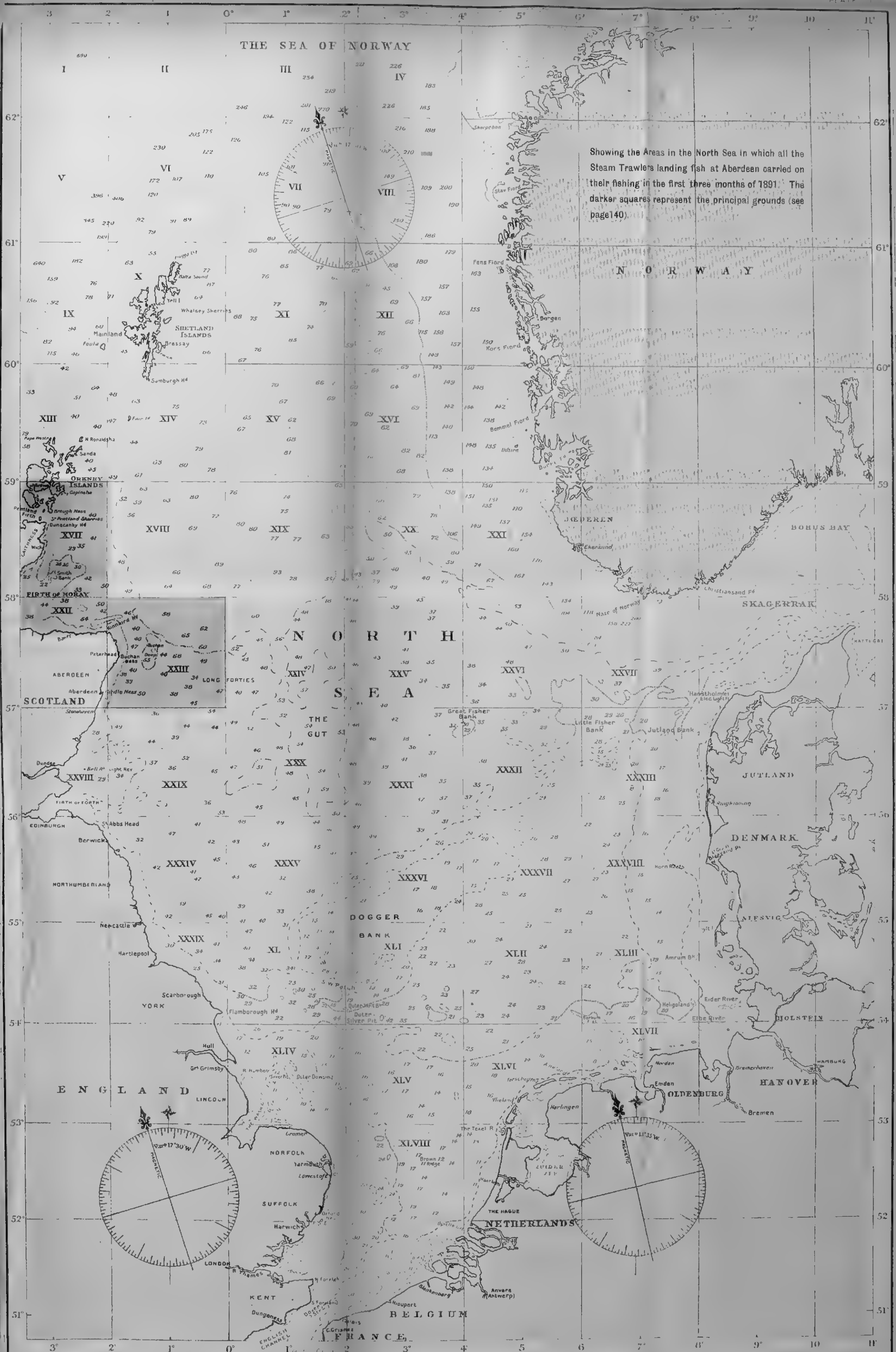
Brill.	Lemons. L.	Lemons. S.	Total Lemons.	Plaice. L.	Plaice. M.	Plaice. S.	Total Plaice.	Dabs.	Witches. L.	Witches. S.	Total Witches.	Megrims. L.	Megrims. S.	Total Megrims.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Total.
.	4	5/8	4·5	1	3¼	.	4·2	¼	¼	.	·2	1¼	.	1·2	.	3	.	1½	.	4	1	59·541
1	7½	2	9·4	3	28	13	44·	1¼	.	.	.	¼	.	·2	.	2¼	.	4¼	4½	5	.	131·87
·1	30·2	1·6	32·	1	26·2	·2	27·4	1·4	2	.	2·	2	.	2·	·2	6	·2	11·6	14·6	14	.	394·5
.	59·6	1·4	61·2	1·4	26·	.	27·4	1·4	1·2	·4	1·6	3·2	1·	4·2	.	9·2	2·4	1·	22	18	.	711·4
·1	100·4	2·	102·4	5	67	.	72·2	.	·6	.	·6	6	1·	7·	·1	10	11	.	27·6	26·4	2	1038·6
·2	184·4	1·6	186·2	6·2	95	.	101·2	.	3·	.	3·	.	.	.	·1	6·	2·4	7·6	20·2	23·2	.	1868·1
.	166·	3·3	169·3	8·7	92·4	.	101·3	·4	2·4	.	2·4	·6	.	·6	·6	21	2	18·4	11·4	21	.	2339·5
·3	93·6	5	98·6	3·5	66·	.	69·5	2·4	·2	.	·2	1·6	.	1·6	.	14	1	33·4	4·6	19·	.	1590·3*
·1	70·2	3·6	74·	2·1	40·	·2	42·3	13·6	·6	.	·6	4·6	1·2	6·	·2	45·4	11	26·	2·6	21·6	10·6	2018·5
.	37	3·1	40·1	1·	38·2	1·2	40·4	13·2	·4	.	·4	4·6	.	4·6	·4	28·	4	35	1·	21·6	11·3	1226·4
.	2·	·4	2·4	.	·4	.	·4	1·6	.	.	.	1·	.	1·	.	1·2	.	.	·4	.	·6	56·6
2·	755·4	25·3	780·7	33·5	482·6	14·6	531·1	36·2	11·2	·4	11·6	25·6	3·2	29·	2·0	146 2	34·2	139·2	109·6	174·2	25·7	11436·2
.	2·	.	2·	·2	1	.	1·2	.	·2	.	·2	.	.	.	.	.	.	.	.	.	.	65·5
.	25	.	25·	·6	5	.	5·6	.	3·	·2	3·2	.	.	.	.	2	1	·4	·4	.	.	611
.	10	.	10·	2·	5·4	.	7·4	.	4·6	.	4·6	.	.	.	.	3·2	.	1·	·4	.	.	513·4
.	4	.	·4	.	.	.	.	.	2·	.	2·	.	.	.	.	.	.	.	.	.	·2	80·1
	37·4		37·4	3·0	11·4		14·4		10·	·2	10·2					5·2	1	1·4	1·0		·2	1270·2
·2	11·6	4	12 2	1	16	.	17·	.	13·	1·2	14·2	·2	.	.	.	10	4	.	41	8	.	515
.	1·4	.	1·4	.	6	.	6·	.	1	.	1·	.	.	.	.	.	.	.	.	.	.	147·7
.	10·2	.	10·2	.	2·4	.	2·4	.	3·6	.	3·6	.	.	.	.	.	1	.	1	.	.	660·1
.	2·4	.	2·4	·4	·4	.	1·	.	3·	·2	3·2	.	.	.	.	2·	3	.	.	.	.	171·3
·2	26	·4	26·4	1·4	25		26·4		20·6	1·4	22·2	·2		·2		12	8		42	8		1494·3
4·3	2·4	.	2·4	·2	20·6	.	21·	.	17·4	.	17·4	2·4	.	2·4	.	12	2·4	.	35	2	.	535
.	3	.	3·	3·6	28·4	.	32·2	.	5	2·3	7·2	2·	.	2·	.	2	2·	.	27·2	1	.	553·3
.	10·4	.	10·4	11·2	69·6	·6	81·6	.	6·6	.	6·6	.	.	.	.	8	5	.	54·4	.	.	1447·4
·2	10·	·2	10·2	4·4	14·4	5·4	24·4	.	5·4	.	5·4	1·4	.	1·4	.	2·4	4	.	7·2	.	.	565·4
.	12·2	.	12·2	2·	8·6	.	10·6	.	4·6	.	4·6	.	.	.	.	8·	.	3	·4	.	.	738·3
.	12	·1	12·1	3·6	34·	·2	28·	.	11·	3·	14·	2·6	1·	3·6	.	15·6	2·4	13·4	.	.	.	1021·3
4·5	50·2	·3	50·5	25·4	166·2	6·4	198·2		50·4	5·2	55·6	8·6	1·	9·6		48·2	12·4	16·4	124·4	3		4861·1
.	1·2	.	1·2	1·2	6·4	.	7·6	.	.	.	.	.	.	.	.	.	·4	.	2	.	.	182
·1	11·2	·4	11·6	·2	3	.	3·2	.	·4	.	·4	.	.	.	.	1	.	.	.	.	.	235·5
.	3·4	.	3·4	.	1	.	1·	.	.	.	.	.	.	.	.	·4	·4	.	·2	1	·3	115·2
·1	14·6	·4	15·2	·2	4		4·2		·4		·4					1·4	·4		·2	1	·2	350·7
.	2·2	.	2·2	.	2	.	2	.	2·4	.	2·4	1	.	1	.	6	.	.	.	.	.	125·6
·2	* †	.	.	·2	8·	2·4	10·6	.	.	.	.	.	.	.	.	7	.	.	.	.	.	57·3
.	1	.	1	1·4	3·	.	1·7	.	.	.	.	..	.	.	.	3·	.	.	.	.	.	97·4
.	·4	.	·4	.	·6	.	·6	.	·2	.	·2	·4	.	·4	.	·4	.	1	2	1	.	40·6

* Including 2 cwts. of Lythe. † 2 Black Sole. ‡ 1 Lemon Sole.

No.	Date.	No. of Landings.	Cod.	Codling.	Total Cod.	Ling.	Tusk.	Haddock. E.L.	Haddock. L.	Haddock. S.	Total Haddocks.	Whiting. L.	Whiting. S.	Total Whiting.	Turbot.
XIII.	1891. Feb.	1	13	1	14	3	.	.	27	.	27	.	.	.	1
XVII.	Jan.	50	267	97	364	30	.	.	1139	315½	1454½	7	1	8	34
	Feb.	78	545	152	697	62	.	.	3276	890	4166	24	4	28	45½
	March.	71	1159	66	1225	.	.	.	4218	1315	5533	15½	.	15½	30
		199	1971	315	2286	92	.	.	8633	2520½	11,153½	46½	5	51½	109½
XXII.	Jan.	14	92	20	112	10	.	.	264	140	404	37	2	39	5
	Feb.	13	99	34	133	13	.	.	351	194	545	18	2	20	6
	March.	69	982	58	1040	11	.	.	5300	1534	6834	38	.	38	15
		96	1173	112	1285	34	.	.	5915	1868	7783	93	4	97	26
XXIII.	Jan.	188	259½	332	591½	19	.	.	1500	603	2103	118	17	135	90
	Feb.	77	166	130½	296½	16	.	.	1403½	450½	1854	46	7	53	136¼
	March.	64	286	95	381	6	.	.	1723	489	2212	18	.	18	39½
		329	711½	557½	1269	41	.	.	4626½	1542½	6169	182	24	206	265¾
XXIV.	March.	3	73	5	78	3	.	.	344	55	399	.	.	.	1
XXV.	Jan.	1	3	9	12	.	.	.	112	9	121	2	.	2	.
	Feb.	6	50	30	80	2	.	.	762	101	863	2	.	2	.
		7	53	39	92	2	.	.	874	110	984	4	.	4	.
XXVIII	Jan.	8	6	15	21	.	.	.	51	28	79	4	.	4	3¾
	Feb.	2	2	3	5	.	.	.	9	3	12	1	.	1	1
	March.	2	14	4	18	.	.	.	5	18	23	.	.	.	1½
		12	22	22	44	.	.	.	65	49	114	5	.	5	6¼
XXIX.	Jan.	32	44½	61	105½	4½	.	.	322	134½	456½	7	5	12	20¾
	Feb.	66	112	108½	220½	3	.	.	576½	413½	990	52	9	61	52¼
	March.	3	9	4	13	.	.	.	35	14	49	.	.	.	1½
		101	165½	173½	339	7½	.	.	933½	562	1495½	59	14	73	74½
XXX.	Jan.	1	9	6	15	3	.	.	36	13	49	2	.	2	½
XXXI.	Jan	1	9	.	9	2	.	.	16	6	22	1	.	1	.
	Feb.	3	33	5	38	2	.	.	277	55	332	.	.	.	2
		4	42	5	47	4	.	.	293	61	354	1	.	1	2
XXXII.	Feb.	1	3	3	6	2	.	.	107	9	116	.	.	.	.
XXXIV	Jan.	2	12	7	19	1	.	.	46	25	71	7	.	7	.
	Feb.	2	5	9	14	1	.	.	27	11	38	1	.	1	1
		4	17	16	33	2	.	.	73	36	109	8	.	8	1
XXXVI	Feb.	1	5	2	7	1	.	.	31	5	36	.	.	.	1
	March.	1	9	2	11	7	.	.	58	1	59	.	.	.	1
		2	14	4	18	8	.	.	89	6	95	.	.	.	2


THE SEA OF NORWAY
Showing the Areas in the North Sea in which a number of Steam Trawlers landing fish at Aberdeen carried on their fishing in 1901 (see page 135). The darker squares indicate the principal grounds.
NORWAY
NORTH SEA
SKAGERRAK
BOHUS BAY
JÆDEREN
SHETLAND ISLANDS
ORKNEY ISLANDS
FIRTH OF MORAY
ABERDEEN
SCOTLAND
THE GUT
DOGGER BANK
JUTLAND
DENMARK
SLESVIG
HOLSTEIN
HANOVER
OLDENBURG
NETHERLANDS
BELGIUM
FRANCE
ENGLAND
NORFOLK
SUFFOLK
KENT
LINCOLN
YORK
NORTHUMBERLAND
EDINBURGH
ENGLISH CHANNEL

		2	14	4	18	8	.	.	89	6	95	.	.	.		



THE SEA OF NORWAY
Showing the Areas in the North Sea in which all the Steam Trawlers landing fish at Aberdeen carried on their fishing in the first three months of 1891. The darker squares represent the principal grounds (see page 140).
NORWAY
NORTH SEA
SCOTLAND
ENGLAND
DENMARK
JUTLAND
NETHERLANDS
BELGIUM
FRANCE
HANOVER
OLDENBURG
HOLSTEIN
SHETLAND ISLANDS
ORKNEY ISLANDS
FIRTH of MORAY
SKAGERRAK
BOHUS BAY
JÆDEREN
DOGGER BANK
THE GUT
LONG FORTIES
Great Fisher Bank
Little Fisher Bank
Jutland Bank
ABERDEEN
Aberdeen
Peterhead
Bergen
Christiansand
Edinburgh
Berwick
Newcastle
Hartlepool
Scarborough
YORK
Hull
LINCOLN
NORFOLK
SUFFOLK
KENT
LONDON
Harwich
Heligoland
Hamburg
Bremen
THE HAGUE
Anvers (Antwerp)
Flamborough Hd

PLATE II

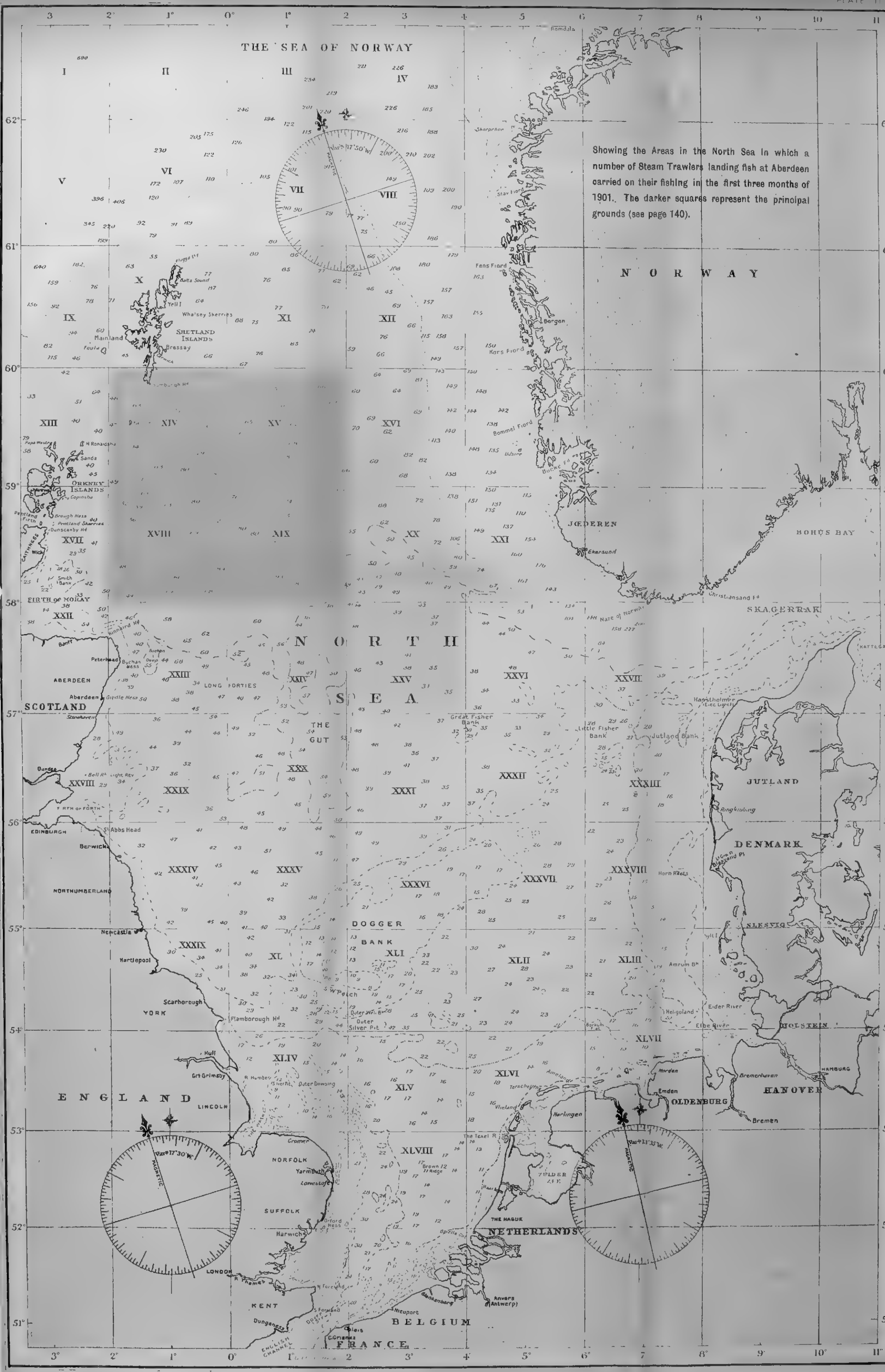

Showing the Areas in the North Sea in which a number of Steam Trawlers landing fish at Aberdeen carried on their fishing in the first three months of 1901. The darker squares represent the principal grounds (see page 140).
THE SEA OF NORWAY
NORWAY
NORTH SEA
SHETLAND ISLANDS
ORKNEY ISLANDS
FIRTH of MORAY
SCOTLAND
ABERDEEN
NORTHUMBERLAND
ENGLAND
YORK
LINCOLN
NORFOLK
SUFFOLK
KENT
LONDON
JUTLAND
DENMARK
SLESVIG
HOLSTEIN
HANOVER
OLDENBURG
NETHERLANDS
BELGIUM
FRANCE
SKAGERRAK
KATTEGAT
BOHUS BAY
JÆDEREN
DOGGER BANK
LONG FORTIES
THE GUT
Great Fisher Bank
Little Fisher Bank
Jutland Bank
ENGLISH CHANNEL
Bergen
Christiansand
Hamburg
Bremen
Emden
Antwerp
Peterhead
Aberdeen
Edinburgh
Berwick
Newcastle
Hartlepool
Scarborough
Flamborough Hd
Hull
Gt Grimsby
Cromer
Yarmouth
Lowestoft
Harwich
Dungeness
Calais
Nieuport
Heligoland
Elbe River
Eider River
Ringkiobing
Horn Reefs
The Texel
THE HAGUE
ZUIDER ZEE
Dundee
Banff
Wick
Stav Fiord
Fens Fiord
Kors Fiord
Bommel Fiord
Ekersund
Naze of Norway
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
XIII
XIV
XV
XVI
XVII
XVIII
XIX
XX
XXI
XXII
XXIII
XXIV
XXV
XXVI
XXVII
XXVIII
XXIX
XXX
XXXI
XXXII
XXXIII
XXXIV
XXXV
XXXVI
XXXVII
XXXVIII
XXXIX
XL
XLI
XLII
XLIII
XLIV
XLV
XLVI
XLVII
XLVIII
MAGNETIC
Var. 17°50' W.
Var. 17°30' W.
Var. 13°55' W.

TABLE III.

Halibut.	Brill.	*Lemons.		*Plaice.			Dabs.	Witches.		Total Witches.	Eels.	Skate.	Hake.	Gurnard.	Cat-fish.	Monks.	Squid.	Others.	Total.
		L.	S.	L.	M.	S.		L.	S.										
.	.	.	.	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	61
.	10½	84¼	.	1461	.	.	.	120	21	141	1	55	5	.	.	.	.	7	3655¼
.	8	209½	.	2995	.	.	.	223	34	257	.	216	.	.	.	.	.	.	8684
.	.	163	.	1181	.	.	.	59	6	65	.	179	.	.	.	.	.	56	8447½
.	18½	456¾	.	5637	.	.	.	402	61	463	1	450	5	.	.	.	.	63	20,786¾
1	.	25	.	83½	.	.	.	166	24	190	.	14	.	.	.	.	.	.	883½
.	½	61	.	38	.	.	.	225	56	281	.	28	.	.	.	.	.	.	1125½
.	.	56½	.	137	.	.	.	190	53	243	.	147	.	.	.	.	.	.	8521½
1	½	142½	.	258½	.	.	.	581	133	714	.	189	.	.	.	.		.	10,530½
.	3	348½	.	813¼	.	.	.	42	3	45	.	22	1	.	.	.	.	21	4192¼
.	4½	321¾	.	554½	.	.	.	29	3	32	.	133½	.	.	.	.	.	.	3401¾
.	.	163	.	127	.	.	.	17	2	19	.	108	.	.	.	.	.	24	3097½
.	7½	832¾	.	1494½	.	.	.	88	8	96	.	263½	1	.	.	.	.	45	10,691½
.	.	9	.	17	.	.	.	.	.	.	.	5	.	.	.	.	.	12	524
.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	137
.	.	6	.	106	.	.	.	.	.	.	.	5	.	.	.	.	.	.	1064
.	.	6	.	108	.	.	.	.	.	.	.	5	.	.	.	.	.	.	1201
.	.	6½	.	74½	.	.	.	.	.	.	.	9	.	.	.	.	.	.	197¾
.	.	.	.	16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	35
.	.	15½	.	4	.	.	.	.	.	.	.	4	.	.	.	.	.	.	66
.	.	22	.	94½	.	.	.	.	.	.	.	13	.	.	.	.	.	.	298¾
1	.	76½	.	260¼	.	.	.	6	.	6	.	2	1	.	.	.	.	7	953
.	.	151¼	.	1089½	.	.	.	.	.	.	.	137½	.	.	.	.	.	2	2707
.	.	4½	.	2	.	.	.	.	.	.	.	7	.	.	.	.	.	3	80
1	.	232¼	.	1351¾	.	.	.	6	.	6	.	146½	1	.	.	.	.	12	3740
.	.	1½	.	.	.	.	.	2	.	2	.	.	.	.	.	.	.	.	73
.	.	2	.	10½	.	.	.	11	3	.	.	.	.	.	.	.	.	.	60½
.	.	2	.	75	.	.	.	.	.	.	.	2	.	.	.	.	.	.	453
.	.	4	.	85½	.	.	.	11	3	14	.	2	.	.	.	.	.	.	513½
1	½	.	.	48	.	.	.	.	.	.	.	.	.	.	.	.	.	.	173½
.	.	4	.	13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	115
.	.	3	.	12	.	.	.	.	.	.	.	7	.	.	.	.	.	.	77
.	.	7	.	25	.	.	.	.	.	.	.	7	.	.	.	.	.	.	192
.	.	1½	.	54	.	.	.	.	.	.	.	.	.	.	.	.	.	.	100½
.	.	.	.	2	.	.	.	1	.	.	.	2	.	.	.	.	.	.	83
.	.	1½	.	56	.	.	.	1	.	1	.	2	.	.	.	.	.	.	183½

* All classified together.

III.—A COMPARISON BETWEEN THE COD (*Gadus callarias*, Linn.), THE SAITHE (*Gadus virens*, Linn.), AND THE LYTHE (*Gadus pollachius*, Linn.), IN RESPECT TO CERTAIN EXTERNAL AND OSTEOLOGICAL CHARACTERS. By H. Chas. Williamson, M.A., D.Sc.

(Plates IV. XI.)

INTRODUCTION.

This research has been undertaken as part of a review of the species of the Cod family. That a revision of the Gadidæ is required is patent to anyone who has had to deal with some of the rarer forms. The re-examination of the different species was not in the first place undertaken with a present expectation that a reconstruction of the classification may be required, but rather with the view of finding a certain number, as few as possible, of external characters which would suffice for ready discrimination.

While for the mere diagnosis of species the gauging of the external characters would suffice, the study of the osteology, of which these characters are the external expression, follows as a natural sequence. The osteological part of the paper has been limited to the bones of the head.

No general deductions are made in this paper regarding the classification, since these would only result when similar data regarding the other Gadid species are available.

The fishes examined were obtained from the following sources. Most of the cod and saithe were procured from the Aberdeen Fish Market; one or two specimens of each were captured in the salmon-nets in the Bay of Nigg. Some of the lythe, which is a comparatively rare fish, were obtained from the two sources of supply mentioned above. Several were got by Dr. Fulton, during his trawling experiments off the coast of Aberdeenshire, and in the Moray Firth; two from St. Andrews were furnished by Professor M'Intosh, while a considerable number were sent from Girvan (Firth of Clyde) by Mr. R. Duthie, Fishery Officer.

External Characters.

In the selection of the external characters by which the species are to be compared, the observer has an absolute freedom. Certain characters demand immediate attention by their prominence as distinguishing marks between species. But, at a rule, any and all measurements are of value as tests either of agreement or of difference.

A proportion of the fishes upon which the measurements of the external characters were made were immature specimens.

Owing to the small number of fishes included in this investigation the measurements have not been treated by the Biometric method. The three forms have been compared by means of the averages of the characters.

The following external characters have been adopted :—

I. Girth, at three points, viz.—

(1) *Pectoral*, just behind bases of ventral fins.
(2) At anus.
(3) At root of tail.

II. Dorso-Ventral Height, at three points, the same as those selected for the girth measurement.

III. *L. Fins.* Length of Paired Fins.—

(1) *Ventr.* Length of ventral fin, measuring from the bases of the fin-rays to the tip of the longest ray.

(2) *Pect.* Length of the pectoral fin, measuring from the base of the first fin-ray to the hind edge of the fin.

IV. Greatest Height or Breadth of Unpaired Fins.

V Tail Rami—

(1) *l. dorsal.* Length of the dorsal ramus of tail, measuring from the base of the most anterior caudal rays to the tip of the dorsal ramus.

(2) *l. ventral.* Ditto of ventral ramus.

(3) *Spread*, or the greatest breadth (dorso-ventral measurement) of the tail. For this purpose the tail is not spread out to its fullest extent, but is simply allowed to drop on to the measuring-board.

VI. Eye. Horizontal diameter and vertical diameter, as measured from one edge of the orbit to the other.

VII. Interorbital Space.

VIII. Fin-rays—

1 D, *2 D*, *3 D*. The number of fin-rays in the first, second, and third dorsal fins.

1 A, *2 A*. The number of fin-rays in the rst and second anal fins.

IX. Vertebræ. The number of vertebræ.

The following characters, x.–xxi. inclusive, have been recorded as projections on the lateral axis. The lateral axis is a line drawn from the most anterior point of the fish to the middle of the tail fin.

X. *l.* Snout.—The length of the snout, viz., from the tip of the premaxilla to the anterior border of the orbit.

The remaining characters are all measured from the most anterior point in the fish, *i.e.*, in the Cod the tip of the premaxilla, and in the Saithe and Lythe the tip of the mandible.

XI. Projection of Mandible.—Distance between the tip of mandible and the tip of premaxilla.

XII. Eye.—Distance from the most anterior point of the fish to the anterior border of the orbit.

XIII. Ventr. *f.*—Distance from anterior point to the base of outer fin-rays.

XIV. Op. cl.—Distance from anterior point to the top of the opercular cleft.

XV. Pect. *f.*—Distance from anterior point to the base of top ray of the pectoral fin.

XVI. Anus.—Distance from anterior point to the anterior border of anus.

XVII. 1 d, 2 d, 3 d.—Distance from anterior point to the beginning . . . . and end of base of the first, &c., dorsal fins.

XVIII. 1 a, 2 a.—Distance from anterior point to the beginning . . . . and end of the first and second anal fins.

XIX. Base of Tail.—Distance from anterior point to the beginning of the tail fin—*d* dorsal edge, *v* ventral edge.

XX. Rami of Tail.—Distance from anterior point to the dorsal (*d*) and ventral (*v*) tips of the rami of tail.

XXI. Lateral Line.—*Beginning of Bend.* Distance from anterior point to the level where the lateral line begins to turn upwards.

In addition to the foregoing the following two vertical measurements were made in connection with the course of the *lateral line*:—

XXII. (1) *Ht. Bend at Anus.* (2) *Ht. Bend at P. f.*—Height of the bend above the line of the straight caudal portion of the lateral line, (1) at the level of the anus, (2) at the level of the base of the pectoral fin.

Measuring Board.

A board similar to that used in the research on the Mackerel (*Eighteenth Annual Report of the Fishery Board*, pp. 295 and 297) was employed in the present case.

The measurements have been made in centimetres. The equivalents in the English standard may be readily got from the following examples:—

2·5 cm. = 1 inch : 15 cm. = 6 inches : 30 cm. = 1 foot.
45 cm. = 1 foot 6 inches : 75 cm. = 2 feet 6 inches : 100 cm. = 3 feet 3 inches.

Conversion of the Measurements into Percentages.

The measurements were converted into percentages of one standard length, viz., the total length of the fish. The total length of the fish is the distance from the most anterior point (viz., in the cod the tip of the premaxilla, in the saithe and lythe the tip of the mandible) to the extremity of the middle ray of the tail. The middle rays of the tail do not project directly backwards, but are inclined a little downwards. The dimensions represented as percentages of this standard are given in Tables I. (Cod), II. (Saithe), III. (Lythe).

[Table.

TABLE IA.—COD (*Gadus callarias*), ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Length —*cm.*	Sex	Girth.			Dorso-Ventral Ht.			L. Fins.		Greatest Ht.—Unpaired Fins.					Tail—Rami.			Eye.		Inter-orbital Space.	*l.* Snout.
			Pect.	At Anus.	Tail.	Pect.	At Anus.	Tail.	Ventr.	Pect.	1 D.	2 D.	3 D.	1 A.	2 A.	*l.* Dorsal.	*l.* Ventral.	Spread.	Horiz. Diam.	Vertic. Diam.		
1 (2) .	45	♀	52·6	48·6	14·4	18·4	18·1	5·3	11·3	13·5	8·2	6·2	6·7	.	.	17·1	18·2	14	4·1	4·1	.	7·5
2 (1) .	55	♂	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
3 (8) .	82·7	♂	48·3	44·5	12·7	17·5	16·4	4·5	10·3	11·2	8·3	7·2	7·4	6·8	6·4	16·5	15·3	14·5	3·8	3	.	8·6
5 (3) .	85·4	♂	.	.	.	.	.	.	10·2	13·6	9·1	7·7	8·3	8·3	8·3	16	16	17·4	4·2	3·9	.	8·8
6 (6) .	89·5	♀	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3·4	3·1	.	8
7 (10) .	92·7	♀	.	.	.	.	.	.	.	.	.	.	.	.	.	17·3	17	14·2	3·9	3·7	5·9	8·3
8 (9) .	93·9	♂	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4·2	3·7	5·5	8·5
9 (11) .	95·2	♂	.	.	.	.	.	.	10·3	13·2	.	.	.	.	.	16·4	17·3	16·7	4·1	3·7	5·9	8·2
10 (7) .	102	♂	50·9	47·2	13·3	.	.	.	9·9	11·6	8·4	5·8	6·8	7·4	7·4	16·3	16·8	16·1	3·3	3·2	.	8·9
11 (4) .	103·5	♀	54·4	50·2	13	21·6	19·9	4·4	10·1	12·4	8·1	6·4	7·3	7·6	6·9	17·1	17·5	14·6	3·6	3·3	.	8·4
Average, .	**84·4**		**51·5**	**47·6**	**13·3**	**19·2**	**18·1**	**4·7**	**10·3**	**12·6**	**8·4**	**6·7**	**7·3**	**7·5**	**7·2**	**16·7**	**16·9**	**15·3**	**3·8**	**3·5**	**5·8**	**8·3**
Variants, .	.		4	4	4	3	3	3	6	6	5	5	5	4	4	7	7	7	9	9	3	9

TABLE IB.—COD (*Gadus callarias*) ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Distance from Tip of PREMAXILLA.													Lateral Line.)			d. Tip of pmx. to Tip of Mandible,
	Ventr. f.	Op. cl.	Pect. f.	Anus.	1 D.	2 D.	3 D.	1 A.	2 A.	Base of Tail.		Rami of Tail.		Beginning of Bend.	Ht. Bend at Anus.	Ht. Be n at Pf.	
										d.	v.	d. Tip.	v. Tip.				
1	24·6	24	26	43·9	28·6 – 42·8	44·8 – 64·6	66·6 – 80·4	45·9 – 64·8	67 – 79·7	82·4	81·9	99	100·3	60·8	4·4	5·3	.
2	.	.	.	44·3	.	.	.	.	.	.	.	.	.	.	.	.	.
3	24·1	24·7	27·2	45·8	29 – 43·1	44·3 – 64·3	65·8 – 78·9	47·4 – 64·6	68·2 – 80·3	82·3	83·3	97·3	97·2	64·8	5·2	7·7	.
5	22·1	26·1	28·4	47·3	30·2 – 42·9	45 – 64·6	66·4 – 81·7	49·5 – 66·1	68·8 – 81·5	83·8	84·2	98·5	98·7	58·5	2·8	4·1	.
6	22·3	23·7	26·3	46·5	29·2 – 42·6	44·6 – 64·3	66 – 80·8	47·9 – 66	67·9 – 80·1	83·2	82·9	98·7	99·3	57·7	3·3	5·7	.
7	23·2	25·5	27·8	46·2	30·1 – 44·1	45·8 – 63·5	65·9 – 79·7	48·1 – 65	68·4 – 79·4	81·7	82·3	97·4	98·3	62·1	3·9	5·9	.
8	23·5	26·3	28·6	45·9	30·9 – 44	45·3 – 65·3	67·2 – 80·2	47·9 – 66	69 – 79·6	82·8	83	98·6	98·4	59·5	3·5	5·9	1·2
9	22·3	25·6	27·7	45·1	30·1 – 43	44·7 – 66·2	68·3 – 81·2	47·7 – 65·9	69·4 – 80·8	83·5	83·4	98·7	99·7	63	5·7	8·2	·5
10	24·3	25·5	27·8	47·3	29·7 – 42	44 – 65·7	67·5 – 81·5	49·4 – 67·6	69·7 – 81·1	84·3	83·6	99·4	99·7	57·8	2·7	4·9	.
11	23·7	24·3	27·1	47·2	30·9 – 44·2	45·6 – 64·9	66·9 – 81·5	48·5 – 66·1	69 – 81·7	84	83·8	100	100·5	63	4·3	6·1	·8
Avg.	**23·3**	**25·1**	**27·4**	**45·9**	**29·8 – 43·2**	**44·9 – 64·8**	**66·7 – 80·6**	**48 – 65·8**	**68·6 – 80·4**	**83·1**	**83·1**	**98·6**	**99·1**	**60·8**	**4**	**6**	**·8**
Var.	9	9	9	10	9	9	9	9	9	9	9	9	9	9	9	9	3

TABLE IIA.—SAITHE (*Gadus virens*), ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Length. —*cm.*	Sex	Girth.			Dorso-Ventral Ht.			L. Fins.		Greatest Ht.—Unpaired Fins.					Tail—Rami.			Eye.		Inter-orbital Space.	*l.* Snout.
			Pect.	At Anus.	Tail.	Pect.	At Anus.	Tail.	Ventr.	Pect.	1 D.	D.	3 D.	1 A.	2 A.	*l.* Dorsal.	*l.* Ventral.	Spread.	H riz. D m.	Vertic. Diam.		
2 (7) .	15	?	48·6	47·3	15·3	18·6	19·3	6	8·6	13·3	6	5	4	5·3	4	19·3	19·3	17·6	6	.	.	.
6 (8) .	16·5	♂	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5·4	.	.	.
7 (2) .	43·2	♀	48·5	49·9	14·3	.	21·9	4·8	6·9	11·5	7·8	7·8	5·1	7·8	5·1	.	.	19·2	.	.	.	.
8 (1) .	49·5	?	46	47·3	13·7	.	.	.	7·9	11·9	.	.	.	.	.	.	.	.	.	.	.	.
9 (5) .	54·1	♀	47·8	54·1	14·7	18·2	22·1	5	6·2	11·6	6·2	5·9	5	6·6	3·9	18·6	17·7	15·4	3·7	.	.	6·6
10 (4) .	56·8	♂	48·7	54·4	15	17·8	21·8	5·3	6·2	11·6	6·2	6·9	4·9	6·6	4·2	18·1	17·1	15·5	3·9	.	.	6·9
11 (3) .	58·4	♀	47·2	48·4	13·8	18·1	20	4·8	7·3	12·4	6·3	5·5	3·4	6·8	3·8	19·3	18·1	17·4	3·9	.	.	.
12 (21) .	87·5	♀	45·6	48·7	13·6	18·1	19·8	4·3	7·1	11·5	.	.	.	.	.	19·6	18·7	14·8	3·5	3·7	5·5	7·4
13 (13) .	88·4	♀	47	51·6	12·9	17·7	20·3	4·6	6·5	11·3	.	.	3·9	6·3	4·3	18·7	18·5	17·1	3·6	3·7	.	6·3
14 (14) .	88·5	♂	49·3	55·1	13·7	19·3	22·6	4·5	7·3	11·6	5·5	5·4	4	6·4	3·6	18·5	18·4	16·8	3·7	3·8	.	6·8
15 (20) .	88·9	♂	43·9	47·3	12·8	18·1	19·5	4·2	7·7	11·8	.		.	.	.	18·8	18·5	16·2	3·5	3·7	5·9	7
16 (16) .	91·1	♂	49·4	56·7	13·7	18·5	21·7	4·4	6·7	11	.	.	.	.	.	17	17·3	14·2	3·9	4	.	6·2
17 (15) .	91·3	♂	44	50·8	13·2	17·8	20·7	4·5	6·2	10·9	4·6	4·5	.	4·7	.	17·6	16·6	16·4	3·5	3·6	.	7·3
18 (19) .	98·2	♂	.	.	.	.	.	.	5·8	11·3	.	.	.	.	.	.	.	.	3·4	3·3	.	7·1
19 (17) .	98·6	♂	50·7	56	13·8	.	.	.	7·2	12·4	.	.	.	.	.	.	.	.	3·5	3·7	.	6·7
20 (18) .	98·7	♂	.	.	.	16·7	19	4·5	5·7	11	.	.	.	.	.	18·1	17·8	14·3	3·3	3·4	.	7·4
Average,	**70·3**		**47·4**	**51·3**	**13·8**	**18·1**	**20·7**	**4·7**	**6·9**	**11·7**	**6·1**	**5·8**	**4·3**	**6·3**	**4·1**	**18·5**	**18**	**16·2**	**3·9**	**3·6**	**5·7**	**6·9**
Variants, .	16		13	13	13	11	12	12	15	15	7	7	7	8	7	11	11	12	14	9	2	11

Table IIb.—Saithe (*Gadus virens*), ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Distance from Tip of Mandible.														(Lateral Line.)			Projection of Mand.
	Eye.	Ventr. f.	Op. cl.	Pect. f.	Anus.	1 D.	2 D.	3 D.	1 A.	2 A.	Base of Tail.		Rami of Tail.		Beginning of Bend.	Ht. Bend at Anus.	Ht. Bend at Pf.	
											d.	v.	d. Tip.	v. Tip.				
2	6·7	23·3	23·3	25·3	36·6	31·3 – 41·3	43·3 – 64·6	67·9 – 81·2	39·3 – 65·3	67·3 – 80·6	84·6	84·6	102·6	103·2	47·9	2	2·7	.
7	.	23·1	22·9	24·7	37·6	32·3 – 43·2	45·5 – 67·2	69·1 – 82·2	40·6 – 67·7	69·1 – 81·5	.	.	103·4	102·1	67	.	5·5	.
8	.	22·2	23	25·2	38·6	31·5 – 42·4	44·6 – 66·2	70·1 – 82·2	41 – 61·2	70·3 – 82·6	.	.	.	.	.	.	.	.
9	7·5	22·1	22·6	23·9	37·3	30·4 – 42·7	44·7 – 65·9	67·9 – 81·9	39·4 – 68·6	70·1 – 82·2	85·4	85·6	103	103	61·8	3·1	4·8	·9
10	7·5	21·8	23	24·8	36·4	31 – 43·3	45·8 – 67·9	69 – 82·5	39·6 – 68·3	70 – 82·5	86·2	86·6	103·7	103·5	59·5	3·2	5	·6
11	8·4	22·9	23·8	25·5	38·3	31·1 – 42·7	45 – 67·2	69·6 – 82·8	40·7 – 67·4	70·3 – 82·8	86·2	86·2	103·8	103·6	64·5	3·8	5·6	.
12	8	22·9	24	25·5	39·8	32·3 – 43·7	45·8 – 67·8	70·3 – 83·4	42·4 – 69·5	70·7 – 82·6	86·9	87	105·2	104·3	74·7	3·2	4·6	·6
13	6·7	21·2	22·4	23·8	39·5	31 – 42·8	45·9 – 70·4	72·8 – 85·1	42·5 – 70·4	73 – 84·6	88·1	88·4	105·3	106·4	73·4	4 5	5·2	·4
14	7·2	21·3	23	24·2	38·9	30·8 – 43·7	46·1 – 68·5	71·4 – 83·7	41·5 – 68·4	71 – 84	86·8	87·1	104·6	104·4	72·8	5·6	5·6	·4
15	7·5	22·1	23·1	.	39·4	30·5 – 42·1	44·6 – 68·2	69·9 – 84·2	42·2 – 68	70·6 – 83·8	87·1	87·4	104·6	104·9	68·4	4·2	5·7	·5
16	6·7	21·9	22·7	23·5	39·8	30·7 – 43·4	46·5 – 68·7	72·6 – 85·4	42·3 – 70·3	72·4 – 85·4	87·6	87·5	103·6	104·2	74·3	4·6	5	·5
17	7·9	21·8	23·4	24·8	39·7	30 – 43·6	46·3 – 67·6	71·2 – 84·4	42·1 – 69·2	71·3 – 84·7	87·5	87·7	104·1	103·1	70·6	3·7	5	·6
18	7·6	.	22·9	24·9	.	31·6 – 42·9	45·1 – 68·5	70·9 – 84·2	42·1 – 70·2	71·9 – 84·3	86·9	86·5	104·7	104·4	66·1	4·1	5·5	·5
19	7·6	22·5	23·1	23·9	42·4	31·4 – 42·8	45·5 – 72·3	72·6 – 85·3	44·8 – 70·2	71·3 – 85·3	87·9	87·9	104	103·7	74·4	3·7	4·4	·9
20	8·1	22·6	23·5	25·2	38·7	32·2 – 43·8	45·8 – 69·7	70·9 – 85	41·2 – 68·6	72 – 85	87·6	87·5	105	104·6	66·1	2·9	4·7	·7
Avg.	**7·5**	**22·3**	**23·1**	**24·6**	**38·8**	**31·2 – 43**	**45·4 – 68**	**70·4 – 83·6**	**41·4 – 68·2**	**70·7 – 83·5**	**86·8**	**86·9**	**104·1**	**103·9**	**67·7**	**3·7**	**5·7**	**·6**
Var.	13	14	15	14	14	15	15	15	15	15	13	13	14	14	14	13	14	11

TABLE IIIA.—LYTHE (*Gadus pollachius*), ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Length —*cm.*	Sex.	Girth.			Dorso-Ventral Ht.			L. Fins.		Greatest Ht.—Unpaired Fins.					Tail—Rami.			Eye.		Inter-orbital Space.	*l.* Snout.
			Pect.	At Anus.	Tail.	Pect.	At Anus.	Tail.	Ventr.	Pect.	1 D.	2 D.	3 D.	1 A.	2 A.	*l.* Dorsal.	*l.* Ventral.	Spread.	Horiz. Diam.	Vertic. Diam.		
3 (28) .	23·5	?	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5·7	6·2	.	.
4 (29) .	23·5	♀	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5·1	5·9	.	.
5 (5) .	25·6	?	46·3	50·5	15·5	17·5	19·8	5·8	6·2	13·2	5·2	5·8]	3·9	7	4·7	17·5	18·9	13·2	5·8	.	.	7·6
6 (3) .	25·7	?	48·6	49·8	14·8	19·1	20·2	5·6	5·4	13·2	5	4·7	2·7	7	3·5	18·5	18·5	12	6·6	.	.	7
7 (1) .	26	?	45·7	51·1	16·1	18	20·7	5·8	6·1	13·4	.	5·6	4·4	8·1	5·2	20·2	18·4	11·9	6·1	.	.	7·7
8 (2) .	26	♀	44·2	49·1	15	16·9	19·2	5·8	5·4	12·7	5·8	5·4	4	5·4	4	17·7	17·7	13·4	5·8	.	.	7·9
9 (25) .	26·3	♂	50·8	57·2	15·2	18·9	23·9	5·7	6·6	13·3	5·3	4·2	3·8	6·1	4·2	18·9	19·7	15·9	4·5	5·7	.	8·7
10 (6) .	27·5	?	47·2	49·4	14·9	18·9	20	5·4	4·7	13·8	5·4	5·8	5·3	6·2	5·4	19·6	19·6	.	.	.	.	.
11 (4) .	27·8	♀	51·3	52·4	16·1	19·7	20·8	6·3	5·9	13·7	6·6	5·9	4·7	7·5	5·2	19·4	18·7	12·9	5·7	.	.	7·7
12 (21) .	30·6	♂	50·5	54·4	15·3	19·6	22·8	6·2	6·2	14·7	6·8	4·6	2·9	6·2	3·9	18·9	19·9	17·6	5·4	5·9	.	7·5
13 (23) .	31	?	45·1	47·3	14·8	17·7	20·3	5·5	5·8	13·2	9	8·4	6·8	8·7	5·8	17·4	16·7	12·2	5·3	5·8	.	8
14 (27) .	31·7	♀	46·3	49·4	15·1	18·6	21·1	5·3	6·1	13·2	8·5	7·9	5·7	9·8	6	17·9	18·6	13·4	5·3	6·3	.	7·1
15 (13) .	36·1	♀	47·1	54·6	16·1	19·9	22·7	5·9	6·2	13·4	5·8	5·5	3·9	6·6	4·3	18	18	.	5	.	.	7·1
16 (40) .	39·8	♀	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4·8	5·3	4·8	.
17 (26) .	42	♀	46·2	52·4	15·5	19·7	22·1	5·9	5·2	12·8	8·3	6·4	5·6	7·8	5·9	17·6	18·1	14·5	5	5·5	.	7·2
18 (9) .	43·7	♀	49	52	16	19·6	20·1	6·4	5	13·3	5·7	5	4·1	3·8	4·3	19·4	19·4	15·3	4·9	5·6	.	6·9
19 (33) .	47·6	♀	44·9	46·6	14·6	17·8	19·4	5·4	5·5	12·7	6·5	5·7	5·7	7·9	5·5	17·8	18·5	.	5	5	.	7·9
20 (22) .	50	♀	46	48	15·8	17·8	19·6	5·6	5·8	13·2	7·5	7·2	5·6	8	5·6	18·4	17·3	15	4·8	5·3	.	.
21 (7) .	50·5	♂	46·1	51·1	15	18·4	21·4	5·7	5·3	12·3	6·1	5·9	4·7	7·9	4·9	16·8	17·8	13·1	4·6	4·5	.	7·3
22 (11) .	51·1	♂	42·9	45·4	14·6	17·3	19·7	5·6	5·3	13·1	7·2	6	4·1	6·8	4·9	17·9	17	16	4·5	4·7	.	7·9

TABLE IIIA.—LYTHE—*continued.*

No.	Length —*cm.*	Sex.	Girth. Pect.	Girth. At Anus.	Girth. Tail.	Dorso-Ventral Ht. Pect.	Dorso-Ventral Ht. At Anus.	Dorso-Ventral Ht. Tail.	L. Fins. Ventr.	L. Fins. Pect.	Greatest Ht.—Unpaired Fins. 1 D.	2 D.	3 D.	1 A.	2 A.	Tail—Rami. *l.* Dorsal.	*l.* Ventral.	Spread.	Eye. Horiz. Diam.	Eye. Vertic. Diam.	Inter-orbital. Space.	*l.* Snout.
23 (15) .	56·5	♀	49·8	52·4	15·3	19·9	21·6	5·6	5·1	12·3	5·1	4·7	3·7	7·2	5	17·1	16·5	12·8	4·7	5·3	.	8
24 (8) .	62	♀	45·1	47·5	14·6	17·7	19·5	5·3	5·5	12·1	5·1	4·4	4	4·7	4	17·1	16·7	10·5	4·5	5·1	.	.
25 (12) .	62·8	♀	43·7	48·5	14	17	19·4	5·2	4·8	11·8	6·8	6·4	4·8	7·8	5·2	16·4	16·2	11·1	4·4	4·8	.	7·5
26 (20) .	68·1	♀	.	.	.	.	.	.	5·5	12·3	6·6	6·6	4·1	8·2	6	17·2	17·1	17·9	4·2	4·5	.	7·9
27 (31) .	69·6	♂	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	8·1
28 (17) .	71·1	♀	50·7	56·4	15·8	19·3	22·8	5·8	5·6	11·9	7·1	6·6	5·7	7·6	5·6	16·8	16·3	17·2	4·2	4·6	.	7·5
29 (41) .	71·4	♂	51·8	59·3	15·4	20·6	24·3	5·6	5·3	12·4	.	.	5·6	7·5	5·6	17·4	16·9	14·7	4	4·3	4·9	7·4
30 (39) .	73	♂	51	56·6	.	20	22·8	5·2	5·2	11·7	7·2	6·1	4·9	7·1	5·2	17·9	17·4	16	3·9	4·5	5	7·5
31 (36) .	76·4	♀	.	.	.	.	.	.	4·6	11·6	.	.	.	.	.	16·2	15·7	15·7	3·9	4·3	4·9	7·3
32 (19) .	77	♂	46·8	51·6	15·1	19·5	22·2	5·5	5·2	12·5	6·4	·1	5·2	8	5·3	17	17	13·1	4·5	4·8	.	7·6
33 (18) .	78·2	♀	50·9	55·5	15·9	19·4	22·9	5·6	5·6	12·3	6·8	6·6	5·2	8·6	5·1	18	18	17·4	3·9	4·9	.	8
34 (34) .	78·4	♀	.	.	.	.	.	.	4·8	11·4	.	.	.	.	.	16·9	16·6	15	3·9	4·4	5·2	7·5
35 (35) .	78·5	♀	.	.	.	.	.	.	4·2	11·4	.	.	.	.	.	16·9	16·6	14·7	4	4·8	4·7	7·5
36 (10) .	79	♀	45·9	49·8	14	17·3	18·8	5·4	5·5	11·8	4·3	3·1	2·9	5·4	3·6	17	17	16·6	4·5	.	.	.
37 (38) .	82·9	♀	49·6	57·5	15·6	19·6	23·2	5·4	4·6	10·6	.	.	.	.	.	17	16·2	16·2	3·7	4·2	5·1	7·2
38 (32) .	85·3	♀	51·9	59·1	15·6	.	.	.	5·1	11·9	.	.	.	.	.	.	.	.	3·5	4·2	.	7·1
39 (37) .	86	♂	.	.	.	.	.	.	4·5	11·4	.	.	.	.	.	.	.	.	4·2	4·2	5	8
40 (14) .	87·8	♀	44·9	50·3	14·1	17·3	21·3	5·1	5·2	10·9	6·8	5·8	4·8	6·8	5·1	15·2	14·8	15·4	3·6	.	.	7·6
Average, .	**53·4**		**49·3**	**51·9**	**15·8**	**18.7**	**21 2**	**5·6**	**5·3**	**12·5**	**6·4**	**5·8**	**4·6**	**6·8**	**5**	**17·7**	**17·3**	**14·5**	**4·7**	**5**	**4·9**	**7·6**
Variants, .	38		29	29	25	28	28	28	34	34	26	27	28	28	28	32	32	29	36	28	8	31

TABLE IIIB.—LYTHE (*Gadus pollachius*), ♂ & ♀.

Dimensions represented as Percentages of Total Length of Fish.

No.	Distance from Tip of MANDIBLE.															(Lateral Line.		Pro-jection of Mand.
	Eye.	Ventr. f.	Op. cl.	Pect. f.	Anus.	1 D.	2 D.	3 D.	1 A.	2 A.	Base of Tail.		Rami of Tail.		Beginning of Bend.	Ht. Bend at Anus.	Ht. Bend at Pf.	
											d.	v.	d. Tip.	v. Tip.				
3	.	.	.	.	.	.	.	.	.	.	.	.	·102	102·8	.	.	.	.
4	.	.	.	.	.	.	.	.	.	.	.	.	102·8	102·8	.	.	.	.
5	8·7	24·1	.	26·4	33·8	33·1 – 43·9	46·6 – 64·2	68·1 – 79·3	36·6 – 63·8	66·1 – 78·2	83·6	83·6	101·1	100·7	54·5	5·8	5·8	1·1
6	8·5	23·3	24·5	25·7	33·4	33·4 – 43·9	46·6 – 65·3	68·1 – 80·1	35·4 – 65·3	66·9 – 80·9	84	84·8	102·6	103	53·7	6·2	6·6	1·5
7	.	24·4	25·7	27·4	34·6	34·9 – 45·7	47·2 – 65·3	68 – 81	36·5 – 67·6	69·1 – 81·8	83·7	85·6	103·3	103·7	53·4	3·4	3·4	.
8	8·6	24·6	25	.	34·9	33·8 – 44·2	47·6 – 65·3	68·7 – 80·6	37·4 – 66	68·3 – 81	84·9	84·9	102·1	102·5	51·1	4	4	·7
9	9·5	22·7	23·9	25·4	33·3	31·6 – 42·8	44·3 – 64·4	67·5 – 80·3	35·2 – 65·6	67·5 – 79·6	83	84·1	101·6	102·7	.	.	.	·8
11	9	24	24	26	33·4	33·7 – 43·8	47 – 65	67·8 – 80·8	35·5 – 66	67·1 – 80	84·4	84	103	101·9	53·8	6·5	7·2	1·3
12	8·8	25·1	24·8	26·7	35·9	32·9 – 43·3	45·6 – 65·2	67·5 – 80·5	37·2 – 64·9	66·5 – 80·8	84·4	84·8	100·7	104·3	55·4	4·2	4·2	1·3
13	9·7	24·1	25·1	27	.	33·8 – 43·8	47·6 – 64·7	68·3 – 79·9	38 – 66·3	68·6 – 80·8	·6	85·6	102·7	102·7	58·6	3·9	2·9	1·7
14	7·9	23·3	23·3	25·5	33·7	31·5 – 41·9	45·4 – 60·5	67·4 – 79·7	36·2 – 65·8	67·7 – 80·3	84·4	84·7	102·1	103·3	56·1	6·3	6·3	·8
15	9	23·5	23·8	25·8	34·1	31·6 – 42·4	44·3 – 65·1	67·6 – 80·9	35·7 – 66·2	68·7 – 81·2	85	85	102·8	103	52·1	5·5	5	1·9
17	8	23·1	23·2	25	34·5	32·6 – 44·5	47·1 – 67·1	70·7 – 81·4	36·6 – 67·3	69·2 – 82·6	84·7	85·2	102·3	103·2	55·9	5·7	6·4	·8
18	9·6	23·5	23·5	25·8	34·6	32·8 – 42·6	46 – 65·4	68·6 – 81·2	36·7 – 67	69·5 – 82·1	85	85	104	102·6	49·7	4·9	5.9	2.7
19	9·4	24·7	24·7	26·7	35·7	33 – 43·5	46 – 67·3	70·4 – 81·3	37·6 – 67·3	69·4 – 81·9	85·3	85·1	102·6	103·2	56·2	4·8	4·8	1·5
20	8·7	23·6	24·2	26·6	35·2	33·4 – 43·4	46·6 – 66·2	68·2 – 81·2	37 – 68·8	70 – 83	85	85	103·2	103	51	4·8		.
21	9·3	23·2	24·1	25·7	35·8	33·3 – 43·7	46·9 – 64·3	69·3 – 80·8	38·2 – 67·5	69·9 – 80·6	85·5	84·7	102·6	102·6	47·9	4	3.8	2
22	9·3	23·8	24·4	26·1	35·7	34·3 – 44·6	47·2 – 67·7	70 – 81·7	37·8 – 68·6	70·2 – 82·7	85·4	85·8	103·3	102·4	50·7	4·2	3.9	1.4

Table IIIb.—Lythe—continued.

No.	Distance from Tip of Mandible. Eye.	Ventr. f.	Op. cl.	Pect. f.	Anus.	1 D.	2 D.	3 D.	1 A.	2 A.	Base of Tail. d.	Base of Tail. v.	Rami of Tail. d. Tip.	Rami of Tail. v. Tip.	(Lateral Line.) Beginning of Bend.	Ht. Bend at Anus.	Ht. Bend at Pf.	Projection of Mand.
23	9·7	24·5	24·3	26·6	35·9	33·6 – 45·8	48 – 68·1	70·6 – 82·7	37·5 – 69·3	70·6 – 83·4	86·1	86·1	102·8	101	57·4	6·2	6·2	1·7
24	9	24·1	.	26·7	37·3	35·1 – 45·9	48·5 – 68·9	71·5 – 83·7	39·4 – 69·5	71·5 – 83·9	86·4	86·8	103·8	103·5	58	4·2	3·9	.
25	9·4	22·9	23·7	25·9	36·1	33·7 – 44·7	48 – 67·2	70·3 – 81·1	38·8 – 69	70·1 – 82	86	86	.	.	51	4·5	4·4	1·9
25	9·3	.	23·5	25·8	36·9	32·8 – 44·4	47·6 – 67·9	76·9 – 82·3	39·4 – 68·6	70·5 – 82·3	85·3	85·4	100·4	101·3	55	4·7	3·2	1·4
27	9·6	.	25	26·9	35·9	34·3 – 45·8	48·5 – 69·2	71·6 – 82·4	38 – 70·8	72·3 – 83·6	85·5	86·5	.	.	59	5·6	5·5	1·5
28	8·5	22·9	23·1	24·7	34·5	31·8 – 43·1	47 – 63·7	68·4 – 81	37·1 – 66·7	68·4 – 81·6	84·9	85·1	100·9	100·7	53	4·9	4	1
29	8·6	22·4	23·1	24	34·7	32·1 – 43·2	46·4 – 67·1	70·7 – 82·4	37·1 – 67·4	69·1 – 82·6	85·6	85·8	102·2	102	53·5	4·4	4·4	1·2
30	8·8	22	23·1	23·9	35·8	32·4 – 43·8	46·5 – 66·2	69·1 – 81·5	38·3 – 68	69·5 – 82	84	84·7	101·4	101·3	54·7	4·3	4·1	1·3
31	8·4	22·2	22·7	24	33·8	31·6 – 42·8	45·5 – 67·1	69·4 – 82·4	36·6 – 69·5	70·9 – 82·4	85·3	85	101·3	100·1	57·7	5·2	4·8	1·1
32	9	23·5	24·1	25·3	36·5	33·7 – 43·7	46·7 – 66·8	70·3 – 81·9	39·3 – 68·4	70 – 82·6	85	85·5	101·9	102·5	52·4	3·9	3·2	1·4
33	9·3	23·4	23·7	25·4	35·8	33·8 – 43·8	46·6 – 67	70 – 82·4	38·7 – 69·3	70·5 – 82·2	85·5	85·2	102·4	102·2	53·8	4·1	4·1	1·3
34	8·8	22·9	23·7	25·6	37·1	34·3 – 45·7	49·1 – 68·8	70·9 – 82·7	39·1 – 69	70·3 – 82·8	85·2	86·2	101·3	102·2	57·8	4·9	4·7	1·3
35	8·8	22·2	23·5	25	35·8	33 – 44·6	47·2 – 67·7	69·3 – 82·2	39·1 – 69·1	71 – 83·3	85·3	85·7	102·1	101·7	53·7	3·8	5·5	1·3
36	10·8	24·1	25·3	26·6	36·2	34·6 – 44·3	– 68	70·7 – 84·7	38·2 – 69·3	70·3 – 81·9	85·5	.	100·6	101·7	50·8	.	.	.
37	8·4	22·6	22·6	23·9	34·7	31·8 – 42·8	46·2 – 67·2	68·7 – 81·3	37·7 – 67	68·4 – 82·1	83·9	84·6	.	.	63·7	5·2	4·6	1·2
38	8·3	22·7	22·1	23·4	36·4	33 – 44·1	46·7 – 67	69·7 – 82	38·7 – 68·3	69·6 – 82·5	84·7	85·2	100·7	101·7	57·1	4·7	4·4	1·2
39	9	24·4	24	26·1	36·4	34·1 – 45·2	48 – 68·4	70·9 – 82·5	39 – 69·1	70·8 – 83·2	85	85·8	.	.	56·3	.	.	1
40	8·7	21·6	23·2	24·5	35·1	33·7 – 42·9	46·4 – 66·3	70·2 – 81·6	36·2 – 68	70·2 – 81·7	85·5	86	100·2	100·2	56·2	4·1	3	1·1
Avg.	**9**	**23·4**	**23·9**	**25·6**	**35·3**	**33·8 – 43·9**	**46·8 – 66·3**	**69·4 – 81·5**	**37·5 – 67·6**	**69·4 – 81·9**	**85**	**85·2**	**101·8**	**102·2**	**54·5**	**4·8**	**4·7**	**1·3**
Var.	33	32	32	33	33	34	33 34	34	34	34	34	33	32	32	33	31	31	30

TABLE IV.—COD, ♂ & ♀.

Number of Fin-rays and Vertebræ.

No.	Length, *cm.*	Sex.	Fin-rays.					Vertebræ.
			1 D.	2 D.	3 D.	1 A.	2 A.	
1	45	♀	15	17	18	22	17	52
2	55	♂	.	.	.	.	.	52
3	82·7	♂	15	20	18	21	17	53
4	83·3	♀	15	19	19	22	18	51
5	85·4	♂	14	18	19	19	19	51
6	89·5	♀	14	18	20	23	18	52
7	92·7	♀	15	18	20	21	18	52
8	93·9	♂	13	19	18	22	17	52
9	95·2	♂	12	22	18	21	17	51
10	102	♂	13	20	18	24	18	53
11	103·5	♀	13	18	20	21	19	52

TABLE V.—SAITHE, ♂ & ♀.

Number of Fin-rays and Vertebræ.

No.	Length, *cm.*	Sex.	Fin-rays.					Vertebræ.
			1 D.	2 D.	3 D.	1 A.	2 A.	
1	14·6	?	14	19	21	25	21	55
2	15	?	14	23	21	28	21	55
3	15·2	?	14	20	19	25	21	55
4	15·6	♂	13	20	21	25	22	55
5	16·2	?	14	20	19	25	20	55
6	16·5	♂	14	22	19	26	22	55
9	54·1	♀	15	21	21	28	22	55
10	56·8	♂	14	22	22	28	23	54
11	58·4	♀	14	21	21	27	21	55
12	87·5	♀	14	22	22	30	24	55
13	88·4	♀	13	23	20	30	20	55
14	88·5	♂	14	20	21	25	21	55
15	88·9	♂	15	22	24	26	23	55
16	91·1	♂	13	21	22	27	23	55
17	91·3	♂	15	19	21	27	23	55
18	98·2	♂	13	24	22	32	22	54
19	98·6	♂	12	23	21	28	21	54
20	98·7	♂	14	23	23	26	22	54

TABLE VI.—LYTHE, ♂ & ♀.
Number of Fin-rays and Vertebræ.

No.	Length, *cm.*	Sex.	Fin-rays.					Vertebræ.
			1 D.	2 D.	3 D.	1 A.	2 A.	
1	20 2	?	13	20	19	33	20	.
2	20·7	?	13	18	17	29	18	53
3	23·5	?	13	18	18	28	19	54
4	23·5	♀	14	18	18	26	18	54
5	25·6	?	13	18	18	29	18	53
6	25·7	?	13	19	19	30	19	53
7	26	?	13	18	18	30	17	54
8	26	♀	13	18	17	25	19	54
9	26·3	♂	13	19	17	31	18	53
10	27·5	?	13	19	19	31	20	53
11	27·8	♀	13	19	17	30	19	54
12	30·6	♂	13	18	18	31	19	53
13	31	?	12	17	17	28	19	54
14	31·7	♀	13	17	18	28	19	52
15	36·1	♀	12	20	19	30	18	53
16	39·8	♀	14	17	18	29	.	54
17	42	♀	13	20	17	29	20	54
18	43·7	♀	12	20	19	30	20	54
19	47·6	♀	12	21	18	30	19	54
20	50	♀	13	21	18	31	18	54
21	50·5	♂	13	17	17	30	18	54
22	51·1	♂	12	20	18	30	19	53
23	56·5	♀	13	22	20	33	21	54
24	62	♀	13	20	19	30	20	54
25	62·8	♀	13	20	18	30	19	53
26	68·1	♀	12	19	18	30	19	54
27	69·6	♂	12	20	17	29	18	50
28	71 1	♀	13	17	20	30	19	54
29	71·4	♂	13	18	19	31	19	54
30	73	♂	14	19	19	29	21	53
31	76·4	♀	13	21	20	34	20	53
32	77	♂	12	19	19	29	19	54
33	78·2	♀	12	19	19	30	19	53
34	78·4	♀	13	18	17	28	17	53
35	78·5	♀	13	20	18	30	20	55
36	79	♀	13	20	17	31	19	52
37	82·9	♀	12	21	19	29	20	55
38	85·3	♀	.	.	.	.	.	52
39	86	♂	13	19	17	29	18	54
40	87·8	♀	12	20	18	31	18	53

Average Number of Rays in each Fin.

Species.	*Fins.*				
	1 D	2 D	3 D	1 A	2 A
Cod	13·9	18·9	18·8	21·6	17·8
Saithe... ...	13·8	21·4	21·1	27·1	21·7
Lythe	12·8	19·1	18·1	29·7	18·9

The number of rays in the dorsal, anal, pectoral, and pelvic fins are given by Day and Smitt as follows:—

	1 Dorsal.		2 Dorsal.		3 Dorsal.		1 Anal.		2 Anal.		Pectoral.		Pelvic.	
	Day.	Smitt.	Day.	Smitt.	Day.	Smitt.	Day.	Smitt.	Day.	Smitt.	Day.	Smitt.	Day.	Smitt.
Cod ...	13–15	12-15	16-19	16-20	17-21	16-20	17-19	17-20	16-18	16-19	16-19	18-21	6	6
Saithe ...	12-14	12-14	20-22	19-24	20-22	19-22	24-27	23-27	20-23	20-23	19	19-20	6	6
Lythe ...	11-13	11-13	16-20	17-21	15-19	16-20	24-31	27-31	16-21	18-20	19	17-19	6	6

THE AVERAGES.

The average of the percentages for each measurement was calculated, and is to be found in the bottom line of the Table. Owing to the comparatively small number of fishes which have been examined it has not been considered advisable to calculate the fluctuations of the means of the various dimensions. There is also the further point, that it would have been preferable that the same homologous standard of length had been adopted. In the case of the cod the measurements are from the tip of the premaxilla, in the saithe and lythe from the tip of the mandible. As the averages are used for a means of comparison between the three species as to their external characters, the averages in the case of the saithe and lythe have been corrected so that they represent in Tables VII. and VIII. the distances measured from the tip of the premaxilla, converted into percentages of the length of the fish measured from the tip of the premaxilla to the extremity of the middle ray of the tail fin. This operation has resulted in very little change in the saithe quantities, the greatest difference (viz., reduction) not exceeding ·5. In the case of the lythe the reduction is as great as 1·2. In five dimensions only is there a reduction of as much as 1, viz., distances of ventral fin, opercular cleft, pectoral fin, anus, and the beginning of the first dorsal fin.

TABLE VII.—COD, SAITHE, AND LYTHE.

The Dimensions represented as Percentages of the Length of the Fish taken as the Distance from the Tip of the Premaxilla to the end of the Middle Ray of the Tail.

Species.	Girth.			Dorso-Ventral Ht.			L. Fins.		Greatest Ht.—Unpaired Fins.					Rami of Tail.			Eye.		Inter-orbital Space.	*l.* Snout.	Pro-jection of Mand.
	Pect.	At Anus.	Tail.	Pect.	At Anus.	Tail.	Ventr.	Pect.	1 D.	2 D.	3 D.	1 A.	2 A.	*l.* Dorsal.	*l.* Ventral.	Spread.	Horiz. Diam.	Vertic. Diam.			
Cod, . .	51·5	47·6	13·3	19·2	18·1	4·7	10·3	12·6	8·4	6·7	7·3	7·5	7·2	16·7	16·9	15·3	3·8	3·5	5·7	8·3	.
Saithe, . .	47·7	51·6	13·9	18·2	20·8	4·7	6·9	11·8	6·1	5·8	4·3	6·3	4·1	18·6	18·1	16·3	3·9	3·6	5·7	6·9	·6
Lythe, . .	49·8	52·4	15·9	18·9	21·4	5·6	5·3	12·6	6·5	5·8	4·6	6·9	5	17·9	17·5	14·6	4·7	5	4·9	7·7	1·3

Species.	Distance from Tip of PREMAXILLA.													(Lat. Line.)	Lateral Line.	
	Ventr. *f.*	Op. cl.	Pect. *f.*	Anus.	1 D.	2 D.	3 D.	1 A.	2 A.	Base of Tail.		Rami of Tail.		Begin-ning of Bend.	Ht. Bend at Anus.	Ht. Bend at P*f.*
										d.	*v.*	*d.* Tip.	*v.* Tip.			
Cod, . .	23·3	25 1	27·4	45·9	29·8 – 43·2	44·9 – 64·8	66·7 – 80·6	48 – 65·8	68·6 – 80·4	83·1	83·1	98·6	99·1	60·8	4	6
Saithe, . .	21·8	22·6	24·1	38·4	30·8 – 42·6	45·1 – 67·8	70·2 – 83·5	41 – 68	70·5 – 83·4	86·7	86·8	104·1	103·9	67·5	3·7	5·7
.	22·3	22·8	24·5	34	32·8 – 43	45·9 – 65·6	68·8 – 81	36·6 – 67	68·8 – 81·4	84·5	84·7	101·5	101·9	53·7	4·8	4·7

Table VIII.

Length of the Bases of the Unpaired Fins represented as Percentages of the Length of the Fish, taken from the Tip of Premaxilla to end of Middle Ray of Tail.

Species.	1 D.	2 D.	3 D.	1 A.	2 A.
Cod, - - - - -	13·4	19·9	13·9	17·8	11·8
Saithe, - - - -	11·8	22·7	13·3	27	12·9
Lythe, - - - -	10·2	19·7	12·2	30·4	12·6

Comparison between the Cod, Saithe, and Lythe.

(Plate VIII.—Cod, Fig. 7: Saithe, Figs. 5, 8, 11: Lythe, Figs. 6, 9, 10.)

The comparison between the three species is made then by means of the averages given in Table VII. Taking the characters in the order in which they are set down in the Table, we may at a glance see the general inter-relations of the three species.

Girth :—It is useful to consider the girths at the pectoral region and at the anus together. The cod has a greater girth in the pectoral region than at the anus; while in the saithe and lythe the anal girth is greater than the pectoral. The girth at both points in the lythe is greater than in the saithe. The greater girth in each of the three species is just over 50 per cent. of the length, while the less is a little under 50 per cent. of the length. The cod and the saithe bear an inverse relation to one another; by simple transposition the girths of one form are converted into those of the other.

As regards the girth of the caudal peduncle, the cod and the saithe agree closely; while the girth of that part in the lythe is considerably greater than it is in the two former.

Dorso-Ventral Height :—In this character practically the same relationship is seen between the three species as was found to exist in respect to girth.

Lengths of Paired Fins :—In the matter of the lengths of the paired fins very definite differences exist between the three species. In the cod and the lythe the pectoral fins are of similar length, and a little greater than that of the saithe. The ventral fins differ in the three forms; and it is by means of the ratio between the lengths of the ventrals and pectorals that the differences are most readily described. Thus the ventral fin of the cod is about *five-sixths* the length of the pectoral; that of the saithe is *more than one-half* and less than two-thirds of the pectoral; while in the lythe the ventral fin is *less than one-half* the length of the pectoral.

Greatest Height of the Unpaired Fins :—The unpaired fins of the cod are higher than those of the saithe and lythe, which are very similar to one another. Those of the lythe are, however, with the exception of the second dorsal, a little higher than those of the saithe.

Tail Fin :—As regards the tail, the shape of which differs in the three species, there is no agreement seen between the species in the measurements which have been selected. In the cod the dorsal and ventral edges (rami) are shorter than in the lythe and saithe, and of the latter two, those of the lythe are shorter than the tail-rami of the saithe. While in the saithe and lythe the tail is forked, in the cod it is practically straight across.

The Eye :—The eye of the lythe is much larger than those of the cod and saithe. In the two latter the eyes are of the same size, and the horizontal diameter slightly exceeds the vertical diameter. In the lythe the vertical diameter is a little larger than the horizontal.

Interorbital Space :—Very few measurements of this character were made, but these show a distinctly broader interorbital space in the cod and saithe than in the lythe.

Length of Snout :—All three differ from one another in the length of the snout. Shortest in the saithe, it is a little longer in the cod than in the lythe.

Projection of Mandible :—The mandible of the lythe projects in front of the premaxilla on an average twice as far as it does in the saithe.

Distances from the Tip of the Premaxilla.

Ventral Fin :—The base of the ventral fin is in each form further forward than that of the pectoral, and is also slightly in front of the top of the opercular cleft. In the saithe the ventral fin is situated at about the same level as in the lythe, and in both of these species it is anterior to its position in the cod.

Opercular Cleft :—The opercular cleft occupies the same position in the saithe and the lythe, considerably in front of its situation in the cod.

Pectoral Fin :—A relation similar to that found in the case of the opercular cleft, exists in respect to the position of the base of the pectoral fin. In the saithe and lythe, in which they are at the same level, they are in front of that of the cod.

Anus :—In the position of the anus the three species differ from one another. In the lythe the anus is furthest forward ; next comes the saithe, and behind it again the cod. The anus has in each a definite position with respect to the first or second dorsal fin. In the lythe and saithe it is below the first dorsal ; but while in the former it is perpendicularly below the anterior half of the first dorsal fin, in the latter it lies below the posterior half of the same. In the cod the anus is vertically below the anterior half of the second dorsal fin.

First Dorsal Fin :—The first dorsal fin begins further forward in the cod than in the saithe, and in the latter it is in front of the same in the lythe. As in all three species the first dorsal fin ends at about the same level, their bases are correspondingly greater the further forward the fins begin. Thus the bases of the first dorsals measure—cod, 13·4 ; saithe, 11·8 ; lythe, 10·2 per cent. of the length of the fish respectively.

Second Dorsal Fin :—The second dorsal in the cod and saithe begins sooner than in the lythe. In the cod it ends first, next in the lythe, and last in the saithe. The bases of the second dorsals measure—cod, 19·9 ; saithe, 22·7 ; lythe, 19·7 per cent. of the length of the fish.

Third Dorsal Fin :—This fin commences earlier in the cod than in the lythe, and in the latter a little in front of the level of its beginning in the saithe. It ends in a corresponding order. In the saithe it comes considerably further back than in the other two. The base of the fin measures—cod, 13·9 ; saithe, 13·3 ; lythe, 12·2 per cent. of the length of the fish.

The length of the finless peduncle, that is, the interval between the end of the third dorsal and the beginning of the dorsal edge of the tail fin, is—cod, 2·5 ; saithe, 3·2 ; lythe, 3·5 per cent. In the lythe and saithe it is longer than in the cod.

First Anal Fin :—The same relative positions which were found in the case of the anus, naturally hold good with respect to the beginning of the first anal fin. It commences furthest forward in the lythe, next in the saithe, and furthest back in the cod. It ends soonest in the cod, then in the lythe, and last in the saithe. The lengths of the bases of this fin in the three species are—cod, 17·8 ; saithe, 27 ; lythe, 30·4 per cent. of the length of the fish.

Second Anal Fin :—In the cod and the lythe the second anals begin together, and in front of that fin in the saithe. This fin ends first in the cod, next in the lythe, and last, and that at a considerable interval, in the saithe. The base of the fin measures—cod, 11·8 ; saithe, 12·9 ; lythe, 12·6 per cent. of the total length of the fish.

The finless part of the peduncle (ventral edge) measures in the cod 2·7, in the saithe 3·4, and in the lythe 3·3 per cent.

Base of Tail :—The base of the tail is further forward in the cod than in the lythe, and in the latter it is in front of the same part in the saithe. The dorsal and ventral origins of the tail are at about the same level.

Rami of Tail :—The rami of the tail, both dorsal and ventral, in the lythe and saithe project behind the ends of the middle rays of the tail. In small cod, *e.g.* 46 cm., they project a very little beyond the middle rays, but in adult cod the middle rays project the furthest back. The tail then in the adult cod is rounded gently outwardly ; in the saithe and lythe it is forked. It is much more deeply forked in the saithe than in the lythe.

The condition in the cod might be imagined to result from the condition in the saithe by a forward transference of the rays of the dorsal and ventral lobes of the tail. All the dorsal fins and the second anal fin of the cod are carried further forward than in the saithe. The hind extremity of the first anal also occupies a more anterior position in the cod than it does in the saithe. The further posterior position of the anus in the cod simply reduces the length of the first anal fin. So that we have in the cod an anterior transference of the unpaired fins, to such an extent that the lobes of the caudal fin, which in the saithe project backwards into two prominent rami, now occupy a position in which their hind edges project little or none at all behind the tips of the middle tail-rays. In the lythe we have an intermediate condition. In this form the third dorsal, first and second anal fins, and the bases of the caudal fin are well in front of those parts in the saithe. The fork in the tail is thus much shallower than in the saithe.

Lateral Line :—The lateral line in all three forms is straight in its hind third, *i.e.* from the base of the tail fin forward to about the middle of the first anal fin. In this region it begins to bend upwards. In the cod and lythe it turns rapidly upwards, and runs in a curve forward to the level of the pectoral region. In the saithe it begins to rise near the hind end of the first anal fin, and proceeds very gently upwards in a straight line to its greatest height in the pectoral region. The point at which the lateral line turns upwards is furthest forward in the lythe, next in the cod, and furthest back in the saithe. In the lythe it rises more rapidly than in the cod, and at the anus it is further up on the side of the fish than it is in the cod and saithe, but just over the base of the pectoral fin it is highest in the cod, next in the saithe, and least in the lythe. The height of the lateral line at these two points is measured above the level of the hind straight third of the line.

The Vertebræ.

The cod has the smallest number of vertebræ, viz., an average of 51·9, while the lythe has an average number of 53·4, and the saithe an average of 54·8 vertebræ.

Day* gives 51 as the number of the vertebræ of the cod. In the "Scandinavian Fishes" the number is stated at 51–54 for the cod, 54–55 for the saithe, and 53, 54 for the lythe. According to Jordan and Evermann,† the saithe has 54 vertebræ.

Fin-rays.

(Table, page 241.)

1*st Dorsal:*—The cod and the saithe have practically the same number of rays in the first dorsal fin, viz., averages of 13·9 and 13·8 respectively, while the lythe has an average of 12·8 rays.

2*nd Dorsal:*—In respect to this fin the cod and lythe approach one another closely, having averages of 18·9 and 19·1 respectively, while that of the saithe is 21·4 rays.

3*rd Dorsal:*—Cod and lythe again resemble one another with respective averages of 18·8 and 18·1, while in the saithe the average is found to be 21·1 rays.

1*st Anal:*—In their average number of rays the saithe and lythe, with 27·1 and 29·7 respectively, are more nearly related to one another than to the cod, in which there was an average of 21·6 rays only.

2*nd Anal:*—In the cod and lythe the averages are 17·8 and 18·9 respectively, while that of the saithe is 21·7 rays.

It has been shown above that in certain characters two of the forms approach each other closely, while they are separated by an interval from the third species. Saithe and lythe resemble one another in the greatest number of characters, but there are, however, certain dimensions in which each of them is more nearly related to the cod than they are to one another.

The inter-relationships are set out in the following scheme. The first two forms are in each case the closely-allied species, and the characters in which they exceed, and those in which they are less than, the third form are given in detail:—

Saithe and Lythe,	$>$ Cod	Girth (at Anus): D.-V. Height (at Anus): Projection of Mandible: *d.* (distance) of beginning of 3 D.: Fin-rays (1 A.): *l.* (length) of base of 1 A.
	$<$ Cod	*l.*, Ventral Fin: Greatest height of all Unpaired Fins: *d.*, Ventral Fin: *d.*, Opercular Cleft: *d.*, Pectoral Fin: *l.* of base of 1 D.
Cod and Lythe,	$>$ Saithe,	Girth (Pect.): *l.*, Pectoral Fin: *d.*, end of 1 D.
	$<$ Saithe,	*d.*, end of 2 D.: *d.*, end of 3 D.: *d.*, beginning and end, 2 A.: Fin-rays, 2 D., 3 D., 2 A.: *l.*, base, 2 D.
Cod and Saithe,	$>$ Lythe,	Interorbital space: *l.*, base of 3 D.: Fin-rays, 1 D.
	$<$ Lythe,	Girth (at Tail): Height of Tail: Diameter of Eye.

* "The Fishes of Great Britain and Ireland," London, 1880–1884.

† "The Fishes of North and Middle America," Pt. iii., *Bull. U.S. Nat. Museum, Washington*, 1898.

By means of the characters which were selected, similarities and more or less prominent differences between the three species have been brought out. But since in a large number of these cases the differences are of small amount, and require therefore rather minute measurement, they are not of much value in a specific description. The specific description should contain nothing more than a sufficiency of characters to ensure the discrimination of the form. These should, moreover, be obvious and readily marked characters. In certain works the specific descriptions are extremely cumbersome, and so overloaded with detail that it is a matter of some difficulty to diagnose the species of a fish by their aid.

For the characters of the Family GADIDÆ, and of the Genus GADUS, we may adopt the description given in Smitt's "SCANDINAVIAN FISHES," Stockholm, 1893, Part I., viz. :—

FAM. GADIDÆ.

Body elongated, compressed, clavate or fusiform, and covered with thin cycloid scales. Caudal fin distinct from the other vertical fins. Jaws furnished with teeth. Gill-openings large; branchiostegal membranes more or less completely free from the isthmus. Pseudobranchiæ wanting, or glandular. Air-bladder and pyloric appendages generally well-developed.

GENUS GADUS.

Three dorsal fins, all fully developed, and two anal fins. Peduncle (finless part) of the tail distinctly marked off. Ventral fins normal, with 6 rays. Jaw-teeth and vomerine teeth present. Branchiostegal rays 7.

SPECIFIC DESCRIPTION.

It is not my purpose to give a complete specific description of the three species, since they alone of the members of the genus Gadus are under consideration. A few characters by which they may be readily separated will be given below.

Barbel.—In most systematic works it is stated that the lythe has no barbel. That is true so far as it refers to an external barbel. Beneath the skin, however, the cartilaginous basis of the barbel may be found on dissection. (*Vide b*, Fig. 29, Pl. I.) The saithe has a very small barbel; that of the cod is large and prominent.

Saithe (Gadus virens).—Parnell, in his "FISHES OF THE FIRTH OF FORTH," divided the saithe into two species, in one of which, *Merlangus carbonarius*, the mandible projected in front of the premaxilla, while in the other, *Merlangus virens*, the upper and lower jaws were of equal length. The form which he described as of the latter species measured 10 inches (25 cm.), and was no doubt a young saithe. In the young saithe the upper and lower jaws are of about the same length, while in the adult saithe the lower jaw projects in front of the upper.

The scheme given below includes certain readily gauged characters, sufficient in number and importance to enable the three species to be easily separated :—

[TABLE.

PLATE VIII.—COD, Fig. 7: SAITHE, Figs. 5, 8, 11: LYTHE, Figs. 6, 9, 10.

Character.	COD. (*Gadus callarias.*)	SAITHE. (*Gadus virens.*)	LYTHE. (*Gadus pollachius.*)
JAWS,	*Upper projects* in front of lower.	*Lower projects* in front of upper.	*Lower projects* in front of upper.
LATERAL LINE,	Broad, *white*, except anterior part. Abdominal part —*curved.*	*Straight: broad white* streak.	Dark narrow line, not prominent. Abdominal part —*curved.*
TAIL FIN, Hind Edge of,	*Very slightly concave* (small cod) *straight* or slightly *convex* (adult cod).	*Deeply forked.*	*Slightly forked.*
ANUS,	Below first part of *2nd Dorsal* Fin.	Below *hind half* of *1st Dorsal* Fin.	Below *first half* of *1st Dorsal* Fin.
LENGTH OF VENTRAL FIN,	About *five-sixths* of the length of the Pectoral Fin.	More than *one-half* and less than *two-thirds* of the length of the Pectoral Fin.	Less than *one-half* ot the length of the Pectoral Fin.
GIRTH AT PECTORAL REGION,	*Greater than* the girth at the Anus.	*Less than* the girth at the Anus.	*Less than* the girth at the Anus.

The pectoral fin of the saithe is pointed at its extremity, whereas in the cod and lythe it is rounded (Figs. 1, 3, and 7, Plate VIII.).

COLOURS.

COD.—The following description was taken from a female cod 46·3 cm. in length, an hour or two after capture:—

On the dorsum and greater part of the side the ground colour is slaty green (dark olive). It is splashed all over the abdominal and caudal portions with round laminarian yellow patches closely set together; they extend on the sides down below the lateral line. In the caudal part of the body, that is behind the level of the anus, the patches are united into a broad yellow longitudinal band running above and below the white caudal part of the lateral line. On the side of the abdomen the lower border of the yellow blotches is in line with the band on the ventral side of the caudal part of the lateral line.

The part of the side below the yellow patches is slate coloured.

The belly is white. The white part is, however, restricted. It is broad below the head and in the pectoral region, but it gradually narrows till behind the anus it is a mere strip alongside the bases of the anal fins.

The dorsum of the head and of the trunk in front of the first dorsal fin is of a dark olive colour.

The dorsal fins and tail are olive; the anals white along their bases, merging into a slaty colour along the distal part of the fin.

The pectoral fin is light, almost colourless, with a yellow tinge.

The ventral fin has a white base, white outer border, dark slaty superior surface, and white and slaty inferior surface.

SAITHE.—The following description was taken from two saithe measuring respectively 56·8 cm. male, and 54 cm. female, captured a short time previously:—

The dorsum of head and body is of a deep black colour, which has a green tinge. The belly and lower part of the sides are white. There is a golden sheen over the belly and the white parts of the side. The ventral fins are coloured white and pink. The lateral line is a broad white streak in its whole length.

LYTHE.—Two lythe measuring 73 cm. male, and 39·8 cm. female, were examined immediately after capture.

The dorsum is of a dark olive colour. This colouration does not extend further down the sides of the abdomen than the highest part of the lateral line. The sides below that level are whitish. Behind the anus the dark olive colour gradually envelops the whole side.

A golden network is spread over the dorsum and down over part of the white side.

The lateral line is dark and not prominent.

The above descriptions of the colours of the three species agree well with those given in Smitt's "Scandinavian Fishes."

ANATOMICAL DIFFERENCE—*Urinary Bladder.*

In the cod there are two lobes to the urinary bladder: in the saithe and lythe the urinary bladder has no lobes.

The ureter leaves the kidney at a point well behind the level of the anus. It passes down on one side of the swim bladder, and is continued forward to dilate into the urinary bladder close to the rectum. The ureter does not always pass down on the same side of the swim bladder.

COD.—Of 5 males examined, the ureter was in two cases on the right side of the swim bladder, and in three, on the left side of the same.

Of 5 female cod, in three cases it was on the right side, and in two on the left.

SAITHE.—Of 8 males, in five the ureter was on the right side, and in three on the left.

Of 4 females, it was in one on the right side, and in three on the left side.

LYTHE.—Of seven males, the ureter came down on the right side of the swim bladder in two cases, and in five cases on the left side.

Of 19 females, it was in fourteen cases on the right side, and in five cases on the left side.

These figures will be more readily followed in the accompanying Table.

SEX.	Cod.		Saithe.		Lythe.	
	Right.	Left.	Right.	Left.	Right.	Left.
Male, - - - - -	2	3	5	3	2	5
Female, - - - - -	3	2	1	3	14	5

The number of specimens examined is small, but they indicate that in the lythe the ureter in the male is most frequently to be found on the left side of the swim bladder, whereas in the female it is usually on the right side of that organ. In the case of the saithe the opposite would seem to be the condition, while in the cod the very insufficient data show a tendency towards the arrangement in the lythe.

Note on the Reproduction of the Lythe.

In May a male measuring 50·5 cm., and a female measuring 43·7 cm., were immature. A female measuring 87·8 cm. was in June spent. In September a female 72 cm. in length had a devoloping ovary, and in December two males measuring 71 and 73 cm. were almost ripe.

According to Mr. Duthie, a few ripe lythe are captured during March in the cod nets at Girvan.

For other data regarding the spawning of the lythe, see M'Intosh and Masterman, "British Marine Food-Fishes," London, 1897.

Osteological Differences.

In addition to the description and measurement of the external characters, this research has included a comparison between the three species in respect to the form of the bones of the head.

The osteology of Teleosteans has been treated by a large number of authors, the names of whom it is not necessary here to mention. It is not the purpose of this paper to enter upon the general morphology of the skull, but simply to institute a comparison between the bones of the head of the three Gadids, Cod, Saithe, and Lythe. It is, moreover, not intended to cover the field of development. All the descriptions are, unless expressly stated otherwise, made upon the skeletons of large specimens, of which the following is a list:—

Cod	Males, measuring 82·7, 85·4, 94, 95.5, 102 *cm.* Females, measuring 92·7, 103·5 *cm* Disarticulated Bones of Skull—male, 95·5 *cm.*; female, 89·5 *cm.*
Saithe	Males, measuring 88·5, 88·9, 90, 98·2, 98·7 *cm.* Females, measuring 87·5, 90, 96·2 *cm.* Disarticulated Bones of Skull—male, 91·1 *cm.*; female, 90 *cm.*
Lythe	Males, measuring 70·6, 71·4, 75, 86 *cm.* Females, measuring 76·4, 78·4, 78·4, 78·5, 82·9, 87·8 *cm.* Disarticulated Bones of Skull—male, 69·6 *cm.*; female, 85·3 *cm.*

Since no very evident indication of sexual differences in the skulls of any of the species was made out, the contrasting points which are detailed are to be regarded as bearing value quite independent of sex. A considerable amount of variation exists in the skulls of any one species, and differences due to individual variation were found between fishes of one sex, of as great amount as there were between those of different sexes.

In instituting the comparison it will be necessary to traverse ground which has been already well opened up—viz., in connection with the osteology of the cod. This is a type which has been much studied; it has been treated in detail by Owen.* So far as I am aware, no detailed description has been given of the skeletons of the saithe and lythe. The osteology of the haddock (*Gadus æglefinus*) has been exhaustively treated by St. John Brooks.†

As might be inferred, the bones of so closely allied species as the three Gadids here treated are on the whole very similar, and the differences are in many cases those of detail. In Plates IV.–XI. drawings or photographs of all the bones described are given.

* Hunterian Lectures II. Lectures on the Comparative Anatomy and Physiology of the Vertebrate Animals. Pt. I. Fishes. London, 1846.

† The Osteology and Arthrology of the Haddock (*Gadus æglefinus*). *The Scientific Proceedings of the Royal Dublin Society.* [Read, 1883.]

The terminology which I have followed is with one or two exceptions that adopted by Günther* and Boulenger.†

The descriptions are made on the bones of the *left* side of the fish.

Skull.

View from Above.

Cod, Fig. 31, Pl. V.: Saithe, Fig. 33, Pl. V.: Lythe, Fig. 34, Pl. V

In the case of fishes of equal length the skull of the cod is larger and more massive than that of the saithe, while that of the latter is greater than the skull of the lythe. Seen from above, the skulls much resemble one another. One point of considerable importance separates the skull of the cod from the other two, and that is that while in the former the front edge of the ethmoid is exactly above the anterior edge of the vomer, in the saithe and the lythe the ethmoid is situated well behind the front edge of the vomer; so that in the view from above nearly all the upper surface of the expanded portion of the vomer is seen.

Another point of difference is in the shape of the frontal. In the lythe the anterior end of the frontal is almost square across, in the cod and saithe it is more tapered and pointed. The ethmoid in the cod has a superior surface of considerable length and breadth; but in the saithe it is reduced to a short, sharp ridge. In the lythe it is broader than in the saithe. The hind portion of the ethmoid which articulates with the frontal is continued backwards in the latter bone as a distinct broad ridge, extending back to the foramina. In the saithe such a ridge is to be traced, but in this fish it is not prominent, while in the lythe it is absent.

The two large foramina in the frontal show certain differences. In the cod and saithe they usually end anteriorly in a narrow angle, though sometimes both ends are rounded. In the lythe they are kidney-shaped, and are on the whole wider than those of the cod and saithe: anteriorly they are turned outwards and have their margins rounded. The posterior end is distinctly wider than the anterior. Not infrequently the shape of the foramen is altered by little bony processes which arise from the margins. In the lythe and saithe the foramina are deep, their hind margins being high. In the cod they are shallow.

The lamellæ which form the grooves which lodge the sapraorbital canals differ in the three species. In the cod the lamella is broader than in the other two; and in the lythe it is distinctly higher than in the other two. The lamellæ of the two sides gradually approach each other as they proceed anteriorly, until they reach the anterior ends of the foramina in the cod, and from this point they turn outwards very slightly, and then bend inwards, being separated at the front end of the frontal by about the same distance as at the level of the foramina. In the saithe the lamellæ approach one another a little more closely at the foramina than they do in the cod. In that region the groove formed by the overhanging lamella is converted into a closed bony canal by the presence of a vertical plate connecting the outer edge of the lamella with the main part of the frontal. In the lythe the lamellæ, after approaching close to one another about the middle of the foramina, bend sharply outwards, and then inwards toward the median line. The vertical wall of the closed canal, however, is continued outwards to the anterior outer corner of the frontal, making a very wide funnel-like mouth to the canal.

* Günther. The Study of Fishes. Edinburgh, 1880.

† Boulenger. Catalogue of the Perciform Fishes in the British Museum, 2nd edition. London, 1895.

In the cod and saithe the mouth of the canal is small in comparison to that in the lythe. The space in front of the foramina and between the edges of the lamellæ is in the cod fairly flat, though it shows a distinct median ridge, the continuation of the process from the ethmoid, and on either side of that a shallow longitudinal groove. In the saithe and lythe, however, there is a broad, deep depression between the prominent edges of the lamellæ. In the hind portion of the frontal the lamella is seen to be two-layered. This is apparent only at its posterior end, where the lower layer appears projecting from below the upper. The posterior edge of the upper layer is irregular, but may be traced to a connection with the beginning of the ridge in the parietal. In the cod this may be made out in only a few skulls, but the two layers are very distinct in the saithe and lythe. In the lythe there is a larger portion of the lower layer free from the upper layer than in the saithe.

The outer edges of the frontals in the cod and saithe are only slightly curved inwards over the orbit: in the latter more so than in the former; but in the lythe there is a deep incurving in that region.

The occipital spine is a continuation of a prominent ridge or spine on the frontal. In very few specimens is the anterior portion or origin of the frontal spine perfectly median: it is usually deflected to one side or the other. In the cod this spine ends anteriorly at some distance behind the two large foramina. In the saithe it begins at the hind border of the foramina, and is to be traced still further forward as a ridge between the two cavities. In the lythe, in which the septum between the two foramina is much broader than in the saithe, the forward continuation of the spine is not always well marked, but may usually be traced. In the cod, however, in front of the origin of the spine, and between it and the hind borders of the foramina, there is a depression which sharply defines the front extremity of the spine.

On the posterior portion of the frontal there is on either side of the frontal spine a ridge running from the angle between the spine and the lamella, backwards and outwards. It practically bisects this angle, and is continued directly into the ridge on the parietal, which further back rises into the crest of that bone. In the saithe and lythe this ridge is very well marked: in the cod it is with difficulty made out, since the ridge on the parietal is reduced to a mere line. The frontal and parietal are dovetailed into one another. In the saithe a broad, and usually long, dovetail of the parietal is inserted in the posterior border of the frontal, between the spine and the oblique ridge, while a process, which is a continuation of the ridge on the frontal, runs backward and well up the ridge on the parietal. The same condition exists in the lythe, but generally the ridge process is much shorter than in the saithe. The same general arrangement of interlocking may be followed in the case of the cod. In two saithe skulls (male) the frontal ridge processes rose at their extremities into crests, which projected above the level of the adjacent parietal ridge. In the posterior external corner of the frontal there is a notch, in which lies the superior suborbital. This notch is deeper in the cod and lythe than in the saithe. The anterior margin of the notch meets the adjacent part of the edge of the frontal in a sharp corner in the lythe: in the saithe it is broadly rounded. In the cod the front margin of the notch projects backwards over it.

The crests of the parietals in the saithe and lythe are very large. They are directed upwards and outwards. In the cod they are small flat triangular processes covering the foramen for the exit of the *nervus lateralis*. In the saithe and lythe the under surface of the crest is pierced by this foramen.

The præfrontals show certain differences in the three species. The neck formed by the two præfrontals, just in front of the frontal, is comparatively narrow in the saithe, and much broader in the lythe and cod. The external edge meets the posterior surface in a sharp angle in the lythe, whereas in the saithe this corner is rounded off. The articular surface at this corner which receives the upper angle of the præorbital is much larger in the saithe than in the lythe. In the cod this articular surface is very large and cut deeply into the edge of the bone. In its anterior corner, too, the cod shows a prominent projecting facet for articulation with the "handle" of the palatine. These expansions shorten and define the neck of the præfrontals. These articular surfaces in the saithe and lythe are not noticed in the view of the skull from above.

The upper surface of the paroccipital in the cod is short and broad, curved distinctly downwards and backwards : in the saithe it has a long narrow surface, the bone projecting posteriorly in a long narrow angle; in the lythe the condition is intermediate between the cod and the saithe.

The paroccipitals are borne on the ends of the lateral expansions of the supraoccipital. The shape of the crescent form of the lateral expansions on either side of the occipital spine is of some moment. In the lythe it is a broad gentle arc ; in the saithe it is a deep bend, of irregular outline. The latter condition is due to the shape of the paroccipital, which is in this species bilobed to a slight degree. In the cod the crescent is very shallow. The angle between the lateral expansion of the supraoccipital and the occipital spine is much more acute than in the other two. The posterior wall of the cranium is brought further posteriorly in the lythe and cod than in the saithe.

The squamosal in the cod ends in a broadly-rounded extremity in the saithe in a sharp point, and in the lythe in an intermediate condition.

View from Below.

Cod, Fig. 35, Pl. VI. : Saithe, Fig. 36, Pl. VI. : Lythe, Fig. 37, Pl. VI.

The vomer and the parasphenoid in the cod are much stronger and broader than those of the saithe and lythe. In respect to the vomerine teeth certain important differences are to be noted. In the cod the tooth-bearing area is a broad chevron band. It has four to five rows of teeth, those on the posterior border and at each end of the chevron being larger than the others. In the saithe there is a narrow band similar in shape to that of the cod, but the teeth are very minute. They are arranged generally in two or three rows, and the teeth increase a little in size as they recede from the apex of the bone. Sometimes the band of teeth is not continuous; in certain cases there is a break at the apex which may be free from teeth. In the lythe there is not a complete chevron-shaped tooth-bearing area. The teeth, which are arranged in two rows, are much larger and much fewer in number than those of the saithe. The teeth in the hind row are larger than those in the outer. Not infrequently there is a small apical patch of teeth separated from the rows of teeth on each side.

The ventral surface of the parasphenoid in the cod is flattened ; and the flat area extends forward to the end of the suture of the vomer. In the saithe the flat area is very sharply defined, although not so broad as in the cod ; it narrows as it approaches the end of the long suture of the vomer, and in some cases is reduced to a ridge before it reaches that point. There is a slight groove in the flattened area just ventral to the prootic in the saithe. In the lythe the flattened area is restricted mainly to the part of the parasphenoid forming the floor of the cranium. Before it reaches the level of the anterior border of the orbito-sphenoid it is replaced by a sharp ridge which splits anteriorly to receive the long insertion of the vomer.

The different shapes of the præfrontals noted above are noticeable in the view from below. Thus the outer oblique border of this bone in the lythe and cod is turned a little more outwards than in the saithe. This refers to the part in front of the præorbital articular area, the anterior edge of which is much higher in the lythe and cod, and so gives a greater bend outwards to the edge in front of it.

The cranium as seen from below is broader and more rounded in the lythe and cod than in the saithe.

Side View.

Cod, Fig. 38, Pl. VII.: Saithe, Fig. 39, Pl. VII.: Lythe, Fig. 40, Pl. VII.

In this view of the skull, the shape of its anterior extremity is seen to vary with the three species. In the cod it is practically vertical to the long axis. The front edge of the vomer lies exactly under the anterior surface of the ethmoid, which articulates with the cartilage situated between it and the adjacent parts of the premaxillæ. In the saithe the front edge of the ethmoid slopes upwards and backwards at about an angle of 60°; and while in the cod the angle between the upper and front surfaces of this bone is practically a right angle, in the saithe this angle is rounded off. In the lythe the front edge slopes backward a little less than in the saithe. The main mass of the ethmoid is thrown further back towards the frontals in the lythe and saithe than in the cod. The anterior portion of the skull is more depressed in the former two than in the latter.

The interorbital space is more highly arched in the lythe than in the saithe and cod. The posterior edge of this large space is formed by the prootic and the ascending part of the parasphenoid which unites with that bone. In the cod and lythe this portion of the parasphenoid is in line with the lower edge of the notch of the prootic, whereas in the saithe they meet in a fairly sharp angle.

A very marked point of difference is seen in the side view of the frontal-occipital spine. The frontal spine in the cod is low and runs very gradually upwards into the occipital spine. In the saithe and lythe the frontal spine is much higher and is convex in outline superiorly. Just at a little behind the point where the frontal fuses with the occipital spine there is an inbending in the upper edge of the spine.

In three skulls of saithe, lythe, and cod of equal length, that is measuring from the tip of the vomer to the hind edge of the basi-occipital, the occipital spines extend backwards to about the same level. The hind edge, however, in the saithe is longer than that of the lythe or cod, since in the latter the supraoccipital and the hind portion of the exoccipital come farther posteriorly than they do in the former. In the lythe the exoccipital extends backwards to the level of the articular surface of the basioccipital, while in the saithe it ends some distance in front of it. In the cod there is an intermediate condition, the exoccipital coming farther back than in the saithe and not quite so far as in the lythe.

In the cod and lythe the squamosal bends downwards much posteriorly, and to a distinctly greater degree than in the saithe. The high parietal crests of the saithe and lythe are very prominent, while their little flat representatives in the cod are not by any means conspicuous.

The long posterior free end of the squamosal unites with a process of the opisthotic. In the saithe this latter process does not extend backwards to the tip of the squamosal; it stops some distance short of it. In the lythe and cod the process of the opisthotic extends to the end of the squamosal, and together they form a broad expanded end to the double process. In the saithe the process of the squamosal projects backwards well beyond the hind edge of the supraoccipital; in the lythe it just reaches that level, and in the cod a little beyond that point.

The side of the bony canal on the front part of the frontal is seen in side view to be much higher in the saithe and lythe than in the cod.

One important difference between the skulls of the saithe and lythe on the one side and the cod on the other is in the shape of the parasphenoid. When the skull is looked at from the side it is seen that the ventral edge of this bone is in the cod practically straight, while it is distinctly curved in the saithe and lythe. Thus if the skull of the cod is placed resting on its vomer and basioccipital, the whole of the parasphenoid is quite above the table. But in the case of the saithe and lythe, the skull would rest on the vomer and the parasphenoid, while the basioccipital would be raised up clear of the supporting plane, the part of the parasphenoid which is directed inferiorly most is that part just below the prootic. This condition is shown in Plate VII., though in the case of the skull of the saithe the bend in the parasphenoid is usually greater than in the case there reproduced.

In a side view of the skulls slightly from above it is seen that the posterior vertical edge of the paroccipital, which with part of the upper posterior edge of the opisthotic and the upper outer edge of the exoccipital forms the outer posterior edge of the part of the cranium containing the auditory organ, is almost vertical in the cod, having a slight forward slope, and in the saithe slopes well forward. In the lythe there is an intermediate condition between these two.

Hind View.

Cod, Fig. 41, Pl. VII.: Saithe, Fig. 42, Pl. VII.: Lythe, Fig. 43, Pl. VII.

The hind lateral expansions of the supraoccipital overhang the exoccipitals, thus forming depressions in the hind wall of the cranium in which are lodged the anterior dorsal trunk muscles. In the lythe the depression is shallower than in the cod, and in the cod shallower than in the saithe.

The cranium is more broadly rounded below in the lythe and cod than in the saithe.

In the hind view the parietal crests of the saithe and lythe are seen projecting above the paroccipitals, but they are hidden in the cod.

Disarticulated Skull.

Vomer (V.).

Cod, Fig. 30, Pl. IX.: Saithe, Fig. 11, Pl. IX.: Lythe, Fig. 29, Pl. IX.

There is little difference, in addition to that of size of the teeth, to be noted between the vomers of the three forms. This bone is in the cod much heavier and more massive than that in the saithe and lythe.

Ethmoid (E.).

Cod, Fig. 42, Pl. IX.: Saithe, Fig. 6, Pl. IX.: Lythe, Fig. 21, Pl. IX.

Attached to the base of the ethmoid there is a large mass of cartilage, which is received into the hollow in the upper surface of the vomer, and the long tapering hind end of which passes backwards into the hollow extremity of the parasphenoid.

The sutural area of the ethmoid with the frontal is in the saithe and lythe broad: in the lythe the sutural laminæ are short; in the saithe the central laminæ are long thin plates. In the cod the sutural area is narrow, but the projecting laminæ of the ethmoid are as long as or longer than those of the saithe. In the case of one saithe, a female measuring 90 cm. in length, the sutural area was reduced to one long central thin lamina, with a few short lamellæ applied to either side of it, and projecting laterally, but separated from the central group by a short plain interval, was a slightly toothed sutural process.

Frontal (F.).

Cod, Fig. 37, Pl. IX.: Saithe, Fig. 1, Pl. IX.: Lythe, Fig. 16, Pl. IX.

With respect to this bone, the differences noted in the description of the skulls were most prominent. The median portion of the hind border projects farther backwards in the cod than in the saithe and lythe. The low frontal spine also serves to distinguish the former from the two latter; while the highly-arched plates which form the grooves for the supraorbital canal differentiate the lythe from the saithe, in which they are comparatively low.

Supraoccipital (s. Oc.).

Cod, Fig. 39, Pl. IX.: Saithe, Fig. 2, Pl. IX.: Lythe, Fig. 17, Pl. IX.

The height of the spine on this bone of itself separates the cod, in which it is low and usually somewhat massive, from the saithe and lythe, while the larger angle between the spine and the lateral arms of the supraoccipital in the case of the cod and lythe separates them from the saithe. In the saithe and cod the disarticulated supraoccipital ends anteriorly in a much finer point than in the lythe.

Basioccipital (b. Oc.).

Cod, Fig. 48, Pl.IX.: Saithe, Fig, 13, Pl. IX.: Lythe, Fig. 27, Pl. IX.

The neck of the basioccipital is rather narrower in the saithe and lythe than in the cod. There is some difference between the three species in respect to the structure of the upper surface of the bone. In the lythe there is a deep cavity running up between the two large hollows in the internal surface of the bone: in the cod there is in this region a wide depression filled up with loose bony matter.

Parasphenoid (p. S.).

Cod, Fig. 51, Pl. IX.: Saithe, Fig. 15, Pl. IX.: Lythe, Fig. 30, Pl. IX.

The points of difference in the parasphenoids have been noted in the description of the skulls. In the saithe and lythe the anterior end of the bone is straight, whereas in the cod it is turned well up. The parasphenoid of the cod is readily separated from those of the saithe and lythe by its greater thickness and strength.

Prefrontal (pr. F.).

Cod, Fig. 46, Pl. IX.: Saithe, Fig. 10, Pl. IX.: Lythe, Fig. 25, Pl. IX.

Rising from the upper surface of the prefrontal there is a process to which is attached a cartilage ligament, which is united in front to the hind part of the ethmoid, and to a similar process on the prefrontal of the opposite side. This process is very small in the lythe; in the cod and saithe it is large. It forms part of the wall of the olfactory foramen, and the anterior lateral part of the frontal rests upon it.

In the cod the part of the bone which articulates with the base of the ethmoid is very broad: in the saithe and lythe it is small. The anterior part which articulates with the vomer is also bound to the large mass of cartilage below the ethmoid. In the saithe and lythe the anterior inner part of the bone which meets the same part of the prefrontal of the opposite side is broadly curved to the base of the sutural process which is inserted into the parasphenoid. It is shorter in the cod, being reduced in size through the larger prefrontal-ethmoid sutural area.

Postfrontal (pt. F.).

Cod, Fig. 44, Pl. IX.: Saithe, Fig. 8, Pl. IX.: Lythe, Fig. 23, Pl. IX.

The postfrontal articulates with the frontal in front, with the orbitosphenoid below, with the squamosal and prootic behind, and with the parietal superiorly. The free part of its posterior side forms the anterior edge of the articular socket which receives the head of the hyomandibular. Part of the upper edge of the prootic shares in forming the lower edge of the same, while the main articulating surface is on the squamosal.

In the postfrontal one point of difference between the cod and the other two species is in the shape of the upper anterior angle, which lies beneath the hind corner of the frontal at the notch in which is situated the head of the fifth suborbital. In the cod the corner of the postfrontal is triangular, whereas in the saithe and lythe it is rounded.

In the cod the bone is united to the prootic by sutures in the whole of the region in which they are in contact, but in the saithe these two bones are only united by a few sutures at the posterior end (and even these may be absent), while the remaining portions of their edges are smooth, and simply bound together by cartilage. In the lythe there is only an intermediate portion free from sutures, both ends being serrated for articulation.

In the case of the orbitosphenoid, in all three species the outer layer of the postfrontal lies over on the upper part of that bone without there being any very close union.

The part of the postfrontal which is seen in the top view of the skull is small in the lythe, a little larger in the saithe, and largest in the cod.

Squamosal (Sq.).

Cod, Fig. 45, Pl. IX.: Saithe, Fig. 9, Pl. IX.: Lythe, Fig. 24, Pl. IX.

The squamosal overlaps the postfrontal in front; it articulates with the prootic below, with the opisthotic below and behind, and on the inside with the parietal and paroccipital. Between the postfrontal and the squamosal there is a large depression filled with cartilage; this forms the anterior part of the hyomandibular socket. The upper rim of the socket in the squamosal stands well up from the surface of that bone in the saithe and lythe, whereas in the cod the rim is low and sometimes absent. The bone-fold on the upper surface of the squamosal which shields part of the infraorbital canal, ends posteriorly, in the cod and lythe, just about the level of the hind margin of the hyomandibular socket, whereas in the saithe it comes well behind that point. The extreme breadth of the bone-fold is in the lythe greater than in the saithe. In the cod the end of the corresponding bone-fold of the frontal overlaps for a bit the anterior extremity of the fold of the squamosal; in the saithe and lythe they meet, and simply the extreme edge overlaps.

The articulation of the squamosal with the paroccipital is a cartilaginous union. In the cod these two bones are, in the region of the union between them, semi-cartilaginous.

Orbitosphenoid (Or. S.).

Cod, Fig. 43, Pl. IX.: Saithe, Fig. 7, Pl. IX.: Lythe, Fig. 22, Pl. IX.

The orbitosphenoid is a little semicircular bone inserted between the frontal, postfrontal, and prootic. It is seen only in side and ventral views of the skull. The two orbitosphenoids are connected together by a cartilage which is closely applied to the lower surface of the frontal.

Prootic (pr O.).

Cod, Fig. 47, Pl. IX.: Saithe, Fig. 12, Pl. IX.: Lythe, Fig. 26, Pl. IX.

The prootic articulates with the postfrontal and orbitosphenoid in front, with the squamosal above, the parasphenoid below, and the opisthotic behind. The edge of the prootic overlaps the orbitosphenoid, and it itself is overlapped by the squamosal, parasphenoid, and opisthotic. The prootic shares superiorly in the formation of the cartilage-filled depression in the front part of the hyomandibular socket.

The internal surfaces of these bones in the saithe and lythe resemble one another more than they do that of the cod. On the anterior upper part of this surface there is a fan-shaped bony mass. In the cod it is distinctly fan-shaped, but in the lythe and saithe it has a deeply incurved posterior edge. Below there is a smooth curved articular border in the saithe and lythe, whereas in the cod it is irregular and laminate.

Parietal (P.).

Cod, Fig. 38, Pl. IX.: Saithe, Fig. 3, Pl. IX.: Lythe, Fig. 18, Pl. IX.

The parietal articulates in front with the frontal, on its inner side with the supraoccipital, on its outer side with the postfrontal and squamosal, and behind with the paroccipital.

There is a distinct difference in the shape of this bone between the saithe and the lythe. In the lythe its breadth is equal to about two-thirds of its length, whereas in the saithe it is less than one-half. In the cod it is about one-half.

Posteriorly the bone has in the saithe and lythe a long thick sutural process which runs up on the outer edge of the paroccipital. In the cod this process is short, and it is a sort of angular cap fitting on the edge of the paroccipital. The dorsal process of the paroccipital is pierced by a foramen on the outer side of its base. By this foramen issues the *nervus lateralis* (Owen).

Opisthotic (op. O.).

Cod, Fig. 49, Pl. IX. : Saithe, Fig. 14, Pl. IX. : Lythe, Fig. 28, Pl. IX.

The opisthotic articulates with the prootic in front, the squamosal and paroccipital above, the parasphenoid and basioccipital below, and the exoccipital behind.

In the saithe the process which articulates with the corner formed by the paroccipital and the exoccipital bones is much longer than in the cod and lythe. In the former it is more than half the length of the process which articulates with the hind projecting portion of the squamosal; that is, measuring from the angle between the two processes of the opisthotic. In the cod and lythe the process is very small. In the saithe the long process which articulates with the squamosal is slender and sharp-pointed : in the cod it is broad and ends in a blunt extremity; in the lythe it is broader towards the tip than in the saithe, but it sometimes ends in a sharp point.

On the posterior edge of the base of the long process there is a roughened area for articulation with the short arm of the post-temporal.

Exoccipital (e. Oc.).

Cod, Fig. 41, Pl. IX.: Saithe, Fig. 5, Pl. IX.: Lythe, Fig. 20, Pl. IX.

The exoccipital articulates above with the paroccipital, above and on the inner side with the supraoccipital, on the outer side with the opisthotic, and below with the basisphenoid. Behind, it is bound, by means of a ligament lodged in its hollow posterior process, to the atlas vertebra.

The ridge running longitudinally on the bone is much more prominent in the saithe than in the cod and lythe.

On the internal surface of the bone projecting into the cranial cavity there is a peculiar process, which consists of a broad blade connected to the main bone by a narrow neck. The blade is long, more than twice its breadth, and tapers to a point in the saithe and lythe. In the cod it is rather short and thick, in length not twice its breadth; its free end is broader than the rest of the process. The neck part is in the lythe very narrow, in the saithe and cod it is much broader than in the former.

Paroccipital (par. O.).

Cod, Fig. 40, Pl. IX.: Saithe, Fig. 4, Pl. IX.: Lythe, Fig. 19, Pl. IX.

The paroccipital is of an irregular hollow pyramid shape. It forms the corner between the parietal, supraoccipital, exoccipital, squamosal, and opisthotic. Its edge of attachment to the squamosal is smooth, without sutures, the union being made by means of cartilage. The hind edge of the disarticulated bone is always less than the superior edge.

The paroccipital of the saithe is much larger than that of the cod and lythe. In the lythe the greatest breadth of the base of the pyramid is just about four-fifths of the greatest length (*i.e.*, the upper surface); in the cod it is equal to the length, and in the saithe the base is only equal to half the length.

Atlas Vertebra (At.).

Cod, Fig. 28, Pl. XI.: Saithe, Fig. 27, Pl. XI.: Lythe, Fig. 26, Pl. XI.

The atlas vertebra is firmly attached to the skull. It articulates with the basisphenoid, and is bound by ligament to the exoccipital, while its neural spine is firmly connected by ligaments to the occipital spine.

The differences between the atlas vertebræ of the three species are not striking. In the saithe the neural spine is thin, while in the cod and lythe the spine is much thicker.

Dentary (D.).

Cod, Fig. 42, Pl. X.: Saithe, Fig. 18, Pl. X.: Lythe, Fig. 12, Pl. IV.

As would be expected from the outward form of the jaws, the mandible of the lythe is longer than those of the cod and saithe, while in general the arch formed by the united mandibles of the lythe resembles that of the saithe and differs from that of the cod. The united dentaries form an arch which in the saithe and lythe is narrow at its apex: in the cod it is broadly rounded. The hind extremities of the dentaries turn inwards in a horse-shoe form in the cod, whereas in the saithe and lythe they are directed backwards and outwards (Cod, Fig. 31: Saithe, Fig. 29: Lythe, Fig. 30, Pl. XI.). Then the ventral descending plate of the dentary curves inwards towards its fellow on the opposite side in the cod and lythe, but does not do so in the saithe. In the shape of the apex of the arch considerable difference is noted between the three species. The tuberosities on the anterior ends of the dentaries project in the saithe well in front on either side of the symphysis: in the lythe they are very small, and in the cod even less conspicuous. In neither of the two latter do they project beyond the gently curved contour of the apex of the arch.

The dentaries are, moreover, to be readily distinguished by the size of the teeth, or, if they are absent, by the diameters of the tooth-sockets. In the saithe there is a more or less complete double row of small teeth on each mandible; at its anterior end, and close to the symphysis, there is an increase in the breadth of the toothed area, three rows being usually very distinct. In the lythe there is usually one complete row on each dentary, with a doubling of the row, by the addition of smaller teeth, at the side of the symphysis. The teeth of the main row in the lythe are much larger than those of the saithe, and even the small tooth-sockets of the lythe are as big as the largest in a similarly-sized dentary of the saithe. In the cod there are two rows, an outer of smaller teeth and a hind row of teeth which when compared to those of the saithe and lythe are huge.

When the united dentaries are viewed from in front, the apex is seen to be slender, in dorso-ventral measurement, in the cod, while in the saithe and lythe it is massive. Inferiorly, the ends of the dentaries recede from one another at the symphysis, the saithe leaving a wide angle, whereas in the lythe there is only a very slight separating notch.

In side view (from without) the different breadths of the descending plates of the dentaries are well seen; that of the lythe is distinctly greater than that of the saithe, especially anteriorly, while the plate of the cod is in its turn narrower than that of the saithe. There is also a distinct separation between the three forms in respect of the angle at which the upper hind ramus of the dentary rises. In the cod it slopes upwards very gently from the line of the tooth area, while in the lythe it breaks sharply upwards; in the case of the saithe an intermediate condition is present. In the side view of the cavity which receives the long process of the articular distinct differences are seen. A small area of the inner side of this cavity is seen posterior to the outer border in the lythe, a larger area is shown in the cod, and a still greater in the saithe. This is due mainly to the fact that the inner side of the cavity is carried further posteriorly in the saithe than in the cod, and in the cod than in the lythe. The outside of the cavity is shorter in the lythe and saithe than in the cod.

The large barbel of the cod is a marked point of difference between that form and the saithe and lythe. In the two latter there is only a small barbel formed by the union of two cartilage elements which arise, one from each dentary. In the lythe the barbel does not project outside the skin, and in the saithe there is only a minute soft barbel.

Premaxilla (pr. M.).

COD, Fig. 41, Pl. X.: SAITHE, Fig. 14, Pl. X.: LYTHE, Fig. 3, Pl. IV.

The same characters as regards the size of the teeth which served to distinguish the dentaries of the three forms are useful as a means for separating the premaxillæ also. The teeth are, however, much more numerous in the latter. In the saithe there are at the part next the symphysis as many as 9 to 12 rows; the toothed area becomes narrower the further it extends along the premaxilla until it is reduced to a single row, which is the outermost row. The tooth-sockets are small, those in the hind rows being the smallest, and the sockets increase in diameter towards the outer row. In the dentary the hind row had the largest teeth. The toothed area on the premaxilla is shorter than that on the dentary in the saithe; they are of about the same length in the lythe; and in the cod that of the premaxilla is of the same length or a little larger than that of the mandible. The toothed area occupies about six-sevenths of the length of the premaxilla in the saithe, about nine-tenths in the lythe; and in the cod it extends almost to the end of the bone. In the lythe there are fewer rows of teeth than in the saithe. The teeth are, however, larger, especially so in the outer row. As many as six teeth are made out in a cross-section of the head of the premaxilla (next to the symphysis), but they are usually fewer in number. In a small female lythe measuring 36 cm., in the broader part of the toothed area there were three rows; in the dentary there was one row only. The huge teeth in the outer row on the premaxilla of the cod at once separate it from those of the saithe and lythe. As in the other two species, the hind teeth are the smaller.

In general shape, looked at from below, the premaxillæ of the saithe and lythe are more curved than that of the cod. In side view the vertical process (or plate) on the posterior third of the bone is long and rather narrow in the cod in contradistinction to those in the saithe and lythe, which are roughly of a truncated triangular form. In two equally-sized premaxillæ of the saithe and lythe, the rounded projection on the head of the bone is higher in the saithe than in the lythe; in the latter it is more rounded on its anterior edge. In side view there is in the anterior end of the bone a cleft between the base of this plate and the beginning of the toothed area. The prominence of this cleft, which is deeper in the lythe than in the saithe, is worthy of notice. In the latter there is a considerable thickness of bone, rounded in front, between the base of the plate and the lower surface of the premaxilla; in the lythe the breadth of the cleft reduces this to a very thin strip.

The smaller process on the head of the premaxilla articulates with the lower part of the head of the maxilla. The higher process of the premaxilla of one side is bound by a long ligament to the base of the process of the palatine on the other side. Behind the two premaxillæ there is a large cubical mass of cartilage which serves to connect them with the front of the ethmoid.

Maxilla (M.).

Cod, Fig. 40, Pl. X. : Saithe, Fig. 13, Pl. X. : Lythe, Fig. 2, Pl. IV.

The maxilla of the cod is a longer bone than that of the saithe and lythe, and in the two latter the head of the bone is bent downwards more than in the former. At the anterior part of the head of the maxilla there is a facet for articulation with the premaxilla. In front of it there is a prominent projecting edge which in the saithe and lythe is semicircular in shape, and in the cod roughly triangular. Alongside the articular facet just mentioned there is a large tuberosity in the cod, which is absent in the saithe and lythe, or marked in the latter by a slight elevation. A ligament binding the maxilla to the premaxilla is attached at this point.

The maxilla articulates with the premaxilla in front, behind with the vomer, and above with the process of the palatine. Its free end is united by means of cartilage to the end of the premaxilla, and also by a thick round cartilaginous ligament to the depression on the outer surface of the dentary.

Articular (Ar.) *and Angular* (An.).

Cod, Fig. 43, Pl. X. : Saithe, Fig. 19, Pl. X. : Lythe, Fig. 13, Pl. IV.

A first point of difference is seen in the shape of the posterior end of the articular. Its hind region has a broad ventral expansion which is larger in the saithe and lythe than in the cod. In articulars of the same size the angular of the cod is much larger than that of the other two species. The angle between the lower plate and the rest of the articular is nearly a right angle; in the saithe and lythe it is much less. The three forms differ from each other in respect to the share which the angular takes in the lower edge of the ventral expansion. In the lythe the angular forms less than one-half of the lower margin, in the saithe it constitutes a little more than one-half, and in the cod three-fourths of the same. The sharp extremity of the plate is carried farther forward in the lythe than in the saithe. On the long shield of the Meckel's cartilage there is a high longitudinal ridge; in the saithe and lythe it is rounded off.

The posterior border or rim of the cavity which serves for articulation with the quadrate projects in a triangular mass, to which is attached the ligament binding the articular and quadrate together. In the cod this elevated border is small and distinctly separated from the articular surface; in the saithe and lythe it is massive. The superior corner of the articular is broader in the lythe than in the saithe. The edges of the groove in the articular which holds part of the hyomandibular sensory canal are in the saithe and lythe low; in the cod they are prominent.

In front the articular fits into the hollow dentary; behind it articulates with the quadrate and is bound to that bone and the preoperculum by ligaments. The angular is connected by means of a strong ligament to the interoperculum.

Hyomandibular Arch.

Hyomandibular (Hy. M.).

Cod, Fig. 36, Pl. X.: Saithe, Fig. 12, Pl. X.: Lythe, Fig. 11, Pl. IV.

The *hyomandibular* has three large processes; the hind one, which has a hollow extremity, articulates with the operculum by means of a ligament; the median, a boot-shaped expansion, is firmly attached to the upper part of the anterior border of the preoperculum, while the anterior process is fixed behind to the median flat plate-like process on the front edge of the preoperculum, and anteriorly to the metapterygoid. The symplectic is united by ligament to the union between the anterior process of the hyomandibular and the preoperculum. This cartilage is lodged in the hollowed extremities of the processes of the hyomandibular and symplectic.

The hyomandibulars of the three species differ to a considerable extent from one another. In the saithe and lythe the median boot-shaped process is quite free from the hind process except at its base; in the cod the heel and back of the boot are united to it by bone, and the uniting bone-plate forms a ridge running out to the extremity of the hind process. Moreover, the toe of the boot is pointed almost vertically downwards in the cod, while in the lythe and saithe it is directed downwards and forwards.

The anterior process is of two parts: the hind portion has a hollow extremity and lodges a ligament which binds it to the symplectic; the fore part is irregular and serrated for suture with a complementary surface on the metapterygoid. In the cod this fore irregular portion is nearly as broad as the hind articular part. From its anterior border there rises a bony wall which forms with a broad expansion from the main body of the bone an arch which overhangs the proximal extremity or origin of the front process. This arch joins the median boot-shaped process. The hollow beneath the arch lodges certain of the muscles pertaining to the mandible. In the saithe and lythe homologous structures are present, but they do not form a distinct arch as in the cod.

Superiorly the bone is rounded into a large knob which fits into the socket on the squamosal. On the hind edge of the posterior process there is a thin lamina of bone uniting it to the main articular knob. It runs along the former as a sharp high ridge, which narrows rapidly to vanish at the extremity. In the lythe it extends to the end of the process; in the saithe it usually stops a little short of the same; in the cod it is small and does not extend along much more than half the length of the process.

If the bones are looked at from in front (as they lie in the fish), it is seen that the prominent ridge arising from the anterior border of the front process gives a great breadth of triangular shape to the fore edge of the bone in the cod. In the saithe and lythe the anterior edge is narrow.

Metapterygoid (m. Pt.).

Cod, Fig. 38, Pl. X.: Saithe, Fig. 15, Pl. X.: Lythe, Fig. 11, Pl IV.

The metapterygoid is a generally triangular bone, with a slender apex, which is superior. In the upper part of this bone there is in the cod a flat plate standing almost perpendicular to the rest of the bone. It begins about the middle of the bone and rises to its greatest height just before reaching the level of the apex. This flat expansion is, when the bone is viewed edgeways, triangular, and very broad superiorly. It forms the part which unites with the anterior surface of the first process of the hyomandibular, which, as was noted above, is very broad in the cod. In the lythe this ridge of the metapterygoid is very narrow. In the saithe, instead of a ridge running vertical to the plane of the bone, as in the cod, there is a wing-like expansion broader than the ridge in the lythe, and much narrower than that of the cod; it rises at an angle from the edge of the bone, and is continued superiorly to give a broad apex to the same.

The metapterygoid is united by sutures with the pterygoid, symplectic, and hyomandibular; it is bound to the quadrate by cartilage.

Symplectic (Sy.).

Cod, Fig. 39, Pl. X.: Saithe, Fig. 17, Pl. X.: Lythe, Fig. 11, Pl. IV.

A large portion of the symplectic lies in a groove on the inner surface of the quadrate. In the case of the cod nearly all the lower half of the bone is thus enclosed, while in the lythe a little less than the half, and in the saithe only the lowest third take part in the articulation with the quadrate. On the posterior edge of the symplectic, just where it leaves the quadrate, there is in the saithe a hook-like expansion. In the lythe there is an angle, but not a backward-turned process as in the saithe. In the cod there is a downward expansion of the internal surface of the bone to form a broader area for articulation with the quadrate.

Quadrate (Q.).

Cod, Fig. 44, Pl. X.: Saithe, Fig. 16, Pl. X.: Lythe, Fig. 11, Pl. IV.

The quadrate is united with the symplectic and lower part of the preoperculum behind and with the pterygoid in front; above, it is bound to the metapterygoid by cartilage.

The main point of difference between the bones of the three species is in the comparative breadth of the broad articular plate which serves for attachment of the cartilage uniting it with a similar part of the metapterygoid. In the saithe and lythe this articular plate constitutes the greater part of the superior portion of the bone. In the cod, however it is seen in external view to occupy less than half of that region. This is due to the fact that a part of the articular area is hidden by the forward growth over it of the bone in the region of the groove which serves for articulation with the symplectic.

The hind process of the quadrate which unites with the lower part of the preoperculum is longer and stouter in the saithe than in the lythe, and the articular groove in its posterior surface is deeper than in the latter. The groove, moreover, twists outwards and backwards considerably, while in the lythe the torsion if present is slight.

Pterygoid (Pt.).

Cod, Fig. 37, Pl. X.: Saithe, Fig. 11, Pl. X.: Lythe, Fig. 11, Pl. IV.

The posterior end of the pterygoid in the cod is practically at right angles to the long axis of the bone; in the saithe and lythe the hind edge is more or less inclined upwards. There is a deep bend or curve in the hind part of the superior edge of the bone in the cod, which is absent in the saithe and lythe. In all three species the bone is broadest at its posterior end, and while in the cod and lythe the superior edge turns inwards immediately in front of the articulation with the metapterygoid, thereby much reducing the breadth of the bone, in the saithe the upper border is carried anteriorly a considerable distance before it turns inwards to any marked degree. The pterygoid of the saithe has thus a broader surface and a distinctly different shape from the other two species. In the lythe the bone is deeply forked anteriorly, while in the cod and saithe the fork is small.

The pterygoid is bound to the metapterygoid, and quadrate behind, with the palatine in front, and superiorly with the entopterygoid.

Palatine (Pl.).

Cod, Fig. 34, Pl. X.: Saithe, Fig. 9, Pl. X.: Lythe, Fig. 11, Pl. IV.

The palatine is a trowel-shaped bone, with the handle directed anteriorly. In the cod this bone is much flatter than in the saithe and lythe. In the last species the long articular process which is inserted into the pterygoid is a little less than one-third of the total length of the bone; in the saithe it is about one-fifth, and in the cod about one-third.

The outer border of the blade of the trowel if continued forward would in the saithe and the lythe not intersect the handle, whereas in the cod it would cut the handle near its base. In the saithe and lythe the outer border of the blade of the trowel is turned up, giving rise to a hollow (saithe) or groove (lythe) on the surface of the blade. The outer corner projects beyond the front edge of the blade in the lythe. The curve between the under surface of the handle and the front edge of the blade is in the lythe an arc of much smaller radius than that of the saithe, owing to the fact that in the latter the base of the handle is thicker (dorso-ventrally) than in the lythe. The corresponding arc in the cod is of even greater radius than that of the saithe.

Entopterygoid (en. Pt.).

Cod, Fig. 35, Pl. X.: Saithe, Fig. 10, Pl. X.: Lythe, Fig. 11, Pl. IV.

One striking point of difference is the small size of this bone in the lythe compared with those of the cod and saithe. In the case of the first the entopterygoid is a bone which shows very little character. It is simply a little flat transparent bone having a toothed anterior edge and a rounded slightly wavy posterior border. It is not perfectly flat; a ridge runs from its anterior superior border towards the centre of the bone. Between the ridge and the outer edge there is a triangular depression. The ridge and the depression are characteristic of the bones of the three species.

The entopterygoids of the saithe and cod differ mainly in the shape of their posterior ends which articulate with the pterygoid. Both have serrated edges, and the upper part of the hind edge projects beyond the lower half, a little in the saithe and a considerable difference in the cod. In the latter, then, the posterior edge is distinctly beak-shaped. In one or two cases the hind edge of the entopterygoid of the saithe was not serrated, and posteriorly in one case at least the posterior end was of a mitre-shape. In the case of the lythe a small projecting piece has been noticed on the middle of the hind border.

The pterygoid is bound to the palatine by cartilage. In the cod and saithe the hind end is interlocked with the pterygoid; in the lythe the union is only by means of connective tissue.

Preoperculum (pr. Op.).

COD, Fig. 31, Pl. X.: SAITHE, Fig. 5, Pl. X.: LYTHE, Fig. 26, Pl. IV.

The preopercula of the three species are more or less readily distinguished. The flat plate projecting from the anterior edge of the bone articulates with the outer surface of the front process of the hyomandibular. The three species differ in respect to the size of the flat process of the preoperculum. In the cod it is much larger than in the other two; it is of two parts, an inferior short lobe and a superior long upwards-directed triangular lobe. In the lythe the anterior edge of the process is divided by an angle into two nearly equal lobes; in the saithe this edge is more or less straight and the whole process is of a quadrilateral shape.

Superiorly the bones differ somewhat. In the cod and saithe the anterior superior corner is prolonged into a stout triangular process. In the lythe this projection is not prominent; it forms one side of a notch in the superior border of the preoperculum.

The anterior edge of the upper half of the bone curves backwards more in the cod and lythe than in the saithe.

In the saithe and lythe the preoperculum is much narrower in its lower half than in the superior; the posterior edge bends anteriorly just at the level of the median articular process. It immediately turns out a little, and then bends anteriorly again, in this way reducing the breadth of the lower half. In the cod the inbend at the level of the median process is hardly noticeable, and the lower half, although it is narrower than the upper, has its posterior edge a regular continuation of the curve followed by the edge of the upper half.

In the cod the preoperculum is ossified except for a narrow strip of its hind border; in the saithe and lythe a considerable portion of the posterior region of the bone is transparent, membranous. The ossified anterior half of the bone is thick and its outer surface projects backwards as a broad fold, in this way forming a deep grove which lodges the hyomandibular sensory canal. In the superior part of the bone a posterior wall is furnished to the groove by a short bony ridge. The groove is open in the greater part of its length in all three species, but superiorly it is in the saithe a closed canal, in the cod an open groove, and in the lythe it is either open or partially closed at the lower end of the short ridge. In three lythe, viz., female 36 cm., female 47·6 cm., and female 87·8 cm, the groove was open in its entire length, and while in female 82·9 cm., male 86 cm., female 78·4 cm., and female 39·8 cm., there was a little bridge across the groove; in male 75 cm., female 76·4 cm., and male 71·4 cm., a considerable part of the upper channel was closed. The projecting fold which forms the groove is in the main portion of the bone supported by three little bony pillars, which may be complete, but usually one or more, or even all, are incomplete in certain preopercula.

The preoperculum articulates anteriorly and superiorly with the front and median processes of the hyomandibular, and with the symplectic and quadrate inferiorly; behind it is bound by ligaments to the operculum, suboperculum, and interoperculum. On the internal surface of the median anterior expansion there is a hollow which receives the head of the stylohyal. This cavity is bounded by the ends of the hyomandibular and symplectic processes.

Operculum (Op.).

Cod, Fig. 33, Pl. X.: Saithe, Fig. 7, Pl. X.: Lythe, Fig. 27, Pl. IV.

The shape of this bone differs in the three species. It is cleft on its posterior border by a more or less deep angle. In the cod the angle is deep, and the two lobes thus formed are very different from one another. The superior is triangular and ends in a narrow apex; the lower is broader and mitre-shaped. In the saithe and lythe the angle enters slightly, in the saithe less than in the lythe.

The socket for articulation with the hind process of the hyomandibular is in the anterior upper corner. The superior edge of the bone runs nearly parallel with the axis of the socket. The anterior and inferior edges are in one curve ending in the apex of the broad lobe.

In the lythe the two lobes of the operculum are of nearly the same size, and except for the widely arched inferior edge it is somewhat difficult to distinguish the two. The bone of the saithe is readily separated from the other two by the great development of the lower lobe. In large specimens the lower lobe is nearly square. The anterior edge of the operculum passes from the articular socket vertically downwards, and then curves backwards to join the inferior edge. In the cod and saithe there is in the anterior superior corner just above the socket a prominent angle. In the lythe it is absent. The operculum is joined to the preoperculum and suboperculum by ligaments; it overlaps the latter bone.

Suboperculum (sb. Op.).

Cod, Fig. 32, Pl. X.: Saithe, Fig. 6, Pl X.: Lythe, Fig. 28, Pl. IV.

The suboperculum of the cod is separated from that bone in the saithe and lythe by the fact that there is in its anterior edge a notch, in which articulates the hind end of the interoperculum. The subopercula of the saithe and lythe rather resemble one another. They are shoe-shaped, but while in the case of the lythe the "instep" part is high, in the saithe it is low. In the lythe the upper edge is gently, in the saithe more deeply, curved downwards. The hollow in the upper edge is the part where the lower lobe of the operculum overlaps the suboperculum. In the cod and lythe the suboperculum ends in a broadly rounded hind extremity, while in the saithe the bone tapers away gradually to a much narrower end than in the former two fishes. The extremity of the suboperculum is in the cod of about the same breadth as that in the lythe, and in general shape the subopercula of the cod and lythe resemble one another more than they do that of the saithe. The shape of the hind portion of the suboperculum has a direct relation to the shape of the operculum. Thus the breadth of the hind end of the former depends on the depth of the angle between the two lobes of the operculum. The extremity of the suboperculnm fills up the gap which the angle in the operculum makes in the opercular plate.

The suboperculum is overlapped by the operculum, preoperculum, and interoperculum. The bones are bound together by ligaments. In the cod there is a distinct articulation between the hind end of the interoperculum and the anterior edge of the suboperculum, whereas in the saithe and lythe the posterior extremity of the former simply overlaps the front end of the former.

Interoperculum (in. Op.).

Cod, Fig. 30, Pl. X.: Saithe, Fig. 4, Pl. X.: Lythe, Fig. 20, Pl. IV.

The interoperculum is a long and rather narrow bone. In the cod it is almost completely ossified, only the hind inferior area remaining membranous, while in the lythe and saithe a larger portion—almost the half in the case of the latter—is membranous. At their narrow anterior extremities, where the strong ligament binding the interoperculum to the angular is attached, the bones of the three species are ossified. In the cod the interoperculum is broadest at the middle of its length, and narrows to either end. In the lythe the middle portion and the posterior end are of about equal breadth, whereas in the saithe the hind extremity is rather broader than the middle part.

On the inner surface of the interoperculum there is a socket which receives the head of the epihyal at its articulation with the inferior end of the stylohyal. In the edge of the bone, just above the articular socket, there is a notch or depressed portion very well marked in the saithe, not so distinct in the lythe, and in the cod practically obliterated.

The saithe and lythe differ in respect to the form of the articular socket on the inner surface of the bone. In both forms the posterior border or rim of the socket is prominent, but while in the saithe it stands almost perpendicularly to the plane of the bone, in the lythe it rises at a very small angle. In the cod this rim rises at a greater angle than in the lythe, in some specimens of cod nearly approaching a right angle. In the cod there is behind the socket a large rounded prominence.

The interoperculum articulates in front by means of a ligament with the angular; it is overlapped superiorly by the preoperculum; it overlaps the suboperculum, and it articulates by its internal surface with the epihyal.

Branchiostegal Arch.

Basihyal (b. Hy.): *Ceratohyal* (cer. Hy.): *Epihyal* (ep. Hy.): *Stylohyal* (st. Hy.).

Cod, Figs. 45–48, Pl. X.: Saithe, Figs. 20–23, Pl. X.: Lythe, Fig. 14, Pl. IV.

The basihyals differ a little in the three species. The larger, viz. the ventral one, is in the lythe, in side view, seen to be roughly of a parallelogram shape, whereas in the saithe it is triangular. The form in the lythe is due to the hind end being extended backwards over the anterior end of the ceratohyal in a triangular expansion. The head of this basihyal, which is bound by ligament to its fellow of the opposite side, is in the cod marked off by a neck-like constriction, which is not present in the two other species.

The ceratohyals do not show great differences. In general shape that of the lythe occupies an intermediate condition between those of the cod and saithe. In the region where the first three branchiostegal rays are attached to the internal surface of the ceratohyal, the ventral outline of the bone bends upwards, then runs forwards, to bend slightly downwards before reaching the extremity of the bone. In the cod there is here then a fairly deep concavity in the ventral outline, in the saithe a slight inbending, and in the lythe an intermediate condition.

In the saithe there is in this region a strong ridge coming down to the ventral edge. This gives to the bone in front of it a distinct depression which is not prominent in the lythe and cod.

In the case of the epihyals no readily distinguished points of difference were made out.

The stylohyal of the lythe is longer and broader at its base than that of the saithe in fishes where the ceratohyal and epihyal, along with the two basihyals, form structures of equal length. Under similar circumstances the stylohyal of the cod is of about the same length as that of the lythe, and greater than that of the saithe.

Urohyal (u. Hy.).

COD, Fig. 50, Pl. X.: SAITHE, Fig. 25, Pl. X.: LYTHE, Fig. 16, Pl. IV.

The differences between the urohyals of the three species are apparent at a glance. The head of the urohyal is deeply cleft, and in the cavity is attached the ligament binding it to the upper basihyals and to the first basibranchial. On either side of the anterior edge there is attached a strong broad ligament binding it to the basihyals on either side.

In general shape the urohyal of the saithe is roughly rectangular, with the cleft head projecting from the upper proximal angle. In the cod the bone is roughly triangular, while in the lythe the urohyal differs from that of the saithe by the greater slope of the anterior edge, and by the fact that while the blade of the bone remains in the saithe of about the same breadth in almost its whole length, in the lythe it tapers rapidly and ends in a pointed extremity. In the saithe the posterior extremity is rounded in outline. The end of the urohyal is serrated in the saithe and lythe: in the lythe the serrations are fewer and deeper. In the cod the posterior border of this bone is smoothly rounded, with superiorly some ridges and blunt processes to which ligaments are attached. The urohyal is traversed longitudinally by three ridges which radiate from a point situated a little below the middle of the front border. The radiating ridges are more prominent in the lythe than in the cod and saithe. The urohyals are cleft longitudinally at the inferior proximal corner. The anterior end of the urohyal of the saithe is rounded, and is on the whole vertical to the ventral edge of the bone; in the cod this edge slopes backward slightly, and in the lythe very much.

Branchiostegals Brst.).

COD, Fig. 49, Pl. X.: SAITHE, Fig. 24, Pl. X.: LYTHE, Fig. 15, Pl. IV.

The seven branchiostegals are divided into two groups. The first three rays articulate in depressions on the inner side of the ceratohyal, while the 4th to 7th inclusive articulate in three broad depressions on the outer surface of the bone. The 6th and 7th articulate with one and the same depressed area. The first ray is the smallest, and the rays follow one another in regularly ascending series. It is thus easy in the event of a complete set of branchiostegal rays of any one fish to arrange them in order. It is, however, difficult to discover characters which would enable one to determine from an examination of one ray alone its position in the series, and even more so to assign it to its proper species.

When the branchiostegals are seen, in position on the fish, from the side, they are all more or less bow-shaped, with the convexity on the anterior side.

The first three rays are much more slender than the remaining four; they have small smooth articular heads, and taper slightly. The 4th and 5th rays resemble one another somewhat; they are broadest at the head, and from a little behind the head taper off gradually. The 6th and 7th have usually falcate heads. The 7th is the broadest as well as the longest ray. The 4th–7th branchiostegals show on the inner surface of the head a flattened smooth articular surface.

The rays, while being most noticeably bent in a vertical plane, as for example in a side view of the fish, are very distinctly bent in another plane; and for the purpose of description the branchiostegals of the left side of a lythe have been selected.

If the ray is grasped in its upper half between the finger and thumb of the left hand with its posterior edge facing the observer, a considerable amount of curvature to the right or left will be noticed. This varies in amount and direction in different rays.

If the first ray be examined in the manner indicated, the bone is seen to be bent to the right in its upper half and to the left in its lower, in shape resembling the letter S, thus $\substack{(\\)}$.

The second ray is of similar shape to the first, but it is not so much bent in either direction.

The third shows a very slight bend to the right at the head, and a wide sweep to the left in its distal half.

The fourth is bent in only one direction, viz. to the left, in this form).

The fifth is bent in the same direction, but to a less extent than the fourth.

The sixth is almost straight, but shows a slight bend to the left at its head.

The seventh is bent to the left in the upper half and to the right in its lower, in shape suggesting a Z, somewhat in this form $\substack{)\\(}$.

A certain amount of variation exists, but the above description will be found, on the whole, fairly constant. The bend to the right (of the observer) of the upper end is characteristic of the first two, and sometimes the third ray. The bend of the head to the left is characteristic of the 4th–7th rays. These remarks apply to the saithe also.

In the case of the cod the rays are not nearly so much bent to either side as in the preceding. Thus the first is practically straight; the distal part of the bone is twisted to the left. The second is similar to the first. The third is straight. The fourth shows a distinct curve on the left side, that is the upper and lower ends are bent to the left. The fifth is straight, and the 6th is slightly Z-shape. The seventh is very markedly Z-shaped.

The first three rays of the lythe are hyaline semi-transparent bones: the first and second of the saithe are also hyaline, while the third is partly so; in the cod the first is hyaline, and the second partly of that nature.

In the branchiostegals of the saithe the transverse growth layers are very distinct; in the lythe they are also to be made out, although they are to some extent hidden by longitudinal striation in the last four rays. The 4th to 7th rays of the cod are white, and in them the transverse growth layers can be made out only at their distal tips. All the branchiostegals of the lythe and saithe are more or less hyaline.

The first branchiostegal of the lythe is to be distinguished from that bone of the saithe and cod by its distinct S-shape.

The fourth ray has certain distinctive characters. In the cod it has a sort of hammer-shaped head; in the lythe its head is rather pointed, while in the saithe it is rounded, with a prominent notch on the posterior edge of the head. In the saithe it is nearly round in its middle third, whereas this bone in the lythe is distinctly oval in section at that part. Both end in flattened extremities.

The fifth ray of the cod is somewhat triangular in section; in its last fourth it flattens out. In the saithe it is oval in section in the middle third; in the lythe the head of this ray is smaller, but otherwise there is a general resemblance between the two. They both have flat sword-shaped ends. The head in the saithe is as broad as any part of the bone, whereas in the lythe the head is distinctly narrower than the part of the bone next it.

The sixth ray in the saithe and lythe is a broad flat bone. In the cod it is a thick bone, oval in section, flattening at the point.

The seventh branchiostegal has a distinctly falcate proximal end. In the saithe and lythe both are flat bones; the greatest breadth being at the middle of their length. It is a flatter and thinner bone in the saithe than in the lythe, in which the posterior edge is much thicker than the anterior, whereas in the former they are both very thin. In the cod this ray is widest in its last fourth. Its proximal half is thick, and its distal third flat and comparatively thin.

The Branchial Arches.

The bones of the branchial arches are of well-marked forms, and are, with one or two exceptions, easily distinguished from one another. Between the lower ends of the branchial arches of opposite sides of the head are the median unpaired *basibranchials*. There are four gill-bearing arches. Each of the first three arches consists of three bones, below the *hypobranchial*, above the *epibranchial*, and between these the long *ceratobranchial*. The fourth arch has an epibranchial but no hypobranchial, but is indirectly attached to the hypobranchial of the third arch. The epibranchials are attached superiorly to the three *upper pharyngeals*. Behind the fourth branchial arch there is the *lower pharyngeal*. It is attached by cartilage to the lower end of the fourth branchial arch. The first basibranchial is attached in front to the union between the basihyals of the two sides. All the articulations between the bones of the branchial arches are made by means of ligaments which are contained in the hollow quill-like extremities of the bones.

The Branchial Bones of the Lythe.

The Basibranchials (b. Br.).

Lythe, Fig. 7, Pl. IV.

The basibranchials are three bones united together by a thick mass of cartilage. The first is a hollow helmet-shaped bone. Its closed apex points anteriorly, and within its posterior hollow end is lodged the front portion of the thick cartilage which unites it to the broad hollow anterior extremity of the second basibranchial. This bone has a wing-like expansion to either side, and on the hind part of the same there is a small toothed area. The presence of the teeth on the second basibranchial serves to distinguish this bone from that of the cod and saithe, in which there are no basibranchial teeth. The bone narrows immediately behind the toothed area and ends in a slender extremity, which is hollowed out for a ligament which attaches it to the cartilage mass which is situated between the hypobranchials and the bases of the fourth ceratobranchials, and which is continued posteriorly to the lower pharyngeals. The lower extremities of the first and second hypobranchials are received in depressions in the side of the cartilaginous body uniting the first and second basibranchials. The third basibranchial is a long slender splinter-bone joining the upper surfaces of the first and second bones, and lying directly on the top of the cartilage. It fits into a suture in either bone. Its long hind pointed extremity fits into a long hollow in the second basibranchial, and reaches back as far as the toothed areas.

Hypobranchials (hp. Br.).

LYTHE, Fig. 21, Pl. IV.

There are three hypobranchials on either side. The first two articulate below with the basibranchial cartilage and above with the first and second ceratobranchials respectively. The third hypobranchial is bound to the hind part of the second basibranchial, and its anterior slender extremity passes downwards under the second hypobranchial. The third hypobranchial has a broad posterior edge, and to the outer portion of it are attached the third ceratobranchials, while to the inner part are attached by cartilage the fourth ceratobranchials.

The first two hypobranchials resemble one another and are very different from the third. The second is shorter than the first. If they are viewed from above, the first and second bones are seen to be bent, with the in-curvature on the side next the basibranchials. The bend does not take place at the middle of the length of the bone; the lower arm is the shorter. On the first hypobranchial there is a lateral expansion on the outer side at the knee; it runs along the long arm for some distance. In the second there is only a small process on the outer side of the corner.

The third hypobranchial resembles much in shape a trowel; when *in situ*, the trowel is upside down, with its handle projecting downward and forward under the second hypobranchial. The end of the handle is hollow, and serves for the attachment of a ligament.

Ceratobranchials (cer. Br.).

LYTHE, Fig. 21, Pl. IV.

Of the ceratobranchials the greatest difficulty arises in distinguishing the second and third. The first is rather longer than the other three, which are of about equal length. The ceratobranchial is a long curved bone, roughly triangular in section, and having a longer or shorter groove, in which are lodged the blood vessels and the bases of the gill filaments. The inferior ends of the bones are of rather greater thickness than the upper extremities. The second and third alone have complete grooves running the whole length of the bone. In the first there is a short broad shallow groove on the superior half only of the posterior surface. On the fourth the groove occupies the upper two-thirds. The fourth ceratobranchial is readily distinguished from the first (and also from the second and third) by the presence of a large irregular projection on its lower half. It rises from the posterior surface, and is directed downwards. The groove in the hind surface of this bone turns inward round the base of this expansion. The first ceratobranchial has a longitudinal depression or groove on its anterior edge.

The second and third, which are readily distinguished from the other two, are not very easily separated from one another. If, however, the bones are held with the posterior grooved surfaces facing the observer, it is seen that while in the third ceratobranchial the groove remains, in the *lower third of the bone,* of one width, in the second, in that part of the bone the groove gradually widens, attaining its greatest width at the inferior extremity. Moreover, the groove on the third is seen to bend forwards and outwards near the lower extremity of the bone, exposing to view a considerable portion of the quill-like side of the articular cavity. The lower end of the third is of greater diameter than that of the second.

Epibranchials (ep. Br.).

LYTHE, Fig. 21, Pl. IV.

Of the epibranchials, of which there are four, the third and fourth are tri-radiate ; the second suggests in its form that shape. The first is a long narrow bone having a thick inferior end and a narrow upper extremity ; it has about the middle of its length a short triangular downward-directed process, which may be regarded as a rudiment of the third arm noticed in the third and fourth bones. The epibranchials articulate inferiorly with the four ceratobranchials, and above with the upper pharyngeals.

The second epibranchial is much nearer a tri-radiate form than the first; on its hind border there is a large triangular expansion. This projection is situated on the lower half of the bone.

The third epibranchial is distinctly tri-radiate ; the three arms are of about equal length. It is, moreover, distinguished from the other epibranchials by a toothed area which it alone has on its anterior edge. The end of each ray serves to lodge the end of a ligament. The thickest extremity is superior, and the end directly opposite is that which articulates with the third ceratobranchial. The third or hind ray, which is directed downwards and which is united to the lower arm by a thin plate of bone, articulates with a corresponding ray of the fourth epibranchial. The fourth epibranchial, also tri-radiate, has, however, a short hind arm, which is directed downwards.

Upper Pharyngeals (up. Phr.).

LYTHE, Fig. 21, Pl. IV

The upper pharyngeals are three in number ; they fit together to form a round toothed area situated on each side above the fauces.

The first or most anterior has a somewhat sickle-shaped toothed area ; it has at its anterior corner a short process which articulates with the first epibranchial. On the under surface of the opposite corner there is a hollow which serves for articulation with the superior extremity of the second epibranchial. The latter bone articulates also by means of its wide upper extremity with a process of the second pharyngeal ossicle. The first pharyngeal rests on an expanded thin portion of the second pharyngeal, which is the largest of the three. Its toothed area is somewhat triangular in shape. From the ventral anterior edge the thin plate of bone which supports the first pharyngeal projects. This expansion shows three articular processes, of which the more anterior is the thinnest. The latter process articulates, along with the first pharyngeal, with the first epibranchial. The median articular process of the second pharyngeal joins, as was mentioned above, the second epibranchial. The third process, which is very broad, articulates with the third and fourth epibranchials.

The third pharyngeal is a little disc-shaped toothed area. It rests on the large articular process of the second pharyngeal, and is bound by ligaments to the superior ends of the third and fourth epibranchials.

Lower Pharyngeal (l. Phr.).

Lythe, Fig. 21*a*, Pl. IV.

The lower pharyngeals are situated one on each side of the fauces : they meet in the middle line beneath the opening of the œsophagus. Each consists of a long narrow bone bearing a broad elliptically-shaped plate. This plate, which is curved inwards, is covered with teeth. It does not rest symmetrically on the bone, but projects out over the inner edge. The anterior end of the pharyngeal is hollow and lodges a ligament which serves to bind it to its fellow of the opposite side.

Comparison between the Branchials of the three species.

The description of the branchial bones of the lythe holds good generally for those of the saithe and cod. In the cod, however, the first ceratobranchial is the shortest, the second and third are a little longer than the first, and the fourth is the longest. In the saithe the first is the longest, the second is next in length, and the third and fourth, which are of the same length, are a little less than the second.

Basibranchials (b. Br.).

Cod, Fig. 20, Pl. XI. : Saithe, Fig. 14, Pl. XI. : Lythe, Fig. 7, Pl. IV.

The second basibranchial of the lythe is distinguished from those of the cod and saithe by the fact that it has two small patches of teeth on it, whereas in the two latter fishes no teeth are found on that bone.

Hypobranchials (hp. Br.).

Cod, Fig. 21, Pl. XI. : Saithe, Fig. 15, Pl. XI. : Lythe, Fig. 21, Pl. IV.

There are no very marked differences between the first hypobranchials of the three species. In the saithe the bone is more bent than in the lythe. In the cod, however, the bone is not so much bent as in the lythe, and the two arms are of equal length, whereas in the saithe and lythe the anterior is the shorter.

In the second hypobranchial the three species are to be distinguished by the form of the ventral surface of the bone. On the under or ventral surface there is a groove which is continuous with the groove in the posterior surface of the second ceratobranchial. The sides of the groove in the hypobranchial are prominent. The outer wall of this furrow is in the lythe not much higher than the inner wall; in the saithe the outer is much higher, and attains its greatest height at the angle of the bone. In the lythe the outer wall is lowest at that point. While in the saithe and lythe this wall ends just a little in front of the angle, in the cod it is carried forward to the anterior extremity of the bone. In the saithe and lythe the groove passes from the ventral to the external surface of the bone at its angle, whereas in the cod the groove is wholly on the ventral surface.

In the cod the third hypobranchial, though retaining the trowel- or scoop-shape shown by those bones in the saithe and lythe, is much flatter. In the lythe the bone has a distinct slender handle, which is not so apparent in the saithe and cod, where the handle is united in its whole extent to the outer edge of the blade by a thin bone plate. When the bone is *in situ* it is seen that in the saithe and lythe the outer edges of the blade and of the handle are in one and the same straight line, whereas in the cod the outer edge is curved. The handle in the cod turns in sharply towards the middle line: in the saithe and lythe this occurs in a hardly noticeable degree.

Ceratobranchials (cer. Br.).

COD, Fig. 22, Pl. XI.: SAITHE, Fig. 16, Pl. XI.: LYTHE, Fig. 21, Pl. IV.

In the case of the ceratobranchials, as in all the other branchial bones, those of the cod are much thicker and broader than those of the saithe, which in their turn are a little heavier than those of the lythe.

The first ceratobranchial of the saithe and lythe has a rather deep longitudinal furrow on the anterior surface; this is not found in the cod. In the saithe the posterior surface of the bone is crenate at the angle of the bend; in the lythe and cod it is smooth.

Except in their different thicknesses no satisfactory points of difference were made out between the second and third ceratobranchials of the three species. Moreover the differences used to separate the second and third ceratobranchials of the lythe were not found of so much value in connection with the saithe and cod. In both the saithe and the lythe the third ceratobranchial is a deeper bone than the second.

In the fourth ceratobranchial the differences between the three species were very slight.

Epibranchials (ep. Br.).

COD, Fig. 23, Pl. XI: SAITHE, Fig. 17, Pl. XI.: LYTHE, Fig 21, Pl. IV.

The triangular process on the hind surface of the first epibranchial is rather smaller in the saithe than in the lythe, and while in the latter the apex of the process is rounded, in the former it is a blunt angle. In the cod the process is low and not triangular in shape.

In the third epibranchial of the saithe the toothed area is very small, and much less than that in the cod and lythe. The tooth-sockets in this bone are larger in the cod than in the other two. In the saithe also the toothed area is at its superior corner raised up from the side of the upper articular process.

No very easily described differences were noticed in respect to the second and fourth epibranchials.

Upper Pharyngeals (up. Phr.).

Cod, Fig. 24, Pl. XI.: Saithe, Fig. 18, Pl. XI.: Lythe, Fig. 21, Pl. IV.

The main point of difference between the upper pharyngeals of the three species consists in the comparative size of the teeth. They are very small in the saithe, much larger in the lythe, and very large in the cod.

Lower Pharyngeals (l. Phr.).

Cod, Fig. 25, Pl. XI.: Saithe, Fig. 19, Pl. XI.: Lythe, Fig. 21*a*, Pl. IV

The teeth in the lower pharyngeals are smaller than those in the upper pharyngeals. The difference in the size of the teeth between the bones of the saithe and lythe is not very striking; in both these species the teeth are very much less than those in the cod. In the proximal portion of the toothed area in the lythe the teeth are considerably larger than the others, and than the teeth in a similarly sized saithe bone.

Dermal Bones.

The dermal bones have been described recently by Cole* in connection with his work on the sensory canals.

Nasal (N.).

Cod, Fig. 26, Pl. X.: Saithe, Fig. 1, Pl. X.: Lythe, Fig. 1, Pl. IV.

In the saithe and lythe the nasal is in large part membranous; in the cod it is almost wholly ossified. The anterior and hind borders in all three are membranous; in the saithe and lythe the membranous anterior portion is fully one-fourth of the total length of the bone. The nasal is depressed along its longitudinal axis; this furrow lodges the nasal part of the supraorbital sensory canal. Processes from either side of the anterior half of the bone approach one another, and form a partial bridge over the canal. In the cod the groove in this bone is more defined than in the other two species.

Præorbital or *Lachrymal* (pr. Or.).

Cod, Fig. 27, Pl. X.: Saithe, Fig. 2, Pl. X.: Lythe, Fig. 4, Pl. IV.

The præorbital is a triangular bone, which articulates by its hind superior corner with the prefrontal, and by its anterior end with the nasal.

In the cod and lythe the superior edge of the bone is concave, while in the saithe it is convex in outline. The præorbital of the lythe is shorter and broader than those of the saithe and cod. The hind edge of this bone in the saithe slopes more posteriorly than in the lythe and cod.

The præorbital has two prominent grooves which are formed by overhanging bone plates. The two grooves, which are in the same line, are not continuous, but are usually separated by an interval at about the middle of the bone. Occasionally there is a secondary narrow plate developed

* Observations on the structure and morphology of the cranial nerves and lateral sense organs of Fishes, with special reference to the genus Gadus, *Trans. Linnean Society of London*, 2nd series, Zoology, Vol. vii., London, 1898.

over this interval which makes the two grooves continuous, but without hiding the interval completely. In the lythe and saithe the fold covering the anterior groove is much narrower than the same in the cod, in which it reaches in the greater part of its length down close to the inferior edge of the bone. The grooves lodge the infraorbital sensory canal. The anterior fold is rather wider in the lythe than in the saithe. The articular surface for attachment to the prefrontal is much broader in the saithe and cod than in the lythe.

Suborbitals (sb. Or.).

Cod, Fig. 28, Pl. X. : Saithe, Fig. 3, Pl. X. : Lythe, Figs. 5, 6, 8, 9, 10, Pl. IV.

There are certain differences between the five suborbitals of the three species, but they are minute.

The second suborbital is in the saithe semicircular in outline; in the lythe it is nearly twice as long as it is broad, while in the cod it is longer than it is broad, but not so long proportionally as in the lythe.

The third suborbital is in the cod wider at its inferior end, and the lower anterior corner projects.

The fifth suborbital in the saithe and lythe is short; its superior extremity is much thicker than the inferior. In the cod it is a lighter though longer bone than in the other two. The top end is rather wider than the lower. The bone is excised more or less all over in a sort of fretwork fashion.

Supratemporals (s. T.).

Cod, Fig. 29, Pl. X. : Saithe, Fig. 8, Pl. X. : Lythe, Fig. 22, Pl. IV.

The supratemporals are four in number. The most remarkable in form is the second, which is a sort of unclosed tube. It is formed by the infolding of either edge to meet (but not to unite) in the middle line. The anterior inturned fold is shorter than the other, and moreover the fold is broader superiorly than it is inferiorly. In the saithe the inturned edges come close to one another, sometimes overlapping slightly. In the lythe there is usually a considerable space between the two edges.

In the saithe and lythe the ossicles resemble one another very much and differ markedly from that of the cod. In the latter the edges of the inturned folds are bent upwards. The second supratemporal is a flatter bone in the saithe and lythe than in the cod.

The third ossicle is bevelled at both ends.

The fourth supratemporal is a scoop-shaped bone having its anterior end more or less bevelled to fit the lower portion of the second ossicle. In the cod its posterior end is deeply notched; in the saithe and lythe it is bevelled, or slightly notched.

Pectoral Arch.

Clavicle (Cl.).

Cod, Fig. 10, Pl. XI. : Saithe, Fig. 2, Pl. XI. : Lythe, Fig. 3, Pl. IV.

The clavicle of the cod is readily distinguished from those of the saithe and lythe. In the two latter the hind edge of the bone is thin and the margin is of transparent bone, whereas in the cod the posterior edge is thick and the whole of the bone superior to the level of the inferior corner of the coracoid is white and well ossified. There is in all three a more or less well marked strengthening rib running from the hilum of the bone down to the point on its posterior edge where the tendon unites the free end of the coracoid to the clavicle. This ridge is especially thick in the cod, and between it and the anterior edge there is a gusset-shaped area of thin transparent bone, similar to the general structure of the clavicle in the saithe and lythe. In the cod, on the front side of the thickened bracing ridge there is a thumb-like depression on the bone. The strengthening ridge is comparatively insignificant, so far as thickness is concerned, in the saithe and lythe, but it is readily noticed from the fact that its striæ run across the general growth layers of the bone.

The bones differ in shape. The posterior edge of the lower half is more rounded in the saithe than in the lythe and cod. The bone is wider in its lower half in the former than in the two latter.

The anterior edge of the clavicle is curved, showing in side view a concave outline. The deepest part of the curve is in front of the scapular region. This hollow is in the saithe filled up with a broad ledge, which is absent or very small in the lythe and cod. In the saithe this ledge passes inferiorly on to the internal edge of the clavicle, leaving a distinct hollow between the prominent outer edge and itself. In cases where an apparent ledge is present in the cod and lythe the last condition does not obtain. In the saithe the hind border below the articulation with the scapula is straight for a little bit, and is parallel to the above ledge. In the cod the hind edge is here rounded, while in the lythē the anterior and hind edges are more or less parallel.

The hind superior process of the clavicle is in the cod short and narrow, whereas it is in the saithe broad, especially at its base. In the latter it makes, with the upper part of the hind edge of the bone, a less angle than in the cod and lythe. In the lythe the process is short and broad.

The superior vertical process of the clavicle, upon which articulates the supraclavicle, is prominent in all three species. In the saithe the angle between it and the superior edge of the bone is nearly a right angle: in the cod and lythe it is very much greater than a right angle. In the cod and lythe the superior process is usually pointed: in the saithe it is commonly truncated.

In the cod and saithe there is in the hind edge a distinct corner at the point where the coracoid ligament is attached: in the saithe the posterior border is evenly curved and does not exhibit this angle distinctly

On the internal surface of the clavicle there is the raised plate to which is articulated the scapula. The inferior and posterior edge of the plate is in the cod smooth except at its upper corner, where it is split into articular leaf-like processes. In the saithe the hind border is similar to that in the cod except that it has near its lower corner a few very small articular teeth. In the lythe, on the other hand, there are at the second articular part fairly large projecting articular laminæ.

There is a high ridge on the internal surface of the lower half of the bone. In the saithe it is a broad thin plate: in the lythe it is considerably narrower and thicker, while in the cod it is very thick and similar in height to that of the lythe.

Scapula (Sc.).

Cod, Fig. 13, Pl. XI.: Saithe, Fig. 6, Pl. XI.: Lythe, Fig. 30, Pl. IV.

The scapula articulates with the clavicle by means of a sutured portion above, and it is bound by a ligament in front to the hind surface of the front of the clavicle. The scapula lies on the projecting plate-like expansion of the clavicle. Inferiorly it is connected with the coracoid by cartilage.

The articular facet which corresponds to a basal element is larger in the saithe than in the cod and lythe. It is, moreover, in the former rounded in its lower extremity, and is thus sharply defined, whereas in the cod its outer edge simply turns inwards in a slight bend to meet the margin of the bone. In the lythe it is more defined than in the cod.

Coracoid (Co.).

Cod, Fig. 13, Pl. XI. : Saithe, Fig. 6, Pl. XI. : Lythe, Fig. 30, Pl. IV.

The coracoid is a somewhat triangular bone which is bound to the clavicle by means of a ligament attached to the long gusset-shaped anterior part of the coracoid. This ligament is part of the cartilage which unites the scapula to the clavicle. Superiorly the coracoid is bound to the scapula by ligament. The anterior ligament-bearing part is in the lythe and saithe broader than in the cod. The lower extremity of the bone is narrow, and lodges in its extremity a ligament for binding it to the posterior edge of the clavicle. Between the anterior and inferior processes there is a thin transparent bony plate. The edge of this plate is much more incurved in the cod than in the saithe and lythe, and rather more in the lythe than in the saithe.

The four *basalia* are attached to the hind edges of the scapula and coracoid.

Post-temporal (pt. T.).

Cod, Fig. 11, Pl. XI. : Saithe, Fig. 5, Pl. XI. : Lythe, Fig. 23, Pl. IV.

The post-temporal is a V-shaped bone, having its two arms of unequal length. The longer ends in a broadened thin extremity which rests on the paroccipital; the shorter has a serrated thick end which articulates with a serrated area on the opisthotic. The angle between the two arms is in the saithe more acute than in the lythe. In the saithe and lythe the shorter arm bears a greater proportion to the length of the longer than in the cod.

In the saithe the anterior corner at the base of the short arm projects as a strong triangular process, which is united by a short lamina to the interspace between the bases of the two arms. In the lythe and cod the corner is usually small, and there is no connecting bone lamina.

The shape of the base of the bone differs in the three species. In the saithe there is a prominent hind expansion at the base of the bone. In the cod and saithe the lower edge is rounded.

The post-temporal articulates below with the supraclavicle.

Supraclavicle (s. Cl.).

Cod, Fig. 9, Pl. XI. : Saithe, Fig. 3, Pl. XI : Lythe, Fig. 25, Pl. IV.

The supraclavicle of the saithe is shorter than those of the lythe and cod. It has, moreover, a widely-expanded upper extremity. The articular hollow on the lower portion of the bone is nearly half the length of the bone in the saithe, whereas it is considerably less than the half in the lythe.

The supraclavicle articulates with the post-temporal above and with the clavicle below.

Postclavicle (pt. Cl.).

Cod, Fig. 12, Pl. XI.: Saithe, Fig. 4, Pl. XI.: Lythe, Fig. 24, Pl. IV.

The postclavicle is subject to a large amount of variation; this is especially the case in the cod.

This bone has a long shaft with an expanded head. In the lythe and saithe it is a slender thin bone, in the cod the stalk is thick and irregular.

The expanded head of the bone in the lythe is short and trumpet-shaped; that of the saithe is usually a long parallelogram-shaped piece, showing sometimes, however, a broadened extremity, which gives it a trumpet form. The head is set at an angle to the stalk. In the cod the head of the bone is helmet-shaped; its extremity is rounded, not straight as in the saithe and lythe, and it has on its posterior side a small beak-like process.

The trumpet-shape can be traced more or less distinctly in the heads of these bones in all the three species, though in the saithe and cod it has been concealed by a bony development in the angle between the head and the stalk. In the cod the trumpet-shaped area is short, and very wide at its base.

In one cod—a male measuring 94 cm.—a remarkable condition was found. The trumpet-shaped area had developed greatly in a backward direction, not, as is usual in the cod, in an upward direction; it therefore projected well in advance of the portion filling up the angle between the head and the stalk. The head had thus a broad sickle shape.

In the usual form of the postclavicle of the cod the little posterior beak is the corner of the original trumpet-shaped area. The head of this bone is two-layered—the outer is the trumpet-shaped part, and the inner is the layer which has filled up the angle between the head and the stalk and which has extended up under almost the whole of the funnel-shaped area. The two layers are seen distinctly in the region of the beak.

The double-layered condition of the head is not present in the saithe and lythe.

The postclavicle is attached by ligaments to the upper border of the clavicle.

Pelvic Arch.

Innominates (Inn.).

Cod, Fig. 8, Pl. XI.: Saithe, Fig. 1, Pl. XI.: Lythe, Fig. 17, Pl. IV.

The innominates articulate anteriorly with one another and posteriorly with a ligament which lies between them. The ventral surface of the bone is concave. Each innominate bone has three articular surfaces—viz., two hollow articular processes, anterior and posterior, and a broad curved hind edge which articulates with the ventral fin-rays.

The innominates of the cod are very much larger than those of the saithe, while those of the saithe greatly exceed those of the lythe. In general appearance those of the saithe and cod resemble one another, and differ much from those of the lythe.

Between the anterior and posterior narrow articular processes there is in the cod and saithe a sheet of thin transparent bone. A cavity of more or less definite shape is cut out of this sheet of bone. Thus, if the united innominates are examined it is seen that in the saithe the cavities of either side together have the form of an arrow-head with a broad shaft attached. In the cod the same cavity has a form recalling that of a pair of lungs, and the posterior parts of the inner surfaces are approximated to touching. In the saithe they are separated. In one cod—viz., a male 94 cm.—in which the two postclavicles had an unusual form, the thin bone plates were irregularly excavated. Each showed a small cavity anteriorly, while a little posteriorly of that there was a small oval hole in the left plate. In the lythe this thin bony plate is practically absent; it is reduced to a narrow rim, sometimes absent from the anterior process, and confined simply to the angle between the two articular processes.

The angle between the anterior and posterior processes is larger in the lythe than in the saithe, and greater in the saithe than in the cod. The converse relation is seen between the three forms in the angle between the posterior process and the large articular plate.

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EXPLANATION OF PLATES.

The figures in Plates IV., VIII., IX., X. and XI. are reduced; those in Plates V., VI., and VII., are natural size.

PLATE IV.

Figures reduced slightly.

Fig.	1.	Nasal of *G. pollachius*, ♀, 87·8 cm.			
"	2.	Maxilla	"	"	
"	3.	Premaxilla	"	"	
"	4.	Præorbital	"	"	
"	5.	1st Suborbital	"	"	
"	6.	2nd Suborbital	"	"	
"	7.	Basibranchials	"	"	
"	8.	3rd Suborbital	"	"	
"	9.	4th Suborbital	"	"	(shewn upside down).
"	10.	5th Suborbital	"	"	
"	11.	Hyomandibular-Palatine Arch of *G. pollachius*, ♀, 87·8 cm.			
"	12.	Dentary of *G. pollachius*, ♀ 87·8 cm.			
"	13.	Articular	"	"	
"	14.	Ceratohyal Arch	"	"	
"	15.	Branchiostegal Rays		"	
"	16.	Urohyal		"	
"	17.	Innominates and Ventral Fin of *G. pollachius*, ♀, 87·8 cm.			
"	18.	Pectoral Fin	"	"	
"	19.	Side View of Head	"	79 cm.	
"	20.	Interoperculum	"	87·8 cm.	
"	21.	Branchial and Pharyngeal Bones	"	"	
"	21*a*.	Lower Pharyngeal	"	"	
"	22.	Supratemporals	"	"	
"	23.	Posttemporal	"	"	
"	24.	Postclavicle	"	"	
"	25.	Supraclavicle	"	"	
"	26.	Preoperculum	"	"	
"	27.	Operculum	"	"	
"	28.	Suboperculum	"	"	
"	29.	Front view of Symphysis of Mandibles, showing rudimentary Barbel (*b*).			
"	30.	Clavicle, Scapula, and coracoid of *G. pollachius*, ♀, 87·8 cm.			

PLATE V.

Fig. 31. Skull of *G. callarias*, ♀, 103·5 cm. View from above. Nat. size.

" 32. The union of the Branchiostegal and Branchial Arches with the Basibranchials and the Lower Pharyngeals of *G. callarias*, ♀, 83 cm. From above.

" 33. Skull of *G. virens*, ♀, 96 cm. View from above. Nat. size.

" 34. " *G. pollachius*, ♀, 83 cm. " " "

PLATE VI.

Fig. 35. Skull of *G. callarias*, ♀, 103·5 cm. View from below. Nat. size.

" 36. " *G. virens*, ♀, 96 cm. " " "

" 37. " *G. pollachius*, ♀, 83 cm. " " "

PLATE VII.

Fig. 38.	Skull of	*G. callarias*, ♀, 103·5 cm.	View from the side.	Nat. size.
" 39.	"	*G. virens*, ♀, 96 cm.	" "	"
" 40.	"	*G. pollachius*, ♀, 83 cm.	" "	"
" 41.	"	*G. callarias*, ♀, 103·5 cm.	View from behind.	"
" 42.	"	*G. virens*, ♀, 96 cm.	" "	"
" 43.	"	*G. pollachius*, ♀, 83 cm.	" "	"

PLATE VIII.

Fig. 1. Pectoral Fin of *G. pollachius*, ♂, 71·4 cm.
" 2. Pelvic " " "
" 3. Pectoral " *G. virens*, ♂, 89 cm.
" 4. Pelvic " " "
" 5. *G. virens*, ♂, 89 cm.
" 6. *G. pollachius*, ♂, 71·4 cm.
" 7. *G. callarias*, ♂, 82·7 cm.
" 8. *G. virens*, ♂, 57 cm.
" 9. *G. pollachius.*
" 10. Head of *G. pollachius.*
" 11. " *G. virens*, ♀, 54 cm.

N.B.—In Plates IX.–XI. all the photographs are of practically the same scale, the figures being reduced to about one-half.

PLATE IX.

Fig. 1. Frontal of Saithe, ♀, 91 cm.
" 2. Supraoccipital of Saithe, ♀, 91 cm.
" 3. Parietal " "
" 4. Paroccipital " "
" 5. Exoccipital " "
" 6. Ethmoid " "
" 7. Orbitosphenoid " "
" 8. Postfrontal " "
" 9. Squamosal " "
" 10. Prefrontal " "
" 11. Vomer " "
" 12. Prootic " "
" 13. Basioccipital " "
" 14. Opisthotic of *G. virens*, "
" 15. Parasphenoid " "
" 16. Frontal of *G. pollachius*, ♀, 85·3 cm.
" 17. Supraoccipital " "
" 18. Parietal " "
" 19. Paroccipital " "
" 20. Exoccipital " "
" 21. Ethmoid " "
" 22. Orbitosphenoid " "
" 23. Postfrontal " "
" 24. Squamosal " "
" 25. Prefrontal " "
" 26. Prootic " "
" 27. Basioccipital " "
" 28. Opisthotic " "
" 29. Vomer " "
" 30. Parasphenoid " "

Fig. 31. Clavicle, left side, internal surface, of *G. virens*. ♀ 90 cm.
" 32. " right side, external " " ♂, 98·7 cm.
" 33. Dentary, internal surface, of *G. callarias*, ♂, 95·2 cm.
" 34. Articular " " " "
" 35. Innominates, upper surface, of *G. virens*, ♂, 98·7 cm.
" 36. Basihyals, Ceratohyal, Epihyal, and Stylohyal, internal surface, of *G. virens*, ♂, 98·7 cm.
" 37. Frontal of *G. callarias*, ♀, 8·95 cm.
" 38. Parietal " "
" 39. Supraoccipital " "
" 40. Paroccipital " "
" 41. Exoccipital " "
" 42. Ethmoid " "
" 43. Orbitosphenoid " "
" 44. Post frontal " "
" 45. Squamosal " "
" 46. Prefrontal " "
" 47. Prootic " "
" 48. Basioccipital " "
" 49. Opisthotic " "
" 50. Vomer " "
" 51. Parasphenoid " "
" 52. Skull of *G. virens*, ♂, 89 cm.
" 53. " *G. pollachius*, ♂, 86 cm.
" 54. " *G. callarias*, ♂, 82·7 cm.

PLATE X.

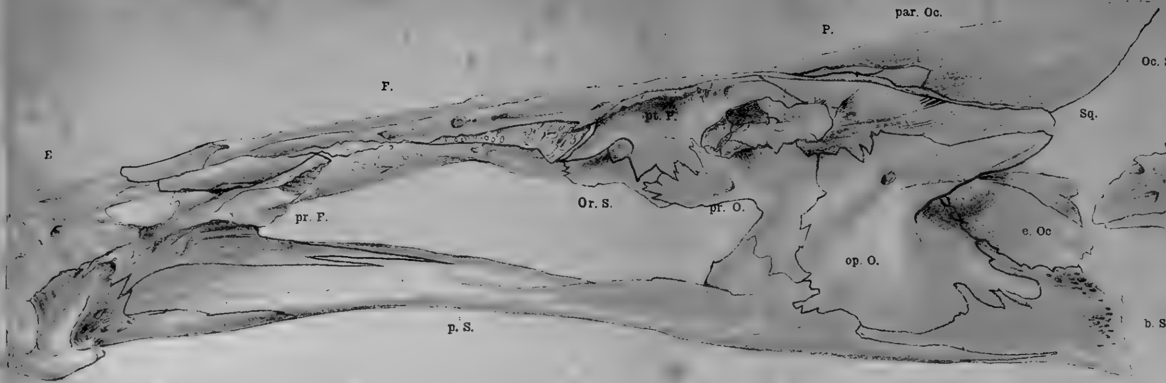
Fig. 1. Nasal of *G. virens*, ♀, 89 cm.
" 2. Præorbital " "
" 3. Suborbitals " "
" 4. Interoperculum "
" 5. Preoperculum " "
" 6. Suboperculum " "
" 7. Operculum " "
" 8. Supratemporals of *G. virens*, ♀, 90 cm.
" 9. Palatine " ♀, 91 cm.
" 10. Entopterygoid " "
" 11. Pterygoid " "
" 12. Hyomandibular " "
" 13. Maxilla " "
" 14. Præmaxilla " "
" 15. Metapterygoid " "
" 16. Quadrate " "
" 17. Symplectic " "
" 18. Dentary " "
" 19. Articular " "
" 20. Basihyals " ♀, 96 cm.
" 21. Ceratohyal " "
" 22. Epihyal " "
" 23. Stylohyal " "
" 24. Branchiostegal Rays " "
" 25. Urohyal " "
" 26. Nasal of *G. callarias*, ♀, 89·5 cm.
" 27. Præorbital " "
" 28. Suborbitals " "

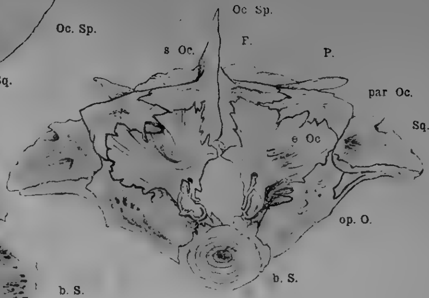
Fig. 29. Supratemporals of *G. callarias*, ♀, 92·7 cm.
" 30. Interoperculum " 89·5 cm.
" 31. Preoperculum " "
" 32. Suboperculum " "
" 33. Operculum " "
" 34. Palatine " "
" 35. Entopterygoid " "
" 36. Hyomandibular " "
" 37. Pterygoid " "
" 38. Metapterygoid " "
" 39. Symplectic " "
" 40. Maxilla " "
" 41. Premaxilla " "
" 42. Dentary " "
" 43. Articular " "
" 44. Quadrate " "
" 45. Basihyals " ♀, 92·7 cm.
" 46. Ceratohyal " "
" 47. Epihyal " "
" 48. Stylohyal " "
" 49. Branchiostegal Rays " "
" 50. Urohyal " "

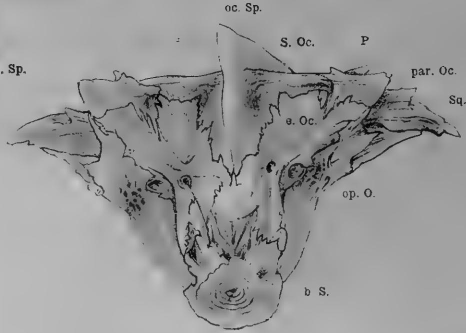
PLATE XI.

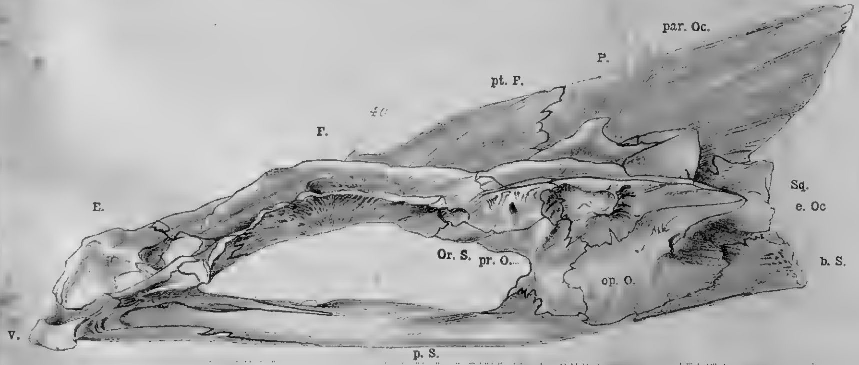
Fig. 1. Innominates of *G. virens*, ♀, 96 cm.
" 2. Clavicle " "
" 3. Supraclavicle " "
" 4. Postclavicle " "
" 5. Posttemporal " "
" 6. Scapula and Coracoid "
" 7. Pectoral Fin-rays of *G. callarias*, ♀, 92·7 cm.
" 8. Innominates and Pelvic Fin-rays of *G. callarias*, ♀, 92·7 cm.
" 9. Supraclavicle " " "
" 10. Clavicle " " "
" 11. Posttemporal " " "
" 12. Postclavicle " " "
" 13. Scapula and Coracoid " " "
" 14. 1, 2, 3, Basibranchials, c., cartilage, of *G. virens*, ♀, 90 cm.
" 15. Hypobranchials " "
" 16. Ceratobranchials " "
" 17. Epibranchials " "
" 18. Upper Pharyngeals " "
" 19. Lower Pharyngeal " "
" 20. 1, 2, 3, Basibranchials of *G. callarias*, ♂, 95·2 cm.
" 20. 3′, Splinter bone (Basibranchial) of *G. callarias*, ♂, 82·7 cm.
" 21. Hypobranchials " ♂, 95·2 cm.
" 22. Ceratobranchials " "
" 23. Epibranchials " "
" 24. Upper Pharyngeals " "
" 25. Lower Pharyngeal " "
" 26. Atlas Vertebra of *G. pollachius*, ♂, 86 cm.
" 27. " *G. virens*, ♂, 89 cm.
" 28. " *G. callarias*, ♂, 83 cm.

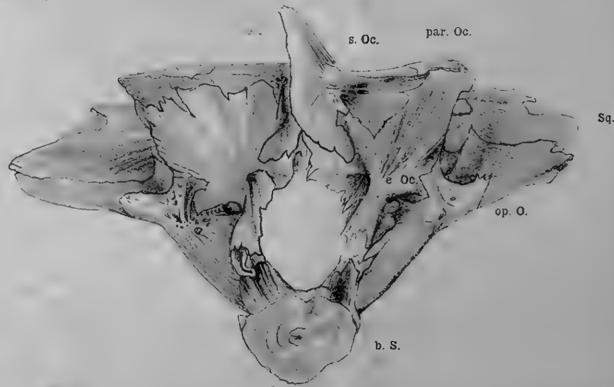
 PLATE VII





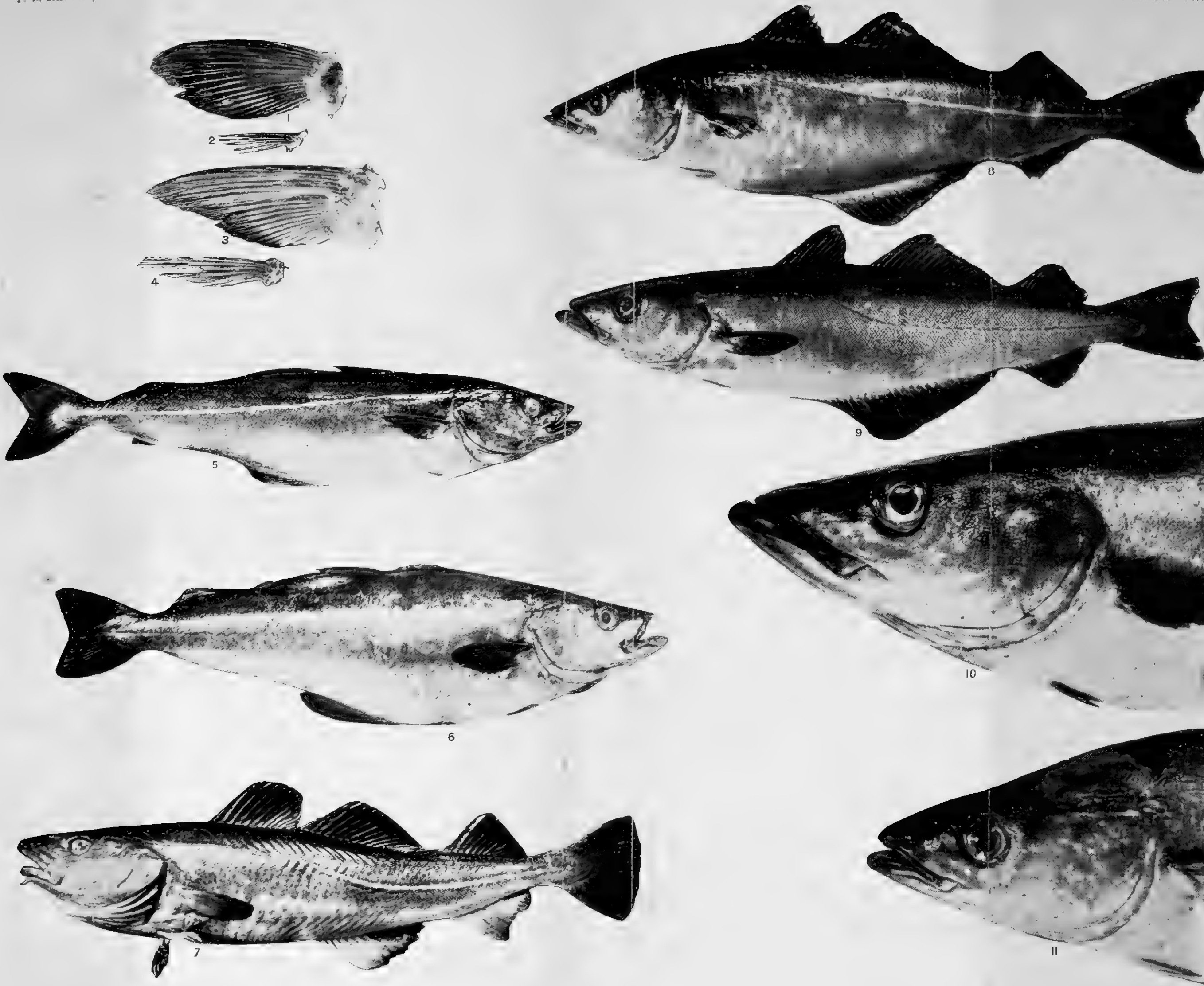






A. H. WALKER, *delt.*

FIGS. 38 and 41.—*Gadus callarias.* FIGS. 39 and 42.—*Gadus virens.* FIGS. 40 and 43.—*Gadus pollachius.*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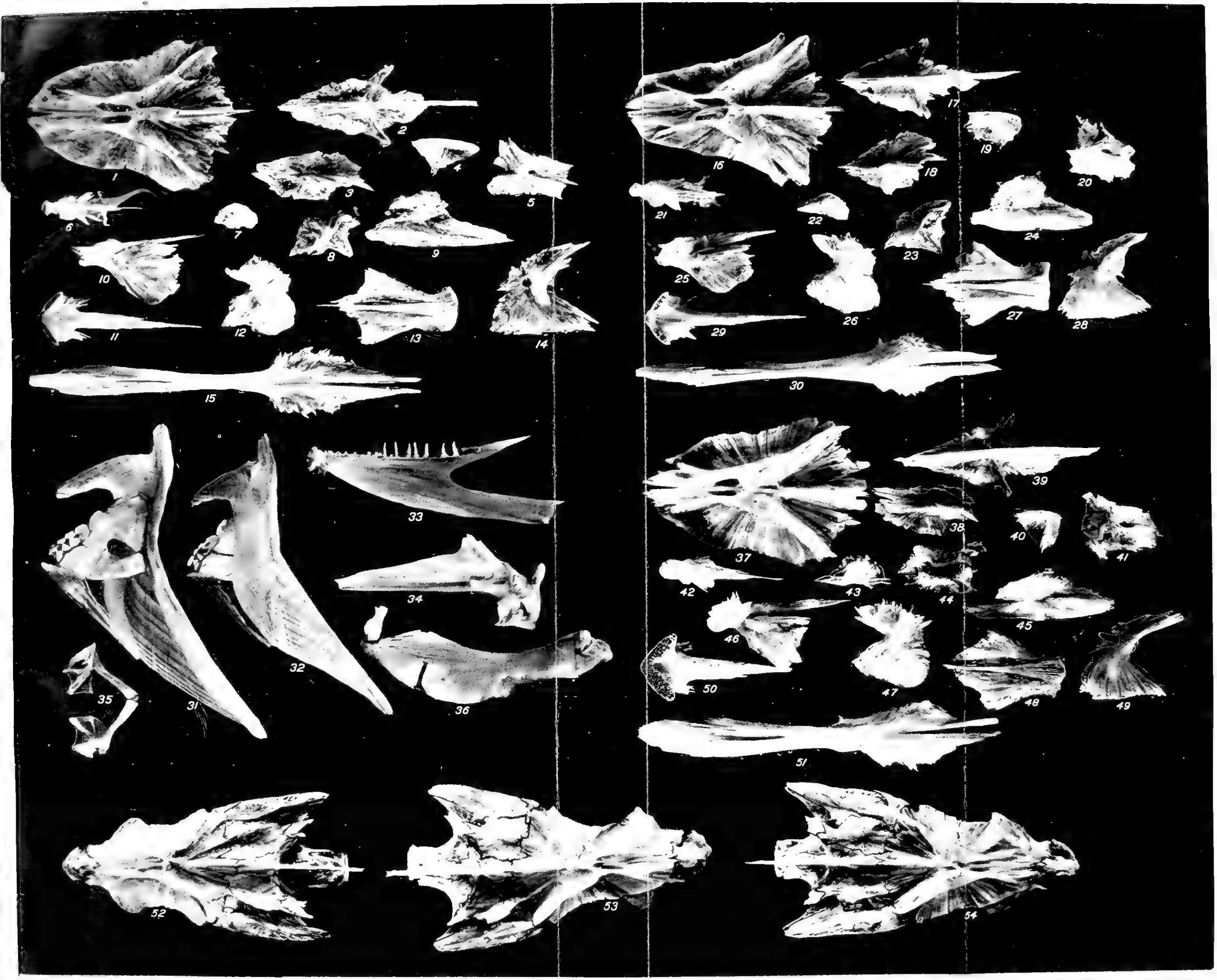
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Fig. 29. United Dentaries of *G. virens*, ♀, 91 cm.
" 30. " *G. pollachius*, ♀, 83 cm.
" 31. " *G. callarias*, ♂, 82·7 cm.
" 32. Supratemporals of *G. pollachius*, ♀, 76·4 cm.

EXPLANATION OF THE LETTERS USED IN THE PLATES.

An.—Angular.
Ar.—Articular.
At.—Atlas (vertebra).
B.—Basalia.
bBr.—Basibranchial.
bHy.—Basihyal.
bOc.—Basioccipital.
Brst.—Branchiostegal.
cerBr.—Ceratobranchial.
cerHy.—Ceratohyal.
Cl.—Clavicle.
Co.—Coracoid.
D.—Dentary.
enPt.—Entopterygoid.
eOc.—Exoccipital.
epBr.—Epibranchial.
epHy.—Epihyal.
E.—Ethmoid.
F.—Frontal.
hpBr.—Hypobranchial.
HyM.—Hyomandibular.
inOp.—Interoperculum.
Inn.—Innominate.
lPhr.—Lower Pharyngeal.
M.—Maxilla.
mtPt.—Metapterygoid.
N.—Nasal.
opO.—Opisthotic.
Op.—Operculum.
OrS.—Orbitosphenoid.
P.—Parietal.
parOc.—Paroccipital.
PF.—Pectoral Fin.
Pl.—Palatine.
prF.—Prefrontal.
prM.—Premaxilla.
prOp.—Preoperculum.
prOr.—Præorbital.
pS.—Parasphenoid.
Pt.—Pterygoid.
ptCl.—Postclavicle.
ptF.—Postfrontal.
ptT.—Posttemporal.
Q.—Quadrate.
sbOp.—Suboperculum.
sbOr.—Suborbital.
Sc.—Scapula.
sCl.—Supraclavicle.
sOc.—Supraoccipital.
Sq.—Squamosal.
sT.—Supratemporal.
stHy.—Stylohyal.
Sy.—Symplectic.
uHy.—Urohyal.
upPhr.—Upper Pharyngeal.
V.—Vomer.
VF.—Ventral Fin

IV.—NOTES ON SOME PARASITES OF FISHES.

By Thomas Scott, F.L.S., Mem. Zool. Soc. de France.

Plates XII. and XIII.

In continuation of my Notes on the Parasites of Fishes I propose to notice here several species not previously recorded, a few of which appear to be undescribed, while some others have not, so far as I am aware, been recorded from the coast of Scotland.

With the exception of two interesting Trematodes, all the species belong to the Copepoda, and include three species belonging to the family Ergasilidæ; four species belonging to the Caligidæ; five belonging to the Dichelestidæ; two to the Chondracanthidæ; one to the Lernæidæ; and two to the Lernæopodæ.

The Trematodes, which are described separately at the end of the paper, belong to the two genera *Callicotyle*, Diesing and *Acanthocotyle*, Monticelli; the first has not been recorded hitherto from Scottish waters, and the second is new to science.

I.

COPEPODA PARASITA.

Fam. Ergasilidæ.

Genus *Bomolochus*, Nordman (1832).

The only member of the genus *Bomolochus* which appears to have been recorded in the Crustacean fauna of the British Islands is the *Bomolochus soleæ* of Claus. This species was described (and figured) in the Eleventh Annual Report of the Fishery Board for Scotland, 1893,* it was taken on the back of *Solea vulgaris*, Guen., captured in the Firths of Forth and Clyde, as well as on the same species of fish captured in the Humber near Grimsby. In the Nineteenth Annual Report I have recorded what appears to be the same species of *Bomolochus* from the nostrils of several kinds of fishes, and the form which I am now to describe from the nostrils of the Ling, *Molua molva*, L., may also be merely a variety of the same *Bomolochus*, but I record it here in order to point out one or two differences and also to correct one or two errors in the former description of the species. Two other species are recorded here which are apparently undescribed.

Bomolochus soleæ, Claus (var. from Nostrils of Ling) Pl. XIII., figs. 13–18.

1864. *Bomolochus soleæ*, Claus, Zeitschrift fur Wissenschaft. Zool., vol. xiv., p. 374, pl. 35, figs. 6–20.

The length of the female represented by the drawing (fig. 13) is 1·6 mm. (about $\frac{1}{16}$ of an inch). The antennules (fig. 14) and antennæ are

* Additions to the fauna of the Firth of Forth; Eleventh Annual Report of the Fishery Board for Scotland, Part III., p. 212, pl. v., fig. 1-13.

similar to those of the specimens described in the Eleventh Annual Report. The mandibles have a somewhat simple structure, the basal joint is stout, but the second is rather slender, and is furnished with a stout and moderately long tooth-like terminal spine; from near the base of this spine there springs a similar but much smaller spine, as shown by the drawing (fig. 15). (In the description of the species in the Eleventh Annual Report the appendages doubtfully described and figured as mandibles are really the second maxillipeds, while figure 5 on the plate (pl. v.) represents one of the mandibles instead of one of the maxillæ.)

The maxillæ consist of small, one-jointed, and somewhat dilated appendages provided with apparently four moderately long plumose setæ (fig. 16).

The first maxillipeds (fig. 17) are small and two-jointed, the basal joint is moderately stout, and bears a small spine near the distal end of the inner margin, the end joint has a moderately long claw-like extremity, and is furnished with a stout ciliated spine which springs from a notch on the inner aspect, and rather below the middle of the joint.

Second maxillipeds large, two-jointed; both joints robust and furnished with a few moderately stout, elongated, and coarsely plumose setæ; the end joints are armed with a powerful and strongly curved terminal claw, the convex margin of which is produced slightly beyond the middle, into a spine-like process, and the curve of the claw is distinctly sigmoid, as shewn in the drawing (fig. 18). The thoracic feet are all as described and figured in Part III. of the Eleventh Annual Report already referred to.

Remarks.—The principal difference between the *Bomolochus* from the nostrils of the Ling and *Bomolochus soleæ* as described and figured in Part III. of the Eleventh Annual Report, is in the armature of the mandibles; in *Bomolochus soleæ* the terminal spines are both short, but in the form from the nostrils of the Ling the terminal spine is nearly as long as the joint from which it springs, while the secondary spine is small. All the other appendages appear to be much the same in both forms. The specimens from the Ling were somewhat larger than those observed on the Black Soles, and they did not appear to be very common. The fishes were obtained at the Fish Market at Aberdeen.

Bomolochus onosi, T. Scott, (sp. n.). Pl. XIII., figs. 19–22.

Description of the Female.—Length about 1·3 mm. ($\frac{1}{19}$ of an inch). The first body segment is proportionally larger than the same segment in the form just described, being equal to nearly half the entire length of the cephalothorax, but the second and third segments are smaller than the segments similar to them in that form (fig. 19).

The antennules are moderately stout, but taper gradually towards the distal extremity; the second joint, which appears to be the largest, is about one and a half times the length of the next one, the third and fourth are sub-equal and larger than those which follow, while the penultimate joint is considerably smaller than any of the others. The plumose setæ with which the antennules are furnished, though somewhat similar to those on the antennules of *Bomolochus soleæ*, do not appear to be quite so stout (fig. 20).

The antennæ, mandibles, maxillæ, and first maxillipeds appear to be similar to the same appendages in the *Bomolochus* from the nostrils of the Ling.

The second maxillipeds are stout and armed with a moderately stout and strongly curved claw, but not so powerful as the terminal claw of the second maxillipeds of the form previously described, but it resembles it in the curve being distinctly sigmoid; a slender seta springs from near the distal end of the inner margin of the first joint, and two small setæ from near the middle of the inner margin of the second joint, a very long and slender seta springs from near the base of the terminal claw, and a smaller one from a point a little further forward (fig. 21).

The thoracic feet are similar to those of the form already described.

The male differs little from the female except that the terminal claws of the second maxillipeds are more powerful and more evenly curved (fig. 22).

Habitat.—On the inside of the gill-covers of *Onos mustelus* (Lin.)—the Five-bearded Rockling—captured in the Firth of Forth in May, and off Kinnaird Head, in 60 to 80 fathoms, on July 24th, 1901. Also on the inside of the gill-covers of a specimen of *Onos cimbrius* (Lin.)—the Three-bearded Rockling—captured in the Forth estuary in 1892, and from the gills and gill-covers of the same species of fish taken on Bressay Shoal to the east of Shetland, on December 11th, 1901. Both males and females of this *Bomolochus* were obtained.

Remarks.—The species just recorded has such a close general resemblance to *Bomolochus soleæ*, Claus, that it might easily be mistaken for that species; the most obvious difference is in the form of the posterior foot-jaws, by the difference in the structure of these appendages the species may be distinguished even without dissection when viewed from the ventral aspect and with the aid of a good light.

Bomolochus zeugopteri, T. Scott, (sp. n.). Pl. XIII., figs. 23–25.

Description of the Female.—Length about ·84 mm. (about $\frac{1}{30}$ of an inch). The first body segment is equal to rather more than the entire length of the next three, the last thoracic segment is small (fig. 23).

The antennuls (fig. 24) are moderately stout; the second joint is equal to about one and a half times the length of the next one; the third and fourth are sub-equal, while the fifth and last joints, which are also of about equal length, are rather smaller than the third or fourth; the penultimate joint is only about two-thirds the length of the end one. The armature of the antennules resembles those of the last species.

The second maxillipeds are short and moderately robust, the terminal claw is feeble, and the curve of the claw is only slightly sigmoid; a small seta springs from the distal end of the inner margin, while two slender and moderately elongate setæ arise from near the base of the claw as shown in the drawing (fig. 25).

All the other appendages are somewhat similar to the same appendages in the *Bomolochus* from the Ling.

Habitat.—About a dozen specimens, most of them females with ovisacs, were found adhering to the back of a small Müller's Topknot, *Zeugopterus punctatus* (Bl.). The fish was captured near the mouth of the Clyde estuary in September 1897, but the *Bomolochus* were not observed till March of the present year (1901); and as it had been in alcohol from the time it was captured, and had more than once been transferred from one vessel to another, it is evident that the copepods must have had a firm hold of their host.

The marked difference in the structure and armature of the second maxillipeds are the principal characters by which this species may be distinguished; it is also a smaller species than the other two, being little more than half the size of the *Bomolochus* from the Ling.

Fam. Caligidæ.

Genus *Caligus*, Müller (1785).

Caligus labracis, T. S., sp. nov. Pl. XIII., fig. 26–29

Description of the Female.—Length about 3·3 mm. (about $\frac{1}{8}$ of an inch). The cephalic shield (fig. 26) is about as broad as long; it is widest near the posterior end, and has the margins evenly rounded, somewhat like *Caligus diaphanus*, Nordmann. The last thoracic segment is subquadrate in outline, but its length is only equal to about three-fourths of the breadth; it is considerably smaller than the cephalic segment, being little more than a third of the length of that segment and half its breadth. The abdomen (exclusive of the caudal furca) is equal to about half the length of the last thoracic segment, and is apparently unsegmented, as shown in the figure.

The fourth pair of thoracic feet are small, and the single branch in each is composed of two joints, which are armed with sabre-like spines (fig. 29).

The sternal fork (fig. 28) is stout; both branches are moderately broad, and obliquely truncate at the ends, and are not greatly divergent.

The male (fig. 27) is smaller than the female, being only about 2·6 mm. in length, it differs little from the female except that, as usual, the last thoracic segment and the abdomen are smaller.

Habitat.—On the gills of *Labrus mixtus*, Lin.—the Striped Wrasse—captured in the Firth of Clyde in the vicinity of Ayr, on January 30th, 1900, and forwarded to the Laboratory by Mr. Robert Duthie, Fishery Officer, Girvan. My son (Mr. A. Scott) has taken the same species on the gills of *Labrus mixtus* and *Labrus maculatus* captured in the Irish Sea.

This *Caligus* differs from any species with which I am familiar in the proportional sizes of the cephalic shield and the last thoracic segment, and in the peculiar form of the sternal fork.

Genus *Pseudocaligus*, A. Scott (1900).

Pseudocaligus brevipedis (Bassett-Smith).

1896. *Caligus brevipedis*, Bassett-Smith, Ann. and Mag. Nat. Hist., (6), vol. xviii., p. 11, pl. III., fig. 1.

1901. *Pseudocaligus brevipedis*, A. Scott, Some Additions to the Fauna of Liverpool Bay, *Trans. Liverpool Biol. Soc.*, vol. xv., p. 350, pl. II., figs. 1–6.

One or two specimens of this curious form were found in the throat of a specimen of the Three-bearded Rockling—*Onos tricirratus*—captured at Dunbar, Haddingtonshire, in 1892. The copepods were only noticed on the fish in August of the present year, 1901, by my son, Mr. A. Scott.

This is comparatively a small species, and differs from *Caligus*, especially in the rudimentary character of the fourth thoracic feet.

Genus *Lepeophtheirus*, Nordmann (1832).

Lepeophtheirus pollachii, Bassett-Smith.

Specimens of this copepod were obtained in the throat of young Pollack—*Gadus pollachius*—sent from Girvan, Ayrshire, in May, 1901. A few of them were also adhering to the tongue of the fish, and the part to which they were adhering appeared to be lacerated.

Genus *Echthrogaleus*, Steenstrup and Lütken (1861).

Echthrogaleus coleoptratus (Guérin).

Two specimens of this species were obtained adhering to the pectoral fins of a small *Lamna cornubica* sent from the Fish Market at Aberdeen on December 12th, 1901.

Fam. Dichelestidæ.

Genus *Clavella*, Oken (1815).

Clavella cluthæ, T. Scott, sp. nov. Pl. XII., figs. 26–31.

Description of the Female.—Length about 1·5 mm. (nearly $\frac{1}{17}$ of an inch). This copepod is like *Clavella labracis*, Van Beneden, in general appearance, but is about one and a half times its size, the lateral margins of the cephalic segment are also evenly rounded instead of being angular, as in that species (fig. 26).

The antennules are short, and apparently four-(? or five-) jointed, and also moderately stout; the basal joint is about as long as all the other three together, while the end joint is very minute; the armature of the antennules consists of a few minute spines (fig. 27).

The antennule represented by the drawing had the basal joint slightly damaged.

The antennæ are fully as long as the antennules; they are composed of two joints and armed with a short but strong terminal claw (fig. 28).

The maxillæ are very small and simple in structure; they consist of a minute papilliform basal joint bearing three small spines as shown by the drawing (fig. 29).

The maxillipeds are also small; they are two-(or three-) jointed, and furnished with a small terminal claw (fig. 30).

There are only two pairs of thoracic feet, and they are both somewhat similar in structure. The drawing (fig. 31) represents the first pair. Each foot, which has two moderately stout basal joints, is two-branched, and each branch is two-jointed and furnished with two small terminal spines; in the outer branches the first joint is larger than the second and bears a small spine at its outer distal angle; in the inner branches, on the other hand, the first joint is smaller than the end one. A small spine springs from the inner distal angle of the second basal joint, as shown in the figure.

The caudal furca are very short, as represented in the full-size drawing (fig. 26).

Habitat.—On the gills of a *Ctenolabrus rupestris*, Lin. (Jago's Goldsinny), captured in East Loch Tarbert in 1885; but the copepods were only observed during the past summer.

Clavella labracis, Van Beneden. Pl. XIII., figs. 10–12.

This species was recorded, but not figured, in Part III. of the Nineteenth Annual Report, and I now give a few figures in order to indicate one or two points of difference between this species and the one just described.

The largest of the female specimens of *Clavella labracis* measured scarcely more than a millimetre in length. In the specimen represented by the figure (fig. 10) the cephalic segment is equal to about one-fifth of the entire length of the animal. The lateral margins are produced outwardly on each side so as to form distinct angular projections and give to the segment, when seen from above, a kind of diamond-shaped outline. The "genital" segment is fully three times the length of the cephalic segment, its breadth is not much more than a third of the length, and its margins curve gently towards both ends. The abdomen is very small, and so also are the furcal joints. The ovisacs appear to be moderately elongated, but in none of the specimens examined were the ovisacs entire.

The antennules are short and moderately stout, and composed of five joints. The first joint is large, and nearly equal to half the entire length of the antennule. The lower distal angle of this joint is produced downwards in the form of a strong hook. The three last joints are sub-equal and shorter than the second. Several short and dagger-like spines spring from the upper margins of the antennules as shown in the drawing (fig. 11).

The antennæ (fig. 12) are somewhat similar to those of *Clavella cluthæ*, and, like them, are armed with strongly-curved terminal hooks.

Habitat.—On the gills of the Striped Wrasse, *Labrus mixtus*, Lin., captured in the Clyde, near Ayr, in January, 1900, and forwarded to the Laboratory by Robert Duthie, Fishery Officer, Girvan. Taken also on the gills of *Labrus mixtus* captured in the Irish Sea (A. Scott).

Remarks.—The angular form of the cephalic segment, and the strong hook on the first joint of the antennules, seem to be characteristic of *Clavella labracis.* This copepod has lately been recorded from the Irish Sea, from the gills of the Striped Wrasse,* and as Professor van Beneden speaks of it as abundant on the gills both of *Labrus bergylta* and *Labrus mixtus*†, it seems probable that its distribution is co-extensive with that of its hosts.

Genus *Eudactylina*, Van Beneden (1853).

Eudactylina acuta, Van Beneden. Pl. XII., figs. 20–25.

1853. *Eudactylina acuta*, Van Beneden, Bull. Acad. Roy. Belg., vol. xx., pt. 1, p. 235; Mem. Acad. Roy. Belg. (1861), p. 150, pl. xxv.

Description of the Female.—Length about 2·6 mm. (fully $\frac{1}{10}$ of an inch). The body is slender and elongated, the thoracic portion consists of five distinct segments, and the abdomen of three (including the genital segment). The first body segment is about equal to the combined lengths of the next two, but the second is smaller than the third; the fourth is about equal in length to the first and only slightly longer than the fifth segment; the abdomen is very small, being equal to little more than a fourth of the entire length of the thorax. The furcal plates are short and dilated (fig 20).

The antennules are short, very stout, and apparently four-or five-jointed, and they are armed with several strong spines. A large strongly-curved spine springs from the upper distal angle of what appears to be the second basal joint, and reaches to near the end of the next joint, there is also a stout and much shorter spine on the lateral aspect of the same joint, and also one or two spiniform setæ; a moderately stout, elongate, and nearly straight spine springs from the upper distal angle of the following joint, while behind and below this spine there is another, which is also moderately stout, but only about half

* Fifteenth Annual Report L.M.B.C., and their Biol. Station at Port Erin (Isle of Man) Dec., 1901, p. 13.

†Les Poissons des Cotes de Belgique, *Mem. Acad. Roy. Belg.*, vol. xxxviii., pp. 45, 46 (1870).

the length of the first; the penultimate joint is furnished with a short stout spine and a few spiniform setæ near its distal end; the last joint is very minute, as shown by the drawing (fig. 21).

The antennæ, which are similar in structure to those of the next species, are provided with one or two stout tooth-like spines on the lower aspect, and armed with an arrangement of strong terminal hook-like claws.

The mandibles resemble very closely those of *Charopinus dalmanni* (Retz.). The maxillæ are also somewhat similar in structure to those of that species, except that the secondary lobe is more produced.

The first maxillipeds are small and three-jointed and furnished with a minute terminal claw.

The second maxillipeds are of moderate size and strongly chelate,, and have a curious resemblance to the chelæ of *Pseudotanais*—a genus belonging to the Isopoda-Chelifera.

The first four pairs of thoracic feet are all two-branched; in the first pair and in the third and fourth pairs both branches are distinctly three-jointed; in the second pair the inner branches, as in the other pairs, are composed of three distinct joints, but in the other branches, which differ considerably from the others, the second and third joints are nearly obsolete, while the first joint is fully as large as the whole outer branch. The basal portion of each foot consists of two joints, the first being large and considerably dilated, while the second is scarcely half the size of the other.

In the first pair of feet the outer branches are rather shorter than the inner ones, the first joint is stout and longer than the combined length of the next two, it is furnished with a row of small spines along its outer margin, while a dagger-like spine springs from its outer distal angle; a similar spine springs from the outer distal angle of the next joint, and two from the end joint, the end joint also carries a moderately long and spiniform terminal seta, together with a small hook-like spine on the inner distal angle; the three joints of the inner branches are sub-equal in length, but the first joint is more dilated than the others, and is provided with a fringe of minute spines on the outer edge; the second and third joints carry a few minute spines on the inner margin, while two moderately large spiniform setæ spring from the apex of the last joint (fig. 22). The inner rounded margin of the second basal joint is fringed with several small but stout spines.

The first basal joint of the second pair is considerably dilated, the second is smaller and fringed on the inner edge with minute spines; the inner branches are small and shorter than the outer, the second and third joints are fringed on both edges with minute spines, while a moderately long and slender seta and a small spine spring from the apex; the first joint of the outer branches is dilated and exceeds the inner branches in length, but the end joints are so modified as to be almost obsolete (fig. 23).

In the third and fourth pairs, which are somewhat similar to each other in structure, the inner branches resemble the same branches in the first pair, except that they carry a single moderately stout and elongated terminal spine; the outer branches are rather longer than the inner ones, and the first joint, which is equal to more than the entire length of the second and third, is fringed on the outer edge with small tooth-like spines, a moderately stout spine springs from its outer distal angle, while a similar spine springs from the outer distal angle of the second joint; the third joint bears three moderately stout spines of varying lengths at its truncate end as shown by the drawing (fig. 4), which represents one of the fourth pair.

The fifth pair consist of broad lamelliform and uniarticulate plates situated on the lateral aspect and near the distal end of the fifth body segment; each foot is about one and a half times longer than broad, it is evenly rounded at the apex, and furnished with two or three small setæ (fig. 24).

The caudal furca, which are fully one and a half times the length of the last abdominal segment, are somewhat dilated, and provided with a small seta on the outer edge and two small tooth-like spines on the rounded apex (fig. 25).

Habitat.—On the gills of an Angel-fish, *Rhina squatina* (Lin.), captured about 8 to 9 miles S.E. from Buchan Ness in January last (1902). My son finds this parasite to be moderately frequent on the gills of Angel-fishes captured in the Irish Sea.

This being the first *Eudactyline* described, may be considered the type of the genus, and its description given above will show more clearly the distinctive points by which the next species may be satisfactorily identified.

Eudactylina similis, T. Scott, sp. nov. Pl. XII., figs. 1-19.

Description of the Female.—Length of the female specimen represented by the figure, 2·97 mm. (about $\frac{2}{17}$ of an inch); it resembles in general appearance the *Eudactylina acuta* (Van Beneden), but differs in the proportional lengths of the body segments and in the structure of some of the thoracic and tail appendages. The first body segment (fig. 1) is about one and a half times the length of the second; the second, third, and fourth are nearly equal in length, but the second is rather the longest; the last is equal to about two-thirds of the length of the preceding segment. The abdomen is small, being scarcely equal to a third of the entire length of the thorax.

The antennules are stout, and taper towards the distal extremity; they somewhat resemble, in structure and armature, the antennules of *Eudactylina acuta* (fig. 3).

The antennæ (fig. 4) are moderately stout and four-jointed, the first and second joints are each furnished with a short and stout tooth-like spine on its inner aspect; the last joint is short and is armed with two or three stout but short terminal claws.

The mandibles are very feeble, and are similar to those of *Eudactylina acuta* (fig. 5).

The maxillæ are small and of a simple bilobed structure, the principal lobe is rather longer than broad, and bears two moderately long spiniform terminal setæ, the one being about twice the length of the other; the secondary lobe is small and provided with a slender one-jointed branch which extends somewhat beyond the apex of the primary lobe, and terminates in a moderately long spiniform seta, as shown by the drawing (fig. 6).

The first maxillipeds are also small, they are three-jointed and armed with a minute terminal claw (fig. 7).

The second maxillipeds are moderately large and strongly chelate, the terminal joint is broad and its lateral angles are more or less produced; the one angle is extended into a spoon-like process, while to the other is articulated a stout, strongly-curved claw, the apex of which impinges against the spoon-like process of the opposite angle as shown in the drawing (fig. 8).

The first pair of thoracic feet are somewhat similar to those of *Eudactylina acuta* except in the following particulars:—The inner margin of the second basal joint is furnished with two small but moderately stout spines; the first joint of the outer branches is, proportionally, considerably larger than either the second or third joints, and the inner branches are more slender (fig. 9).

The second pair are similar to the same pair in *Eudactylina acuta*, but the inner branches are proportionally smaller (fig. 10).

The third and fourth pairs are also similar to those of the species referred to (fig. 11).

The fifth pair are larger than those of *Eudactylina acuta*, and they are also proportionally broader, the width being about equal to four-fifths of the length, as shown in the drawing (fig. 12).

The caudal furca, which are equal to about twice the length of the last abdominal segment, are narrow and slightly curved; they are widest at the base, but the width is scarcely equal to half the length; they taper gradually to the blunt-pointed apex, and carry two or three minute spines (fig. 13).

Description of the Male.—Length 1·9 mm. (about $\frac{1}{13}$ of an inch), being only about three-fourths the length of the female. The body is more slender than that of the female, while the abdomen is about equal in length to the cephalo-thorax (fig. 2).

The antennules are moderately stout, and appear to be seven-jointed; they do not taper as much as the antennules of the female, but are provided with somewhat similar spines; they also differ from the female antennules in being furnished with a short but strong hooked claw at the distal extremity (fig. 14).

The antennæ and mouth appendages are somewhat like those of the female, with the exception of the second maxillipeds, which resemble the same appendages in *Charopinas ramosus* (fig. 15).

The first four pairs of thoracic feet have both branches apparently three-jointed, but in the outer branches of the first pair the articulation between the second and third joints is somewhat indistinct (fig. 16). The inner branches of the second pair are armed on the inner aspect with a moderately stout and elongated curved spine, which springs from the distal angle of the first joint (fig. 17).

The third and fourth pairs have somewhat slender branches; the inner are furnished with two terminal spiniform setæ, the outer bear two terminal setæ and a spine; a moderately stout spine also springs from the outer distal angles of the first and second joints (fig. 18).

The fifth pair are somewhat similar to those of the female.

The caudal furca are very narrow, and armed with small and slightly-hooked terminal spines (fig. 19—see also fig. 2).

Habitat.—On the gills of *Raia radiata*, Don. (the Starry Ray), captured to the east of the Shetland Islands on May 22nd, and off Aberdeen on November 29th, 1901; both females and males of this *Eudactyline* were obtained, and specimens were moderately frequent on the gills of some of the ta rry Rays examined.

Eudactylina similis, though it resembles *Eudactylina acuta* in general appearance, may be readily distinguished from it by the difference in the form of the caudal furca.

Eudactylina acanthii, A. Scott. Pl. XIII., figs. 1–9.

1901. *Eudactylina acanthii*, A. Scott, 15th Ann. Rept. of the L.M.B.C., and their Biol. Stat. at Port Erin, Isle of Man, Dec., 1901, p. 14.

Description of the Female.—Length about 2 mm. ($\frac{2}{25}$ of an inch). Body moderately stout, the cephalothoracic segment about one and a half times the length of the next one; the second, third, and fourth segments sub-equal in length, but the fifth is rather shorter than the one immediately preceding. The abdomen is very short, being only about a fifth of the entire length of the cephalothorax; the genital segment exceeds the combined lenghts of the next two as shown in the full-size drawing (fig. 1).

The antennules are short but moderately stout, and they taper towards the distal end; the first and second joints are considerably dilated, and together are equal to more than half the entire length of the antennules; the curved spine at the distal end of the second joint is much smaller than the spine similar to it on the second joints of the antennules of *Eudactylina acuta* (fig. 2).

The antennæ are somewhat similar to the same appendages in *Eudactylina acuta*, but they want the stout tooth-like spines on the inner aspect of the first and second joints, and there appears to be only one claw-like spine at the end of the last joint (fig. 4).

The mandibles, maxillæ, and other mouth appendages are somewhat similar to those of *Eudactylina acuta* (or *Eudactylina similis*).

In the first four pairs of thoracic feet, the inner branches are all two-jointed; but while the outer branches of the first pair consist apparently of one joint, those of the next three pairs appear to be composed of three joints; all the four pairs are short and robust. The inner branches of the first pair are armed with a number of very short but stout spines, chiefly on the exterior margins; the outer branches, which are shorter than the inner ones, are fringed on the exterior edge with minute setæ; a small spine springs from a notch slightly posterior to the middle of the same margin, while two or three small spiniform setæ terminate the joint, as shown in the drawing (fig. 5).

In the second pair the inner branches are somewhat similar to, but rather stouter than, the inner branches of the first pair; the outer branches are somewhat indistinctly three-jointed, and only slightly longer than the inner branches, and both branches are fringed on the exterior edge with small spines; the outer margin of the first basal joint is also similarly fringed, while small spines are scattered sparingly over portions of the surface of all the joints as shown in the drawing (fig. 6).

The remaining two pairs are somewhat similar in structure to the second pair, but are, comparatively, rather stouter, they are also less spiniferous than that pair (fig. 7).

The fifth pair resemble those of *Eudactylina acuta*, but differ slightly in their form and armature (fig. 8).

The caudal furca, which are not much longer than the last abdominal segment, are somewhat narrower than those of *Eudactylina acuta*—the width being only equal to about half the length; two short spines spring from the outer margins of each furcal joint and the spiniform setæ from the apex, the middle apical seta being the longest (fig. 9).

Habitat.—On the gills of the Piked Dog-fish, *Squalus acanthius*, L., captured in Beaumaris Bay, on September 26th, 1901. I am indebted to my son for the privilege of describing this species, and for the illustrative drawings. This *Eudactylina* appears to be of frequent occurrence on the gills of *S. acanthius*, captured in the Irish Sea, and may probably also be obtained on the gills of Scottish specimens of the fish. It may be noted in passing that *Eudactylina acuta* has been recorded both from the Angel-fish and the Piked Dog-fish (see Professor van Beneden's memoirs already referred to); perhaps the two forms may have been mixed up under the one name; but whether that be so or not, the parasites from the two fishes named, which have been examined by myself and my son, appear to be distinct.

Fam. Lernæidæ.

Genus *Hæmobaphes*, Steenstrup and Lutken (1861).

Hæmobaphes ambiguus, T. Scott.

1900. *Hæmobaphes ambiguus*, T. Scott, 19th Ann. Rept. of the Fishery Board for Scotland, pt. iii., p. 162; pl. vii., fig. 15.

Specimens of this curious Lernæan were obtained on Spotted Dragonets, *Callionymus maculatus*, Bonap., captured in the Firth of Clyde on October 4th, 1901. This is an addition to the Clyde crustacean fauna, and an extension of the distribution of the species (see also a further reference to this species under the record of *Chondracanthus ornatus*).

Hæmobaphes cyclopterina (Fabr.).

A specimen of this parasite was obtained on the gills of a Butterfish, *Pholis gunnellus*, L., captured in the Forth estuary during the preceding summer. This appears to be an addition to the number of the hosts of *Hæmobaphes cyclopterina.*

The following are the names of the fishes mentioned by Steenstrup and Lutken in their work on Parasite Copepoda (p. 65) as hosts for this *Hæmobaphes* :—

Cottus grönlandicus, *Cottus bubalis*, *Cottus scorpius*, *Cyclopterus spinosus*, *Gadus merlangus*, *Centronotus fasciatus*, and *Sebastes norvegicus*. To this list have been added the *Pholis gunellus* mentioned above, and *Agonu cataphractus*, also captured in the Forth, and on which *Hæmobaphes cyclopterina* was obtained some years ago.

Fam. Chondracanthidæ.

Genus *Chondracanthus*, De la Roche (1811).

Chondracanthus ornatus, T. Scott. Pl. XIII., fig. 34.

Further specimens of this species have been obtained on the gills of some Spotted Dragonets captured in the Clyde on October 4th, 1901, both males and females were obtained on these Dragonets, and I am now able to give a full-size figure of a male specimen, prepared by my son. The specimen scarcely reaches half a millimetre in length, and is moderately robust, as shown by the drawing (fig. 34).

A number of specimens of *Hæmobaphes ambiguus*, T. Scott, were obtained on the gills of the same sample of Spotted Dragonets, and as both species were sometimes found on the gills of the same fish, the following notes on the relative frequency of the two forms may be of interest.

Fifty-five fishes were contained in the sample collected on the 4th of October, and on the gills of these, fifteen specimens of *Hæmobaphes ambiguus* and eight of *Chondracanthus ornatus* were obtained; usually the specimens of the two species occurred singly and on different fishes, but in several instances two specimens of the same species, or a specimen belonging to each species, occurred on the gills of a single fish; for example, a Spotted Dragonet seventy-three millimetres in length had a *Chondracanthus* on one side and a *Hæmobaphes* on the other; another Spotted Dragonet had a *Chondracanthus* and a *Hæmobaphes* on the same side. Another fish one hundred and four millimetres in length had two *Chondracanthus ornatus* on the same side, while the other side was free of parasites; a fourth specimen of Spotted Dragonet eighty-six millimetres in length had a *Hæmobaphes* on each side, but no *Chondracanthus.* The total number of parasites observed on this sample of fifty-five Spotted Dragonets was twenty three, and they comprised fifteen *Hæmobaphes ambiguus* and eight *Chondracanthus ornatus.* It was also observed that when only one parasite occurred it was frequently on the right side—the fish resting on its ventral surface and with its head toward the observer.

It may be further noted that seventeen specimens of the Common Dragonet, *Callionymus lyra,* captured at the same time and place, were also examined, but no parasites were observed on them.

Fam. LERNÆOPODIDÆ.

Genus *Thysanote,* Kröyer (1863).

Thysanote impudica (Nordmann).

This species was recorded in Part III. of the Eighteenth Annual Report (p. 169), but there was some doubt as to the exact locality where the fish on which it was obtained came from, but I am able to record the occurrence of another specimen which was obtained on the gills of a *Trigla hirundo* captured in Burghead Bay, Moray Firth,on July 1st, 1901.

II.

TREMATODA.

In the present paper I am able to record only two Trematodes in addition to those described in my paper on Fish Parasites published in Part III. of the Nineteenth Annual Report, but they both appear to be of special interest. They are each provided with a single large posterior sucker which is discoidal and sessile or nearly so, and would thus appear to belong to the Tristomatidæ, but they differ in several important points not only from each other, but also from the Tristomes described in my previous paper.

Fam. TRISTOMATIDÆ.*

Genus *Callicotyle,* Diesing (1850).

Callicotyle Kröyeri, Diesing. Pl. XIII., fig. 30.

1850. *Calicotyle Kröyeri,* Diesing, Syst. helminth., vol. i., p. 434.
1856. *Calicotyle Kröyeri,* Hök, Ofvers of K. Vet. Akad. Förhandl Stokholm, September 20th (1856).
1858. *Calicotyle Kröyeri,* Diesing, Denkschrift. d. K. Akad. d. Wissensch, vol. xiv., p. 70. k., i, figs. 16–20.
1863. *Callicotyle Kroyeri,* P.-J. van Beneden and Hesse, Rech. sur les Trématodes, p. 79.

The Trematode which I ascribe to this species was obtained in the cloaca of specimens of *Raia radiata,* Don., captured about 60 miles south-east of the Shetland Islands on May 22nd, 1901. Specimens of the same Trematode were subsequently observed on *Raia radiata* captured off Aberdeen; as well as on a small *Raia clavata* captured in the Clyde

* In the Cambridge Natural History, vol. ii., p. 73, Van Beneden's division of the Trematodes into Monogenea and Digenea is adopted, and *Callicotyle* is, along with other two genera, placed in the sub-family Monocotylinæ Tschbg—one of the three sub-families into which the Tristomatidæ are divided.

on October 10th, 1901, and forwarded to the Laboratory at Bay of Nigg. My son has also obtained the same species on *Raia clavata* captured in Beaumaris Bay.* Professor P.-J. van Beneden in his work on the Fishes of the Coast of Belgium (p. 16) records this Trematode also from the cloaca of the Grey Skate, *Raia batis*.

Kröyer, after whom this Trematode is named, discovered the species on *Raia radiata*, taken in the Kattegat,† and it is described very shortly by Diesing in Vol. I. of his *Systema Helminthum*, published in 1850 (p. 431). In 1856 M. C.-T. Hök published a special work on this parasite, while Van Beneden and Hesse in their *Recherches sur les Trématodes* (p. 79) refer to a few of the more important characters which serve to distinguish this species from others of the family Tristomatidæ to which it seems to belong. Two of the more obvious of these characters are, (1) the posterior sucker has seven rays and two spines, and (2) the small sucker which in most of the Tristomatidæ is present on each side of the mouth at the anterior end is in this species apparently wanting. The authors referred to appear to consider the latter peculiarity as of special interest, for they remark "Ce qu'il offre de plus remarquable jusqu'à present, c'est que, tout en appartenant à la famille des tristomides les ventouses anterieures semblent faire complétement défaut."

This parasite, besides occupying a peculiar position on the fish, is usually of an opaque white colour, corresponding very closely with that of the skin on which it is adhering, so that unless the observer knows beforehand what to look for, it is easily missed. If specimens with nearly ripe eggs be closely examined, the sides (indicated in the figure by the darker shading) will be seen to be of a faint yellow colour. The general form, as might be expected, varies considerably, but that which is indicated by the figure seems to be the more normal one.

Genus *Acanthocotyle*, Monticelli, 1888.
(Saggio di una morfologia dei Trematodi, p. 97.)

Acanthocotyle monticellii, T. Scott, sp. n, pl. XIII., figs. 31–33.

A single specimen of a small Trematode was obtained on the gills of a Thornback Skate, *Raia clavata*, sent from the Fish Market at Aberdeen in April, 1901—the fish was captured in the North Sea. This Trematode belongs to the genus *Acanthocotyle* instituted by Fr. Sav Monticelli in 1888, but does not appear to agree with any of the species already described. There have been three species of *Acanthocotyle* described by Monticelli, and they have all been found adhering to the skin of specimens of the Thornback Skate (*Raia clavata*) captured at different times in the Gulf of Naples. The following are their names, arranged in the order in which they were described.

(1.) *Acanthocotyle lobiancoi*, Monticelli, described in 1888 in a work entitled *Saggio di una morfologia dei Trematodi* (p. 13). This species was obtained on the dorsal surface of the Thornback Skate, *Raia clavata*, captured in the Gulf of Naples in December, 1887. It does not appear to be a very rare species, but is easily missed; it measures from three to six millimetres in length, and its colour closely resembles that of the skin to which it is attached.

* Fifteenth Annual Report of the L.M.B.C., and their Biol. Station at Port Erin (Isle of Man), December, 1901, p. 13.

† I.V. Beneden and Hesse, in their *Recherches* (p. 79), state that Kroyer found the worm which served for the establishment of the genus in the rectum of *Raia batis*, but Diesing's record is "Habitaculum—*Raia radiata*; in corporis superficie, Kattigat—(*Kroyer*)."

(2.) *Acanthocotyle elegans*, Monticelli. This was described in 1890 (Boll. Soc. Napoli, iv., p. 191, fig. III.), it measures from two to four millimetres in length, and, like the other, was found on the back of a Thornback Skate captured in the Gulf of Naples.

(3.) *Acanthocotyle oligoterus*, Monticelli. This species was obtained on the under (ventral) side of a Thornback Skate captured in the Gulf of Naples in 1893, but was not described till 1899, in *Archives de Parasitologie*, II. No. i., p. 115. This appears to be the smallest of the three species, as it measures only from one and a half to two and a half millimetres.

The learned author, after whom the present species is named, informs me that another *Acanthtcotyle—A. verrilli*, Goto—is described in *Journ. Coll. Sc. Imp. Univ. Tokyo*, 1899, p. 4; but that our species differs from it as well as from the others mentioned above.

The following are one or two of the more easily observed characters which distinguish *Acanthocotyle* from other Trematodes, and by which also the different species of *Acanthocotyle* may be distinguished. First, the structure of the posterior sucker (ventouse) differs from that of other Trematodes; this sucker is provided with numerous rows of small teeth—twenty rows appear to be the prevailing number, as this is the number in the species I record (see fig. 32), and it is also the number in the three species described by Monticelli. Second, the large posterior sucker is provided with a minute supplementary disk—the "*adhesive* disk,"—situated at its posterior end (as shown in fig. 32). In *Acanthocotyle lobiancoi* this *disk* is tongue-shaped (lingualate), but in the other three species it is circular in form. In *Acanthocotyle elegans* the posterior edge of the *adhesive disk* is almost in line with the posterior margin of the large sucker.* In *A. oligoterus* about half of the *adhesive disk* extends beyond the margin of the sucker; while in *A. concinna* the whole of the *disk* is outside.

The *adhesive disk* is armed with a number of small hooks that appear to be placed at the ends of the stalk-like processes, and which in their form and arrangement differ to some extent in the different species. In *A. lobiancoi* these hooks, which appear to be eight in number, are arranged along and just within the posterior margin, their stalks being directed inward like the radii of a circle. In *A. elegans* and *A. oligoterus*, the number of hooks is fifteen, and they are arranged in regular order all round and a little within the circumference of the *disk*, with their stalks directed towards its centre. In *A. monticellii*, on the other hand, the *adhesive disk* appears to be furnished with sixteen hooks, fourteen of which are arranged somewhat irregularly around the circumference, while two are sub-central; the stalks of these hooks are not directed toward the centre so regularly as in the other species.

It may also be noted that in the species recorded here the teeth form a continuous row, each being joined to the other as shown in figure 32A. *Acanthocotyle monticellii* appears also to be a larger species than any of those described by the author referred to; the largest of the species recorded by him is *A. lobiancoi*, which measures from three to six millimetres in length, whereas the length of our specimen extends to about six and a half millimetres.

It may be of interest to state that M. Monticcelli, who very kindly examined for me not only this but also several other Scottish Trematodes,

* In this species, the margin of the large sucker is fringed with short, narrow, and somewhat irregular scallops; and in this respect it differs from the next two species in which the margin of the sucker is plain.

remarks concerning the *Acanthocotyle* now recorded, that it is a very distinct new species, and differs from others:

1. In its general features.
2. In its more slender and elongated body.
3. In the anterior suckers not being well developed, and somewhat resembling those of *A. verrilli*, Goto.
4. In the great development of the anterior glands.
5. In the form and structure of the hooks of the posterior sucker.
6. In the *testes* being smaller in number, and apparently more developed.

A second species—probably *A. lobiancoi*, Monticelli, has recently been obtained in some material from the Firth of Clyde; this specimen, which measures 2·4 mm., will, however, require further study, as it is somewhat imperfect.

EXPLANATION OF THE PLATES.

PLATES XII.—XIII.

PLATE XII.

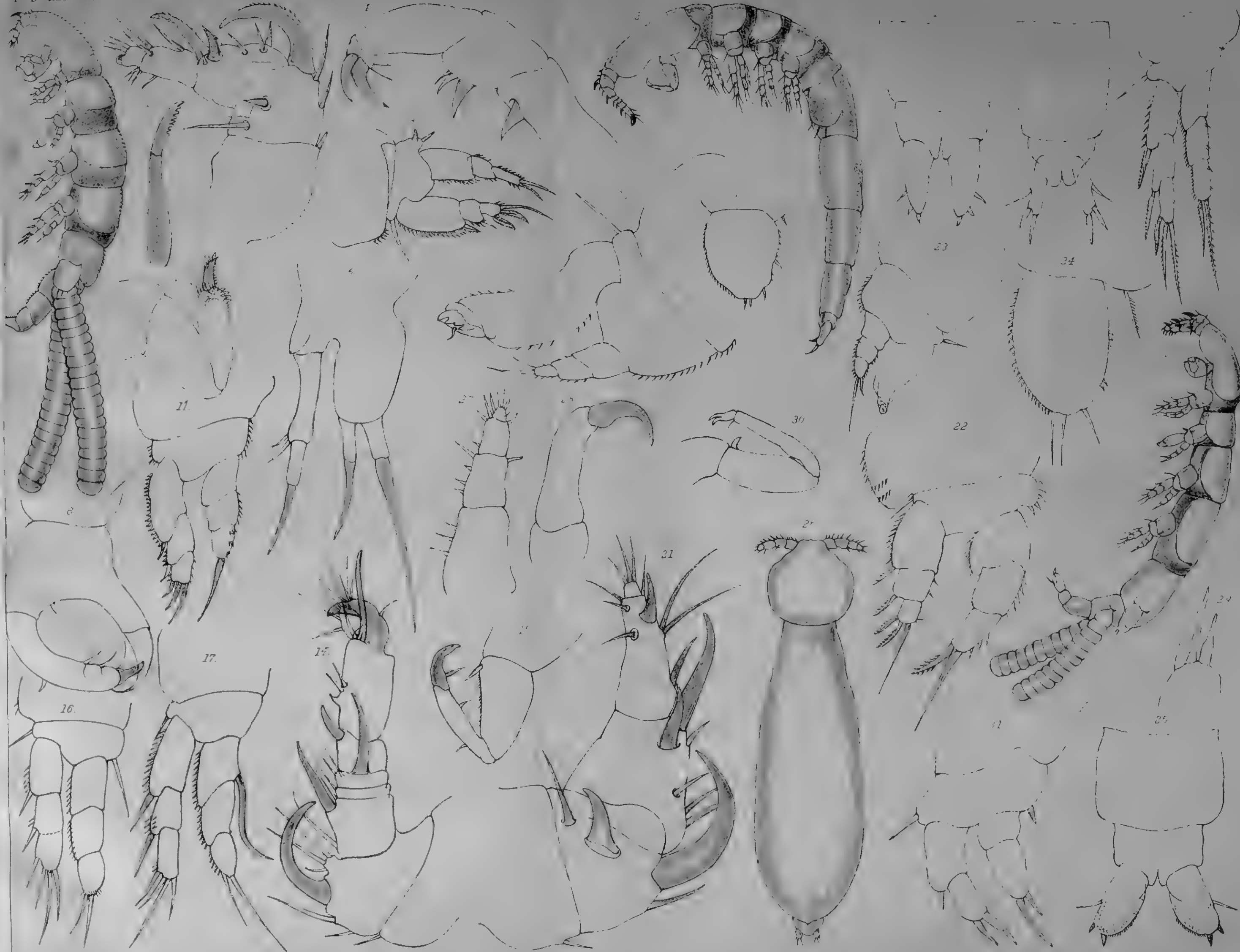
Eudactylina similis, sp. n.	Diam.
Fig. 1. Female, side view	× 29.
Fig. 2. Male, side view	× 58.
Fig. 3. Antennule, female	× 233.
Fig. 4. Antenna, ,,	× 233.
Fig. 5. Mandible, ,,	× 525.
Fig. 6. Maxilla, ,,	× 525.
Fig. 7. Anterior foot-jaw, female	× 154.
Fig. 8. Posterior foot-jaw, ,,	× 154.
Fig. 9. Foot of first pair, ,,	× 177.
Fig. 10. Foot of second pair, ,,	× 154.
Fig. 11. Foot of fourth pair, ,,	× 105.
Fig. 12. Foot of fifth pair, ,,	× 77.
Fig. 13. Part of abdomen and caudal furca, female	× 103.
Fig. 14. Antennule, male	× 233.
Fig. 15. Posterior foot-jaw, male	× 175.
Fig. 16. Foot of first pair, ,,	× 350.
Fig. 17. Foot of second pair, ,,	× 233.
Fig. 18. Foot of fourth pair, ,,	× 175.
Fig. 19. Part of abdomen and caudal furca, male	× 154.

Eudactylina acuta, Van Beneden.

Fig. 20. Female, side view	× 41.
Fig. 21. Antennule	× 350.
Fig. 22. Foot of first pair	× 233.
Fig. 23. Foot of second pair	× 105.
Fig. 24. Foot of fifth pair	× 175.
Fig. 25. Part of abdomen and caudal furca	× 131.

Clavella cluthæ sp. n.

Fig. 26. Female, dorsal view	× 58.
Fig. 27. Antennule	× 262.
Fig. 28. Antenna	× 154.
Fig. 29. Maxilla	× 1050.
Fig. 30. Posterior foot-jaw	× 262.
Fig. 31. Foot of first pair	× 525.



A. Scott, *del. ad nat.*

Parasites of Fishes.—*Crustacea.*

PLATE XIII.

A. SCOTT, del. ad nat.

PARASITES OF FISHES.—*Crustacea and Trematoda.*

PLATE XIII.

Eudactylina acanthii, A. Scott.

Fig.	1. Female, side view	× 41.
Fig.	2. Female, dorsal view	× 41.
Fig.	3. Antennule	× 262.
Fig.	4. Antenna	× 262.
Fig.	5. Foot of first pair	× 262.
Fig.	6. Foot of second pair	× 175.
Fig.	7. Foot of fourth pair	× 262.
Fig.	8. Foot of fifth pair	× 262.
Fig.	9. Part of abdomen and caudal furca	× 262.

Clavella labracis, Van Beneden.

Fig.	10. Female, dorsal view	× 38.
Fig.	11. Antennule	× 262.
Fig.	12. Antenna	× 262.

Bomolochus soleæ, Claus, var.

Fig.	13. Female, dorsal view	× 19.
Fig.	14. Antennule	× 131.
Fig.	15. Posterior foot-jaw	× 262.
Fig.	16. Mandible	× 350.
Fig.	17. Maxilla	× 262.
Fig.	18. Anterior foot-jaw	× 350.

Bomolochus onosi, sp. n.

Fig.	19. Female, dorsal view	× 38.
Fig.	20. Antennule	× 131.
Fig.	21. Posterior foot-jaw, female	× 262.
Fig.	22. Posterior foot-jaw, male	× 262.

Bomolochus zeugopteri, sp. n.

Fig.	23. Female, dorsal view	× 51.
Fig.	24. Antennule	× 262.
Fig.	25. Posterior foot-jaw	× 525.

Caligus labracis, sp. n.

Fig.	26. Female, dorsal view	× 15.
Fig.	27. Male, dorsal view	× 15.
Fig.	28. Sternal fork, female	× 117.
Fig.	29. Foot of fourth pair, female	× 77.

Callicotyle kröyerii, Diesing.

Fig.	30. Seen from the ventral side	× 15.

Acanthocotyle monticellii, sp. n.

Fig.	31. Seen from the ventral side	× 15.
Fig.	32. Posterior sucker (*s. adhesive disk*)	× 28.
Fig.	32A. Teeth of one of the rays of posterior sucker	(greatly enlarged).
Fig.	33. Adhesive disk	(greatly enlarged).

Chondracanthus ornatus, T. Scott.

Fig.	34. Male, side view	× 115.

V.—THE ECHINODERMS OF THE MORAY AND CROMARTY FIRTHS.

By Fred G. Pearcey.

It has been often considered desirable to draw up lists of the various groups of the invertebrate animals which inhabit the sea bottom in the areas where the supply of food fishes is obtained, and upon which the fish themselves depend more or less for their food supply.

This report comprises the Echinoderms that have for the greater part been taken by trawl or dredge over and near the areas of the sixteen stations laid down for special observations in the Moray and Cromarty Firths. It cannot, however, by any means be considered an exhaustive list for the whole of both areas, as will be seen by reference to the chart, since the stations cover but a small portion of either the Moray or Cromarty Firths. I have, however, when opportunity afforded, trawled and dredged outside or near these localities, as well as in isolated spots, the results of which are here incorporated, so as to make the list as complete as possible.

The discussion of the distribution of the various species is founded upon 117 hauls made by means of the dredge, beam-trawl, otter-trawl, or small shrimp-trawl. In Table A are given the physical characters of the Stations, viz., nature of the bottom, depth of water, and the temperature of the water at the bottom at the time of each haul. The numbers of specimens of each species obtained on each station by all the hauls made there are set out in Table B. From these data a certain amount of information regarding the most favourable habitat of each species is available. I have, however, left this question over for further and more direct observation.

In drawing up these lists I have made use chiefly of Mr. F. Jeffrey Bell's British Museum Catalogue of the British Echinoderms for the identification of the species here enumerated, and have followed the classification there given. After each species I have noted the names of the common fishes which are definitely known to prey upon it.

For the list of bearings of each station I am partly indebted to Captain Robert Campbell, of the "Garland," to whom I wish here to tender my thanks.

Bearings of Special Stations in the Moray and Cromarty Firths.

Station I. extends in a straight line from W. ½ N. to E. ½ S. Brough Head Pier bearing S.E. ½ E., distance 1½ miles, to Findhorn Spit, bearing S. ½ E., distance 2 miles.

Station II. extends in a semi-circle E. to W. off Nairn, bearing S. W. by W., distance 4½ miles, extending parallel to the beach line for about 4 miles.

Cromarty Firth.

Station III. extends in a straight line W.N.W. to E.S.E. from off Cromarty village, nearest the south side, westward, passing the mouth of Udall Bay, till abreast of Black Buoy, Chapelton Point.

Dornoch Bay.

Station IV. extends from N.N.E to S.S.W., curving parallel to the beach line, Embo Point bearing N.W. by W. $\frac{3}{4}$ N., distant $\frac{3}{4}$ mile, till Dunrobin Castle bearing W. by N. $\frac{1}{4}$ N., distant $3\frac{1}{5}$ miles.

Station V. extends in a straight line from N.E. by E. to S.W. by W. Dunrobin Castle bearing N.W. by W., distant $4\frac{1}{2}$ miles ; Embo Point bearing W. by N. $\frac{1}{4}$ N., distant $3\frac{1}{2}$ miles.

Station VI. extends in a straight line from W. to E. Tarbet Ness Lighthouse bearing south, distant $2\frac{3}{4}$ miles, till Fairway Buoy bearing S. $\frac{3}{4}$ E., distant $\frac{1}{2}$ mile.

Moray Firth.

Station VII. extends in a straight line from E. by S. $\frac{1}{2}$ S. to W. by N. $\frac{1}{2}$ N. Tarbet Ness Lighthouse bearing west, distant 4 miles, till Tarbet Ness Lighthouse bearing W. $\frac{3}{4}$ N., distant 7 miles.

Station VIII. extends in a straight line from N. by W. to S. by E Covesea Lighthouse bearing S.S.W., distant $8\frac{1}{4}$ miles, till Tarbet Ness Lighthouse bearing W. by N., distant 12 miles.

Station IX. extends in a straight line from N. by E. to S. by W. Covesea Lighthouse bearing S.W. $\frac{1}{4}$ S., distance $10\frac{1}{2}$ miles, till Covesea Lighthouse bearing S. by S. $\frac{1}{4}$ S., distant $12\frac{3}{4}$ miles.

Station X. extends in a straight line from N.W. $\frac{1}{2}$ W. to S.E. $\frac{1}{4}$ E. Covesea Lighthouse bearing S.W. by W., distant $5\frac{1}{4}$ miles, till Lossiemouth Pierhead bearing W. by S., distant $5\frac{3}{4}$ miles.

Station XI. extends in a straight line from W. by S. to E. by N. (West end) Ord of Caithness bearing N.W by W. $\frac{1}{2}$ W., distant$16\frac{3}{4}$ miles. (East end) Scarabein Mountain bearing N.W. by W. $\frac{1}{2}$ W., distant from coast line 19 miles.

Station XII. extends in a straight line from N. by W. to S. by E. (North end) Scarabein Mountain bearing W.N.W., distant from coast line $16\frac{1}{4}$ miles. (South end) Ord of Caithness bearing N.W. by W. $\frac{1}{2}$ W., distant 21 miles.

Station XIII. extends in a straight line from N. by W. to S. by E. (North end) Scarabein Mountain bearing W. by N. $\frac{1}{2}$ N., distant from coast line $21\frac{1}{2}$ miles. (South end) Scarabein Mountain bearing N.W. by W. $\frac{1}{2}$ W., distant from coast line $24\frac{3}{4}$ miles.

Station XIV. extends in a straight line from N. by W. to S. by E. Clythness bearing W. by N. $\frac{1}{2}$ N., distant $3\frac{1}{4}$ miles ; Scarabein Mountain bearing W. by N. $\frac{3}{4}$ N., distant from coast line 13 miles.

Station XV. extends in a straight line from N. by W. to S. by E. (North end) Scarabein Mountain bearing N.W., distant from coast line 10 miles. (South end) Ord of Caithness bearing N.W. $\frac{1}{4}$ N., distant $15\frac{1}{2}$ miles.

STATION XVI. e tends in a straight line from N. $\frac{1}{2}$ E. to S. $\frac{1}{2}$ W. (North end) Scarabein Mountain bearing N.W., distant from coast line $24\frac{1}{2}$ miles. (South end) Ord of Caithness bearing N.W. $\frac{1}{4}$ N., distant $28\frac{3}{4}$ miles.

HOLOTHURIOIDEA.

DENDROCHIROTÆ.

Cucumaria.

Cucumaria frondosa, Gunnerus.

1892. *Cucumaria frondosa*, Bell, Brit. Mus. Cat., pp. 39, 40, pl. iv., fig. 2.

Cucumaria frondosa is the most common Holothurian in the Moray and Cromarty Firths. I have taken it at twelve of the sixteen special stations in from 6 to 41 fathoms, often exceeding a foot in length, and four inches or more in diameter. It is well distributed over the whole of both areas, and was found in considerable numbers at Stations III., XI., and XIV.

The bathymetrical range of this species extends in the British seas, so far as is known, from 6 to 70 fathoms, but it is a widely distributed form, and has been obtained off the Florida Reefs and the coasts of California in from 3 to 220 fathoms.

Cucumaria fucicola, Forbes and Goodsir.

1892. *Cucumaria fucicola*, Bell, Brit. Mus. Cat., p. 40.

Two specimens of this doubtful species were obtained by me in the Cromarty Firth by shrimp trawl, between Invergordon and Alness Point, in $7\frac{1}{2}$ fathoms, adhering to the roots and stems of *Laminariæ*. This species has been regarded by some authors as the young of *Cucumaria frondosa.* One of the two specimens obtained by me was found on dissection to correspond with the diagnosis given by Mr. F. Jeffrey Bell in his catalogue of the British Echinoderms. The type specimens were found not uncommon in Bressay Sound, Shetland, in 7 fathoms, also adhering to the stems of *Laminariæ.*

The bathymetrical range of *Cucumaria fucicola* is not definitely known.

This species has been found in the stomach of the following fish:—*Haddock*, *Plaice*, *Lemon-sole*, and *Common dab.*

Cucumaria lactea, Forbes and Goodsir (Düb. and Kor.).

1892. *Cucumaria lactea*, Bell, Brit. Mus. Cat., pp. 38, 39, pl. iii., fig. 2.

1897. *Cucumaria lactea*, Pearcey, F.B. for Scot. Rept., No. 15, p. 58.

Cucumaria lactea has been obtained at two stations only, viz. III. and VIII. It appears to be a rare form in the Moray Firth, but its small size ($\frac{1}{2}$ to 1 inch in length) may be the cause of its having been overlooked. More diligent search in favourable localities would probably prove it to be more abundant.

Its bathymetrical range in the British seas, so far as is known, extends from extreme low water down to 50 fathoms.

This species has been taken in the stomachs of *Cod, Haddock,* and *Plaice.*

THYONE.

Thyone fusus, O. F. Müll.

1892. *Thyone fusus,* Bell, Brit. Mus. Cat., p. 42, pl. v., fig. 1; pl. vii., fig. 3.

Thyone fusus is apparently rare in the Moray Firth.

Only two specimens have been taken, at two localities, viz. Stations X. and XIV., in from 19 to 42 fathoms, and one in the Cromarty Firth between Invergordon and Alness Point, in 11 to 5 fathoms.

The bathymetrical range of this species in the British seas is from 15 to 100 fathoms.

It has been taken in the stomach of *Haddock.*

Thyone raphanus, Düb. and Kor.

1892. *Holothuria raphanus,* Bell, Brit. Mus. Cat., pp. 42, 43, pl. v., fig. 2; pl. viii., fig. 3.

1896–7. *Holothuria raphanus,* Scott, F.B for Scotland Report, Part III., 1897, p. 162, pl. iv., fig. 3.

Thyone raphanus is very rare in the Moray Firth, only one specimen having been obtained, at Station XVI. So far as I am aware it has never before been taken in this area, although it is not uncommon off the Shetland Islands, and common on the west coast and in the lochs of the Clyde area.

Its bathymetrical range in the British seas extends from 20 fathoms in Loch Fyne to 570 fathoms in the Faröe Channel.

The head of this species has been found in the stomach of *Cod, Haddock,* and *Plaice.*

PSOLUS.

Psolus phantapus, Strussenfeldt (Jäger).

1765. *Holothuria phantapus,* Strussenfeldt, Vet. Ak. Hdlg., xxvi., p. 263, pl. 10.

1892. *Psolus phantapus,* Bell, Brit. Mus. Cat., pp. 44, 45, pl. vi., fig. 1, and pl. viii., fig. 4.

Only one specimen of this species has been obtained by me in the Moray Firth, at Station I., in 7 to $8\frac{1}{4}$ fathoms. *Psolus phantapus* has not hitherto been recorded from this area.

Its bathymetrical range extends from 7 to 127 fathoms.

ASTEROIDEA.

Astropectininæ.

Astropecten irregularis, Pennant.

1885. *Astropecten irregularis,* Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404; F.B. for Scot'd. Rept., No. 17, 1897, pp, 57–63.

1892. *Astropecten irregularis*, Bell, Brit. Mus. Cat., Echin., pp. 66–68.

1892. *Astropecten irregularis*, Scott, F.B. for Scot'd. Rept., No. 11, 1892, pp. 126, 127.

I have taken *Astropecten irregularis* at all the special stations except II., III., and XIV. It appears to be well, though sparingly, distributed over the whole of the Moray Firth in from 6 to 42 fathoms.

Its bathymetrical range in the British seas extends from 6 to 500 fathoms. It has also been taken in 1000 fathoms off the S.W. coast of Ireland.

This species has been taken in the stomach of *Cod*, *Halibut*, and *Conger*.

Luidiinæ.

Luidia ciliaris, Johnston.

1890-1-2. *Luidia savignii*, Scott, Proc. Roy. Phys. Soc., Edinb., p. 82.

1892. *Luidia ciliaris*, Bell, Brit. Mus. Cat., pp. 70, 71

Luidia ciliaris has been taken by me at seven of the sixteen special stations in the Moray Firth, all of which, with the exception of Station VI., are situated well off shore, and in not less than 17 fathoms. This species appears to be fairly well, although sparingly, distributed throughout the Moray Firth. I have not found it in the Cromarty Firth. It is by far the more common of the two species of *Luidia*.

L. sarsi is confined more to deeper water; it has not been taken in less than 26 fathoms.

The bathymetrical range of *Luidia ciliaris*, so far as is at present known, extends, in the British seas, from 8 to 55 fathoms. It has also been taken in the Mediterranean at a depth of 87 fathoms.

Luidia sarsi, Düb. and Kor.

1884. *Luidia sarsi*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.

1890-1-2. *Luidia sarsi*, Scott, Proc. Roy. Phys. Soc., Edinb., p. 82.

1892. *Luidia sarsi*, Bell, Brit. Mus. Cat., p. 72.

Luidia sarsi is by no means a common form in the Moray Firth. It has been taken at four stations only, and never more than one specimen at a time, being confined to the deeper water of the farthest off-shore stations, where the bottom deposit is composed for the most part of a gray coherent mud.

Its bathymetrical range extends from 26 to 374 fathoms.

Hippasterias.

Hippasterias phrygiana, Linn.

1892. *Hippasterias phrygiana*, Bell, Brit. Mus. Cat., pp. 76, 77, 78.

1892. *Hippasterias phrygiana*, Scott, Ann. Scot. Nat. Hist., p. 49, pl. ii.; Scott, Proc. Roy. Phys. Soc., Edin., 1890-91 (92), p. 82.

Hippasterias phrygiana has been taken at eight stations, all in the deeper water farthest from shore, in not less than 20 fathoms; below this depth it appears to be well distributed over the whole of the Moray Firth. It has not been found in theCromarty Firth.

The bathymetrical range of the species extends, in the British seas, from 20 to 82 fathoms. It has also been obtained in the North Atlantic at a depth of 150 fathoms. At Station X. in the Moray Firth, 19 to 42 fathoms, a fine specimen with only four rays was obtained.

GYMNASTERIIDÆ.

Porania.

Porania pulvillus, O. F. Müller.

1892. *Porania pulvillus*, Bell, Brit. Mus. Cat., pp. 79, 80, pl. x., figs. 7 and 8.
1896. *Porania pulvillus*, Scott, F.B. for Scotd. Rept., No. 15, p. 161.

Only one specimen of *Porania pulvillus* has been taken by me in the Moray Firth area, at Station XIV., in 29 to 35 fathoms. Mr. F. Jeffrey Bell, in his Catalogue of British Echinoderms, gives the late Dr. Sutherland, of Invergordon, as the authority for its having been obtained off the Ross-shire coast, but gives no depth.

Its bathymetrical range extends in the British seas from 10 to 40 fathoms. It has also been taken by the Porcupine Expedition off the west coast of Ireland in 106 fathoms.

P. pulvillus appears to be very rare in the Moray Firth. On the west coast and islands of Scotland it is comparatively common.

ASTERINIDÆ.

PALMIPES.

Palmipes placenta, Pennant.

1872. *Palmipes placenta*, Bell, Brit. Mus. Cat., pp. 84, 85.
1892. ,, ,, Herdman, Livpl. Marine Biol. Assoc.
1890–91) 1892). *Palmipes placenta*, Scott, Proc. R. P. Soc., Edin., p. 82; Pearcey, F.B. for Scotland Rept. 17, 1897, pp. 59, 60.

Palmipes placenta has been taken by me on four occasions in the Moray Firth, at two stations only, viz. Stations VIII. and X., in 17 to 36 fathoms. I consider it, therefore, an uncommon form in this area.

Its bathymetrical range in the British seas extends from 5 fathoms on the west coast of Scotland, where it is found moderately common to 110 fathoms in the Firth of Lorne.

STICHASTERIDÆ.

Stichaster.

Stichaster roseus, O. F. Müll.

1884. *Stichaster roseus*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.
1892. ,, Scott, F.B. for Scotland Rept., p. 161.
,, ,, Bell, Brit. Mus. Cat., pp. 85, 86.

Stichaster roseus is apparently a rare form in the Moray Firth. I have only obtained it twice, at Station VII., in 25 to 33 fathoms.

Its bathymetrical range extends in the British seas from 10 to 50 fathoms, but it has been taken off the Irish coast at a depth of 200 fathoms.

SOLASTERIDÆ.

Solaster.

Solaster papposus, Fabr.

1892. *Solaster papposus*, Bell, Brit. Mus. Cat., pp. 89, 90.
1896-97. „ „ Scott, F.B. Scot. Rept., p. 161.
1884. „ „ Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.

Solaster papposus is a moderately common form in both the Moray and Cromarty Firths.

I have taken it at eleven stations in the Moray Firth, 7 to 35 fathoms, and find it generally distributed in the lower reaches of the Cromarty Firth, in from 4 to 20 fathoms.

This species is found more or less commonly all over the British seas, its bathymetrical range extending from 4 to 632 fathoms (if we include the Faröe Channel). At Station XIV., 18/11/97, one very large specimen was obtained, measuring $13\frac{3}{8}$ inches across the arms.

Solaster endeca, Linn.

1892. *Solaster endeca*, Bell, Brit. Mus. Cat., pp. 90-91.
1896-97. *Solaster endeca*, Scott and Pearcey, F.B. Scot. Rept., pt. 15, p. 161.

Solaster endeca has been taken by me at eleven stations in the Moray Firth, from those along the coast to the farthest off shore, and at three in the Cromarty Firth. It appears to be well distributed, although sparingly, throughout both areas.

Its bathymetrical range extends in the British seas from 7 to 80 fathoms; it has also been taken in the Arctic Ocean at a depth of 150 fathoms.

ECHINASTERIDÆ.

HENRICIA.

Henricia sanguinolenta, O. F. Müll.

1840. *Cribella oculata*, Forbes, British Starfish, p. 100.
1892. *Henricia sanguinolenta*, Bell, Brit. Mus. Cat., pp. 95, 96.
1896-97. *Henricia sanguinolenta*, Scott and Pearcey, F.B. Scot. Rept., 15, p. 161.
1884. *Cribella sanguinolenta*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.

Henricia sanguinolenta is not a common form in the Moray Firth, very rarely more than a single specimen being taken in any one haul. I have obtained this species at eight stations in the Moray Firth, and at two in the Cromarty Firth, in from 7 to $37\frac{1}{2}$ fathoms.

The greatest number taken at one haul was seven young specimens, by the otter trawl, off the Suter Heads of Cromarty, in 13 to 15 fathoms.

Its bathymetrical range extends in the British seas, including the Faröe Channel, from 5 to 555 fathoms.

It is also recorded from the North Atlantic Ocean from a depth of 1350 fathoms.

ASTERIIDÆ.

Asterias.

Asterias rubens, Linn.

1885. *Asterias rubens*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.
1892. *Asterias rubens*, Bell, Brit. Mus. Cat., pp. 100-102.
1896-97. *Asterias rubens*, Scott, F.B. Scot. Rept., 15, p. 161.

Asterias rubens is the most common asterid in the British seas. It is found abundantly and generally distributed over the whole of both the Moray and Cromarty Firths, but most abundant in from 6 to 15 fathoms.

Its bathymetrical range in the British seas extends from low-water mark down to 125 fathoms off the Shetland Islands.

Asterias rubens, var. *attenuata*, Hodge.

Two specimens of this variety were obtained, at Station XIV., in 29 to 40½ fathoms, and in the Cromarty Firth, between Invergordon and Alness, in 11 to 5 fathoms.

I have also dredged it off North Rona, in 56 fathoms, and at Tobermory, Mull, in 30 fathoms.

Its bathymetrical range is not definitely known. Young specimens of *A. rubens* have been found in the stomachs of *Haddock*, *Plaice*, and *Long-rough dab*.

Asterias Murrayi, F. J. Bell.

1891. *Asterias Murrayi*, F. Jeffreys Bell, Ann. and Mag. Nat. Hist., vii., p. 478, pl. xv.
1892. *Asterias Murrayi*, Bell, Brit. Mus. Cat., p. 103, Pl. xii., figs. 1 and 2.

Asterias Murrrayi is here recorded for the first time from the Moray Firth.

It appears, so far as my observations have extended, to be a rare form in this area. Three specimens only have been taken; two typical and one doubtful, at Stations IX. and XII., in 27½ to 36 fathoms.

Hitherto this species has been obtained only from the Firth of Clyde area, where it was trawled and dredged by Sir John Murray and myself for the first time in 1888-90 in from 20 to 65 fathoms. It is also recorded from the west coast of Ireland, but no depth or exact locality is given.

It is therefore of considerable interest to have discovered this beautiful species inhabiting the waters of the east as well as the west coast of Scotland.

Asterias hispida, Pennant.

1890-91. *Asterias hispida*, Scott, Proc. Roy. Phys. Soc., Edinburgh, p. 81.
1892. *Asterias hispida*, Bell, Brit. Mus. Cat., pp. 103, 104.

One specimen of this doubtful species was obtained by me, in the ordinary trawl, at Station XII. in 22½ to 25 fathoms on Smith Bank. I have not met with it elsewhere in the Moray Firth.

It has been taken by Mr. Thomas Scott, F.L.S., Naturalist to the Fishery Board for Scotland, in fair abundance at Kessock Ferry, at the entrance to the Beauly Firth, near Inverness, in fully 18½ fathoms. Mr. Scott says the specimens that he obtained were, when living, easily distinguished from the young of *Asterias rubens* by their prominent spinulation. *Asterias hispidus* has also been taken by the Rev. Canon Norman off the Outer Skerries, Shetland, and off the coast of Co. Down, the only other two localities known.

The bathymetrical range of this species, so far as is at present known, extends from 18½ to 25 fathoms.

Specimens which appear to belong to this species have been taken by me from the stomachs of *Haddock*, *Turbot*, and *Plaice*.

Amphiura elegans (Leach).

1892. *Amphiura elegans*, Bell, Brit. Mus. Cat., pp. 119, 120.

I have taken *Amphiura elegans* at four stations only, two in the Moray and two in the Cromarty Firths, in from 6¾ to 17 fathoms, but always in small numbers, never more than five at one haul, and in most cases concealed among the finer roots of *Laminaria*.

Its bathymetrical range in the British seas is confined from low spring tide to 17 fathoms.

Ophiactis.

Ophiactis Ballii, Thompson.

1892. *Amphiura Balli*, Bell, Brit. Mus. Cat., pp. 123, 124.

I have not taken *Ophiactis Ballii* in the Moray Firth myself, but have included it in this list on the authority of Messrs. Hoyle* and Edward.

The bathymetrical range of this species in the British seas extends from 40 to 363 fathoms.

Ophiopholis.

Ophiopholis aculeata, Linn.

1892. *Ophiopholis aculeata*, Bell, Brit. Mus. Cat., pp. 125, 126.

I have taken *Ophiopholis aculeata* at four of the special stations; it is comparatively rare in the Moray Firth proper, but fairly abundant in the Cromarty Firth, from Castle Craig down to the Suter Heads of Cromarty, in 6 to 15 fathoms. Its favourite habitat here is among the roots of *Laminaria* and colonies of *Sabellaria alveolata*, where it delights to nestle in the hollows and crevices, squeezing its disk and twisting its arms so as to conform to all the irregularities of the surface to which it attaches itself.

Its bathymetrical range in the British seas extends from 5 to 560 fathoms. It is, however, chiefly confined to depths from 5 to 20 fathoms.

Ophiopholis aculeata has been found more or less commonly in the stomachs of *Cod*, *Haddock*, *Plaice*, and *Common dab*, *Halibut*, *Turbot*, and *Cat-fish*.

OPHIOCOMID

Ophiocoma.

Ophiocoma nigra, Abilg.

1892. *Ophiocoma nigra*, Bell, Brit. Mus. Cat., pp. 129, 130.

Ophiocoma nigra is a very rare form in the Moray Firth. I have taken only two specimens, at Station I., off Burghead Bay, in 8½ to 17½

* Bell, Brit. Mus. Cat., 1892, p. 103.

fathoms. I have not found it in the Cromarty Firth. It is also recorded,* on the authority of the late Dr. Sutherland, of Invergordon, from the east coast of Ross-shire, but no depth is given.

The bathymetrical range of *O. nigra* extends from 3 to 20 fathoms (in the Firth of Clyde, where it is extremely abundant) to 87 fathoms (in the Faröe hannel).

OPHIOTHRICIDÆ.

Ophiothrix.

Ophiothrix fragilis, Abilg.

1892. *Ophiothrix fragilis*, Bell, Brit. Mus. Cat., pp. 131, 133.

Ophiothrix fragilis has been taken in moderate numbers at nine of the Moray Firth stations, and is found fairly abundant all along the main channel of the Cromarty Firth, from above Castle Craig to the Suter Heads, in from 3 to 10 fathoms.

Its bathymetrical range extends from low spring tide mark, or the Laminarian zone, to 516 fathoms.

It is often found in the stomachs of *Cod*, *Haddock*, *Coal-fish*, *Cat-fish*, *Plaice*, *Turbot*, *Halibut*, *Lemon-sole*, *Long-rough dab*, and *Common dab*.

CLADOPHIURÆ.

Astronycinæ.

Astronyx.

Astronyx Loveni, Müll. and Tr.

1892. *Astronyx Loveni*, Bell, Brit. Mus. Cat., pp. 136, 137.

I have included this genus as doubtful from the Moray Firth. I have not taken it in the Firth myself, but four masters of Aberdeen trawlers to whom I have shown specimens say that they have taken it in their trawl, some 10 or 15 miles S. by E. of the Smith Bank, in 40 to 50 fathoms, but that it is very rare.

Mr G. Sim, of Aberdeen, also informs me that he obtained specimens from the trawlers on several occasions, but he could not be sure that they were obtained in the Moray Firth area.

Astronyx Loveni has been obtained in the stomach of *Halibut* and *Conger*.

OPHIUROIDEA.

Ophiura.

Ophiura ciliaris, Linn.

1892. *Ophiura ciliaris*, Bell, Brit. Mus. Cat., pp. 106, 107 108.

Ophiura ciliaris has been taken by me at ten of the sixteen special stations, in from 7 to 34 fathoms, and in abundance off the Suter Heads of Cromarty, in 12 to 15 fathoms.

The bathymetrical range of this species extends in the British seas from 7 to 87 fathoms; in the latter depth I dredged it off the island of North Rona in 1882.

In the Mediterranean this species has also been taken at a depth of 100 fathoms.

* Bell, *op. cit.*

Specimens of *Ophiura ciliaris* have commonly been taken from the stomachs of *Cod*, *Haddock*, *Whiting*, *Coal-fish*, *Turbot*, *Halibut*, *Plaice*, *Lemon-sole*, *Long-rough dab*, *Common dab*, *Sail-fluke*, *Witch-sole*, *Cat-fish*, *Gurnard*, and other fishes.

Ophiura albida, Forbes.

1892. *Ophiura albida*, Bell, Brit. Mus. Cat., pp. 108, 109.

Ophiura albida has been taken at six stations in the Moray Firth in from 24 to 41 fathoms, and off the Suter Heads of Cromarty in 12 to 15 fathoms.

Its bathymetrical range, in the British seas, extends (if we include the Faröe Channel, where I have taken it by dredge in the warm area at 458 fathoms in 1882) from 12 to 458 fathoms.

This species has often been found in the stomachs of *Cod*, *Haddock*, *Whiting* (rare), *Cat-fish*, *Coal-fish*, *Turbot*, *Halibut*, *Plaice*, *Common dab*, *Long-rough dab*, *Witch-sole*, and rarely in *Gurnard*.

Ophiura robusta, Ayres.

1892. *Ophiura robusta*, F. J. Bell, Brit. Mus. Cat., Echinoderms, pp. 109, 110.

Ophiura robusta, so far as I am aware, has not hitherto been recorded from the Moray Firth, where it appears to be an uncommon form. I have taken it in two localities only, off Tarbet Ness in 10 to 18 fathoms, and at Station XV. in 26 to 33 fathoms, on a bottom deposit of sandy mud.

Its bathymetrical range in the British seas, so far as is at present known, extends from 10 to 33 fathoms. It has, however, been taken at a depth of 180 fathoms in the Christiania Fjord (Norman).

I have also found this species in the stomach of *Haddock* on Smith Bank, Moray Firth.

AMPHIURIDÆ.

Amphiura.

Amphiura chiajii, Forbes.

1841. *Ophiocoma punctata*, Forbes, British Starfishes, p. 37 (Young ?).

1892. *Amphiura chiajii*, Bell, Brit. Mus. Cat., pp. 117, 118.

Only three specimens of *Amphiura chiajii* have been taken by me in the Moray Firth, viz., at Station XIV., 27 to 40 fathoms, and so far as I am aware it has never before been recorded from this area, but further and more careful search in deposits of mud, on which it is generally found, may prove it to be more abundant.

The bathymetrical range of this species extends in the British seas from 20 to 120 fathoms. It was also dredged by me on H.M.S. "Triton," in the warm area of the Faroe Channel from 555 fathoms.

Amphiura chiajii has been found in the stomach of *Plaice*, *Witch-sole*, *Common dab* and *Long-rough dab*, *Haddock*, and *Cod*.

Amphiura filiformis, Forbes (O. F. Müller).

1892. *Amphiura filiforms*, Bell, Brit. Mus. Cat., p. 119.

Amphiura filiformis must also be regarded as a rare species in the

Moray Firth. I have only taken five specimens, 3 from Station VII. and 2 from Station V., in 25 to 34 and 12 to 19 fathoms.

As in the case of *Amphiura chiajii*, there is reason for believing that it may be found in greater abundance if specially searched for on suitable ground.

The bathymetrical range of *A. filiformis* extends from 12 to 555 fathoms.

This species is often found in the stomachs of *Haddock*, *Cod* (rarely), *Whiting*, *Plaice*, *Common dab*, *Long-rough dab*, *Witch-sole*, *Sail-fluke*.

ECHINOIDEA.

Echinidæ.

Echinus.

Echinus acutus, Lamk.

1883. *Echinus acutus*, Hoelker, Ann. Mus. Marseille., i. iii., p. 121.
1892. *Echinus acutus*, Bell, Brit. Mus. Cat., pp. 146, 147.
1895. ,, ,, Lamk., T. Scott, Annals of Scottish Nat. His., p. 255 ; Note by Sim, Aberdeen.

One very fine typical specimen of *Echinus acutus* was taken at Station XV. in 34 fathoms, the only specimen obtained. It must, therefore, be regarded as a rare species in the Moray Firth.

The bathymetrical range of this species in the British seas, so far as it is at present known, extends from 34 to 400 fathoms.

It was also trawled by the Challenger Expedition off Nova Scotia from a depth of 1350 fathoms.

Echinus norvegicus, Düb. and Kor.

1885. *Echinus norvegicus*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404.
1892. *Echinus norvegicus*, Bell, Brit. Mus. Cat., pp. 147, 148.

Echinus norvegicus appears to be, so far as my observations have extended, a rare form in the Moray Firth, only two specimens having been taken, at Station XIII., Smith Bank, in 28 to 30 fathoms. It is, however, generally abundant wherever it is found. There is no record of its being hitherto taken in the Moray Firth.

Its bathymetrical range in the British seas extends from 6 to 530 fathoms. It has been obtained off the coast of Japan, in a depth of 2435 fathoms.

Echinus norvegicus has been found in the stomachs or *Cod*, *Haddock*, *Halibut*, and *Cat-fish.*

Echinus miliaris, Gmel.

1884. *Echinus miliaris*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404, vol. viii.
1896. *Echinus miliaris*, Scott, F.B. Scot. Rept., pt. 15, p. 162.
1892. ,, ,, Bell, Brit. Mus. Cat., pp. 150, 151.

Echinus miliaris has been taken sparingly by me at two stations only in the Moray Firth, viz. I. and II. I have both dredged and trawled it in fair abundance in the Cromarty Firth. This well-known species is, however, widely distributed in shallow water all round the British coasts.

Its bathymetrical range extends from low-water mark to 56 fathoms *Echinus miliaris* has been found in the stomach of *Cat-fish.*

Echinus esculentus, Linn.

1892. *Echinus esculentus*, Scott, Ann. Soc. Nat. Hist., i., p. 49.
,, ,, ,, Bell, Brit. Mus. Cat., pp. 152, 153.

Echinus esculentus is the most common species in the Moray Firth, and perhaps also in the British seas. I have taken it in more or less abundance at all the special stations, in fact on almost every occasion that the trawl or dredge was worked.

In the Cromarty Firth a marked variety is common, with test much compressed; spines thick and short, often abnormal; with the inter-ambulacral areas much sunken or compressed inwards, and the ambulacral areas prominent and projecting.

This variety, so far as I am aware, is peculiar to the Cromarty Firth, and recorded here for the first time.

The bathymetrical range of *Echinus esculentus* extends in the British seas from the low-water line to 140 fathoms.

This species has often been found in the stomachs of *Cat-fish.*

Strongylocentrotus droebachiensis, O. F. Müll.

1885. *Strongylocentrotus droebachiensis*, Pearcey, Proc. Roy. Phys. Soc., Edinb., vol. viii., p. 404.
1892. *Strongylocentrotus droebachiensis*, Bell, Brit. Mus. Cat., pp. 156, 157.
1892. *Strongylocentrotus droebachiensis*, Scott and Pearcey, F.B. Scot. Repts., 1890 to 1897.

Strongylocentrotus droebachiensis has been taken sparingly at seven of the special stations in the Moray Firth, all small specimens.

In the Cromarty Firth, however, it is abundant, large, and the tests in most cases are much compressed. I have taken in this locality as many as 193 specimens in one haul of the trawl, in $6\frac{1}{2}$ to 14 fathoms.

Its bathymetrical range extends in the British seas from 4 to 640 fathoms.

CLYPEASTRIDÆ.

Echinocyamus.

Echinocyamus pusillus, O. F. Müll.

1885. *Echinocyamus pusillus*, Pearcey, Proc. Roy. Phys. Soc., Edinb., vol. viii., p. 404.
1892. *Echinocyamus pusillus*, Bell, Brit. Mus. Cat., pp. 160, 161.
1897. *Echinocyamus pusillus*, Pearcey, F.B. for Scot. Rept., pt. 16, p. 54.

Echinocyamus pusillus is not an uncommon form in the Moray Firth, where I have taken it at nine of the special stations, in from 8 to 42 fathoms, and at one station in the Cromarty Firth, $5\frac{1}{4}$ to $9\frac{3}{4}$ fathoms, where it appears to be very rare.

The bathymetrical range of *E. pusillus*, in the British seas, extends from 5 to 145 fathoms. This is a widely distributed species. It was taken by the Challenger Expedition in great abundance off the coast of Brazil, in 350 fathoms, in a deposit of red mud.

It is often taken in the stomachs of *Cod, Haddock, Whiting* (rarely), *Plaice, Sail-fluke, Long-rough dab, Common dab,* and *Gurnard* (rarely). I have taken as many as 35 perfect specimens from the stomach of one haddock 13¾in. long.

SPATANGIDÆ.

SPATANGUS.

Spatangus purpureus, O. F. Müll (Leske).

1885. *Spatangus purpureus*, Pearcey, Proc. Roy. Phys. Soc., Edinb., vol. viii., p. 404.
1892. *Spatangus purpureus*, Bell, Brit. Mus. Cat., pp. 165, 166, pl. xvi., fig. 10.
1892. *Spatangus purpureus*, Scott, F.B. for Scot. Report, 11, pt. iii., p. 126.
1897. *Spatangus purpureus*, Pearcey, F.B. for Scot. Rept., pt. 16, p. 61.

I have taken *Spatangus purpureus* in moderate numbers at seven of the off-shore stations in the Moray Firth, and especially fine specimens on and near Smith Bank. Those taken in the deeper water, 30 to 42 fathoms, on a muddy bottom, generally have the minute bivalve mollusc, *Montacuta substriata*, attached to their spines.

Spatangas purpureus is a very rare form in the Cromarty Firth.

The bathymetrical range of the species extends, in the British seas, from 5 to 530 fathoms. Its natural habitat, however, is in depths of from 20 to 50 fathoms, on a bottom deposit of sandy mud, where it is often taken in abundance.

Spatangas purpureus has been found in the stomachs of *Cod, Haddock,* and *Cat-fish.*

ECHINOCARDIUM.

Echinocardium cordatum, Penn.

1885. *Echinocardium cordatum*, Pearcey, Proc. Roy. Phys. Soc., Edinb., p. 404, vol. viii.
1892. *Echinocardium cordatum*, Bell, Brit. Mus. Cat., pp. 169, 170, pl. xvi., figs. 1–4.
1896. *Echinocardium cordatum*, Scott, F.B. for Scot. Rept., pt. 15, p. 162.
1897. *Echinocardium cordatum*, Pearcey, F.B. for Scot. Rept., 16, pp. 57 to 63.

Echinocardium cordatum, the commonest of all the British Heart Urchins, is but sparingly distributed over the off-shore stations of the Moray Firth, its natural habitat being in shallow-water sandy bays along the coast, where it can be taken in great quantity. I have taken it in small numbers at thirteen of the special stations in the Moray Firth, but I have not found it in the Cromarty Firth, where the nature of the bottom deposits is unfavourable to its existence.

The bathymetrical range of this species extends from the low spring tide mark to 75 fathoms, in the British seas.

Echinocardium cordatum has been found in the stomachs of *Haddock, Cod, Cat-fish, Whiting, Plaice,* and *Halibut.*

Echinocardium flavescens, O. F. Müll.

1776. *Echinocardium flavescens*, O. F. Müll, Prod. Zool. Dan., p. 236.
1891. *Echinocardium flavescens*, Scott, Proc. Roy. Phys. Soc., Edinb., p. 82.
1892. *Echinocardium flavescens*, Bell, Brit. Mus. Cat., pp. 171, 172, pl. xvi., figs. 6 and 7.

Echinocardium flavescens is a rare species in the Moray Firth, so far as my observations have extended. I have taken six specimens, at four of the special stations farthest from the coast line, in 30½ to 42 fathoms. It appears to be absent altogether in the Cromarty Firth.

The bathymetrical range of this species extends from 53 to 140 fathoms; its natural habitat, however, is confined to depths between 40 and 100 fathoms, and on a bottom deposit of shell-sand and ooze.

Echinocardium flavescens has been found in the stomachs of *Haddock* and *Cat-fish.*

Brissopsis, Agass.

Brissopsis lyrifera, Forbes.

1885. *Brissopsis lyrifera*, Pearcey, Proc. Roy. Phys. Soc., Edinb., vol, viii., p. 404.
1889. *Brissopsis lyrifera*, Scott, Report Scot. Fishery Board, p. 316; *id.*, Ann. Scot. Nat. Hist. (1892), p. 50.
1892. *Brissopsis lyrifera*, Bell, Brit. Mus. Cat., pp. 172, 173, 174.

Brissopsis lyrifera is not an uncommon form in the Moray Firth, but it is confined to the farthest off-shore waters in the greatest depths, on a bottom deposit of homogeneous mud. I have taken this species in moderate numbers at five of the special stations, near Smith Bank, in 24 to 42 fathoms. It was not found in the Cromarty Firth.

The bathymetrical range of this species, in the British seas, extends from 10(?) to 200 fathoms. In the Southern Atlantic, however, it is found in great depths. It was obtained by the Challenger Expedition off the American coast, in a depth of 1555 fathoms.

Brissopsis lyrifera has been found in the stomachs of *Cat-fish*, *Cod*, and *Conger*.

[Table.

Table of the Species which were found in the Moray and Cromarty Firths.

(A cross indicates the presence of the species.)

Species.	Moray Firth.	Cromarty Firth.
Cucumaria frondosa, Gunnerus,	×	×
,, *fucicola*, Forbes and Goodsir,	.	×
,, *lactea*, Forbes and Goodsir,	×	×
Thyone fusus, O. F. Müll.,	×	×
,, *raphanus*, Düb and Kor.,	×	.
Psolus phantapus, Strasenfeld,	×	.
Astropecten irregularis, Penn.,	×	.
Luidia ciliaris, Johnston,	×	.
,, *sarsi*, Düb and Kor.,	×	.
Hippisterias phrygiana, Linn.,	×	.
Porania pulvillus, O. F. Müll.,	×	.
Palmipes placenta, Penn.,	×	.
Stichaster roseus, O. F. Müll.,	×	.
Solaster papposus, Fabr..	×	×
,, *endeca*, Linn.,	×	×
Henricia sanguinolenta, O. F. Müll.,	×	×
Asterias rubens, L.,	×	×
,, *rubens*, var. *attenuata*, Hodge,	×	×
,, *Murrayi*, F. J. Bell,	×	.
,, *hispidus*, Penn.,	×	.
Ophiura ciliaris, L.,	×	×
,, *albida*, Forbes,	×	.
,, *robusta*, Ayres,	×	.
Amphiura chiagii, Forbes,	×	.
,, *filiformis*, O. F. Müll.,	×	.
,, *elegans*, Leach,	×	×
Ophiactis Ballii, Thompson,	×	.
Ophiopholis aculeata, L.,	×	×
Ophiocoma nigra, Obilg.,	×	.
Ophiothrix fragilis, Obilg.,	×	×
Astronyx Lovéni, M. Tr.	×	.
Echinus acutus, Lamk.,	×	.
,, *norvegicus*, Düb and Kor.,	×	.
,, *miliaris*, Gmel.,	×	×
,, *esculentus*, L.,	×	×
Strongylocentrotus droebachiensis, O. F Müll.,	×	×
Echinocyamus pusillus, O. F. Müll.,	×	×
Spatangus purpureus, O. F. Müll.,	×	×
Echinocardium cordatum, Penn.,	×	.
,, *flavescens*, O. F. Müll.,	×	.
Brissopsis lyrifera, Forbes.		.

TABLE A.

GIVING THE DATES UPON WHICH THE STATIONS WERE EXAMINED, WITH THE BOTTOM TEMPERATURE AND DEPTHS FOUND AT THE TWO ENDS OF EACH STATION.

MORAY FIRTH.

Number of Haul.	Station. Nature of Bottom.	Date.	Bottom Temperature at the Ends of Station. °F.	Depth (Fathoms) at the Ends of Station.
	I.			
1	Rolled stones, rock fragments, brown sand, shells.	9 June 1897	47·2 : 47·6	8½ : 17
2		8 November 1897	51	9 : 9½
3		24 May 1898	49·2 : 48·9	7 : 8¼
4		11 October 1898	54	7½ : 8½
5		18 April 1900		7½ : 9½
6		6 June 1900		
7		12 December 1900	46·8 : 47·5	8 : 7
	II.			
8	Light brown sand, with traces of grey mud, and shell fragments.	9 June 1897	46·3 : 47	19 : 17
9		5 November 1897	51	14 : 17
10		24 May 1898	46·9 : 48·1	12½ : 12
11		10 October 1898	53·8	13 : 13
12		3 December 1900		12 : 10
	IV.			
13	Light brown sand, with traces of grey mud and shell fragments.	11 November 1897	50	13 : 8
14		25 May 1898	48·8 : 49·1	12 : 9
15		14 June 1898	49·3 : 51	11 : 8½
16		13 October 1898	54·1 : 54·2	10½ : 12½
17		8 May 1900		9 : 13
18		6 December 1900		10 : 7
	V.			
19	Grey sandy mud, slightly coherent.	11 November 1897	49·9 : 50·1	13 : 20
20		25 May 1898	48	12 : 19½
21		14 June 1898	49·5 : 48	12½ : 21
22		13 October 1898	54 : 54·2	15 : 13
23		11 June 1900		10 : 15
24		5 December 1900	47·8 : 48	9¾ : 15
	VI.			
25	Grey sandy mud, slightly coherent.	6 October 1893	53·2 : 52·1	8 : 17
26		10 November 1897	49·9 : 50	18 : 12
27		25 May 1898	50 : 47·2	6 : 16
28		14 June 1898	50·8 : 48·1	6½ : 16½
29		8 May 1900	46·4 : 43·9	7 : 15
30		5 December 1900	48·2 : 47·6	16 : 17
	VII.			
31	Dark grey coherent sandy mud, with few shell fragments.	10 November 1897	50·3 : 50·8	25 : 34
32		27 May 1898	46	25¼ : 33
33		15 June 1898	47·2 : 47	25½ : 38
34		18 November 1898	51 : 50·9	30 : 27
35		11 April 1900	42·1 : 42·2	26½ : 33
36		12 June 1900	46·1 : 45·8	25 : 33
37		19 December 1900	47·5	25 : 33
	VIII.			
38	Grey homogeneous sandy mud, with few shells and shell fragments.	10 June 1897	45 : 45·6	23 : 26½
39		27 May 1898	46	34 : 36½
40		15 June 1898	47	33 : 30
41		18 December 1900	47·6 : 47·1	33½ : 29

TABLE A. MORAY FIRTH—*continued.*

Number of Haul.	Station. Nature of Bottom.	Date.	Bottom Temperature at the Ends of Station. °F.	Depth (Fathoms) at the Ends of Station.
	IX.			
42	A greenish-grey coherent sandy mud, with few shell fragments.	25 August 1896	53·2 : 53·1	38 : 32
43		24 October 1896	50·9 : 50·5	39 : 32
44		26 November 1896	47·9	38 : 32
45		10 June 1897	45·5	34 : 29½
46		9 November 1897	51	30½ : 35
47		28 May 1898	46	36 : 30½
48		16 June 1898	47·5 : 47·3	37½ : 31
49		18 November 1898	50·8 : 51	33 : 28
50		18 December 1900	47·5 : 48·1	35 : 30
	X.			
51	Dark grey homogeneous mud, with few shell fragments.	26 August 1896		19½ : 35½
52		24 October 1896	50·3 : 50·5	18 : 36
53		10 June 1897	45·3 : 44·9	34½ : 34
54		8 November 1897	50·8 : 51	35 : 30
55		28 May 1898	46	42 : 19
56		16 June 1898	47·8 : 47·1	24 : 36¼
57		19 April 1900		18½ : 25
58		14 June 1900	46·5 : 45·9	17 : 33
	XI.			
59	Quartz sand and shell fragments.	10 June 1897	46·3 : 46·8	23 : 24½
60		22 November 1897	49·9 : 50	24 : 24
61		19 May 1898	46·1 : 46	23 : 11½
62		23 April 1900	43·2 : 43·3	21 : 33
	XII.			
63	Light brown sand and shells.	22 November 1897	49·8 : 49·9	23½ : 22½
64		18 May 1898	46·1 : 46·2	22½ : 25
65		10 June 1898	48·4 : 48·3	23½ : 25¼
66		21 June 1900		24
	XIII.			
67	Fine shelly sand, with traces of grey mud.	17 July 1894	50·7 : 51	23 : 30
68		20 November 1897	50 : 50·1	27½ : 29½
69		19 May 1898	46·1	27 : 30
70		9 June 1898	48·2 : 48	28 : 30
71		24 April 1900	43·3 : 43·4	29 : 28
72		22 June 1900	48 : 47·8	25 : 28½
	XIV.			
73	Fine light brown shell sand.	14 October 1896	51·5 : 52	25 : 41
74		18 November 1897	50·1 : 50	29 : 35
75		20 May 1898	46·3 : 46	29 : 40½
76		24 April 1900		27 : 40
77		21 June 1900	48·6 : 47·2	25½ : 41
	XV.			
78	Light brown sand and shells.	10 May 1893	44·6 : 45	27 : 30½
79		25 November 1897	49·2 : 49·3	33¾ : 26½
80		19 May 1898	46	34 : 27
81		10 June 1898	48·5 : 47·6	26 : 37½
82		30 May 1900	46 : 49·9	33 : 28
83		14 February 1901	42·9 : 43·2	26 : 33

TABLE A. MORAY FIRTH—*continued.*

Number of Haul.	Station. Nature of Bottom.	Date.	Bottom Temperature at the Ends of Station. °F.	Depth (Fathoms) at the Ends of Station.
	XVI.			
84	Grey coherent sandy mud.	11 May 1893	43·9 : 43·6	34 : 35
85		17 July 1894	50·7 : 50·9	32 : 46
86		18 May 1898	45·9 : 46	41½ : 38
87		10 June 1898	47·9 : 47·3	36½ : 40½
88		24 April 1900	43·1 : 43	30 : 41
89		31 May 1900	40 : 45·5	29 : 36
90		21 February 1901	43·1 : 43·3	31½ : 42
91	2 miles E. of Sutors—stones, sand, traces of mud.	11 December 1900	46·8	13 : 15
92	2½ miles S.E. of Sutors—sand and pebbles, rock fragments.	11 January 1901		13½
93	Shells, with traces of mud.	18 January 1901	46·5	13½
94	Off the Sutors—sand, rolled stones and shells, with trace of mud.	18 December 1900		15 : 12
95	Off Tarbetness—homogeneous sandy mud and shell fragments.	24 December 1900		10 : 18

CROMARTY FIRTH.

Number of Haul.	Station. Nature of Bottom.	Date.	Bottom Temperature at the Ends of Station. °F.	Depth (Fathoms) at the Ends of Station.
	III.			
96	Muddy sand and shells with much vegetable debris, pebbles, rock and shell fragments.	14 June 1897	51·7 : 51·2	8½ : 19
97		6 November 1897	49·6 : 50	8 : 7½
98		26 May 1898	49·9 : 51	8¾ : 7
99		12 October 1898	54·2 : 54·4	8 : 9
100		8 January 1900		9 : 7½
101		12 April 1900	42·1	9 : 22½
102		30 November 1900		8 : 7½
103		3 December 1900		8 : 7½
104		7 January 1901		9 : 7½
105		12 January 1901	45·2 : 45·1	11 : 7½
106		21 January 1901		9¾ : 5¼
107	Between Invergordon and Alness—blue sandy mud, much vegetable debris, *e.g.*, dead *Zostera*.	9 January 1901	43	7
108		21 January 1901	43·9	11 : 7

TABLE A. CROMARTY FIRTH—*continued.*

Number of Haul.	Station. Nature of Bottom.	Date.	Bottom Temperature at the Ends of Station. °F.	Depth (Fathoms) at the Ends of Station.
	III.			
109	Invergordon to	10 January 1901		9 : 7½
110	Saltburn.	17 January 1901		11 : 7
111	Off Invergordon—blue mud, sand and shells, and much vegetable debris.	3 December 1900		10
112		4 December 1900		10 : 8
113		8 January 1901		9 : 7½
114	Off Alness—muddy sand and shells, with pebbles and vegetable debris.	8 January 1901		7 : 5[1]
115	North of Station III.—sandy mud and shells, with much vegetable debris.	7 January 1901	45 : 44·3	9 : 7½
116	Invergordon to Cromarty, N. side of channel.	7 January 1901		9 : 6½
117		8 January 1901		16 : 6½

TAB

Showing the Total Number of Specimens of each Species taken by the various Hauls "d" signifies by the dredge; "b" by the 25-feet beam trawl;

	MORAY								
STATION.	I.	II.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Cucumaria frondosa,	..	..	..	..	1b	5b : 1s	4b : 3s	3b	..
,, fucicola,	..	..	..	..	..	..	..	..	..
,, lactea,	..	..	..	..	..	..	1d	..	..
Thyone fusus,	..	..	..	..	..	..	..	..	1b
,, raphanus,	..	..	..	..	..	..	..	..	..
Psolus phantapus,	1b	..	..	..	..	..	..	..	..
Astropecten irregularis,	2b	..	2b	1d : 5b	2b	6b : 4s	1b : 1s	2b	1b
Luidia ciliaris,	..	..	..	..	1b	..	..	3b	1d : 2b
,, Sarsi,	.	..	..	..	..	..	1b	2b	..
Hippasterias phrygiana,	..	..	..	..	..	..	1b	1d : 6b : 1s	2d : 15b : 1s
Porania pulvillus,	..	..	..	..	..	..	..	..	..
Palimpes placenta,	..	..	..	..	..	..	..	..	4b
Stichaster roseus,	..	..	..	..	..	2b	..	..	..
Solaster papposus,	2b	1d : 4b	.	2d : 6b	..	1b	..	..	1b
,, endeca,	1b	3b : 1s	..	1d : 4b	2b	4b : 1s	2b	3b	1b
Henricia sanguinolenta,	..	..	..	..	1b	1b	..	1b : 1s	2b
Asterias rubens,	14b	5d : 45b	3d : 29b	2d : 91b	83b	8d : 31b : 1s	11b	4d : 41b : 1s	18b
,, ,, *var.* attenuata,	..	..	..	..	..	..	..	..	..
,, Murrayi,	..	..	..	..	..	..	..	2b	..
,, hispidus,	..	..	..	..	..	..	..	..	..
Ophiura ciliaris,	34b	2b	55b	21b	39b	..	..	..	..
,, albida,	..	..	..	..	..	..	..	2b : 1s	..
,, robusta,	..	..	..	..	..	..	..	..	..
Amphiura chiajii,	..	..	..	..	..	..	..	..	..
,, filiformis,	..	..	..	2b	..	2b : 1s	..	..	..
,, elegans,	7b	3b	..	..	..	..	..	..	..
Ophiopholis aculeata,	4b	..	..	..	..	..	..	2b	..
Ophiocoma nigra,	2b	..	..	..	..	..	..	..	..
Ophiothrix fragilis,	2b	49b	..	2b	..	2b : 1s	..	6b : 3s	18b
Echinus acutus,	..	..	..	..	..	..	..	..	..
,, norvegicus,	..	..	..	..	..	..	..	..	..
,, miliaris,	1b	8b	..	..	..	..	..	..	..
,, esculentus,	4b	3b	25b	27b	7b	14b : 8s	1b	3b	7b
Strongylocentrotus droëbachiensis,	..	..	..	..	..	1b	2b : 1s	..	..
Echinocyamus pusillus,	..	..	5b	3b	..	..	..	..	9d : 5b
Spatangus purpureus,	..	..	..	..	..	..	..	1b : 1s	..
Echinocardium cordatum,	5b	1b	2b	1d : 7b	..	1s	1b	1b	1b
,, flavescens,	..	..	..	..	..	..	2d : 1b	1b	1b
Brissopsis lyrifera,	..	..	..	..	..	..	1d : 4b	..	2b
Number of Hauls on each Station,	7	5	6	6	6	7	4	9	8

LE B.

made on the Stations. The letters placed after the number indicate the mode of capture: "ot" by the otter trawl; "s" by the 15-feet beam shrimp trawl.

FIRTH.								CROMARTY FIRTH.		
XI.	XII.	XIII.	XIV.	XV.	XVI.	2 Miles East and 2½ Miles S.E. of the Sutors.	Off Tarbet Ness.	III.	West of Invergordon.	East of Invergordon.
3d : 30b : 6s	2d : 4b	10b : 2s	1d : 17b : 2s	7b : 2s	2b	..	..	1d : 36b : 1s	..	..
..	..	..	..	..	..	..	..	..	2s	..
..	..	..	..	..	..	..	..	1b	..	..
..	..	..	1b	..	..	..	..	..	1s	..
..	..	..	..	..	1b	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
1d : 2b	3b : 1s	3b : 1s	..	2d : 7b : 1s	2d : 6b : 1s	..	..	..	..	..
..	1d : 1b	1b	..	1b	1b	..	..	..	..	..
..	1b	..	..	..	1b : 1s	..	..	..	..	..
3b : 1s	4b	4b : 1s	..	2d : 9b : 1s	2b : 2s	..	..	..	..	..
..	..	..	1b	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
2b : 1s	..	1b	1b	1b	..	8ot	..	1d : 12b	..	..
..	..	2b : 1s	1b	..	1b	3ot	..	1d : 2b : 1s	2ot	..
..	..	1b : 1s	1b	2b	..	7ot	..	1b	3ot	..
10b : 3s	1d : 9b	3d : 9b	7b	21b	3d : 9b	..	..	40b	..	..
..	..	..	1b	..	..	..	..	..	1s	..
..	..	1b	..	..	..	..	..	..	..	..
..	1b	..	..	..	..	..	..	..	..	..
3b : 1s	1b	7b : 5s	..	4b	101ot	..	..	5d : 21b	..	..
1b	..	5b : 2s	3b*	..	..	5s	..	..	..	..
..	..	..	..	3b	..	..	5s	..	..	..
..	..	..	3b	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	2b : 3s	3ot : 5s	3d
..	..	3b	..	..	..	15ot	..	117b	10b : 18ot : 5s	19ot 7s
..	..	..	..	..	..	..	..	..	..	..
5b : 2s	..	..	9b	5b : 2s	..	..	..	7d : 114b	22ot : 18s	..
..	..	..	..	1b	..	..	..	..	..	..
..	..	1d : 1b	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	1d : 31b : 1s	3s	..
10b : 8s	1d : 12b	16b : 11s	7b	14b	7b : 4s	..	..	3d : 173b : 22s	..	129ot : 22s
6b : 1s	1s	1d : 2b	..	3b	2b : 1s	..	..	179b : 53ot	97ot	193ot : 14s
2b : 3s	..	9b : 4s	5d : 2b	14b : 10s	32d : 3b	..	..	2d	..	..
3b	1d : 8b : 1s	1d : 9b : 4s	31b	8b : 5s	1d : 5b : 1s	..	..	1b : 1ot	1s	..
3b : 1s	6b	1b	..	1d : 16b	3b : 3s	..	..	..	..	..
..	..	..	.	..	1b	..	..	..	..	..
..	5b	..	..	9b	6b : 3s	..	..	..	..	..
4	4	6	5	5	7	4	1	11	8	3

* A few, the number of which was not recorded, were got in Haul No. 73 (Table A).

VI. RATE OF GROWTH OF SEA FISHES.

II.

By Dr. T. Wemyss Fulton, F.R.S.E., Scientific Superintendent.

(Plates XIV.-XXI.)

During the autumn of 1900 and throughout the greater part of 1901 investigations were made on board steam trawlers fishing from Aberdeen, the employment of which at intervals within the territorial waters was authorised by the Fishery Board. The general results, so far as they concern the numbers of the various species of fish taken on the different grounds in the different months, are given in another part of this Report (p. 92). In the course of the work opportunity was taken to measure the fish brought on board in certain of the hauls, comprising most species of the food fishes, and a very large amount of material was thus obtained for the determination of their rate of growth. In the present paper the observations made on the rate of growth of the plaice, common dab, long rough dab, whiting, and haddock are given. The treatment of the measurements of the other species has had to be postponed.

In the course of the enquiry it became evident that the method employed was likely to furnish information of importance, not only regarding the rate of growth of the food fishes, *per se*, but also with respect to other subjects relating to their natural history and to certain fishery problems. Among these may be mentioned seasonal migrations, the distribution of the young and of the older generations, the influence of temperature and of locality on growth, the determination of the size and age at maturity, and the natural mortality, or death-rate, in a given generation of the different species. With respect to the impoverishment of certain grounds by overfishing, it is also obviously a matter of importance to have an ample series of accurate measurements of the fish frequenting the grounds at different seasons in different years, since one of the first signs of decrease in the abundance of fish is a diminution in their average size, the larger and older individuals being removed in greater proportion than the smaller. This has happened, for example, with the plaice at the Dogger Bank and at Iceland, and I am informed by skippers of trawlers that they do not now get so many large witches, or pole-dabs, and megrims on the north-eastern grounds, off the Shetlands, as when these grounds began to be first trawled over, some five or six years ago. Moreover, the average size of a species may normally differ in different localities, and in different parts of the same sea, as the North Sea (examples of which are given in the present paper), and this difference in average size may not be due to difference in the seasonal temperature.

I think it probable, therefore, that a series of similar observations made in different regions, *e.g.*, of the North Sea, would furnish much useful information on the questions above referred to, and it may be desirable to describe in some detail the methods and treatment employed in the course of the enquiry.

Methods.

The first requisite is to get a sufficiently large supply of fish at the same time and place, and for this purpose the use of a large trawl is necessary, as well as special nets. The otter-trawl of an ordinary steam trawler is well adapted for the work, but owing to the smallest meshes, in the cod-end of the net, being about $1\frac{1}{4}$ inches from knot to knot, immense numbers of the smaller fishes escape through the apertures; and consequently the younger series or generations of the larger fishes, and all or almost all the series of those fishes which when adult do not attain a great size, may not be represented in the catch. Thus, with the ordinary otter-trawl, only a few of the larger individuals of haddock or whiting under one year of age are taken, while nearly all the Norway pouts and herrings, most of the dabs, and all the sprats, escape capture. With the ordinary otter-trawl it is only the measurements of the larger fishes which are of value. In order to obtain the small fishes which pass through the meshes of the trawl, I made use of a fine-meshed net twenty-five feet long attached to the upper edge of the cod-end, and enveloping it loosely in its whole extent. It was tied about a yard behind the termination of the cod-end, and when the net was brought up and swung over the deck the fish in the small-meshed net were allowed to fall into tubs and baskets, and were then removed from the "fish-pond" before the cod-end was opened. When working on roughish or hard ground the outer net was occasionally chafed, and this sometimes occurred also on a sandy bottom when the cod-end of the trawl-net happened to be old and heavy. It was therefore an improvement to lace the fine-meshed net to a specially made cod-end of our own, with *one*-inch meshes (to relieve the pressure on the fine-net when small fish were abundant), and to substitute this for the ordinary cod-end, which could be done in about twenty minutes. A further improvement is to buoy the end of the net with a "pallet" or large float, used by fishermen, which helps to raise it from the bottom, and when working on the edge of hard ground to use a piece of old sail as a chafer under the net.

The small-meshed net referred to was made of hemp, with meshes about

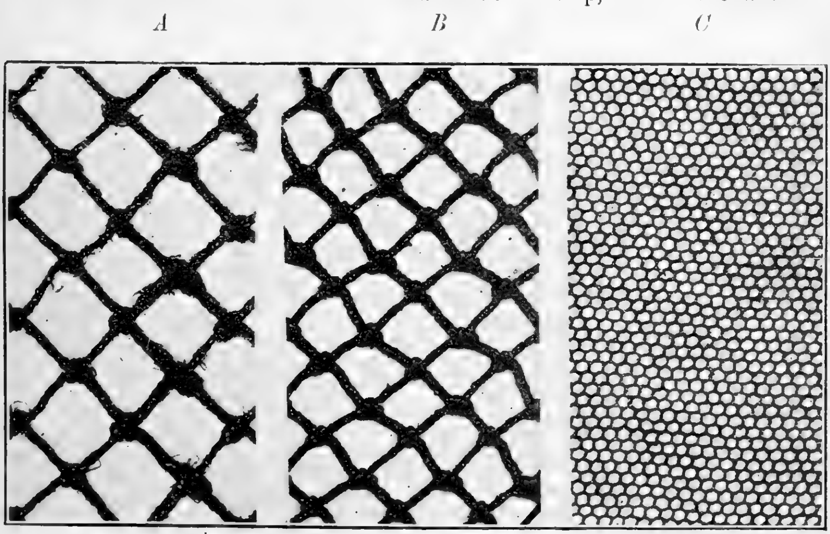


FIG. I.—Showing the Meshes of the Nets employed.

one centimetre ($\frac{3}{8}$ inch) square (A, Fig. 1); but while this net was found sufficient to retain the great majority of small fishes which entered it—and in autumn all the young haddocks, for example—experiment showed that many of the smaller fishes on the bottom, especially in the summer, were not taken. This was shown by attaching a third net, with still smaller meshes (B, Fig. 1) around the end of the second net. In this third net young long rough dabs, Norway pouts, and sprats were found which had passed through the meshes of the inner net. The inside of the end of the fine-meshed net was also lined with mosquito netting, somewhat larger in the mesh than that represented in the figure (*c*), but when used on the bottom it was ruptured.

For enveloping the cod-end of the trawl, I have lately tried a cotton net with meshes as represented in B, viz., about 6 mm. ($\frac{1}{4}$ inch) square. It has been used on three occasions on the bottom, without mishap, and by means of it smaller fishes have been taken. I am of opinion that a net with meshes of even 4 mm. ($\frac{3}{16}$ inch) could be used in this way on the otter-trawl with safety, provided the arrangements above described are attended to, viz., the employment of a special lightly-made hempen cod-end, with one-inch meshes, the buoying of the cod-end, and particularly when working on or near hard or rough ground, the use of a canvas chafer under the whole of the fine net. Such a net ought, I think, at all events in autumn, to take the smallest fishes which are then on the bottom, unless perhaps such unusually elongated forms as *Lumpenus* and pipe-fishes, and young gobies.

The ideal aimed at is the collection of complete series of fishes with all sizes duly represented, and from this point of view it is worth considering carefully this and other methods employed.

In many cases the very young fishes are not to be found living on the bottom, and they cannot therefore be taken with a bottom-net, however fine the meshes may be. Such, for example, is notably the case with haddock and whiting long after the post-larval stage, and even certain post-larval flat-fishes, before transformation is completed, may reach a considerable size (up to as much as 40 mm.) while still pelagic. It is evident, therefore, that in order to obtain the early stages in due proportion the method of collection must not be limited to the use of bottom apparatus, but ought to include the use of adequate apparatus for pelagic fishing in the layers of water between the bottom and the surface. It is in this region that the methods of collection have been hitherto least effective. The tow-nets ordinarily employed, with a ring a yard or so in diameter, capture very few post-larval fishes compared with the numbers that we know must be present in the water, and they only occasionally take a specimen a little larger. The larger net introduced by Professor M'Intosh for mid-water work, made of mosquito netting, has been more successful, but its comparative delicacy requires that it should be towed slowly, which has the disadvantage of enabling the larger and more active young fishes to escape from it; and experience on the *Garland* shows that it is very liable to be ruptured unless in calm weather. It is, moreover, not large enough to be effective for the purpose referred to. On board trawlers I made use of tow-nets composed of the cotton netting described above (B), with meshes about 6 mm. square, and with a ring 5 feet in diameter, without much success, and I have used lately a ring 10 feet in diameter with a similar net and lined inside with mosquito netting. It has been used in winter only, when the mid-water is comparatively barren, but the net itself stood the strain well, and was uninjured. Ring-nets still larger were made use of by Dr. Hjort in the expedition of the *Michael Sars*,*, and with good success, young cod, haddock, and saithe being taken in them in the summer. Some of these nets were no less than 21 feet in diameter, and formed of shrimp-netting, and others were 8 feet in diameter. Judging from my experience with the 10-feet ring, nets of such large dimensions must prove troublesome to work when the sea is at all

*Aarsberetning vedkommende Norges Fiskerier for 1900, 4de Hefte 1900, p. 253.

rough, even if they are provided with hinges to fold up. Dr. Hjort mentions also a pelagic otter-trawl as part of the equipment of the *Michael Sars*, but states that it was little employed during the cruise. The pelagic otter-trawl was introduced as an instrument of marine research by the Prince of Monaco, and it is in this apparatus, I believe, that we shall find what is desiderated. The ordinary otter-trawl, fitted with fine-meshed netting, might itself be used for the purpose, but it has the disadvantage that the lower part of the net lies far behind the upper part, and fish disturbed and striking downwards (as they do) may escape capture. It is well-known that a steam trawler by going full speed ahead can lift the otter-trawl from the bottom, and I made use of this fact for pelagic fishing, having the small-meshed (6 mm.) net around the cod-end of the trawl and the head-line buoyed with a series of "pallets" or large floats, the heavy ground-rope hanging down keeping the mouth of the net open. It was towed for three-quarters of an hour in 60 fathoms off Aberdeen, with 85 fathoms of warp out, but as the experiment was made in January, only three small fishes—a sprat, a post-larval herring, and a post-larval flat-fish—were taken. Judging from the efficiency of the net in capturing small fishes on the bottom, I think its use in this way in mid-water in summer and autumn, when pelagic forms are numerous, would be successful.

There is another disadvantage in the ordinary otter-net employed as I have described, both for bottom fishing and for pelagic fishing. While the number of fishes taken by it in the former case has been proved by practice to be large, and sufficient for the assortment of the different generations and the determination of the rate of growth, it is evident that it does not furnish the real numerical proportion of the various generations or series. The small-meshed net envelopes only a part of the otter-trawl, and although it is the most important part, into which the great majority of fishes, unless the smallest, are probably guided, there can be no doubt that large numbers of small fish escape from the otter-trawl before they reach the cod-end, *i.e.*, through the still larger meshes of the back and sides. Thus the smaller fishes—the earlier generations—are not duly represented. For scientific purposes, such as I have referred to, it would be desirable to employ a special otter-trawl of somewhat smaller dimensions than the large ones used on steam trawlers, made of hemp with smaller meshes, and entirely enveloped in a fine-meshed net, a canvas chafer being used below it and the cod-end buoyed. Experience has shown that the fine net is less liable to injury when placed outside the hemp-net than when within it, in which case constant friction takes place between them. With a net of this kind the due representation of the smaller series would be much more complete.

In this connection I may refer to a net which has been much used by Dr. Petersen in Denmark and elsewhere on the Continent, and which is fully described in one of the reports of the Danish Biological Station.* It is an otter drag-seine, consisting of a seine used in eel-fishing with otters attached to the wings to spread it. The net has given good results in Dr. Petersen's hands, but it seems to me from the figures and description not only to have no advantages over the otter-trawl net, but to have a considerable disadvantage from the presence of the two long wings attached to the mouth of the bag, which must disturb fish on the bottom before the net is over them. The disadvantage in regard to flat-fish is not so great as with respect to round fishes, because when disturbed they do not, as a rule, rise high above the bottom, but I think that with this net a large

*Eighth Report, Copenhagen, 1899.

proportion of round fish when disturbed will rise clear above the wings and escape the mouth of the bag which follows.

For bottom-fishing, then, the best apparatus appears to be an otter-trawl of the kind above described, and a modification of it seems to be also the best for pelagic fishing. The bottom-net itself—the otter-trawl—when used for pelagic work has one disadvantage that, owing to the retrocession of the belly of the net and the traction when moving through the water, the lower part of the net will be far behind the upper part attached to the headline, and as a fish disturbed at the surface darts downwards, many will escape capture in this way. An ideal pelagic otter-trawl would be one with two pairs of boards, one at each corner, and the mouth of the net in a vertical plane or even sloping backwards and upwards; but the practical men who make and work the otters are of opinion that four boards would be very difficult to manipulate. Instead of this, one which is now being made, having a (vertical) mouth of 110 feet in circumference, will have the two boards placed at the upper part of the net with a headline of about 25 feet and a detachable bar of similar length affixed to the lower part instead of a ground-rope, the sides of the net being about five fathoms deep.

Other methods of fishing, such as drift-nets or floating lines, while useful for certain purposes, cannot replace the bag-net method, because they are selective in regard to the sizes, and to some extent the kinds, of fishes they take.

The Treatment of the Fishes.

In dealing with the fishes caught, experience has shown the necessity of using a method of measurement as minute and accurate as possible, and as rapid as is consistent with accuracy. Measurements to fractions of an inch, or to centimetres only, are unsatisfactory, more particularly in all except the earlier series. The most important object is to determine as precisely as possible the limits of the various series or generations—the points of division between the groups—and this in many cases is sufficiently difficult from natural causes, referred to below, without the addition of difficulties from inexact measurement. In order to do this it is often necessary to adopt a 2-millimetre or 3-millimetre grouping. The fish are therefore measured to millimetres, and although with large or medium-sized fishes the measurements are no doubt in many cases not exact to the particular millimetre taken, the constant endeavour to reach this standard obviously makes the general accuracy greater than if a larger unit were adopted as the standard.

The method in practice is as follows. A brass measure, one-and-a-quarter inches in breadth, a metre long and divided into millimetres, half-centimetres, and centimetres, the latter being boldly figured, is screwed flush into a groove on the top of a table specially constructed for the work (fig. 2). This table is made of hard wood, is solid and heavy, with outwardly-curving legs, in order to give it greater stability on deck; it is sixteen inches broad, forty-six inches long, and twenty-six inches high. One end, as shown in the figure, is enclosed by boards to form a receptacle in which the fishes are placed (it might well be larger). Against the end of the millimetre measure, which is flush with the opposite edge of the table is placed a "nose-piece," so called because the snout of the fish being measured is placed against it. The table also contains a convenient drawer for instruments, &c., and a sliding rod to which is attached an acetylene lamp that can be fixed at any angle to illuminate any part of the scale at night according to the size of the fishes being dealt with it. The fishes which have been poured on the table at one end are rapidly passed by an assistant one by one to the lower part of the scale, the length measured by the recorder, who sits opposite, and the fish then slid off the table into a basket on deck.

The measurements used to be recorded first in a note-book and then transferred to forms, but now much time is saved by using the forms

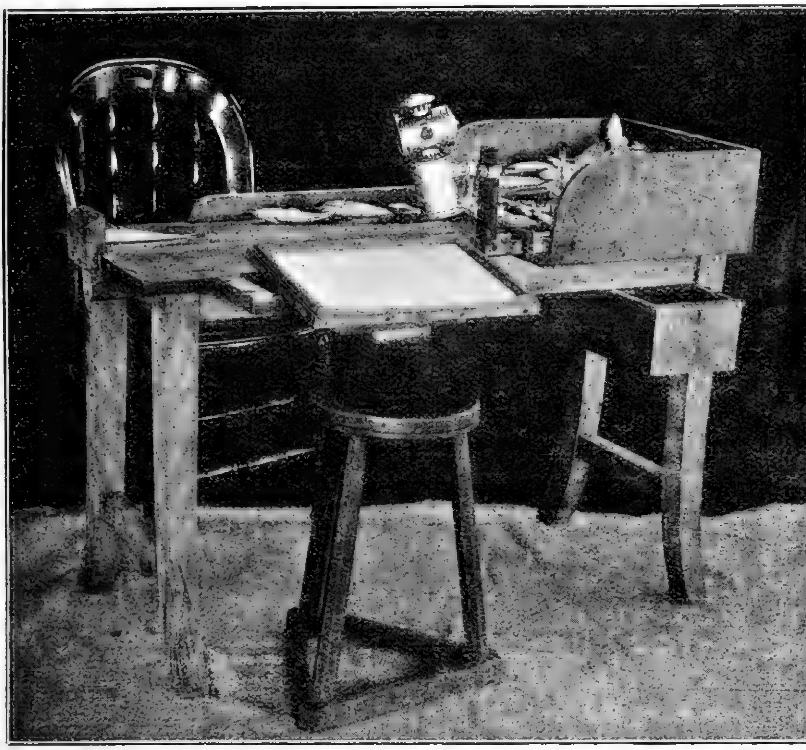


Fig. 2.—Table for Measuring the Fishes.

themselves, fitted on a frame, as shown in the figure, each measurement being recorded opposite the proper printed figure by a pencil dot. The most convenient form measures thirteen inches by ten; it has ten vertical rows of figures, up to 499 mm., and these are divided into ·5 cm. groups by horizontal lines (for convenience in computation). Each millimetre figure has four spaces opposite to it, each of which is adapted to contain ten dots. For larger fishes other forms are used.

The measurements in all cases (except rays) represent the extreme length of the fish from the snout to the end of the caudal fin.

In carrying on this work on board trawlers it has been found convenient to make use of a small portable deck-house, seven feet by eight and five and a half high, as represented in the adjoining cut, which can be put up or taken down in a few minutes. It consists of a frame-work of twelve stout pitch-pine beams, fitted and pinned into eight strong cast-iron corner sockets, and securely lashed to the ship; over this is drawn, like a cap, a canvas covering, and over this again a similar covering of tarpaulin both of which are securely fixed by rods and wedges to the bottom of the frame-work, and have a slit in them for doorway. Lined with rugs, and furnished with mats and an oil-stove, it is fairly comfortable, and has been found of great service in cold and stormy weather. It is lit at night either with acetylene gas led from the ship's apparatus, or by a lamp. It is strong enough to withstand the wind and a good lashing of spray; when seas are shipped the canvas is unrolled, but the pitching of the vessel then makes work impossible.

Fig. 3.—Portable Deck-house.

In many cases when it was found impracticable on board to measure the fish from the small-meshed net, they were placed in air-tight tanks in a weak solution of formaline and transferred to the laboratory, where the measurements were made. These tanks, one of which is shown on the left of the cut (fig. 3), have been found very convenient for this purpose and for the preservation of other material.

In dealing with the results graphic diagrams or curves are made of each series of measurements, the grouping varying according to the sizes of the fishes. For most round fishes, the larger flat-fishes, skates, and rays, one-centimetre groups usually suffice; but even in such cases it is often necessary, particularly with the older series, to plot them out also in ·5-cm., or even 2- or 3-mm. groups in order to determine the limits of the series. In some cases, *e.g.*, gurnard, where the coalescence of successive generations is marked, one must often group the mm. measurements in a variety of ways before feeling satisfied as to the point of division. In the case of the smaller flat-fishes, and smaller fishes generally, ·5-cm. groups are much more satisfactory for the curves.

Having fixed upon the point of division—in the earlier series usually quite a simple matter—the average size of a series was obtained by the computation of the measurements comprised within it, which gave the arithmetical mean. This method, besides being laborious, does not always give the true mean size of the series unless the fishes of different sizes are equally represented, and a simpler and better method is to take the median point between the extreme limits of the series, when these limits have been well ascertained. Sometimes considerable difficulty was encountered in determining the true limits of a series. In many cases a group may be insufficiently represented by the absence of a due proportion of either the larger or the smaller fishes. The latter may be owing to imperfection of the apparatus of capture, as already explained, the smaller fishes, present on the ground, escaping from the net; or it may be due to difference of habitat, as, for example, in the case of the young whiting and haddock, which are pelagic, and the young plaice, found only in the shallow water while the larger individuals are in deeper water. In other cases the imperfect representation may arise from the migration of part of a series, as with the larger haddocks and whitings in autumn and winter in Aberdeen Bay, or to their irregular roving movements as with the cod. In the latter case it may happen that one haul in a particular locality furnishes one part of a series and a second haul the other part. Moreover, it often happens that while the division between one series and another is distinctly indicated in one haul, it may be obscure in another haul owing to the capture of an undue proportion of the larger fishes of one series and the smaller fishes of the next older series. This, curiously, occurred most commonly in the deep water off Aberdeen, the hauls in the deep water far from land (off the Shetlands), being, as a rule, the most satisfactory. Another example of the coalescence of groups is found with the plaice when the fishing is carried on within a limited range of depth (*see* p. 347).

Besides all these causes, which are temporary or fortuitous, difficulties arise from the natural overlapping or coalescence of groups due to differences in the rate of growth among individual members of one and the same series, and in the average growth of successive series. The utility of the method depends altogether upon the circumstance that reproduction is restricted to a portion of the year, so that the brood of a particular species are all born within a limited space of time—usually a few months in spring—which is separated from the preceding reproductive period by a considerable interval. If the average rate of growth of successive generations were similar, then, notwithstanding the variation in growth of the members of one and the same generation, the difficulty of separating the various series from one another would not be great. But the average growth in length is slower in successive generations, and this becomes especially marked after maturity is reached, so that the larger individuals of a younger series are longer than the smaller individuals of the next older series, and this coalescence or overlapping of the groups increases with age. As a rule, however, the young fishes under one year of age are all, or almost all, smaller than the fishes of the previous generation, and the interval between the two series is the greater the earlier the period after the spawning season. The variation in growth among the individuals of one series depends to a large extent upon the duration of the spawning season, but it is also influenced by the relation to temperature, *e.g.*, plaice and gurnard.

Another circumstance that tends in certain cases to obscure the division between the series is the different rate of growth of the sexes. Among round fishes this is not so obvious, because the sexes are apparently sub-equal in length at all stages. Thus, of 957 cod, of all sizes, examined, the length of the female to the male at 100 was 95; of 1375 haddocks, the proportional length of the female was 98; and of 1318 whitings, the proportional length of the female was 104 to the male at 100. The difference is thus not very great; but at the same time, looking to the difficulty of separating the groups from overlapping, better results would be obtained by treating the sexes separately, and this might be done at the spawning season without many fishes requiring to be opened. Among flat-fishes, however, when they have reached the adult size, it is necessary to deal with the sexes separately, because the males then begin to grow much less rapidly than the females. Fortunately the sexes can, as a rule, be distinguished by simple methods. At about the spawning time the ovary can be, in most cases, readily detected without the fish requiring to be opened. At other times its presence may be easily revealed by the use of transmitted light. The method adopted by me was to have the fish passed *seriatim* in front of the acetylene lamp in the darkened deck-house; those obviously females or males were placed in separate baskets, and doubtful specimens were set aside and opened. With some species, *e.g.*, lemon soles, the sexes cannot be determined in this way.

Comparative Growth of Flat-Fishes and Round Fishes.

One of the points brought out in the course of the investigation is the great difference in the rate of growth of the flat-fishes and the round fishes, the latter increasing in size with much greater rapidity than the former from the earliest stages onwards. The haddock and the plaice, and the whiting and the common dab, may be taken as examples, since the spawning periods of these pairs coincide fairly well. At the end of the first summer and autumn, when the first year's growth is nearly completed, say early in November, the average length of the haddock at Aberdeen is about 172 or 173 mm., or $6\frac{13}{16}$ inches; some of the year's fish may be as small as $4\frac{3}{4}$ inches, and others as large as about $8\frac{1}{4}$ inches. On the other hand, at the same date the young plaice average about 65 mm., or a little over $2\frac{1}{2}$ inches. Some may be as small as about $1\frac{11}{16}$ inches, and others as large as about $3\frac{3}{4}$ inches. These measurements show a marked difference, but they do not exhibit the contrast in growth so well as when the mass or weight is compared. The normal weight of the average-sized haddock stated is a little under $1\frac{1}{2}$ ounces (about 40·5 grammes), while the weight of the average-sized plaice after the first summer's growth is only about $\frac{1}{12}$ of an ounce, or 2·5 grammes. The young haddock thus increases its weight on the average sixteen times faster than the young plaice. Moreover, some of the young plaice weigh only 0·8 gramme, and the heaviest is about 8 grammes, or a little over a quarter of an ounce; while the smallest haddock weighs about half-an-ounce, and the largest nearly $2\frac{3}{4}$ ounces (76 grammes).

These particulars are derived from the weighing of a large number of specimens of all sizes, and the construction of curves.*

After the second summer's growth, when the fish are nineteen or twenty months old, the average size of the haddock is about 276 mm., or $10\frac{7}{8}$ inches, while some may be as small as about $8\frac{1}{2}$ inches or as large as $12\frac{3}{4}$ inches. At the same period plaice of corresponding age average about 145 mm., or $5\frac{3}{4}$ inches, some being about 4 inches and others as large as about $6\frac{3}{4}$. Here again the contrast in weight is striking. After

* The weights of different specimens of the same length vary considerably, especially the large ones. The *abscissæ* in the diagrams represent length, and the ordinates weight, and the smoothed curve enables the average weight of a fish whose length is known to be readily ascertained. The curves vary for different species; among the flat-fishes dealt with, for example, the heaviest in proportion to length is the plaice, then the common dab, and, at a considerable distance, the long rough dab; the witch is still lighter. Among the round fishes the heaviest in proportion to length is the cod, then the haddock, and then the whiting; the plaice is heavier than the cod, whose curve corresponds rather to the common dab. The curves do not everywhere agree with the rule that in similarly-shaped bodies the masses vary as the cubes of the dimensions; the proportions appear to change somewhat with growth. The number of haddocks included in the part of the curve above dealt with was 258, and the number of plaice 272.

the end of the second summer the average weight of the haddock is about $6\frac{3}{4}$ ounces (188 grammes), while the average weight of the plaice of corresponding age is only a little over one ounce (30·5 grammes). The smallest haddocks weigh about $3\frac{1}{4}$ ounces, and the largest about $10\frac{1}{2}$ ounces; the smallest plaice weigh a little over a quarter of an ounce (9·5 grammes), and the largest about $1\frac{3}{4}$ ounces (50 grammes).

After the third summer's growth the average length of the haddock is about 360 mm., or $14\frac{1}{4}$ inches, and its weight about $14\frac{3}{4}$ ounces (415 grammes), while the plaice of corresponding age has a length of about 217 mm., or $8\frac{1}{2}$ inches, and weighs scarcely $3\frac{1}{2}$ ounces (97 grammes). The smallest haddocks weigh about $10\frac{1}{2}$ ounces, and the smallest plaice scarcely $1\frac{3}{4}$ ounces.

The difference between the whiting and the common dab is not so pronounced, but is still very considerable. The average length of the whiting at the end of the first summer is about 125 mm., or $4\frac{15}{16}$ inches, and its weight 14 grammes, or half-an-ounce. The average length of the common dab is about 60 mm., or $2\frac{3}{8}$ inches, and its weight is 1·7 grammes, not $\frac{1}{16}$ of an ounce. Some of the young whitings measure $2\frac{3}{4}$ inches and others as much as $6\frac{1}{2}$ inches, and the variation in weight may be from $\frac{1}{10}$ of an ounce (3 grammes) to $1\frac{1}{10}$ ounce (31 grammes). The variations in the dabs may range from 28 mm. ($1\frac{1}{8}$ inches) and 0·2 grammes, to about $3\frac{1}{2}$ inches and 5·4 grammes, or scarcely a fifth of an ounce.

After the second summer's growth the average length of the whiting is about $8\frac{3}{4}$ inches, and its weight about $2\frac{3}{4}$ ounces, or 77 grammes. At the same date the dab of corresponding age measures about $5\frac{1}{8}$ inches, and weighs under three-quarters of an ounce (19 grammes). The range in the whitings may be from about 7 to 11 inches, and from under $1\frac{1}{4}$ ounces to about 6 ounces (168 grammes). The range among the dabs of corresponding age runs from about $3\frac{3}{4}$ to $6\frac{7}{8}$ inches, and from a quarter of an ounce to nearly $1\frac{3}{4}$ ounces.

These observations in regard to the comparative rate of growth of the plaice and haddock, and the common dab and whiting, hold also in regard to other species. The slow growth of the flat-fishes is especially marked in the first year, and is no doubt then in part directly accounted for by the transformation which they undergo; and it is throughout life clearly correlated with their change in structure and conformation. Compared with what it is in the round fishes, the whole of the digestive system of the flat-fishes is small relatively to the mass of the body, and the amount of nutriment available for growth is correspondingly less. They have been described as flattened cod-fishes, and it would be equally applicable to say they were dwarfed cod-fishes.

The Influence of Temperature upon Growth.

The growth of fishes is closely related to the temperature of the water in which they live, the maximum increment taking place when the water is warm and the minimum when it is cold; and the greatest variations occur where the range of temperature is greatest. The influence of the temperature of the water on growth is no doubt twofold, directly affecting it by accelerating or retarding metabolism, and indirectly by increasing or diminishing the abundance of the lower organisms which form a large part of the food of fishes. The direct effect is probably much the more important of the two. The information available as to the temperature of the bottom water in the deeper parts of the North Sea throughout the year is imperfect; but it is evident from the scattered observations which have been made by various expeditions and from a consideration of Dr. Hugh Robert Mill's investigations in the Clyde sea area, and Dr. Hjort's in the deep water on the Norwegian coast, that the range is much less, and the maximum and minimum retarded, in comparison with the shallower water near the shore; but it is not clear what relation the mean temperature for the year in one region bears to that in the other. The most favourable conditions for growth, so far as concerns temperature, are to be found in the shallower inshore waters in summer, and in the deeper water offshore in winter, and it is probable that this in part explains the movements of fishes at these seasons—as, for example, the whitings in Aberdeen Bay, referred to later.

The greatest range in the temperature takes place in the shallow water on the beaches, where it may fall to 32° F. or below it in winter, and rise to about 70° F. in summer, and since the young plaice inhabit this region it is of interest to note the relation that exists between the changes in the temperature of the water and the rate of growth of the fish. On page 343 will be found a diagram showing the rate of growth of the plaice in the Solway in relation to the temperature of inshore water in the different months of the year, from which it appears that the greatest growth takes place at the time the greatest rise occurs in the temperature, viz. in May and June. After the temperature reaches its maximum, growth begins to be retarded; although the temperature in September and October is higher than it is in May, growth is much less rapid; while in winter, growth is quite arrested. Other examples may be found in connection with the whiting and haddock. In the Firth of Forth, for instance, where the range between the summer maximum and the winter minimum is considerable, the growth of the whiting in summer is rapid, while in winter it is greatly retarded (Pl. XXI.). Off Aberdeen, where the seasonal range in temperature is not so great, the curve of growth is correspondingly flatter, while in the deep water off the Shetlands, where the range is still less, the rate of growth is much more uniform throughout the year (Pl. XX.-XXI.). Further illustrations of the close connection between the temperature of the water and the rapidity of growth of fishes will be found in the following pages.

It is evident, however, that temperature alone does not explain the difference in the rate of growth of one and the same species in different localities. The plaice, for example, grows quicker on the east coast of Scotland than it does on the west, and the same is true of the common dab, and yet the temperature in the former region is not so high. In this respect the long rough dab furnishes a marked example. In the Clyde its growth is slower than in the deep water off the Shetlands, and much slower than off Aberdeen or in the Firth of Forth. There is obviously some other cause, or causes, which bring about the differences in rate of growth referred to, apart from temperature, or salinity, as the above instances show, for the salinity of the water is lower in the Firth of Forth than it is off the Shetlands. The observations made by Mr. J. T. Cunningham some years ago on the variation in the size of plaice, especially at maturity, from different parts of the North Sea are of interest in this connection.* He found that those taken off the Dutch coast were smaller than those from the English coast, or north of the Frisian Islands, and resembled rather those obtained on the south coast of England; and he says, "It would appear that the Channel conditions extend northwards along the Dutch coast, while the size of the mature plaice, which is characteristic of more northern grounds, extends

* *Journ. Mar. Biol. Assoc.*, IV, 104.

southwards to some distance along the English coast." It is noteworthy that the parts of the North Sea in which the larger varieties of plaice are obtained, whether on the western or the eastern side, are included within the limits of the North Sea current, as shown by my observations,* while the parts where the smaller varieties are obtained are included in the water which goes northwards from the English Channel, as shown by Garstang.† The plaice on the west coast of Scotland, as at Plymouth, belong to the smaller kind.

THE PLAICE (*Pleuronectes platessa*, L.).

The rate of growth of the plaice has been investigated by several naturalists. Mr. J. T. Cunningham in 1891 made a comparison between the sizes of a number of plaice from 3·5 to 31·5 centimetres, and caught at various times between June 1889 and September 1891, and he provisionally deduced their age. The total number of specimens was, however, small—only seventy-four—and relying on certain experiments in rearing flounders in tanks, which in some cases showed a very rapid growth, this naturalist overestimated the rapidity of the growth of the plaice under natural conditions. He was of opinion that this species could not reach a size of twelve inches (30·5 cm.) in less than two years, and that it did not begin to breed until it was two years old, and over eight inches in length, on the south coast of England, where the species is relatively smaller than in the North Sea.‡

Some years later Mr. Cunningham carried on investigations on plaice from various parts of the North Sea, chiefly with reference to the average size when first mature, and expressed a similar view, stating that specimens averaging about thirteen inches in December were scarcely two years old, and that those taken off the German and Danish coast in spring and summer, and ranging from seven to ten inches in length, were one year old.§

In 1893 I published a paper on the migrations and rate of growth of certain fishes, the data being derived from experiments in marking fish, which were measured and returned to the sea, and were remeasured when captured.‖ The increase in size was, as a rule, very small, owing to the irritation caused by the attachment of the label to the fish; but in some cases a considerable increase was found to have taken place. In view of the fact that one plaice, notwithstanding the irritation of the label, increased in length from $10\frac{5}{8}$ inches to $13\frac{1}{4}$ inches during the 353 days it was living in the sea—an increase of nearly three inches—and that some others increased by over two inches in periods somewhat longer, although a scar had been caused by the ligature, I concluded that "a plaice of ten or eleven inches in length, living in the sea under natural conditions, grows at least three or four inches longer in the course of a year."

In the same year Dr. C. G. J. Petersen published a paper dealing with the plaice, among other things with its growth, and he came to the conclusion that this fish generally required three years to become ripe, but might do so in its second year; that the size at which it first became ripe was subject to considerable individual variation, and that

* *Fifteenth Annual Report, Part iii.*, 334 (1897).
† *Journ. Mar. Biol. Assoc.*
‡ *Journal Marine Biol. Assoc.*, ii., 99, 1891.
§ *Ibid.*, iv., 136, 1896.
‖ *Eleventh Ann. Rep. Fishery Board for Scotland*, Part iii., p. 192 (1893).

the approximate average size at that period differed in different seas.* Ten inches was assigned as the average size at maturity in the Baltic. Petersen had earlier published another paper in which he briefly dealt with the subject, and which is of interest inasmuch as in this paper he first made use of the method employed in the present investigation, by the assortment of the fish into groups.†

In 1898 Mr. H. Dannevig made an investigation at Dunbar on the rate of growth of this species, the fish being obtained at three localities, or depths, up to five fathoms. The number of specimens of the first, and occasionally of the second series, was considerable, and the conclusion reached was that the average growth of the plaice during the first year was about 77 mm., during the second year 79 mm., and during the third year about 76·4 mm. He concluded that the average growth is a little greater in the second than in the third year; that the average length of plaice was 77·2 mm. when one year old, 156·7 mm. when two, and 233 mm. when three years old, and that the plaice was ordinarily not mature till its fourth year.‡

The investigations referred to were made on collections in which the sexes were not separately distinguished, but this circumstance does not materially affect the results until the fish are about three years of age, since the males and females in this species grow with almost equal rapidity during adolescence. After that period, however, it is necessary to distinguish the sexes, since the males grow much more slowly than the females.

I shall now endeavour to trace the growth of the plaice as indicated by the observations made by myself. The investigations were for the most part carried on on board trawlers fishing in Aberdeen Bay and the Moray Firth, a small-meshed net being placed around the cod-end of the otter trawl, as previously described, and considerable numbers of fish were sometimes measured. These observations were supplemented by others with a shrimp trawl in the Solway Firth used in shallow water from a few feet at high tide to five fathoms, while collections of the very smallest plaice were made by means of a push-net on the beaches. The collections of these small fish were considerable and consecutive, and it will be desirable to begin with them first, and to trace the growth of the plaice during its first year, from the time the eggs are spawned.

On the East Coast of Scotland the spawning period extends, as a rule, from the end of January until the beginning of May, the maximum, according to the proportion of spawning fishes, being in March. This agrees with the limits of the spawning of the plaice in confinement in the ponds at Dunbar and the Bay of Nigg, the first fertilised eggs being collected from the water towards the middle or end of January or the beginning of February, most being obtained in March and the last in the beginning of May. But variation may take place to some extent, influenced apparently chiefly by changes in temperature. The floating eggs of the plaice, moreover (which are easily identified), were obtained in the Firth of Forth and neighbourhood from early in February until the end of May—in one year one was got in the tow-net on 4th June—and they were found in Loch Fyne from the end of February until the beginning of June, most being obtained in April and towards the end of March.§

* Report of the Danish Biological Station to the Home Department, iv., pp. 6, 22, 33 (1893).

† *Beretning til Indenrigsministeriet fra den danske Biologiske Station.* Copenhagen, 1892.

‡ *Seventeenth Ann. Rep. Fishery Board for Scotland*, Part iii., p. 232 (1898).

§ Masterman, *Fifteenth Ann. Rep. Fishery Board for Scotland*, Part iii., p. 229 (1897); Williamson, *ibid.*, *Seventeenth*, iii., 97 (1899).

On the East Coast of Scotland the period of normal maximum spawning may be placed about the middle of March. At this time the mean temperature of the surface water is a little over 40° F., and the bottom water is almost the same, but a very little colder, in depths of twenty to thirty fathoms, where the fishes spawn. In April the mean temperature of the surface water is about 43° F., while the bottom water is about 1·5° colder in the depth stated, approximating to the surface temperature in shallow water.* The eggs of the plaice take about eighteen days to hatch at a temperature of about 42°·8, and twelve days at a temperature of 50° F.,† so that the period when the young plaice normally issue in greatest numbers from the egg may be placed at about the beginning of the second week in April.

The larval plaice on hatching is about 7 mm. in length, and it is established that during the period of transformation its growth in length is very slow. Holt found specimens in the transformation stage measuring 10 to 13 mm.; Petersen states that the average size at the end of the post-larval period is 10 to 11 mm.; Ehrenbaum describes specimens 13 to 17 mm. long, in which the left eye was not over the edge, and the smallest plaice he found on the bottom measured 13 mm. In the push-net collections referred to, specimens of 12, 13, and 14 mm. were taken in June and July. In rearing experiments Dannevig found that young plaice in which the left eye had passed over to the right side measured about 13·7 mm., and that when somewhat younger and measuring about 12·4 mm., and while the eye was still on the edge, they remained permanently on the bottom; and he states that the time taken from hatching (May–June) to the complete transformation varied from 37 to 48 days. Dr. Kyle, who has made a careful comparative study of the differential characters of port-larval flat-fishes, comes to the conclusion that in the plaice transformation is completed when the fish are between thirteen and sixteen millimetres in length.‡

From the various data it will be seen that the young plaice starts life on the beach when about 12 or 13 mm. ($\frac{1}{2}$ inch), and that the greater number settle there about the middle of May. Others arrive earlier and later, derived respectively from eggs spawned towards the beginning or the close of the spawning season; but it would be wrong to assume—as is sometimes done in explanation of the considerable range of sizes found in fish of the same series—that the duration of the spawning season and of the period of transformation and settlement on the bottom is of equal extent. Eggs spawned at the beginning of February must pass their development, and the larvæ their pelagic life, in water of about 40° F., while those spawned at the beginning of May pass the same stages in water 6° or 8° higher, and from the data given above it is probable that, while the spawning season lasts for about four months, the period of transformation and settlement lasts only about three months—namely, from the beginning of April to the end of June or early part of July, the bulk of the young plaice, as stated, settling about the middle of May.

From the time of hatching until the end of post-larval life growth in length is slow compared with what it is after transformation is

* Fulton, *ibid.*, 218; compare Dickson, *Quart. Journ. Roy. Meteorological Soc.*, xxv., No. 112 (1899).

† Dannevig, *ibid.*, *Thirteenth*, 149.

‡ Holt, *Scientific Trans. Roy. Dublin Soc.*, iv., v. (1891, 1893); Petersen, *op. cit.*, 126; Ehrenbaum, *Eier und Larven von Fischen der Deutschen Bucht* (1896); Dannevig, *Fifteenth Ann. Rep. Fishery Board for Scotland*, 175; Kyle, *Sixteenth ibid.*, 225 (1898).

completed and life on the bottom is begun, and this is due not merely to the difference in temperature at the two periods, but to the fact that the metamorphosis involves growth in breadth. In the five or six weeks after hatching the plaice increases in length by only about five or six mm. But after they have begun their life on the bottom their growth is very rapid.

The first collections of the brood of the year from the bottom were made in June, both with the push-net in Loch Fyne and the shrimp net in the Solway; no haul was made in May. The smallest plaice found in April with the push-net on the beach measured 54 mm., and with the shrimp net 45 mm.; and they belonged to the brood of the preceding year. At the end of June specimens were taken with the push-net measuring from 12 to 58 mm.; in the first week of July the same range was observed, while towards the end of the month the range was from 18 to 72 mm.; at the very end of August the smallest taken was 34 mm., and the largest 87 mm.; and in November specimens of 33, 34, and 41 mm. were procured.

The shrimp-net collections, as stated, were made in the Solway Firth, in water from a few feet to five fathoms in depth, in 1889 and 1890. The plaice caught always belonged to two series, and sometimes odd specimens of a third series were present. The first series of youngest fish was usually well represented; the second series, however, as an examination of the curves shows, was usually imperfectly represented owing to the comparative absence of the larger individuals, which live in deeper water than the smaller fishes.

The particulars of the various hauls are given in the following Table:—

Date.	No.	Smallest.	Largest.	Range.	Average Size.			
					Computed.		Amended.	
1899.		Mm.	Mm.	Mm.	Mm.	Ins.	Mm.	Ins.
1st August.	9	43	59	16	53·4	$2\frac{1}{8}$	–	–
14th ,,	25	42	63	21	53·6	,,	44·0	$1\frac{3}{4}$
11th Sept. .	72	45	67	22	56·7	$2\frac{1}{4}$	48·5	$1\frac{15}{16}$
27th ,,	319	39	76	37	55·3	$2\frac{3}{16}$	53·0	$2\frac{1}{8}$
10th Oct. .	489	43	76	33	55·7	,,	54·0	$2\frac{1}{8}$
26th ,,	309	42	76	34	59·9	$2\frac{3}{8}$	54·0	$2\frac{1}{8}$
27th Nov. .	159	43	73	30	58·6	$2\frac{5}{16}$	52·5	$2\frac{1}{16}$
28th Dec. .	115	45	76	31	57·4	$2\frac{1}{4}$	54·0	$2\frac{1}{8}$
1900.								
14th March .	85	43	76	33	56·6	$2\frac{1}{4}$	55·5	$2\frac{3}{16}$
30th April .	146	45	81	36	60·9	$2\frac{3}{8}$	62·0	$2\frac{7}{16}$
29th June .	180	29	57	28	40·6	$1\frac{5}{8}$	35·5	$1\frac{3}{8}$
30th July .	33	41	74	33	54·0	$2\frac{1}{8}$	46·0	$1\frac{13}{16}$
30th August.	152	45	79	34	58·3	$2\frac{5}{16}$	52·0	$2\frac{1}{16}$
28th Sept. .	400	42	83	41	61·2	$2\frac{3}{8}$	56·5	$2\frac{1}{4}$
31st Oct. .	113	43	81	38	61·0	$2\frac{3}{8}$	56·5	$2\frac{1}{4}$
27th Nov. .	181	43	82	39	61·1	$2\frac{3}{8}$	57·0	$2\frac{1}{4}$

The first series is, as a rule, quite sharply separated from the second series, especially in summer (Pl. XIVA.), the coalescence or overlapping exhibited by older groups being absent.

The averages shown in the above Table cannot, however, be regarded as accurate, especially in the months immediately following the spawning season, because great numbers of the young plaice are then too small to be captured with the net, and the average indicates not the mean size of the series at the time, but the mean size of those taken by the net, *i.e.* of the larger individuals. It will be observed that, with the exception of June, the minimum size of those taken in all the months ranges from only 39 to 45 mm. We know, however, that much smaller plaice inhabit the beaches than these. Dr. Kyle, in the paper previously referred to,* shows that post-larval plaice may be taken in considerable numbers in June and even in July, August, and September; in the latter months, however, they must be relatively few. In the push-net collections above referred to plaice from 12 mm. were obtained at the end of June and beginning of July, while at the end of the month the minimum size was 18 mm.; at the end of August the smallest was 34 mm., but since specimens this size and 33 mm. were taken in November, the minimum size is probably less at this time. In order to reduce the computed averages to a better standard, I have taken the ascertained maximum size of the series as one limit, and have assumed as the minimum sizes in the various months the following, viz.:— June, 14 mm.; 30th July, 18 mm.; 30th August, 25 mm.; 28th September, 30 mm.; October, November, and December, 32 mm.; March 35 mm.; and April, 40 mm.

The series of the year, derived from eggs spawned in spring, was first collected in June, no haul being made in May in the shallow water. On the 29th June the range of the 180 specimens was from 29 to 57 mm., the apparent average size being 40·6 mm., or $1\frac{5}{8}$ inches. An examination of the curve, however (Pl. XIVA.), shows, as stated, that the smaller fishes must have escaped in numbers from the net, and that the mean size at this period is about 35 or 36 mm., and the range from 12 or 14 to 57 mm. A month later, on 30th July, the mean size was 54·0 mm., showing an apparent growth of 13·4 mm. in the month; on 30th August, when the curve indicated that the series was more nearly uniformly represented, the average size was 58·3 mm., a total increase of 17·7 mm. in the two months. From this period until the end of November growth in these small plaice was practically in abeyance. The averages for this series in the various hauls in the previous year—1899—were somewhat lower, and are not so uniform, but the series was pretty uniformly represented in each haul, as shown by the curves. It will be observed that plaice as small as 43 and 45 mm. were actually taken in the shrimp net in March and April, when they must be very nearly a year old.

These averages may be examined more closely. The size of the plaice newly settled on the bottom, about the middle of May, was, we have seen, about 12 or 13 mm., and the average size on 29th June was (as corrected) 35 or 36 mm. The young plaice have thus increased in length in the interval of forty or forty-five days by about 22 mm., that is to say by very nearly threefold. This appears to be the period of relatively most rapid growth during its life, and it coincides with the period, as we shall immediately see, when the *rise* of temperature of the shallow water on the beaches is greatest. At the end of July, thirty-five days later, the average increase amounted to 13·4 mm., the

* *Sixteenth Ann. Report Fishery Board for Scotland*, iii., p. 239.

mean size being then 54 mm. During August growth is slower, the apparent increase in length in the 31 days to the end of that month being only 4·3 mm. In September the diminution in growth is more marked, the apparent increase in the 29 days amounting to only 2·2 mm. In the next thirty-three days to the end of October the increment was only 0·1 mm. The averages for the preceding year from 1st August to 28th December show the same diminution of growth in autumn, although not with quite the same regularity, the average size of the young plaice being somewhat less in that year, probably owing to a lower temperature in the summer, or a later spawning. But if the two series of hauls in August, September, and October 1899 be combined, and the mean taken for the average and the period, the apparent increments of growth are as follows:—In the 44 days from 7th August to 19th September 2·5 mm., in the 30 days from 19th September to 18th October 1·8 mm., and in the 40 days to 27th November 0·8 mm. At the end of December, it will be observed, the average size was 1·2 mm. less than in November, and that at the middle of March it was less than in December by 0·8 mm., and than in November by 2 mm.

These facts, I think, prove that the growth of this series of young plaice, living on the beaches, is quite arrested in winter. It is possible, indeed, that the fish actually diminish in length as the averages indicate, for in certain experiments I made some years ago by keeping plaice from thirteen to eighteen inches long in tanks, in which the temperature of the water followed that of the air, it was found they usually diminished somewhat in length and always in weight in winter, from October until March.* Moreover, the period indicated—from November to February is characterised by the most rapid *fall* in the temperature of shallow water.

The close relation of the temperature of the water to the growth of the young plaice is well brought out by detailed comparison, and this connection, it is interesting to observe, extends to the spawning period as well. It so happens that the period in which the greatest number of plaice eggs are spawned coincides with the time when the temperature of the sea at some distance from the land, where the spawning takes place has just begun to rise. This in indicated in the accompanying diagram (fig. 4), which also shows the relation between the mean temperature of the shallow water in the various succeeding months, and the average growth of the young plaice. The temperature of the bottom water, in which the spawning plaice live, reaches its lowest point in the year about the beginning of the second week in March, after which it begins to rise. Very soon after this the spawning attains its maximum, so that the development of the great bulk of the embryonic fishes within the egg takes place in a slowly rising temperature, and the transformation of the post-larval stages in a temperature somewhat higher, and rising more rapidly. When the settlement of the swarms of small transformed plaice on the bottom is at its maximum the temperature is rising most rapidly, and the greatest increase in growth coincides with the greatest increase in temperature. It is noteworthy that growth is less rapid when the temperature is more uniform, although higher, in July, August, and September; that it slackens most when the temperature begins to fall, which is usually towards the middle or end of August, and becomes arrested at the period when the fall is greatest.

The temperatures I have been dealing with are the mean temperatures

* *Eleventh Ann. Report Fishery Board for Scotland*, Part iii., table, p. 193 (1892).

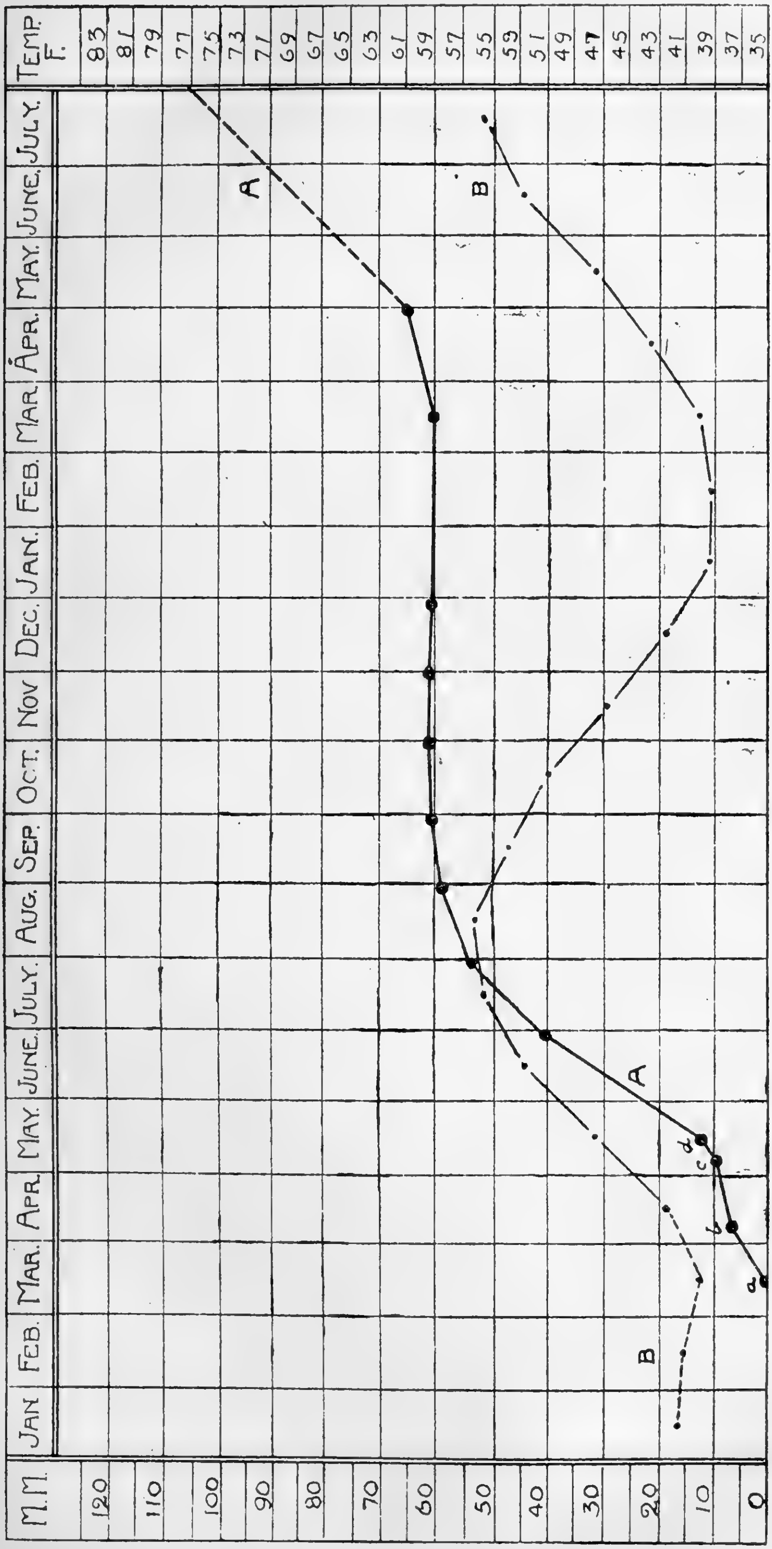


FIG. 4.—Showing relation between the temperature of the water and the growth of young plaice. A, A. Curve of growth; B, B. Curve of temperature; a-b, growth within egg; b-c-d, during transformation.

for the month,* but there is considerable variation in different years, especially in the temperature in shallow water, and during each month, according to whether there is prolonged frost or low air temperature in January, February, and March, or prolonged high or low air temperatures in summer. The minimum temperature on the beach, while usually occurring in the early part of February, may not occur until the end of February, or even the middle of March, and a corresponding variation takes place with the maximum towards the end of July or beginning of August.

These facts throw light not merely on the normal growth of the young plaice, but on the variation in growth in different years, since the habitat selected by this species at this stage of its life, viz. the margin of the sea, is the one most exposed to variation in temperature caused by change in the temperature of the air.† They, moreover, explain the retardation or acceleration of the spawning season in different years. After a hard winter the temperature of the water in twenty or thirty fathoms is lower than after a mild winter, and spawning is later or earlier accordingly. This may, perhaps, be partly due to the slower or quicker development of the reproductive elements under the direct influence of temperature, but that it is also due to voluntary inhibition of spawning is shown by what takes place in the tanks at the hatchery. When plaice actually spawning are transferred from the sea to the tanks the spawning process is inhibited for days or weeks from fright, and the fish may ultimately become egg-bound and die with the ovaries enormously distended; and when the temperature in the tanks falls suddenly from the onset of frost or snow, spawning which has begun with quite healthy fishes may be quite arrested until the temperature begins to rise, as occurred last year.‡

* They are as follows:—

		Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Shallow water.		39·2	39·2	40·1	43·5	47·8	52·9	55·8	56·3	54·1	50·8	46·5	42·6
20–30 fms.	Surface.	41·6	41·2	39·9	42·2	46·6	–	–	–	–	–	–	–
	Bottom.	42·2	41·3	40·0	41·8	44·5	–	–	–	–	–	–	–
Mean		41·9	41·2	39·9	42·5	45·5	–	–	–	–	–	–	–

† The selection of this habitat is clearly of advantage to the species in summer, since it is the region of maximum warmth, but it is curious that the beach should still be frequented in winter when it is the coldest region; for although the larger individuals and some of the others appear to withdraw to slightly deeper water, they may still be procured on the beach in considerable numbers. There is probably a greater advantage to the species by the comparative immunity from enemies which the situation confers, since few piscivorous fishes venture into shallow water unless in exceptional circumstances. In the experiments on board trawlers, I have found that after a gale, when the shallow water near the coast is rendered less transparent by mud or sand in suspension, cod and codling may be found there in great numbers, preying chiefly upon herrings or young whitings, which drop from their mouths as they are brought to deck; while at the same time most other fishes, as haddocks, plaice, and dabs, may be almost absent.

‡ On 24th January the temperature of the water in the pond was 5·7° C., and 60,000 eggs were collected. From this time it gradually sank to 3·7° on 26th January, and the number of eggs collected fell daily to 30,000 on that date. From 26th January the temperature declined daily to 1·6° on the 30th, after which it rose slightly to 3·6° on 4th February, and during this period of eight days no eggs could be found in the pond. After reaching 4·6° on 9th February it fell again to 1·4° on 14th February, and spawning was again inhibited for three or four days. The temperature in the pond rose to 6·0° and 7·0° in the middle of March, and on an average more than 1,000,000 eggs were collected daily at this time; it again declined to between 3° and 4°, and 2° and 3° from 24th March to 1st April, but at this period, although the daily quantity of eggs diminished to 740,000, spawning as a whole was not interrupted. The temperature rose again rapidly to 6°, and the number of eggs collected daily increased to between one and two millions.

Thus the spawning period is normally related to the period most advantageous for the settlement of the young metamorphosed plaice on the beaches, both varying together according to the temperature. In this respect the reproduction of the plaice is comparable to other cases, as, for example, the nesting of birds. The seasonal temperatures also, it may be said, are related to the selection of the spawning ground, the position of which is not, as some imagine, a matter of indifference; so that the plaice, although its progeny settle on the margin of the sea, spawns in spring (in cold water) some distance from the shore, while the flounder, whose young have a similar habitat, may spawn quite close to the shore in summer (when the water is warm), and its eggs hatch in a few days. In both cases the loss of eggs by stranding on the beach is reduced to a minimum, while the advantageous habitat is obtained.

The average growth of the plaice in the Solway Firth, then, in its first summer—from the time development begins about the middle of March to the arrest of growth about the end of October—may be said to be, on the average, about 60 millimetres, or $2\frac{1}{3}$ inches. The largest individuals may measure 25 mm. more, or a little over $3\frac{1}{4}$ inches, while specimens as small as 33 mm., or $1\frac{3}{10}$ of inch, may be procured as late as November. The series is then not absolutely, but almost quite, separated from the series of the preceding year.

In the spring of the next year, as we have seen, the young plaice are about the same length, and the average size of one of these plaice one year old, computing from the beginning of embryonic life, or the beginning of larval life, is about what is above stated. With the rising temperature of April growth recommences, so that at the end of the month the average length is 6 or 7 mm. greater. In May growth is no doubt accelerated, and in June especially growth is rapid, so that at the end of that month the average size is about 90 mm., or $3\frac{1}{2}$ inches, showing an increase of 30 mm.

These plaice are in their second year, but the collections made of this second series are not complete, and I think I may say, from an examination of their Tables, that the same remark applies to the collections made by others. The particulars are given in the following Table:—

[TABLE.

Date.	No.	Smallest	Largest.	Range.	Average Size.		
					Computed.	Amended.	
1899.		Mm.	Mm.	Mm.	Mm.	Mm.	Inches.
1st August.	38	70	117	47	89·5	(93·5)	–
14th ,,	164	72	139	67	94·4	105·5	$4\frac{3}{16}$
11th Sept. .	242	73	139	66	96·4	106·0	$4\frac{3}{16}$
27th ,,	296	78	143	65	94·8	110·5	$4\frac{3}{8}$
10th Oct. .	248	77	144	67	93·2	110·5	$4\frac{3}{8}$
26th ,,	513	78	145	67	96·3	111·5	$4\frac{3}{8}$
27th Nov. .	435	79	142	63	100·6	110·5	$4\frac{3}{8}$
28th Dec. .	355	77	142	65	109·7	109·5	$4\frac{5}{16}$
1900.							
14th March .	96	80	142	62	100·9	111·0	$4\frac{3}{8}$
30th April .	116	82	145	63	104·4	113·5	$4\frac{1}{2}$
29th June .	266	65	113	48	89·2	89·0	$3\frac{1}{2}$
30th July .	107	79	130	51	107·7	105·0	$4\frac{1}{8}$
30th August.	134	82	136	54	107·1	109·0	$4\frac{5}{16}$
28th Sept. .	90	85	141	56	107·3	113·0	$4\frac{7}{16}$
31st Oct. .	36	86	146	60	115·3	116·0	$4\frac{9}{16}$
27th Nov. .	19	86	132	46	104·6	–	–

I have already said the larger individuals are not duly represented in the shrimp-net hauls from shallow water and this series was almost always absent from the hauls made on board trawlers. But in one case, when it was present in numbers, the same defect as in the Solway hauls was apparent. An examination of the curves of the shrimp-net hauls shows, however, that the averages for the end of July and for the end of October indicate approximately the real increase. The distance between the ordinates placed over the middle of the base of the first and second groups in ten cases where the limits of the groups are pretty clearly defined varies from about 5·8 to 7·2 cm., the mean being 6·6 cm. This closely corresponds with the average length of the plaice in April, when one year old, as shown above, and represents with approximate accuracy the increase in length that takes place between the first and second series in a year.

In the last columns of the above Table I have given an amended mean size derived from the median ordinate between the limits of the series. The upper or maximum limit is not in all cases quite clear from the occasional presence of fish belonging to the third series, but the averages given, if they err at all, err on the side of being rather large than rather small.

The particulars both for the first and for the second series show that the plaice in the Solway grows more slowly than on the East Coast—

it might be called a smaller race. The same is true of the common dab.

The presence of the first series of small plaice on the beaches in summer, and scarcely ever present in my hauls made on board trawlers, was also shown by the use of the push-net in a foot or two of water at low tide. The collections in this case were made for the most part in Loch Fyne, but it is unnecessary to detail here the averages, since they varied considerably, and were usually too low for the particular season, owing, as the curves show, to the proportion of the smaller fishes being unduly large. At the end of December a fairly good curve included sixty-three small plaice from 46 to 87 mm., the average size being 64·9 mm. The next series was represented by a few from 94 to 116 mm., and a third series by three, measuring 176, 194, and 202 mm.

I now turn to the investigations on the East Coast made on board trawlers. In them, as already mentioned, the first series was entirely absent, and the second series only occasionally represented, and then almost always by only a few specimens. This was due to the circumstances that the plaice of different series have a special distribution and that the fishing was conducted within a certain range of depth. The successive groups or generations of plaice exhibit a more or less perfect rotation or succession from the margin of the beach out into moderately deep water, so that a given generation or series, speaking broadly, inhabits a particular zone or range of depth—with a certain amount of overlapping. This relationship to depth, or segregation of series, is, however, more or less disturbed in stormy weather, by seasonal (temperature) change, and in the case of the adults by the migratory movements associated with spawning. In winter I have observed that plaice that normally inhabit several fathoms may be found, notwithstanding the diminished temperature, sometimes irregularly in shallow water, and are even caught in the push-net on the beach ; this wandering may be due to storms or to the search for food at a season when food is scarce.

The steam trawlers cannot work very close to the shore, and hence, the normal distribution of the series being such as I have described, the smaller fishes were rarely taken. Another imperfection may be alluded to—viz., that in the hauls of the trawlers the older series, inhabiting usually deeper water, were also, as a rule, imperfectly represented. The trawlers worked for profit, and only incidentally for scientific purposes, and they fished in the places and depths at which the best catches of plaice for the market could be obtained, *i.e.* most medium-sized fish. It thus happens that in most of my hauls only one or two series or generations of plaice were well represented, those, namely, living within the depths at which the net was worked, and it was often a matter of much difficulty to ascertain the true features of the measurements. In one case, for example, a series might contain an undue proportion of large fish belonging to it, and the average size of the group would consequently be high, while the same series, at a later date, might contain a large proportion of small individuals and the average size would be lower, showing an apparent diminution instead of increase of growth. Difficulties of this kind were common, but when the limits of the groups were ascertained with some certainty, comparison of the medium ordinates of each gave a clue to the real growth.

The hauls were made in Aberdeen Bay and the Moray Firth, and in several cases, from the circumstances referred to, the measurements of the plaice did not give satisfactory results. The sexes, moreover, were not at first separately distinguished. The particulars of various of these hauls are given in the appended Tables, and some of the features may be here described.

On 31st October and 1st November 1900, two hauls in Aberdeen Bay, in from eight to fifteen fathoms, yielded 432 plaice, the smallest of which was 165 mm., or $6\frac{1}{2}$ inches, and the largest 593 mm., or about $22\frac{3}{8}$ inches. The sexes were not separately measured. The curve shows they form five or six annual groups, the first and last of which were not well represented; while the younger series inhabiting the beaches and shallows were of course absent. The first group of forty-six ranged from 165 to 247 mm., and had an average of 226·5 mm. ($8\frac{15}{16}$ inches). This is greater than the true mean size owing to the paucity of the smaller and medium members of this series; it ought to lie between 20 and 21 cm. The second group was composed of 302 plaice, forming thus the bulk of the catch, the smallest measuring 250 mm. ($9\frac{7}{8}$ inches) and the largest 369 mm. ($14\frac{1}{2}$ inches), while the mean size was 309·7 mm., or $12\frac{3}{16}$ inches. The third group comprised 71 plaice from 370 mm. to 438 mm., the average size being 397·4 mm., or $15\frac{11}{16}$ inches. The curve shows that this average is too low (the maximum ordinate being at 38 cm.), *i.e.* the larger fishes were not present in due abundance. A fourth group contained eleven fishes from 447 to 495 mm., with a mean size of 471·2 mm., or $18\frac{1}{2}$ inches. There were other two, one measuring 555 mm. and the other 593 mm., each of which probably represented an older group.

On 30th May 1901, in 8 to 15 fathoms of water, 214 plaice were obtained belonging to five groups, unequally represented, the measurements furnishing somewhat irregular curves.

The first series contained three females and two males, the former measuring from 127 to 194 mm., with an average of 166·3 mm., the latter 182 and 198 mm., with an average of 190 mm. The second group comprised 31 females, from 212 to 299 mm., with a mean size of 260·4 mm. ($10\frac{1}{4}$ inches), and 34 males, from 201 to 300 mm., with an average size of 263·3 mm., the mean size of the group being 261·4 mm. The third series contained seventy-two females from 304 to 408 mm., with a mean size of 351·8 mm. ($13\frac{7}{8}$ inches), and fifty-two males ranging from 304 to 376 mm., the average being 341·3 mm. ($13\frac{7}{15}$ inches). A fourth series was represented by two females, 454 and 472 mm., with an average of 463, and fourteen males from 379 to 409 mm., with a mean size of 390·4 mm. ($15\frac{3}{8}$ inches). There were other four females measuring from 521 to 584 mm., and averaging 552·0 mm., or $20\frac{1}{2}$ inches.

On 6th and 7th June the plaice in several hauls with the ordinary otter trawl in eight to twenty fathoms were measured. A first series, not well represented, comprised twenty-eight fish ranging from 123 to 196 mm., and having an average size of 176·2 mm. The second series contained 247 females, ranging from 203 to 307 mm., the average size being 262·1 mm., or $10\frac{5}{16}$ inches, and 276 males from 201 to 302 mm., with a mean size of 252·5 mm., or $9\frac{15}{16}$ inches. The average size of this group, according to the curve for the sexes mixed, was 256·1 mm., or $10\frac{1}{16}$ inches. The next series contained 469 females from 308 to 413 mm., with a mean size of 357·9 mm., or $14\frac{1}{8}$ inches. and 333 males from 303 to 385 mm., with an average length of 346·6 mm., or $13\frac{5}{8}$ inches. The mean size of the plaice included in the curve with the sexes mixed (850 fishes) was 355·3 mm., or 14 inches. There was a fourth series of 84 females, ranging from 414 to 491 mm., and having an average length of 445·4 mm., or $17\frac{1}{2}$ inches, and forty-three males measuring from 386 to 455 mm., the average being 400·9 mm., or $15\frac{13}{16}$ inches. The mean size of the eighty-seven mixed fishes included in this curve was 441·1 mm., or $17\frac{3}{8}$ inches.

On 13th June a haul in nine to twelve and a half fathoms yielded 161 plaice, of which six, measuring from 173 to 207 mm., had an average size of 193·3 mm. The second series was composed of 46 fishes from 229 to 301 mm., with an average size of 273·2 mm., or $10\frac{3}{4}$ inches. The third series of 103 plaice ranged from 303 to 407 mm., and had an average size of 352·6 mm., or $13\frac{7}{8}$ inches. There were six larger fishes, from 423 to 461 mm., which had an average size of 439·8 mm., or $17\frac{5}{16}$ inches.

On 31st July a haul in $11\frac{1}{2}$ to $12\frac{1}{2}$ fathoms yielded representatives of three series. The first comprised three females, ranging from 250 to 299 mm., with a mean size of 275·7 mm., and ten males, from 262 mm. to 298 mm., with an average size of 284·8 mm., the mean size of the group of thirteen being 282·7 mm., or $11\frac{1}{8}$ inches. The next series contained 12 females measuring from 322 to 416 mm.. the average size being 367·2 mm., or $14\frac{7}{8}$ inches, and twenty-two males from 306 to 394 mm., and with an average size of 344·2 mm. ($13\frac{9}{16}$ inches), the mean size of the group being 352·4 mm., or $13\frac{7}{8}$ inches. There was also one female measuring 450 mm.

A haul on 4th September, in ten fathoms, yielded two series, the first comprising twelve fishes, measuring from 255 to 317 mm., and with an average size of 292·2 mm., or $11\frac{1}{2}$ inches, and the second containing twenty-eight, ranging from 327 to 411 mm., with an average of 359·4 mm., or $14\frac{3}{16}$ inches.

On 18th October several series were represented, although very unequally, in a haul in sixteen fathoms. The first series comprised one male of 88 and one female of 84 mm. The second series was made up of thirty-three males, measuring from 156 to 247 mm., and having an average size of 199·3 mm., or $7\frac{7}{8}$ inches, and 24 females between 165 and 242 mm., with a mean length of 201·1 mm., the average size of the group being 200 mm. The third series comprised thirty-three males, with an average size of 316·9 mm., and a range from 268 to 359 mm., and forty females from 267 to 356 mm., and a mean length of 320·2 mm., the average size of the group being 318·7 mm. The other series were too imperfect to deal with.

Very good hauls were got on 6th November, a considerable number of the smaller plaice being taken, and as the males and females were separately measured, good curves were obtained (Pl. XIV.). The smaller fish were taken in the fine-meshed net around the cod-end of the otter trawl, which was dragged for thirty-five minutes in about six or seven fathoms; the larger plaice were procured in a drag of the otter-trawl in from seven to thirteen fathoms at the same place, the haul lasting four hours and twenty minutes. With the exception of six, all the plaice belonging to the first and second series were taken in the small net, and as that haul lasted only $\frac{7}{52}$ of the time occupied in the other haul, the number of fish representing the second series ought to be multiplied accordingly in order to give due proportion to the curves.

The number of plaice taken in the two hauls was 1898. The first series was represented by one fish at 84 mm. The second series comprised 184 plaice, of which seventy-six were females ranging from 92 to 162 mm., with an average size of 118·9 mm., or $4\frac{11}{16}$ inches; and 108 males, from 91 to 160 mm., of an average size of 117·9 mm., or $4\frac{5}{8}$ inches.

The third series was made up of 288 females, from 164 to 262 mm., with an average size of 218·7 mm., or $8\frac{5}{8}$ inches, and 331 males ranging from 166 to 257 mm., and having a mean size of 214·5 mm., or $8\frac{7}{16}$ inches. The average size of the group as determined by the curve for the sexes combined, comprising 619 fishes, was 216·5 mm. or, $8\frac{1}{2}$ inches.

The fourth series contained 336 females and 310 males, the former ranging from 263 to 361 mm., with a mean size of 316·2 mm., or $12\frac{7}{16}$ inches, and the latter from 259 to 357 mm., with a mean size of 314·9 mm., or $12\frac{3}{8}$ inches. The average for the curve-group of mixed sexes (640 fishes) was 315·3 mm., or $12\frac{3}{8}$ inches.

The fifth series comprised 220 females, from 363 to 442 mm., with an average size of 400·3 mm., or $15\frac{3}{4}$ inches, and 150 males, ranging from 358 to 405 mm., and having a mean length of 375·9 mm., or $14\frac{13}{16}$ inches. The mean size for the curve-group comprising 392 fishes of both sexes was 391·6 mm., or $15\frac{7}{16}$ inches.

The sixth series contained forty-six females, from 444 to 479 mm., the average size being 459·7 mm., or $18\frac{1}{8}$ inches, and eighteen males, from 411 to 446 mm., and an average length of 425·0 mm., or $16\frac{3}{4}$ inches. The mean for this part of the curve, comprising 48 fishes, was 459·4 mm., or $18\frac{1}{8}$ inches.

There were thirteen females and one male larger, of which eleven females, from 490 to 540 mm., and a mean size of 507·4 mm. ($19\frac{15}{16}$ inches), and the male, measuring 460 mm., appear to form one group. The remaining two females were 572 and 587 mm. respectively, with an average of 579·5 mm., or $22\frac{13}{16}$ inches, and they seem to represent another older group.

The plaice taken in several hauls in various parts of the Moray Firth were also measured, but in several cases the curves based upon them were so irregular that that they had to be discarded, and the sexes were usually not determined.

In a haul in the Dornoch Firth on 11th October 1900, in from eight to twelve fathoms, the measurements of 334 plaice were grouped as follows:—

The youngest series, comprising eighty fishes, ranged from 143 to 196 mm., and had an average size of 170·6 mm. The second series, of 165 fishes, varied from 200 to 278 mm., with an average length of 240·1 mm. The third, comprising thirty-six fishes, had a mean size of 314·2 mm., and a range from 287 to 350 mm. The fourth, containing forty-one fishes from 360 to 420 mm., had a mean length of 383·4 mm. There were twelve larger plaice, of which seven varied from 433 to 494 mm., and had an average size of 458·4 mm. The other five, measuring 544, 578, 578, 660, and 679 mm., belonged probably to three groups.

On 5th and 7th November the plaice got in a haul in the same locality were measured. The first series was composed of seven plaice from 76 to 88 mm., and with an average size of 82·7 mm. The second series, comprising 126 plaice from 132 to 201 mm., had an average size of 171·4 mm., or $6\frac{3}{4}$ inches. The third series included 266, measuring from 204 to 282 mm., and with a mean size of 249·1 mm., or $9\frac{13}{16}$ inches. The fourth series, containing 211 plaice from 283 to 349 mm., had an average size of 313·9 mm., or $12\frac{3}{8}$ inches; a fifth series, comprising 121 fishes from 350 to 403 mm., had an average of 373·5 mm., or $14\frac{11}{16}$ inches.

Another series of thirty-six, from 405 to 452 mm., appeared to form a group with an average of 421·6 mm. There were other thirteen plaice, measuring from 470 to 675 mm., difficult to group, but obviously forming several series. Their measurements were 470, 472, and 493 mm.; 527 and 529 mm.; 560 and 562 mm.; 587, 600, and 609 mm.; 632 and 633 mm., and 675 mm. If considered series as grouped—and it will be observed they often occur in pairs—there would be other six series with averages of 478·3, 528, 561, 598·7, 632·5, and 675 mm.

On 11th November 1901, a haul, also in Dornoch Firth in 8-10 fathoms, yielded 240 plaice which grouped themselves as follows:—A first series comprised fifteen females and eighteen males; the former ranged from 165 to 203 mm., and had an average of 182·9 mm., while the males, from 138 to 195 mm., had a mean size of 176·8 mm., the average for the group being 179·6 mm., or $7\frac{1}{16}$ inches.

The second series was made up of sixty-two females, from 209 to 290 mm., with an average size of 254·1 mm., and eighty-one males from 209 to 292 mm., and having an average of 246·4 mm. The mean length of the group with the sexes combined was 249·8 mm., or $9\frac{7}{8}$ inches.

The third series comprised twenty-two females from 294 to 369 mm., with an average of 323·6 mm., and seventeen males from 297 to 364 mm., and with a mean size of 324·7 mm., the average for the group being 324·1 mm., or $12\frac{13}{16}$ inches.

A fourth group contained four females with an average of 407 mm., and twelve males with an average of 385·2 mm., the mean for the group being 390·9 mm., or $15\frac{3}{8}$ inches. Other eight females from 443 to 495 mm. appeared to form the fifth series with an average size of 469·6 mm., or $18\frac{1}{2}$ inches. Another female measured 662 mm,

Another haul with the ordinary otter trawl in the same place on the same day yielded a number of plaice of which 365 females were measured, the measurements grouping themselves into five series corresponding very well to those first described, the respective averages being 186·2, 249·1, 321·2, 390·4, and 460·2 mm.

A haul off Lossiemouth on 3rd November 1900 yielded a number of plaice among which four groups, comprising 450 fish, seemed fairly well defined. The first had an average size of 188·3 mm., and a range from 152 to 223 mm.; the second an average of 275·7 mm., and a range of 228 to 310 mm.; the third an average of 358·2 mm., and a range of 313 to 401 mm.; the fourth ranged from 402 to 464 mm., with an average of 422·4 mm. There were also a number of large plaice, all, or almost all, females, not easy to allocate.

In considering the measurements above detailed it will be found that the apparent mean annual increment of growth from one series to another varies considerably, due, as indicated, to the true average not being represented owing to the imperfection of the groups. The differences between the average or mean size deduced for each successive annual series, or the apparent increment of growth in a year from one series to the other, are shown as follows for Aberdeen Bay, the series being numbered according to their probable age.

	Depth in Fathoms.	I. to II.	II. to III.	III. to IV.	IV. to V.	V. to VI.
30th May 1901 .	8–12	–	85·6	85·9	–	–
6th, 7th June 1901	8–20	–	79·9	99·2	85·8	-
13th June 1901 .	11–12½	–	79·9	89·4	87·2	–
31st July ,,	11½–12½	–	–	[69·7]	–	–
4th Sept. ,,	10	–	–	[67·2]	–	–
18th Oct. ,,	16	–	–	[118·6]	–	–
31st Oct. 1900 .	8–15	–	83·2	87·7	73·8	[83·8]
6th Nov. 1901 .	6–13	–	98·4	98·8	76·3	–
Mean . .	–	–	85·4	89·6	80·8	–

Excluding the figures for 6th November and 18th October, the increments show a fair uniformity, and indicate an apparent increase from the second to the third annual series of 84·8 mm., or $3\frac{3}{8}$ inches, from the third to the fourth of 83·2 mm., and from the fourth to the fifth year of 82·3 mm. It would, however, be erroneous to assume that these amounts represent quite accurately the real increase in length of the plaice in a year, because first, as stated, an examination of the curves shows that the groups are unequally represented, and second, the haul of 6th November, comprising 1898 fishes, the sexes of which were distinguished and carefully measured separately, gives by far the most regular curves (Pl. XIV).

The unequal representation of the various groups in the other hauls is well shown by the curves. As a rule, only one group was present in approximately due proportion, the groups of younger fishes being represented principally by the larger individuals of the group, while the larger individuals of the older groups were for the most part absent. The consequence of this is that the maximum ordinate of the curves of the smaller group and of the larger group does not stand over the centre of the base of the group (whose limits have been previously determined), but is approximated to the maximum ordinate of the central group, which is duly represented by both small and large individuals; and of course the arithmetical average derived by computation from the measurements deviates in like manner. The distance between the maximum ordinate of the perfect group and the ordinate standing over the middle of the base of the imperfect groups measures nine or ten centimetres, as in the case of 6th November.

This unequal representation of the groups is, as stated, brought about by the depth of water in which the hauls happened to be made, and it will be seen from the depths given in the Table above that the haul in which the shallowest water was entered was that of 6th November. In most of the hauls, as a rule, only one group was well represented, and it was usually the fourth; but in the hauls on 6th or 7th June the third group was also present in nearly due proportion, and in this case the apparent annual increment approximates closely to that indicated in the haul of 6th November. The haul of 18th October, which gives anomalous increments, comprised only 142 fishes, from sixteen fathoms, and the curve is very irregular.

It appears, therefore, that the yearly increment of growth of the plaice in Aberdeen Bay is most accurately shown in the haul of 6th November for the various groups, and for Groups III., IV., and V. the measurements may be taken as indicating pretty nearly the real growth in a year from one to the other. But a careful examination of the curves makes it evident that the first group (II.) and the later groups are not properly represented. The fish, as already stated, were obtained in two hauls, one with the fine-meshed net, chiefly in six and seven fathoms, and one with the ordinary otter-trawl in sweeps from eight to thirteen fathoms, the first haul lasting for thirty-five minutes, and the second for four hours and twenty minutes. Series II., except six fish, were entirely the product of the first haul, while the remaining series were entirely the product of the second haul. On the time basis the fish in the first haul should be multiplied by a little over seven, and this would to some degree extend the range of the group (and the base of the curve), but it ought not materially to alter the maximum ordinate or arithmetical mean. It will be observed from the one-centimetre curve that the interval between the base of the columns representing the second and third series is considerable. This would to some extent be improved by the multiplication of the first series as described, but it would still exist. The measurements of the fish in the hollow, from 120 to 190 mm., have been plotted out in 5-mm. and 2-mm. groups, with and without the multiplication by seven of the first series, and the fact is brought out that the plaice between 137 and 175 mm. are imperfectly represented in the hauls, and are no doubt those which were on the bottom between seven and nine fathoms, an interval in which the trawl-net was but little used in either haul.

The first question to decide is whether these fish, so scantily present, belong to an intermediate series, or to the larger or smaller series, or partly to one and partly to the other. The evidence is against the view that there is a missing series, because the space is too small for its intercalation, and if a curve to represent an imaginary group is inserted, the overlapping would be far greater than between the succeeding older series, where overlapping is always greatest. Moreover, we have seen that the small plaice of the Solway grow about 60 mm. in their first year, and if a group were inserted, and only the same minimum rate of growth assumed for the succeeding series as for the first, we should have the averages for the groups as 60, 120, 180, and 240 mm., which, as the curve shows, cannot be true.

The plaice of intermediate size appear to belong to both series, but far more to the second than to the third. Some do, however, appear to belong to the third series, as the slopes of the curve suggest, but their presence would not tend to disturb the maximum ordinate and arithmetical average of that series to any great extent—not more, probably, than a few millimetres. A study of the evidence makes it almost certain that the missing fish belong mostly to Series II., because, as this series stands, it shows an increase of only 58 mm. for the second year's growth, whereas it is certain the second year's increase in length is greater. If the fish were present in due proportion the maximum ordinate and arithmetical average would be shifted nearer to Series III., and from a study of the curves in this and other cases it is probable they should lie about 13 or 13·5 centimetres, and the apparent yearly increment of growth would be correspondingly increased to about 70 or 75 mm. from the first series to the second, and reduced from the second to the third to 80 or 85 mm.

There is probably a first series, about six or seven months old, ranging in size from under 40 to 85 or 90 mm., and with a mean size of about 65 mm. (or $2\frac{1}{2}$ inches); a second series ranging from about 90 mm. to 160 or 165 mm., and with a mean size of about 137 mm. ($5\frac{1}{4}$ to $5\frac{1}{2}$ inches), and the third series, referred to below, with a mean size of about 215 mm., or $8\frac{1}{2}$ inches.*

The later groups of older fishes are also imperfect, as may be seen from the position of the peaks, or maximum ordinates, in the figure and this also is mainly due to the depth of water in which the hauls were made, the larger fishes being further out from shore.

*A haul with the shrimp-net in Aberdeen Bay, in from 4 to 10 fathoms, on 9th May 1902, furnished 126 plaice, of which the first series comprised 98, ranging from 57 to 126 mm., the arithmetical average being 92·2 mm. ($3\frac{5}{8}$ inches), and the median ordinate on base-line 92·5. These fish were nearly 14 months old. The second series was imperfect; it comprised 28 from 140 to 227 mm., the arithmetical average being 190·8, and the median ordinate 185 mm. ($7\frac{1}{4}$ inches).

[TABLE

A similar comparison may be made between the average size of the females and males of each group, and the particulars are shown in the following Table:—

	I. to II.		II. to III.		III. to IV.		IV. to V.		V. to VI.		VI. to VII.		VIII. to X.	
1901.	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂
30th May .	–	–	94·1	–	91·4	79·0	[111·2]	49·1	–	–	–	–	–	–
6th, 7th June	–	–	–	–	95·8	94·1	87·5	54·3	–	–	–	–	–	–
31st July .	–	–	–	–	91·5	59·4	–	–	–	–	–	–	–	–
18th October	–	–	–	–	119·1	117·6	[56·3]	[51·2]	[84·3]	–	–	–	–	–
6th November	–	–	99·8	96·6	97·5	100·4	84·1	61·0	59·4	49·1	47·9	[35·0]	(72·1)	–

The observations made above apply also here, and the figures most nearly representing the yearly increase in the females and the males are those of 6th November, but the yearly increment of growth from Series II. to Series III. in the haul must be reduced a few millimetres, as stated above. It will be noticed that the increments of growth, particularly in the males, diminish in each generation after the fourth group, that is to say, about the time sexual maturity is reached. The curve (Pl. XIV.) shows that, with the plaice, the males grow as rapidly, or almost as rapidly, as the females until this period is reached, and that thereafter they lag very much behind the females. The increment of 72·1 mm. in the last column, it should be said, is based upon only two females, and no doubt represents rather the growth between the eighth and the tenth generations.

The differences between the averages of the groups in the Moray Firth hauls, showing the apparent annual increments of growth, are as follows:—

Date.	Depth.	I. to II.	II. to III.	III. to IV.	IV. to V.	V. to VI.	VI. to VII.	VII. to VIII.	VIII. to IX.
Dornoch Firth									
11th Oct. 1900 .	8–12	–	–	69·5	74·1	69·2	[75]	[85·6]	[34]
5th Nov. 1900 .	–	–	–	77·7	64·8	59·6	48·1	–	–
11th ,, 1901 .	8–10	–	–	70·2	74·3	66·8	[62·6]	–	–
11th ,, 1901 .	–	–	–	62·9*	72·1*	69·2*	69·8*	–	–
Off Lossiemouth									
3rd Nov. 1900 .	11–15	–	–	87·4	82·5	64·2	47·0	–	–
Mean .	–	–	–	73·5	73·5	65·8	60·5	–	–

* Females.

The increments here also show considerable diversity in the different cases, but the means have a certain uniformity of relation, and show, as in the average for Aberdeen Bay, a diminution with age. The apparent increase in length in the two cases in a year may be contrasted as follows:—

	I. to II.	II. to III.	III. to IV.	IV. to V.	V. to VI.	VI. to VII.	VII. to VIII.
Aberdeen Bay .	–	85·4	90·3	76·0	71·9	–	
Moray Firth .	–	–	73·5	73·5	65·8	60·5	

The growth of the plaice in Aberdeen Bay, according to their averages, appears to be somewhat more rapid than in the Dornoch Firth, but it is much the same as at the more open parts of the coast off Lossiemouth. The curves, however, for these hauls show that with the exception of the first and second groups (III. and IV.) in the Lossiemouth haul the series are not proportionally well represented.

It would be of interest to determine the rate of growth of the various older series in the intervals between the hauls, as I have done with the first series, but this is made very difficult in many cases owing to the imperfection of the groups. In other cases it is only possible to make comparison between groups which were pretty equally represented in the hauls at different periods, and this has been done for Aberdeen Bay. Particulars regarding the fourth series are as follows:—

Date.	Females.		Males.		Mixed.	
	Average Size.	Increment.	Average Size.	Increment.	Average Size.	Increment.
30th May .	260·4	–	262·3	–	261·4	–
6th, 7th June	262·1	1·7	252·5	–	256·1	–
18th Oct. .	320·2	58·1	316·9	54·6	318·7	57·3
6th Nov. .	316·2	55·8	314·9	52·6	315·3	53·9

It thus appears that during the summer, in the five months from the beginning of June to the beginning of November, plaice of this size—about 10½ inches—increase in length by between 50 and 60 mm., or two to two and a half inches, which would leave over 30 mm. to be added during the seven months of the year remaining. It appears that growth is not arrested to the same extent in these older fishes during the winter as with the first series, a result which might be expected from the fact that they live in deeper water at a higher temperature. I have not sufficient data to elucidate the subject in detail, but the increment of Series II. from the beginning of November to the 30th of May in the following year (when it becomes Series III.) amounts to about 43·3 mm.; while the increment of the next series amounts to 32 mm. Most of this growth no doubt took place after March.

With regard to the second series, or plaice over a year old, my observations, as stated, are not sufficient to show the increments of growth at different periods, but it is probable that their growth is not arrested in winter to the same extent as happens with the first series, since they are in deeper water—*e.g.*, on 6th November in six or seven fathoms. But from a combination of the results from the Dunbar collections and the haul of 6th November it appears fairly certain the increase in length in the second year amounts to between 70 and 80 mm., and that the average size in April, when the plaice are two years old, will be probably about 150 mm., or nearly six inches.

The increase during the third year appears to be a little greater, and amounts to between 80 and 85 mm.; and the average size when three years old is probably about 23 cm. ($9\frac{1}{16}$ inches), allowing for a slight increase from November to March. During the next year the increment is about the same, so that a plaice when four years of age (in March) probably measures about 32 or 32·5 cm. ($12\frac{1}{4}$ inches). In connection with this and the later groups it is, however, necessary to distinguish the males from the females, because the rate of growth now begins to be markedly different.

It appears fairly certain that in the plaice the males and females are approximately equal in numbers and in size, the disparity in the average number and average size of the sexes in the species as a whole, such as has been shown to exist,* being due to the slower growth and earlier death of the males. The proportion of females to males, taking all sizes, is about 142 to 100, and the ratio of length about 114 to 100, the mean length of 1355 males examined being 13·74 inches, and of 1932 females 15·62 inches. During the present investigation I endeavoured whenever possible to separate the sexes and record the results apart. In the smallest plaice, *i.e.* of the first summer, it nearly always requires microscopic examination to distinguish the sexes, although sometimes the minute pouch which the ovary forms may be detected through the translucent flesh.† In going through a number of specimens, however, it happened that some cases occurred in which I failed to determine the sex, being sometimes unable to find the reproductive organ; and hence in most of these collections the sexes were not completely separated. In two cases they were, and they are included in the following table, which brings together the numbers and measurements in some other cases.

	Females.		Males.	
	No.	Average Size.	No.	Average Size.
Series I. .	164	59·4 mm.	155	59·9 mm.
Series II. .	1289	100·0 mm.	1201	99·5 mm.
,,	76	118·9 mm.	108	117·9 mm.
Series III.	169	147·73 mm.	170	141·07 mm.
,,	288	218·7 mm.	331	214·5 mm.
,,	31	260·4 mm.	34	262·3 mm.
,,	247	262·1 mm.	276	252·5 mm.

The disparity of the sexes in the first case is probably exceptional, because in the next series they are almost equal in numbers, and in the third series slightly in excess. The observations cannot be regarded as showing absolutely the exact relation, but it is fairly certain that the sexes are at first almost equal in numbers. Their equality in

* Fulton, *Eighth Ann. Rep. Fishery Board for Scotland*, Part iii., p. 348; *Ibid.*, *Tenth*, p. 239.

† Among this series a few months old (in October) the largest eggs in several examined, and measuring 62, 65, 58, 54, 50 mm., had a diameter of ·015 and ·017 mm. In some caught at the same time measuring 85 mm., the eggs were ·035 mm.; in some, 91, 94 mm., the largest were ·045 mm.; in some, 169, 166 mm., .08 mm. The same sizes were observed on 30th April. In such specimens the testis is a thread-like slightly frilled band.

size up to a certain period is also clear, as the above averages show, but it would seem the females begin to grow slightly quicker than the males after the third summer. In the fourth summer the same divergence is observed, the average size of the females exceeding the average size of the males, and in the fifth year the disparity is marked (*vide* Pl. XIV.), and it doubtless goes on in increasing ratio in the following generation. The disparity in size is therefore due to inequality of growth after a certain period. The largest male I examined in the course of the investigation measured 483 mm., or 19 inches, and the largest female 743 mm., or 29½ inches. In the paper above referred to the largest male recorded measured 559 mm., or 22 inches; but males over 40 cm. are very scarce.

The divergence in growth is no doubt associated with the attainment of sexual maturity in the male at a smaller size than in the female.

With regard to the subsequent series or older generations, it is difficult to define their limits or state their average size, but female plaice which have lived through five summers have a mean size of between fifteen and sixteen inches. Since growth subsequently is slower, and since they may attain a size of thirty inches, it is obvious that there may be many older generations, and that a plaice of the great size mentioned may have reached a considerable age.*

I have collected the measurements of all large plaice from 470 mm., which were measured in the Dornoch Firth and off Lossiemouth, on 3rd and 5th November 1900, and grouped in ·5-cm. groups they are as follows:—

470	475	480	485	490	495	500	505	510	515	520	525	530
10	**8**	**7**	**7**	**6**	**4**	**6**	**6**	**5**	**8**	**5**	**6**	**8**
535	540	545	550	555	560	565	570	575	580	585	590	595
6	**5**	**5**	**2**	**2**	**6**	**7**	**8**	**8**	**10**	**5**	**1**	**8**
600	605	610	615	620	625	630	635	640	645	650	655	660
4	**4**	**4**	**6**	–	**1**	**6**	**2**	**2**	**8**	1	**2**	**8**
665	670	675	680	685	690	695	700	705	710	715	720	725
2	**2**	**3**	**2**	–	–	**1**	**2**	**2**	**2**	–	**1**	–
730	735	740	745	750	–	–	–	–	–	–	–	–
1	**1**	**1**	–	–	–	–	–	–	–	–	–	–

These have been plotted out, as well as in 3-mm. grouping, and they seem to show a division into nine series (Pl. XIVA.), divided as follows.—493 mm., 530 mm., 558 mm., 589 mm., 619 mm., 650 mm., 687 mm., 714 mm., and 743 mm. The measurements cannot be exact in such large specimens, and this grouping would make the largest about sixteen years old, the averages being separated by intervals of about 35 to 40 mm. Many of these large specimens, I may say, were thin, a condition which I have also observed in extremely large haddocks which frequent the inshore waters.

The size at which male and female plaice first become reproductive has been investigated by several naturalists, and it is evident that it

* So far as I am aware, the largest plaice recorded was one caught on 20th May 1902 on the inshore fishing grounds, and landed at Grimsby. It measured 38½ inches, and weighed 28½ lbs.—*Fish Trades Gazette*, 24th May 1902.

varies considerably, not only for different seas but for different parts of the same sea—*e.g.*, the North Sea.*

The sizes and ranges given, even for regions nearly similar, do not always agree, and it seems to me from a re-examination of the evidence that the subject deserves further investigation on a larger scale than hitherto. Holt, who investigated this point by the examination of a large number of plaice landed at Grimsby, came to the conclusion that seventeen inches represented the average size at which female fish became mature in the North Sea,† but many were found mature at fifteen inches, and one at thirteen inches. It is not clear whether all the fish came from the same part of the North Sea. Holt found a male ripe when it was only six inches in length, an occurrence which he says is probably altogether exceptional, fifteen inches appearing to be nearer the usual size at which the male becomes mature, but he says he did not pay very much attention to that sex during the spawning season. Cunningham found that at Plymouth the female may spawn at about ten or even nine inches in length, and from the investigations made at Grimsby he found that the size at maturity varied very much according to the region from which the fish had been taken. Among plaice taken in the neighbourhood of the Brown Ridges, for example, males were found mature at sizes from nine to fourteen inches, and females from eleven to sixteen inches, and some caught off the Hook of Holland had a similar range of sizes. Among plaice taken about 15 miles north of the island of Nordeney the limits were considerably higher, from eleven to seventeen inches for the males, and while one female was mature at eleven inches, 92 were immature between ten and fourteen inches, one mature at eighteen and two at twenty inches. Among plaice from the Leman Shoals, which is somewhat north of the Brown Ridges, the limits were found to be much higher than at the latter place, mature females ranging from thirteen to eighteen inches, corresponding with the observations of Mr. Holt. Among others caught forty to forty-five miles E.S.E. of Lowestoft, males were mature from eleven to sixteen inches, and females from twelve to eighteen inches. In all these cases the higher limit of the immature specimens in the same collections, was usually about three inches or four inches above the lower limit of the mature specimens.

Kyle's inquiry places the average of first-maturity of the plaice in the southern part of the North Sea between thirteen and fourteen inches for the female and between ten and eleven inches for the male; and for the northern part of the North Sea at about fifteen inches for the female and eleven or twelve inches for the male. Thirteen inches was fixed by me as the lower limit of mature males, and about fifteen inches as the lower limit for mature females.

It will be seen from the curve of measurements of the plaice taken in Aberdeen Bay on 6th November (Pl. XIV.) that the males of Group IV., which apparently range in size from ten inches to fourteen inches, with an average size of $12\frac{3}{8}$ inches, and are about three years and six months old, are mature. It might be held that many of these males may have spawned in the previous spring when three years old, but in the group as it is in November the curtailment of growth is not at all marked, and this is not likely to occur until the reproductive elements have matured. On the assumption that the growth in summer amounts on

* Holt, *Proc. Roy. Dub. Soc.*, *Journ. Mar. Biol. Assoc.*; Fulton, *Eighth Ann. Rep. Fishery Board for Scotland*, iii., p. 163, *Tenth*, *ibid.*, 240; Cunningham, *Journ. Mar. Biol. Assoc.*, iv., 16, 100; Kyle, *Seventeenth Ann. Report Fishery Board for Scot.*, iii., 190; Petersen, *loc. cit.*

† *Ibid.*, ii., 374.

the average to about $2\frac{1}{2}$ inches, the apparent range of size in the previous spawning season would be from $7\frac{1}{2}$ to $11\frac{1}{2}$ inches. I say the *apparent* range, because the real range must be considerably greater, owing to the overlapping of the groups, and it probably extends from about 24 to 36 cm. or more. But it seems to me most likely that this group forms the main bulk of the milters in the next spawning season, when they would probably range from about eleven to fifteen inches and be four years old. This view receives support from a comparison of the average sizes of the males and females of the group, which do not differ to any considerable extent. It is probably after the first spawning that growth becomes retarded, and Group V., comprising fish which are over four years of age, undoubtedly represents males which spawned in the preceding spring, and whose summer's growth has been slight. Their average size in November, it will be seen, was about an inch less than the size of the females of corresponding age, and the curve shows that the maximum number lie intercalated between the females of Groups IV. and V.

It may, I think, be said with some certainty of the females of Group IV.—three and a half years old—that none of these spawned in the preceding spring. Their apparent range in November is much the same as the males, namely from about ten to fourteen inches, and their mean size closely corresponds. In the preceding spring they would be less by over two and a half inches, and in the following spring scarcely an inch longer—*i.e.*, ranging from about eleven to about fifteen inches. The latter size coincides with the minimum mature size given by Holt for the female plaice of the North Sea, and I think it probable that the group of females present in the November haul which would spawn for the first time in the ensuing spring is Group V. The fish would then be five years old, with a size varying from about fifteen to eighteen inches.

In the observations made by various observers it has been noticed that the mature and immature specimens of either sex, collected at the same time, overlap to a considerable extent—so that, for example, one may find a few mature females at thirteen and fourteen inches, while the great number about these sizes are immature—the proportion of immature gradually declining, while the proportion of mature increases. This circumstance is consistent with the view that such immature and mature individuals, although of corresponding size, belong to different series and differ in age by one year. The coalescence or intercalation of the groups, as the curves show, is considerable in all except the younger fishes, and it increases in the older generations. If it were possible to separate out all the females belonging, for example, to Group IV., from Group III. and Group V., it would be found that the variation in size in the group is much greater than the limits of the groups as defined in my tables. Thus, the number of those which can be said with absolute certainty to belong to Group IV.—*i.e.*, those beyond the range of overlapping—is comparatively small, comprising those around the median ordinate. Females belonging to Group IV., for example, might, as the prolongation of the curve will show, range from about 23 or 24 to 39 or more centimetres (nine to fifteen and a half inches).

It seems to me probable that maturity is determined in the plaice of any given region not by size, but by age, that the variation in size of mature or immature specimens, and their overlapping, is due to variation in growth, and that the plaice in all regions spawn at the same age, difference in the average size at first-maturity being due to differences in the rate of growth in the different regions. That such differences in the rate of growth exist in different localities I have shown also to hold in the case of the long rough dab (p. 385); and it is, I believe, the cause of the variations in the size at first-maturity, which Cunningham found among plaice collected from various localities, sometimes not far apart, in the southern part of the North Sea. It is a subject worthy of further investigation.

With regard to the males, it is indeed possible, as some observations appear to indicate, that maturity may be in exceptional cases reached at an earlier age than normal; but all the facts in connection with the *rôle* of the males among fishes tend to show that its part in reproduction is less fundamentally associated with the organism than in the case of the female, and is subject to greater variability. Ripe males, for example, may be found long before and long after the spawning season. With the female everything is subordinated to the production of eggs, and since growth shows such marked seasonal rhythm and periodicity that reminds one of the phenomena of terrestrial vegetation, I think it must rarely happen that spawning occurs before the attainment of a definite age.

According to these investigations the males become mature when four years old, and the females when five years old.

THE COMMON DAB (*Pleuronectes limanda*, L.).

The rate of growth of this flat-fish appears to have been but little investigated. Mr. J. T. Cunningham, from the comparison of a number of specimens (over three hundred), from 14th June 1890 to 18th September 1891, came to the conclusion that while five and a half inches was about the maximum length reached by a dab in one year, and small specimens measuring 1·8 inches in May represented the minimum, the great majority at one year old were below the size first mentioned. He estimated the approximate size of the dab at different ages as follows:—First year, 2 to 6 inches; second year, 5 to 8 inches; third year, 7 to 10 inches; and he was of opinion that the dab did not breed before it was two years old.* Dr. Petersen also showed the existence of different groups in Danish waters, but without apparently stating his opinion as to their age.

Mr. H. Ch. Williamson, by the comparison of a number of specimens (49) caught at different times and dates, came to the conclusion that four caught in January, ranging in size from 14 to 17·5 mm. were probably from seven to ten months old; others caught in March, from 20 to 52 mm., were at least nine months old, the larger perhaps older; that six specimens from 70·5 to 106 mm., caught in September, were sixteen to seventeen months old; and two specimens 146 and 148 mm., taken at the end of April, were two years old.†

The investigations made by me as to the growth of this fish were carried on as with the plaice, partly on board trawlers, and partly with a shrimp-net and push-net in shallow water. Since the dab is one of the commonest flat-fish in the areas examined, a considerable number were measured and the sexes in most cases distinguished. The smallest series were first secured in July, but before dealing with them it will be well to consider the spawning season.

The spawning season of the common dab is later than that of the plaice, and extends on the East Coast from late in February to June, or even into July, but it occurs mostly in April, May, and June, the

* *Journ. Mar. Biol. Assoc.*, ii., 101.
† *Eleventh Ann. Rep. Fishery Board for Scot.*, iii., p. 267.

maximum being probably attained in the early part of May.* At this time the temperature of the sea is rising steadily (see p.), and the eggs, which are much smaller than those of the plaice, hatch in May in eight or nine days. The larval fish is also relatively small, and measures about 2·6 millimetres; it is thus only about a third of the size of the early hatched plaice.

We have not the same information as to the time taken by the dab to go through its metamorphosis, as we have concerning the plaice, but according to Petersen's observations the post-larval dab remains pelagic until it attains a larger size than the post-larval plaice—*i.e.*, it is larger when it begins life on the bottom. He states that while in Danish waters the pelagic stage of the plaice ends when the fish is 10 to 11 mm., it does not seem to end in the common dab until a length of from twelve to thirteen millimetres is reached.† Professor M'Intosh also points out certain features which support this statement of Petersen's, and he thinks that the dab, although a smaller fish than the plaice, takes a longer time, or at least attains a greater size, before completing its metamorphosis.‡

Holt figures a specimen 12·25 mm. long which is nearly at the same stage as a young plaice of 10 mm., and in which the left eye is not yet over the edge. He figures another 15·25 mm. long in which the transformation has been almost completed.§ Dr. Kyle, in the paper previously alluded to (p. 358), states that the limits of complete transformation are probably between 16 and 18 mm.

The facts above stated suggest that the duration of the pelagic stage of the dab is longer than in the plaice, since in the interval between its issue from the egg and its settlement on the bottom after transformation, it grows about 13 or 14 mm. in length, or more than double the corresponding increment added by the plaice. At the same time it must be borne in mind that the temperature of the water is much higher during the period of the pelagic life of the dab, and thus growth and metamorphosis will be more rapid. Post-larval dabs have been procured in the tow-nets in April, May, June, July, and August,‖ mostly at the end of May and first part of June. As many as 3000 were caught in surface tow-nets on 16th and 19th May fifteen miles off the coast between Montrose and Aberdeen. It is probable that the great bulk of dabs begin their life on the bottom about the middle or end of June.

For comparison with the plaice I here append temperatures for ten-day periods from the beginning of February to the end of June, derived from the mean of surface and bottom temperatures at five stations near and beyond the mouth of the Firth of Forth in depths varying from eleven to thirty-two fathoms, viz. :—

41·5, 41, 40·8, 40·5, 40, 40·9, 41·7, 42·5, 43·5, 44·6 | 45·8, 46·8, 47·7, 48·9, 49·7.

The earliest collections of small dabs obtained by me between one spawning season and the next were as follows :—

* *Tenth Ann. Rep. Fishery Board for Scot.*, iii., 234.
† *Op. cit.*, p. 126.
‡ British Marine Food Fishes, p. 378.
§ Sci. Trans. Roy. Dub. Soc., v. (Sec. vi.), pl. xiv.
‖ Kyle, *op. cit.*

Place and Date.	Depth	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
Aberdeen Bay.											
1900.				Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.
18th–26th Sep.	4–8	♂♀	47	26	$1\frac{1}{16}$	69	$2\frac{3}{4}$	43	$1\frac{11}{16}$	37·5	$1\frac{7}{16}$
9th–13th Oct.	–	♂♀	34	30	$1\frac{3}{16}$	78	$3\frac{1}{16}$	48	$1\frac{7}{8}$	56·7	$2\frac{1}{4}$
8th Oct. . .	12-14	♂♀	33	50	2	80	$3\frac{3}{16}$	30	$1\frac{3}{16}$	63·1	$2\frac{1}{2}$
13th Oct. .	8–18	♀	12	68	$2\frac{11}{16}$	88	$3\frac{1}{2}$	21	$\frac{13}{16}$	[80·0]	$3\frac{3}{16}$
	–	♂	3	79	$3\frac{1}{8}$	81	$3\frac{3}{16}$	–	–	[80·0]	$3\frac{3}{16}$
17th–21st Dec.	5–15	♀	986	43	$1\frac{11}{16}$	87	$3\frac{7}{16}$	44	$1\frac{3}{4}$	61·1	$2\frac{3}{8}$
	–	♂	893	38	$1\frac{1}{2}$	88	$3\frac{7}{16}$	50	2	61·4	$2\frac{3}{8}$
	–	♂♀	1879	38	$1\frac{1}{2}$	88	$3\frac{7}{16}$	50	2	61·3	$2\frac{3}{8}$
1901.											
30th May .	–	–	–	–	–	–	–	–	–	–	–
13th June .	–	–	–	–	–	–	–	–	–	–	–
5th July . .	–	–	–	–	–	–	–	–	–	–	–
31st July .	–	–	–	–	–	–	–	–	–	–	–
10th Sep. .	7–9	♂♀	20	47	$1\frac{7}{8}$	73	$2\frac{7}{8}$	–	–	60·8	$2\frac{3}{8}$
18th Oct. .	–	♀	17	47	$1\frac{7}{8}$	82	$3\frac{1}{4}$	35	$1\frac{3}{8}$	62·4	$2\frac{7}{16}$
	–	♂	22	45	$1\frac{3}{4}$	72	$2\frac{13}{16}$	27	$1\frac{1}{16}$	59·6	$2\frac{5}{16}$
	–	–	39	45	$1\frac{3}{4}$	82	$3\frac{1}{4}$	37	$1\frac{1}{2}$	60·8	$2\frac{3}{8}$
6th Nov. .	6–13	♀	17	49	$1\frac{15}{16}$	87	$3\frac{7}{16}$	38	$1\frac{1}{2}$	60·9	$2\frac{3}{8}$
	–	♂	22	46	$1\frac{13}{16}$	86	$3\frac{3}{8}$	40	$1\frac{9}{16}$	59·5	$2\frac{3}{8}$
	–	♂	39	46	$1\frac{15}{16}$	87	$3\frac{7}{16}$	41	$1\frac{5}{8}$	59·9	$2\frac{3}{8}$
29th Nov. .	7–12	♂♀	144	47	$1\frac{7}{8}$	87	$3\frac{7}{16}$	45	$1\frac{3}{4}$	60·9	$2\frac{3}{8}$
1902.											
15th Jan. .	–	♂♀	214	28	$1\frac{1}{8}$	80	$3\frac{1}{8}$	52	$2\frac{1}{16}$	47·8	$1\frac{7}{8}$
Firth of Forth.											
1901.											
9th, 13th May	–	♂♀	84	42	$1\frac{5}{8}$	98	$3\frac{7}{8}$	56	$2\frac{1}{4}$	67·5	$2\frac{5}{8}$
23rd July .	–	♂♀	103	32	$1\frac{1}{4}$	49	$1\frac{15}{16}$	17	$\frac{11}{16}$	40·7	$1\frac{5}{8}$
19th, 22nd Aug.	–	♂♀	188	37	$1\frac{7}{16}$	75	$2\frac{15}{16}$	38	$1\frac{1}{2}$	52·3	$2\frac{1}{16}$

Place and Date.	Depth	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.
Cromarty, outside Suters.											
1900.											
11th Dec.	12	♂♀	17	23	$\frac{7}{8}$	66	$2\frac{5}{8}$	43	$1\frac{3}{4}$	49·5	$1\frac{15}{16}$
10th Jan.	$6\frac{1}{2}$–7	♂♀	3	41	$1\frac{5}{8}$	52	$2\frac{1}{16}$	11	$\frac{7}{16}$	44·7	$1\frac{3}{4}$
Dornoch.											
1901.											
11th Nov.	–	♂♀	14	51	2	98	$3\frac{7}{8}$	47	$1\frac{7}{8}$	77·6	$3\frac{1}{16}$
Solway Firth.											
1889.											
1st Aug.	–	–	–	–	–	–	–	–	–	–	–
14th Aug.	–	–	–	–	–	–	–	–	–	–	–
11th Sept.	3–8	♂♀	60	33	$1\frac{5}{16}$	57	$2\frac{1}{4}$	24	$1\frac{5}{16}$	47·0	$1\frac{7}{8}$
27th Sept.	–	♂♀	157	33	$1\frac{5}{16}$	63	$2\frac{1}{2}$	30	$1\frac{3}{16}$	48·0	$1\frac{7}{8}$
5th Oct.	–	♂♀	179	35	$1\frac{3}{8}$	63	$2\frac{1}{2}$	28	$1\frac{1}{8}$	50·7	2
26th Oct.	–	♂♀	90	37	$1\frac{7}{16}$	62	$2\frac{7}{16}$	25	1	58·2	$2\frac{1}{4}$
27th Nov.	–	♂♀	17	37	$1\frac{7}{16}$	62	$2\frac{7}{16}$	25	1	54·2	$2\frac{1}{8}$
1900.											
14th March	–	♂♀	50	36	$\frac{7}{16}$	62	$2\frac{7}{16}$	26	1	45·0	$1\frac{3}{4}$
30th April	–	♂♀	2	50	2	54	$2\frac{1}{8}$	4	$\frac{1}{8}$	52·0	$2\frac{1}{16}$
24th May	–	–	61	55	$2\frac{3}{16}$	124	$4\frac{7}{8}$	69	$2\frac{11}{16}$	92·6	$3\frac{5}{8}$
26th June	–	♀	9	61	$2\frac{3}{8}$	92	$3\frac{5}{8}$	31	$1\frac{1}{4}$	71·1	$2\frac{13}{16}$
		♂	2	61	$2\frac{3}{8}$	63	$2\frac{7}{16}$	–	–	62·0	$2\frac{7}{16}$
28th Sept.	–	♂♀	198	36	$1\frac{7}{16}$	64	$2\frac{1}{2}$	28	$1\frac{1}{16}$	45·6	$1\frac{13}{16}$
31st Oct.	–	♂♀	171	38	$1\frac{1}{2}$	60	$2\frac{3}{8}$	22	$\frac{7}{8}$	46·5	$1\frac{13}{16}$
27th Nov.	–	♂♀	85	38	$1\frac{1}{2}$	62	$2\frac{7}{16}$	24	$\frac{15}{16}$	49·4	$1\frac{15}{16}$
30th Dec.	–	♂♀	98	37	$1\frac{7}{16}$	57	$2\frac{1}{4}$	20	$\frac{13}{16}$	45·3	$1\frac{3}{4}$
Lochfyne.*											
1900.											
30th July	–	♂♀	1	–	–	–	–	–	–	[35	$1\frac{3}{8}$]
10th Sept.	–	♂♀	8	25	1	48	$1\frac{7}{8}$	23	$\frac{7}{8}$	34·5	$1\frac{3}{8}$

* Push-net on beach at low water.

It will be noticed that in some cases the averages at different dates do not correspond as one would expect. This appears to have been due sometimes to scanty numbers, or difference in depth or habitat, but in most cases it was due to insufficient representation of the series. In most cases the small-meshed net employed had meshes of about 1 cm. from knot to knot (fig. 1.A, p. 326), and very small dabs, which are not only narrow, but soft and pliable, no doubt escaped in considerable numbers. The smallest specimens caught in this net measured usually forty or over forty mm., sometimes a little less, whereas the completely transformed dab is estimated above to measure from 16 to 18 mm. Some of the hauls were made with a net having finer meshes measuring 6 mm. from knot to knot (fig. 1.B), and in these cases the proportion of small dabs was greater, the smallest measuring 25, 26, 28, 30, 32 mm. The hauls made with this net were on 15th January 1901, in Aberdeen Bay, and those in the Firth of Forth, while those collected in the Moray Firth in December and January, and those caught in the Solway, were taken with a shrimp-trawl.

It is evident, therefore, that the ranges and averages in the Table do not in the great majority of cases represent the real ranges and averages, owing to the fact that a considerable proportion of the smaller fishes belonging to the series were not caught. The average size is too large and the range too small. It is thus necessary to consider the evidence in detail.

The series clearly comprises the brood of the year, which originated in the preceding spawning season. The first of my collections in which they occur is that made on 23rd July in the Firth of Forth, when 103 were taken, ranging from 32 mm. ($1\frac{1}{4}$ inches) to 49 mm. ($1\frac{15}{16}$ inches), the average size being 40·7 mm., or $1\frac{5}{8}$ inches. They were taken with the fine net. They formed a compact group, giving a columnar curve, and the largest was separated from the smallest of the older series by an interval of 19 mm. The largest at 49 mm. shows the apparent maximum growth from the beginning of the spawning season at the end of February, or early part of March, but the smallest at 32 mm. does not represent the inferior limit, since we know that they may be got on the bottom at 20 mm. and under. If we place this limit at 18 mm., then the range at this period becomes 31 mm., and the median ordinate or average size 33·5 mm., or $1\frac{5}{16}$ inches, which would represent the average amount of growth in length from about the early part of May. By this reasoning the average, as computed directly from the haul, is too large by 7·2 mm., which is equivalent to the error introduced at this period by the imperfection of the net.

Collateral evidence on this point is afforded by the growth of the next older series in this haul from the previous hauls on 9th and 13th May, the latter date approximately representing the maximum of spawning. The second series in May, consisting of 84 specimens about one year old, had an average size of 67·5 mm. ($2\frac{5}{8}$ inches), the smallest being 42 and the largest 98 mm. On 23rd July the range extended from 68 mm. to 127 mm., and the average size was 101 mm. (4 inches), or 33·6 mm. greater than in May, the difference representing the amount of growth in the interval. This, it will be observed, is almost precisely the same as the mean increase computed for the first series during the same period, viz., 33·5 mm. It is just possible, however, that the smallest fish taken, viz. 43 mm., does not represent the real minimum size in May, although it is 10 mm. larger than the smallest taken with the same net in July. The reason of the doubt is that the range from the largest to the smallest is 56 mm., which is rather too low, and while a larger collection would tend to increase the upper limit slightly, it would at this stage increase the lower to a greater extent. In July the smallest specimens of this, now the second series, increased from 42 to 68 mm., an increment of 26 mm., and the largest from 98 to 127 mm., an increment of 29 mm., a slight difference which may show the tendency of those which have begun to lag in the race to maturity to lag still further, while those which have taken the lead increase it. But any such extension of the range will make very little appreciable difference in the mean size; if the lower limit is fixed at 35 mm., the range becomes 63 mm., and the average size 66·5 mm.

On 19th-22nd August, twenty-eight days later, the first series, or brood of the year, collected, comprising 188 specimens, varied in length from 37 to 75 mm., with a mean size of 52·3 mm. ($2\frac{1}{16}$ inches). The apparent mean increment in the interval thus amounted to 11·6 mm., while the largest specimens had increased in length by 26 mm., or almost 1 mm. daily, and since the smallest taken had increased by 5 mm., it would indicate that the proportional number of the very small specimens escaping was less than before. But the occurrence of specimens less than 20 mm. later in the year shows that the settlement of the swarms of post-larval dabs had not ceased in August, although doubtless greatly reduced in ratio.

Applying the same method, and again placing the lower limit at 18 mm., the amended series would have a range of 57 mm. up to the maximum caught, viz. 75 mm., and the mean size would become 46·5 mm., showing an apparent increment of 13·0 mm. in the twenty-eight days. This approximates to the apparent mean size, computed from the catch, being 5·8 mm. less, which, in like manner, might be taken as equivalent to the error introduced at this period by the imperfection of the net. The apparent increment in the interval, computed from the actual measurements, was 11·6 mm., while the increment as amended amounts to 13 mm., or 1·4 mm. more. The apparent growth of the next older series in the same period (with a range from 84 to 137 mm., and numbering 110 specimens) was only 1·3 mm., which is probably incorrect and too low.

There are no later hauls in the same locality with the same net to allow the comparison to be extended further, but it is evident that, as the fishes grow in size, a point must be reached at which practically none escape, and that in the interval between the period when the swarms settle, and this point, the ratio between the numbers which escape and the numbers captured, will constantly diminish, and the error from the net, or the deviation between the apparent and real mean size will diminish in like proportion. In the above cases the assumption that the lower limit is equal in July and August, after an interval of twenty-eight days, is no doubt inexact. The lower limit would be probably more correctly placed at 20 mm., and on that basis the ranges would be reduced to 55 mm., and the mean size would be 47·5 mm., or 4·8 mm. less than the apparent increase derived from the actual measurements. In May, when the series is a year old, the minimum size was 42 mm., and the range 56 mm., for 84 fishes, and at this time probably very few, if any, smaller fishes escaped capture.

The fine-meshed net was also used in one haul in Aberdeen Bay on 15th January 1902, and the results may be also particularised. The number of dabs taken was 214, measuring from 28 to 80 mm., the range being 52 mm., and the arithmetical mean 47·8 mm., or $1\frac{7}{8}$ inches. This is under the average in the Forth in August, and there are reasons for believing that in this case the apparent average size is less and not greater than the true mean size.

In this haul scarcely any other fish were taken either in the otter-trawl or the small meshed net, and not a single larger dab than the one measuring 80 mm. was found.* The hauls taken on this and the following day in Aberdeen Bay were extraordinarily poor, so that the fishing was abandoned by the trawler as unremunerative. A four-hours' drag yielded only 23 marketable and 181 unmarketable (small) fishes, and in the total of 204 there were only eight flat fish, six plaice and two dabs. Another haul for four hours yielded 247 fishes, including only five flat fishes, viz., four plaice and one brill, no dabs at all being taken. Haddocks were also extremely scarce, only three being procured in the two drags of eight hours, the catches being mostly composed of small whitings, large cod, and starry rays. The weather had been very stormy previously, and the fish had probably moved out into deeper water away from the commotion at the bottom near the shore. This must have been the case with the haddocks, although many fishermen think the flat fishes bury themselves in the sand. But whatever the cause, the only dabs caught were those mentioned, and thus the absence of a due proportion of the larger members of the first series might be explained by the fact that they were able to move off with the older dabs. Dabs are usually extremly abundant in Aberdeen Bay, and are frequently taken in thousands.

Moreover, the upper limit of the group—the maximum size of individuals belonging to it—was considerably higher in previous months, *e.g.*, on 31st October 89 mm., the next largest (or the smallest member of the older series) being 100 mm; 17th-21st December the largest was 88 mm., and the smallest of the next series 90 mm.;† 18th October, 1901, 82 mm., the next largest being 94 mm., and on 29th November the limits were 92 and 106. Moreover, a study of the ·5cm. curves also indicates the absence of a due proportion of the larger members of the series, because while the arithmetical average is 47·8mm., and the maximum ordinate of the curves between 46 and 47, the median ordinate on the base lies over 5·2 cm.

Dr. Kyle ‡ states that a dab measuring 17·5 mm. was taken in the Forth on 19th January, and one on 4th March measuring 20 mm. It is possible, therefore, if the dates are accurate, that the true lower limit of the dabs taken in Aberdeen Bay is really lower than 28 mm. I am, however, inclined to think that those referred to by Dr. Kyle are exceptional, and that the lower limit is not much less than what is indicated by the measurements in this case, but may be put at 25 mm. The higher limit, judging from other hauls, may be placed at 88 mm., and on this basis the more correct mean size of the group would be 56·5 mm., showing an increase of 8·7 mm. over the mean size computed from the actual measurements.

There were some other hauls in which very small dabs were taken. Thus a haul with the shrimp trawl in 12 fathoms of water, outside the Suters of Cromarty, on 11th December 1901, yielded seventeen dabs of this series, ranging from 23 to 66 mm., the average size being 49·5 mm., or $1\frac{15}{16}$ inches, and on 10th January, in $6\frac{1}{2}$-7 fathoms, within the Cromarty Firth, three were taken measuring 41, 42, and 52 mm., and with an average size of 45·0 mm., or $1\frac{3}{4}$ inches. The numbers in these cases are small.

* The ·5 cm. grouping of the small dabs is as follows:—

2·5—3	3—3·5	3·5—4	4—4·5	4·5—5	5—5·5	5·5—6	6—6·5	6·5—7	7—7·5	7·5—8
3	17	28	33	44	30	30	16	6	3	1

† The mm. groups are as follows:—

75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
27	20	17	10	5	6	5	5	3	3	2	2	1	1	-	1

‡ *Loc. cit.*

The hauls in the Solway Firth also sometimes yielded moderately good catches of dabs, and it will be seen that the average size of the first series, as represented, approximates to that of the January catch in Aberdeen Bay, but as the Solway dabs are smaller at all sizes, they will be considered by themselves.

It is unnecessary to go over each of the other cases separately, and I shall here tabulate the amended ranges and mean size of some of them, based upon the limits of the group, the upper of which is ascertained and the lower assigned on the evidence indicated and stated in each case. All the hauls, it must be understood, except those mentioned above, were made not with the finer-meshed net, but with the one-cm. mesh (fig. 1.A). The alteration in the average is therefore more considerable in these cases than in those already considered, because the proportion of small fishes added is greater.

Place and Date.	No.	Range.	Difference.	Mean Size.	Difference from Computed.
Aberdeen Bay.					
1900.		Mm.	Mm.	Mm.	Mm.
*18th–26th Sept. .	47	*20*–69	49	45·5	+ 7·0
9th–13th Oct. . .	34	*22*–78	56	50·0	− 6·7
8th Oct. . . .	33	*22*–80	58	51·0	−12·1
17th–21st Dec. .	1879	*25*–88	63	56·5	− 4·8
1901.					
10th Sept. . .	20	*20*–73	53	46·5	−14·3
18th Oct. . .	39	*22*–82	60	52·0	− 8·8
6th Nov. . . .	39	*24*–87	63	55·5	− 4·4
29th Nov. . .	144	*24*–87	63	55·5	− 5·4
1902.					
15th Jan. . .	214	25–*88*	63	56·5	+ ·7
Firth of Forth.					
1901.					
9th and 13th May .	84	42–98	56	67·5	
	–	*33–100*	*67*	*66·5*	–
23rd July . .	103	*18*–49	31	33·5	–
19th–21st Aug. .	188	*18*–75	57	46·5	–

* This haul was imperfect by the comparative absence of the larger individuals.

The haul in May in the Forth shows that the dab when about one year old has on the average an approximate length of 67 mm., or $2\frac{5}{8}$ inches, and a range from 42 (or 33) mm., *i.e.* from $1\frac{5}{8}$ (or $1\frac{5}{16}$) inches to about 98 or 100 mm., or $3\frac{7}{8}$ inches.

The July hauls indicate a mean size of about 33·5 mm., or $1\frac{5}{16}$ inches, in the period of about two months and a half, and a range of from 18 mm. ($\frac{11}{16}$ inch) to 49 mm. ($1\frac{15}{16}$ inches).

The August results show a further mean increase to 46·5 mm., or $1\frac{13}{16}$ inches, and a range from about 18 mm. to 75 mm. ($2\frac{15}{16}$ inches). This would leave about 20 or 21 mm. to be added in the remaining eight months of the year.

In Aberdeen Bay no hauls were made early in May during the height of the spawning season, and in those at the end of the month only five of this series were taken and they were relatively large individuals. The haul in September 1900 was imperfect, and the average assigned is probably a little too low. The other averages show in 1900 a growth of about 6·5 mm. from the early part of October to the third week in December; those of 1901 a growth of 9·0 mm. from 10th September to 9th and 29th November, and an additional 1 mm. to 15th January.

Of the second series of dabs, or those from one to two years old, the earliest collection was that made in the Forth in May above referred to, when they had an average size of 67·5, or as amended 66·5 mm., the largest being about 100 mm., or nearly four inches.

On July 23rd the range of 498 dabs was from 68 to 127 mm. ($2\frac{11}{16}$ to 5 inches), and the average size 101 mm., or four inches, showing a mean increase in the seventy-three days from May of about 33·6 mm., or $1\frac{5}{16}$ inches. The curve in this case is symmetrical.

On 19th-22nd August the series comprised 110 specimens ranging from 84 to 137 mm. ($3\frac{5}{16}$ to $5\frac{3}{8}$ inches), with a mean size of 102·5 mm., or $4\frac{1}{16}$ inches, showing an apparent increase of only 1·4 mm. The curve, however, shows that a due proportion of the larger dabs were absent. The maximum ordinate is placed at 9 cm., and the median ordinate is at 110·5 mm., and this is approximately the mean size of the group at the date, the increase in the twenty-eight days being thus 9·4 mm., or 43 mm. ($1\frac{11}{16}$ inches) in the 101 days from the early part of May.

The series in Aberdeen Bay in September 1900 comprised 396 females and 307 males, the former ranging from 97 to 173 mm. ($3\frac{13}{16}$-$6\frac{13}{16}$ inches), and having an average size of 127·0 mm., or 5 inches. The males ranged from 91 to 172 mm., and their mean size was almost precisely the same, viz. 127·1 mm.

On 9th-13th October 205 females ranged from 96 to 197 mm., with a mean size of 131·8 mm., and 186 males, from 101 to 173 mm., had an average size of 133·1 mm. The curves in these cases are good.

These hauls were made with a shrimp-trawl. On 8th October, in a haul with the fine-meshed net (A, fig. 1) over the otter trawl, 123 females and 114 males were procured, the average of the former being 120 mm. and the range from 92 to 157 mm., and of the latter 118·3 and the range 98 to 152 mm.

On 13th October 458 females, ranging from 102 to 173 mm. (4 to $6\frac{13}{16}$ inches), had an average size of 130·6 mm. ($5\frac{3}{16}$ inches), and 574 males a range from 102 to 175 mm., and an average size of 126·1 mm., or $4\frac{15}{16}$ inches. The curve in this case is good and symmetrical.

On 31st October a haul in 8-10 fathoms gave 404 females ranging from 100 to 180 mm., with an average size of 137·5 mm., or $5\frac{3}{8}$ inches, and 323 males from 102 to 173 mm. with a mean size of 134·3 mm., or $5\frac{1}{4}$ inches. The curve in this instance is also symmetrical.

On 17th-21st December this series was not well represented. It comprised 183 females from 96 to 184 mm., and an average size of 132·1 mm., or $5\frac{1}{4}$ inches, and 173 males from 92 to 180 mm., with a mean size of 127·4 mm., or 5 inches.

In the hauls in May in Aberdeen Bay the measurements of the dabs obtained in the otter trawl were imperfect and have been discarded, and I am therefore unable to give the size when two years old for this area. On 13th June the series, now over three years old, was represented in one haul by twenty-one females from 136 to 218 mm., with an average size of 173·0 mm., and seven males from 135 to 193 mm., and an average size of 162 mm. The curve is very irregular and imperfect and the numbers small. A better curve is given by the second haul on the same day, in which 308 dabs whose sexes were not determined, ranging from 131 to 219 mm., had an average size of 167·3 mm., or $6\frac{9}{16}$ inches. In this case the curve is quite symmetrical to 19 cm., and then is irregular, and the maximum ordinate is at 16 cm. On 5th July the series was well represented by seventy-nine females from 148 to 224 mm , and an average size of 178·7 mm., or 7 inches, and forty-one males from 143 to 222 mm., with an average of 176·9 mm., or $6\frac{15}{16}$ inches; the mean size of the group with sexes combined being 178·1 mm., or 7 inches. On 31st July the mean size of 109 females was 195·7 mm. ($7\frac{11}{16}$ inches), and the range from 163 to 239 mm.; the mean size of 31 males was 185·3 mm. ($7\frac{5}{16}$ inches), and the range from 164 to 224 mm., the mean size of the mixed group being 193·0 mm., or $7\frac{5}{8}$ inches.

In the Firth of Forth on 9th-13th May, twenty-six females ranging from 109 to 178 mm. had an average size of 148·0 mm., or $5\frac{13}{16}$ inches, and 21 males, an average size of 151·4 mm. ($5\frac{15}{16}$ inches) and a range from 111 to 181 mm., the mean size of the group being 149·5 mm., or $5\frac{7}{8}$ inches. On 23rd July the mean size of the mixed group, now the third, was 179·1 mm., or $7\frac{1}{16}$ inches.

It appears from these averages that the mean size of the common dab in the Firth of Forth when about two years old is nearly 150 mm., or about $5\frac{7}{8}$ inches in length; it is probably less in Aberdeen Bay.

The next older series is not very fully represented in most of the hauls. In Aberdeen Bay in September 1900, 278 females had a range from 176 mm. to 267 mm., with a mean size of 213·4 mm., or $8\frac{7}{16}$ inches, and 52 males, ranging from 175 to 246 mm., had a mean size of 205·9 mm., or $8\frac{1}{8}$ inches. On 13th October the mean size of the females was 216·4 mm. ($8\frac{1}{2}$ inches), and of the males 199·0 mm. ($7\frac{13}{16}$ inches). In December the mean size of 49 females was 250·3 mm., or $9\frac{7}{8}$ inches, and of four males 241·8 mm., or $9\frac{1}{2}$ inches. The differences are due principally to unequal representation of the groups.

Comparison may now be made of the apparent annual increment of growth from one series to another, and in the following Table are given the differences between the averages as deduced from the actual measurements of the different series.

[Table.

Place and Date.	I. to II.			II. to III.			III. to IV.			IV. to V.		
Aberdeen Bay.												
1900.	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂	♀	♂	♀♂
18th–26th Sept. .	–	–	[89·5]	86·4	78·8	85·2	[92·5]	–	–	[29·1]	–	–
9th–13th Oct. .	–	–	76·3	83·1	66·2	–	74·8	–	–	–	–	–
8th Oct. . .	–	–	56·4	91·4	88·7	–	–	–	–	–	–	–
13th Oct. . .	66·2	62·9	63·8	86·8	72·9	–	77·3	–	–	43·3	–	–
31st Oct. . .	–	–		86·4	73·9	–	77·6	–	–	–	–	–
17th–21st Dec. .	72·0	66·	68·5	–	–	–	–	–	–	–	–	–
1901.												
13th June . .	–	–	–	85·2	83·5	–	–	–	–	–	–	–
13th June . .	–	–	–	–	–	85·1	–	–	–	–	–	–
5th July . .	–	–	–	73·6	71·8	72·3	86·0	77·3	82·8	45·3	–	–
31st July . .	–	–	–	78·7	70·8	77·2	77·0	–	79·1	–	–	–
18th Oct. . .	56·9	59·7	58·5	85·8	68·3	84·1	[91·8]	–	–	48·8	–	–
29th Nov. . .	–	–	61·9	–	–	–	–	–	–	–	–	–
Mean . .	65·0	63·1	64·2	84·2	75·0	80·8	78·5	77·3	–	–	–	–
Firth of Forth.												
9th–13th May .	–	–	–	82	–	–	–	–	–	–	–	–
23rd July . .	–	–	60·4	–	–	–	–	–	–	–	–	–
19th–22nd Aug.	–	–	50·3	–	–	–	–	–	–	–	–	–

With regard to the growth from the first series to the second, the remarks made on a former page as to the imperfect representation of the early series in the collection must be borne in mind. If the mean sizes then adopted be taken the annual increment from the first series to the second series becomes amended as follows:—

September, 83·5; 9th–13th October, 82·5; 8th October, 68·4; December, 74·3; 18th October, 67·3; 29th November, 67·4; the mean being 73·9 mm.

From the observations it would appear that the average size of the common dab when one year old is about 67 mm., or $2\frac{5}{8}$ inches; that it grows in the next year nearly three inches more (73·9 mm.), attaining a length of about 140 mm., or $5\frac{1}{2}$ inches; and that in the next year it adds rather over 80 mm. to its length, the dab when three years old measuring about 220 mm., or $8\frac{5}{8}$ inches.

The measurements of the dabs taken in the Firth of Forth in May nearly, but not quite, correspond to these figures, the males of the second series—two years old—measuring 148 mm., or $5\frac{13}{16}$ inches, and the females 151·4 mm., or $5\frac{15}{16}$ inches, the mean for the group being 149·5 mm., or $5\frac{7}{8}$ inches. The best curve in Aberdeen Bay following the spawning season refers to 5th July, when this series (now III.) had a mean size of 178·1 mm., or 7 inches, the females being 178·7 mm., and the males 176·9 mm.

It will be observed both from the averages and the curves that the growth of the two sexes is at first fairly equal, but that after from about 160-170 mm. ($6\frac{1}{4}$-$6\frac{3}{4}$ inches) the growth of the males becomes greatly retarded, while the females continue growing almost as rapidly as before. These differences are associated with the attainment of sexual maturity at an earlier stage in the male than in the female, as occurs in the plaice and long rough dab. The male appears to reach maturity a year earlier than the female, namely when two years old, while the females do not spawn until their third year.

The dabs of the Solway, like the plaice, grow more slowly than the dabs on the East Coast. The particulars of a number of collections at various dates will be found in the Table on page 420, and curves representing the first and second series in some cases are given on Plate XV. The measurements indicate that the first series, or brood of the year, reaches a length of only about 50 mm., or two inches, in the autumn. In these cases also it is necessary to introduce a correction for the smaller dabs which have escaped capture, the minimum size of those taken being usually from 33 to 37 mm., and the maximum size of those belonging to the group about 60 or 63 mm.

If the same method is adopted as was applied to the series from Aberdeen Bay, the range and average size of the group at the various dates in the Solway becomes modified as follows :—

Date.	No.	Range.	Difference.	Mean Size.	
		Mm.	Mm.	Mm.	Ins.
11th September . .	60	*20*–57	37	38·5	$1\frac{1}{2}$
27th September . .	157	*20*–63	43	41·5	$1\frac{5}{8}$
10th October . . .	179	*22*–63	41	42·5	$1\frac{11}{16}$
26th October . . .	90	*22*–62	40	42·0	$1\frac{11}{16}$
27th November . . .	17	*22*–62	40	42·0	$1\frac{11}{16}$
14th March . . .	50	*25*–62	37	43·5	$1\frac{3}{4}$
28th September . .	198	*20*–61	41	42·0	$1\frac{5}{8}$
31st October . . .	171	22–60	38	41·0	$1\frac{5}{8}$
27th November . . .	85	22–62	40	42·0	$1\frac{11}{16}$
30th December . . .	98	23–57	34	40·0	$1\frac{9}{16}$

These averages and ranges must be regarded as approximate, but they fairly indicate the growth of this fish in the Solway, which is also indicated by the curves.

The second series is usually imperfectly represented, but in some cases the curve is fairly symmetrical. On 26th October 179 specimens ranged from 65 to 112 mm. ($2\frac{9}{16}$ to $4\frac{7}{16}$ inches), with a mean size of 81·6 mm., or $3\frac{1}{4}$ inches. In this case the older fishes were not present in proper proportion, but taking the limits of the series as described, the amended mean size would be about 88·5 mm., or $3\frac{1}{2}$ inches. This would represent the mean length of a dab in the Solway when about seventeen months old, and show the apparent increase in a year from the first series of 44·5 mm., or $1\frac{3}{4}$ inches. On 27th November 156 specimens ranged from 66 to 107 mm., the mean size being 83·8 mm., or $3\frac{5}{16}$ inches. On 10th October, 145, with a range from 66 to 97 mm., had an average size of 78·6 mm., or $3\frac{1}{8}$ inches. On 27th November 1900, 125 ranged from 68 to 108 mm., and had an average length of about 81 mm., or $3\frac{3}{16}$ inches. On 30th December, sixty-two, ranging from 67 to 98 mm., had a mean length of 84·8 mm., or $3\frac{3}{8}$ inches.

THE LONG ROUGH DAB (*Drepanopsetta platessoides*, Fabr.).

Collections of this species were obtained by the fine-meshed net from deep water off the Shetlands, from the Moray Firth, the Firths of Clyde and Forth, and from deep water off the coast of Aberdeen.

1. Off the Shetlands.

The hauls in the deep water in the northern part of the North Sea were made in August, September, and October 1900, and in May and December 1901.

In two hauls on 31st August and 4th September, in 62 and 65 fathoms, about 65 miles S.E. by E. from Sumburgh Head, 3202 long rough dabs were caught and measured. The sex of those obtained in the first haul was not determined, but in the second haul the sexes were distinguished and their measurements separately recorded.

In each case two groups were very clearly represented, the first being distinctly marked off from the second by a considerable interval. In the haul of 31st August there were 20 specimens belonging to the first series, measuring from 28 to 57 millimetres, with a range of 29 mm., and an average size of 48·3 mm., or $1\frac{7}{8}$ inches. In the haul on 4th September 244 fishes of this series were obtained, ranging in length from 31 to 63 mm., and with an average size almost precisely the same—viz., 48·4 mm. These fishes were the brood of the year, probably about six months old, and their small size after a summer's growth attests the slow development of this species. Moreover, an examination of the grouping in which they are arranged in 2-millimetre groups, or of a curve constructed on that grouping, shows that the smallest individuals are not adequately represented (considerable numbers having no doubt escaped through the meshes of the net), and that the average size is more probably under 46 mm.

The second series or group was also very well differentiated in each haul, separated from the younger group by a blank interval of 25 mm. and 14 mm. respectively, but overlapping slightly the next older group. In the collection of 31st August the series (sexes mixed) commences at 82 mm. and extends to about 122 mm. The average size of the 551 fishes composing the group was found to be 103·2 mm., or $4\frac{1}{16}$ inches, the range being 40 mm. between the smallest and the largest. In the second haul the sexes in this and the following series were distinguished. Of the 1334 fishes forming the group, 782 were males and 552 were females. The males ranged in length from 77 mm., or very slightly over three inches, to 119 mm., or $4\frac{5}{8}$ inches, the difference between the largest and smallest being 42 mm., or $1\frac{5}{8}$ inches. The average size was 102 mm., or 4 inches. The females measured from 82 mm., or about $3\frac{1}{4}$ inches, to 128 mm., or slightly over five inches, the difference in size between the largest and smallest being 46 mm., or $1\frac{13}{16}$ inches. The average size was 105·8 mm., or slightly over $4\frac{1}{8}$ inches. The females were thus somewhat larger than the males; they grow faster, as I have already explained. If the measurements of the males and females are combined the termination of the mixed group is found to be precisely as in the haul four days earlier—viz., at 122 mm. (the 2-mm. grouping from 117-118 to 129-130 being 11, 15, 8 | 8, 10, 12, 12, 16), and if the females in excess of this are excluded, and the males between 119 and 122 mm. are added, the average size of the combined group (of 1326 fishes) is 103·5 mm, or only 0·3 mm. greater. On the assumption that the spawning season in the region indicated has its maximum about the middle of March, as happens further south, the fishes composing the group would have an average age of about one year and five months.

In each collection there are larger fishes belonging to older generations, but the demarcation between these groups is in some measure problematical. With the haul of 31st August the difficulty is greater, since the sexes were not distinguished in that case, and thus the confluence due to simple variation in growth is increased and complicated by the variation in the size of male and female. In the case of the haul of 4th September the curve of the measurements (Pl. XVI.) shows a group of females beginning about 130 mm., with the maximum ordinate about 150 mm., and a regular decline to about 165 mm., after which there is irregularity and a slow fall to 235 mm. The curve of the measurements of males ascends from 120 mm., reaches its maximum at about 135 mm., and then declines rapidly to 145 mm., after which it slowly descends to 170 mm. The termination of the third group among the females may be placed at 174 mm., in which case the range extends from 130 to 174 mm., and the average size of the 325 fishes contained in it is 154·0 mm., or $6\frac{1}{16}$ inches, showing an increment of growth from the females of the previous generation of 48·2 mm. If the limit is placed at the point where the first interruption in the decline of the curves takes place—viz., 164 mm., the average size of the 279 fishes in the group is slightly less—viz., 153·2 mm.

The range of the males in this group extends from 121 mm. to apparently 153 mm., and the average size of the 145 fishes composing it is 136·9 mm., or $5\frac{3}{8}$ inches, showing an annual increment of growth from the males of the previous generation of 34·9 mm., or $1\frac{3}{8}$ inches.

A fourth series of females appears to begin about 175 mm. and to terminate about 201, the demarcation in this case being more doubtful. The 85 fishes comprised within it have an average size of 182·9 mm., or $7\frac{1}{4}$ inches, showing an annual increment of growth from the previous generation of 28·9 mm. The corresponding males are eighteen in number, ranging from 155 to 173 mm., and having an average size of 156·1 mm., or $6\frac{3}{16}$ inches, and thus indicating an annual growth from the previous series of 19·2 mm., or $\frac{3}{4}$ inches.

A fifth group of females, 23 in number, is placed between 204 and 238 mm., with an average size of 222·8 mm., or $8\frac{3}{4}$ inches, and showing an apparent annual increment of growth from the previous generation of 39·9 mm., or $1\frac{9}{16}$ inches. The increment indicated is greater than in the previous series, which shows that the limits of the group are probably not accurately defined, or the proportion of the different sizes not equally represented. One female at 261 mm. probably belongs to a sixth series.

On 16th and 19th October two hauls with the fine net were made in the northern part of the North Sea, in 60 to 65 fathoms, about sixteen miles south-east of Fair Isle, and therefore about fifty or sixty miles further to the westward than the hauls in August and September. The number of long rough dabs obtained was 1550. The first series comprised 180 fishes whose sex was not determined. They ranged in length from 40 to 68 mm., and had an average size of 53·3 mm., or $2\frac{1}{8}$ inches. The second series was very distinctly defined. The females, numbering 464, varied in length from 79 to 136 mm., and their average size was 111·4 mm., or $4\frac{3}{8}$ inches. The males exceeded the females in number, there being 557 ranging from 81 to 123 mm., and having an average length of 102.5 mm., or $4\frac{1}{16}$ inches.

These averages show an increased growth in the 44 days from September 4th of 4·9 mm. for the first series, or the youngest fishes, of 5·6 mm. for the females of the next series, and of ·5 mm. for the males; the increase for the males and females of the second generation combined is 2·8 mm. These increments agree pretty well with those in other cases at the season. It is therefore not probable that the somewhat different position of the ground where they were taken affected the result.

The next largest group in the October hauls was fairly well demarcated. The females numbered 198, and ranged from 137 to about 175 mm., with an average size of 155·6 mm., or $6\frac{1}{8}$ inches. The males, 125 in number, ranged from 124 mm. to apparently 158 mm., and had an average size of 137·6 mm., or $5\frac{7}{16}$ inches. It is possible, however, as an examination of the curve indicates, that the males of this group end at 146 mm., and that the next group commences at 149 mm. In that case the range would be only 22 mm., and the average size 130·9 mm., or $5\frac{3}{16}$ inches. Comparison of the corresponding September averages indicates an apparent increase in the interval of 1·6 mm. for the females, and 0·7 mm. for the males, taking the former average as correct.

The remaining larger females, 23 in number, form a fourth group, with a range from 176 to 203 mm., and an average size of 184·5 mm., or $7\frac{1}{4}$ inches, an apparent increase of 1·6 mm. from 4th September. The males above 158 mm. number 3, viz. 166, 168, and 183 mm. If combined they have an average size of 172·0 mm., or $6\frac{3}{4}$ inches, which would indicate an increase of 15·9 mm. from the corresponding September series (of 18 fishes). Probably, therefore, the one at 183 mm. represents a succeeding group.

A haul on 19th May 1901, in 65 fathoms, about 58 miles E. by S. of Sumburgh Head, and thus about 25 or 30 miles north of the place where the August and September hauls were made, yielded fewer specimens, viz. 175, and of these 141 belonged to the first series. Judging from the experience in some other cases, the small number of the larger series in this haul may have been due to the temporary congregation of the sexually mature fish on some other spot in connection with spawning. The 141 individuals of the first series ranged in size from 52 to 92 mm., the average size being 68·4 mm., or $2\frac{11}{16}$ inches. The mean size was thus 15·1 mm. larger than in October, the increment representing the growth in the interval of 214 days during winter and early spring. These fish were about fourteen months old (Pl. XVII.).

The next series, or those a little over two years old, was represented by only fifteen females and nine males. The former ranged from 98 to 146 mm., and had an average size of 127·9 mm., or 5 inches, showing, therefore, an apparent growth in the interval named of 16·5 mm. The number of specimens is small, but the amount probably approximates to the true growth. The nine males ranged from 113 to 138 mm., and had an average size of 124·8 mm., or $4\frac{15}{16}$ inches, showing an apparent growth in the 214 days of 22·3 mm., which is evidently above the true growth, owing to the absence of the smaller males, and the inconsiderable number. A third group of fish a little over three years of age was represented by six females and four males. The former ranged from 152 to 198 mm., with an average size of 170·2 mm., or $6\frac{11}{16}$ inches, indicating an apparent growth from October of 14·6 mm. The males ranged from 151 to 179 mm., with an average of 167·0 mm., and indicated an apparent growth from October of 28·3 mm. The number of specimens is too small to make these conclusions reliable.

Another haul was made on 11th December 1901, 75 miles S.E. of Sumburgh Head, in 75 fathoms of water, and 1830 long rough dabs were obtained. The first group comprised 28 individuals, ranging in length from 45 to 61 mm., and having an average size of 54·4 mm., or $2\frac{1}{8}$ inches. These fish were about nine months old. The next series, the measurements of which give a very complete curve, comprised 1249 specimens, 614 females and 635 males (Pl. XVII.). The females varied in length from 79 mm. to 134 mm., with a range, therefore, of 55 mm., and an average size of 104·8 mm., or $4\frac{1}{8}$ inches. The males extended from 81 mm. to 118 mm., with a range of 37 mm. and an average size of 98·4 mm., or $3\frac{7}{8}$ inches.

When we contrast these measurements with those of the corresponding series in May (which was then the first series, the sexes of which were not determined) the mean increase amounts to 33 mm., or $1\frac{5}{16}$ inches. This represents the apparent growth during the 216 days throughout the summer and autumn for the group with the males and females combined.

If we compare the measurements of December 1901 with those of October 1900 it will be seen that while the average size of the first undifferentiated group is greater by 1·1 mm. in December than in October, the averages for the males and females of the second series for the combined undifferentiated group are somewhat less. Thus, while in October 1900 the females had an average length of 111·4 mm., in December 1901 their average length was 104·8 mm., or 6·6 mm. less. The males at the former period had an average length of 102·5 mm., while at the latter period their average length was 98·4 mm., or 4·1 mm. less. The range of sizes in the two cases is almost alike—viz., for the females from 79 to 136 mm. in October, and from 79 to 134 in December (the next largest being 138 mm.), and for the males 81 to 123 mm. in October, and 81 to 118 mm. in December. In the latter case (males) the range in December is 5 mm. less; but there are only three between 118 and 123 mm., the transference of which from one group to another would make no appreciable difference in the average. The curves in both cases are good, the numbers are large, and the 2-millimetre grouping shows that the point of division between the groups is as indicated.

The conclusion, therefore, appears to be that the environmental conditions for the growth of the long rough dab were more favourable in the summer or autumn of 1900 than in 1901. Probably the bottom temperature was lower in the latter year.

The limits of the larger series in the December hauls are not very clearly defined. The females of the third group begin with a size of 138 mm., and an examination of the 2-mm. grouping shows that the series may end at 173 or at 183 mm. The former is the best, because it corresponds with the rest of the curve (see Pl. XVII.), and the group as thus defined comprises 207 females, having an average size of 155·7 mm., or $6\frac{1}{8}$ inches, and this is 0·1 mm. more than the corresponding average in October. The group of males extends from 121 to either 149 or 157 mm.; if the latter is selected, the average size of the group is 138·7 mm., or 1·1 mm. greater than in October.

The fourth group is still less easily defined. The females, numbering 140, appear to extend from 174 to 219 mm., with an average size of 198·6 mm., or $7\frac{13}{16}$ inches; and the males, 21 in number, from 158 to 178 mm., with an average of 166·0 mm., or $6\frac{9}{16}$ inches. There appears to be a fifth group of 21 females from 221 to 257 mm., and having an average length of 229·2 mm., or 9 inches. The limits and averages of these larger groups, as already indicated, are uncertain.

II. Off Aberdeen.

A series of hauls were made, from eight to twelve miles off Aberdeen, where a depression in the bottom exists, the depths varying from about 50 to 70 fathoms. The number of long rough dabs obtained varied very considerably. The results of their measurement formed a great contrast to those described above, the curves being usually extremely irregular or erratic. In some cases a series was represented only by the larger or by the smaller individuals belonging to it; in other cases the greater number appeared to belong partly to one group and partly to another. After plotting the measurements in ·5-centimetre groups, in 2-millimetre groups, and in 1-centimetre groups, discordant results were in many cases obtained. There are indications that the differentiation of the sexes was sometimes not exact, particularly in June, July, and August, but that this does not explain the circumstance referred to is evident from the curves of thehaul in December (Pl. XVII), when the sexes were carefully separated, all those not clearly females being opened. The proximity of the shallower water in and near Aberdeen Bay, where long rough dabs are also found,may perhaps partly explain the difference of the results from those obtained far from shore, since the temperature, and no doubt the feeding, vary within a short space, whereas in the deep water in the open sea the conditions are more uniform.

The first series of younger fishes was not represented in the hauls in June and July, but they were found in the haul on 21st August. Eleven were then captursd ranging in size from 48 to 57 mm., and having an average length of 53·0 mm., or $2\frac{1}{8}$ inches. In September two were obtained measuring 54 and 58 mm. On 5th November two females, 63 and 67 mm., and four males from 60 to 64 mm., were taken, the average size being 65·0 mm. for the former and 62·0 mm. for the latter, and the mean was 63·0. On 28th November the number caught was eleven, ranging from 61 to 75 mm., and having an average length of 66·1 mm. On 16th December 116 were caught varying in size from 53 to 80 mm., the average size being 65·5 mm., and in January none were taken. So far as these observations go they show a growth of 10 mm. in the period from 21st August to 5th November, and of 2·5 mm. between 5th November and 16th December.

The next series, as already mentioned, was imperfectly and irregularly represented in the hauls. On 28th June nineteen females from 78 to 113 mm. were fairly well defined; they had an average length of 97.5 mm., or $3\frac{7}{16}$ inches. Eleven males belonged to the same group, from 90 to 117 mm., and with an average size of 103·4 mm. On 28th November the same series comprised eighteen females from 110 to 142 mm., the average size being 125·6 mm., or $4\frac{15}{16}$ inches, and eleven males ranging from 107 to 135 mm., and averaging 123·6 mm. The apparent increase in length in the five months was thus 28·1 mm. for the females and 20·2 mm. for the males, while the apparent annual increase from the preceding series was 58·7 mm. The next series was fairly well defined in this haul, the females numbering 22, ranging from 150 to 196 mm., and averaging 175·9 mm., or $6\frac{15}{16}$ inches; and the twenty-six males varying from 141 to 174 mm., and having an average size of 155·4 mm., or $6\frac{1}{8}$ inches. Comparison with the previous group shows an apparent annual rate of growth of 50·3 mm. (2 inches) for the females and of 31·8 mm. ($1\frac{1}{4}$ inches) for the males.

The haul on 16th December proved the most productive, 1823 long rough dabs being taken, and they gave the best results. The first series of this haul has been described. The females of the next series, 389 in number, were well defined, extending from about 106 to about 157 mm., and having an average size of 130·6 mm., or $5\frac{1}{8}$ inches. The limits of the males were also defined, but they were confluent to a remarkable degree with those of the next older series (Pl. XVII). They numbered 448, ranged from 100 to about 142 mm. in length, and had an average size of 128·7 mm., or $5\frac{1}{16}$ inches. The indicated growth from the corresponding series at the end of June amounted to 33·1 mm. for the females and 25·3 mm. for the males, and the annual increment of growth deduced from the average of the previous generation was (for males and females combined) 64 mm., or $2\frac{1}{2}$ inches.

The smallest females of the third series were 158 mm. long, but, as usual, the limit between this series and the next older was difficult to define. I have placed it at 198 mm., and the average size of 219 fishes included in it is 178·5 mm., or 7 inches. The limit of the males is also difficult to decide, but they appear to extend from 143 mm. to 180, comprising 578 fishes with an average size of 157·1 mm., or $6\frac{3}{16}$ inches. These averages indicate an annual increment of growth from the preceding generation of 47·9 mm. ($1\frac{7}{8}$ inches) for the females, and 28·4 mm., or $1\frac{1}{8}$ inches, for the males.

The largest females present appear to form two succeeding series, one ranging from 200 to 227 mm., comprising 51 individuals, and having an average size of 210·5 mm., or $8\frac{1}{4}$ inches, and the other represented by five specimens from 245 to 265 mm., with an average size of 259 mm., or $10\frac{1}{4}$ inches. The annual increment indicated by the former average is 32 mm., and by the latter 38·5 mm., which is probably inaccurate. There were also seventeen larger males, of which sixteen, from 181 to 201 mm., are classed together, having an average size of 187·1 mm., or $7\frac{3}{8}$ inches; the other at 214 mm. probably represents another series.

A haul on 15th January 1902 yielded 77 long rough dabs, of which 46 belonged to one series—viz., 31 females varying from 106 to 145 mm. in length, with an average size of 123·9 mm., or $4\frac{7}{8}$ inches, and fifteen males from 109 to 137 mm., and averaging 125·1 mm. These sizes are smaller than in the corresponding series in the December haul, but in this particular case a net with a somewhat smaller mesh than usual was employed. The second series present was composed of 31 fishes, twenty-six females, from 160 to 208 mm., and averaging 184·9 mm., or $7\frac{5}{16}$ inches, and five males, ranging from 147 to 180 mm., with an average size of 157·4 mm., or $6\frac{3}{16}$ inches. The averages in this case are slightly above those of December. The apparent annual increment of growth from one series to the other is 61·0 mm., or $2\frac{3}{8}$ inches for the females, 32·3 for the males, and 45·9 mm. for the sexes combined.

III. The Firth of Forth.

Certain hauls were made in the Firth of Forth in May, June, July, and August, the same small-meshed net being employed; one series were made at Station III., in from eight to ten fathoms, and another series at Station V., near the mouth of the Firth, in from 20 to 30 fathoms (Pl. XVIII.) The number of large fishes taken was relatively small, but the younger series were well represented. The brood of the year were found in small numbers in May at both stations; at Station III. there were three, 32, 42, and 52 mm., but it is possible the latter belonged to the next series, the smallest member of which as defined was 57 mm. The average for the three was 42 mm., or $1\frac{5}{8}$ inches, or if the one at 52 mm. be excluded, 37 mm. At Station V. two were caught, 32 and 49 mm., with an average of 40·5 mm., the next largest, belonging to the succeeding series, measuring 60 mm. On 19th August, at Station III., 24 ranged from 46 to 75 mm., with an average size of 51·3 mm., or 2 inches; on 22nd August nineteen, ranging from 45 to 59 mm., had an average length of 52·8 mm.; the average of the two combined was 51·9 mm., or $2\frac{1}{16}$ inches. At Station V., on 24th July, four ranged from 39 to 51 mm., with an average of 43·3 mm.; on 16th August the average was increased to 52·3, the number of specimens being 31 and the size varying from 44 to 59 mm. On 21st August sixty-five of this series, ranging from 36 to 63 mm., had an average length of 54·4 mm., and the mean size of the 96 fishes belonging to this series for the dates mentioned was 54·8 mm., or $2\frac{3}{16}$ inches.

The next series was also well represented in most of the hauls, and formed the greater bulk of the catches. In May, in 8 to 10 fathoms, 504 of this series were taken, the sexes of which were not determined; the combined group gave an average of 87·1 mm., or $3\frac{7}{16}$ inches, and ranged from 57 to 123 mm. On 20th June this series was imperfectly represented, the smaller fishes being absent, and the twenty specimens obtained varied from 104 to about 135 mm., giving an average of 113·5, which is too high. On 24th July 278 of this series ranged from 83 to 135 mm., with an average of 112·1 mm., or $4\frac{7}{16}$ inches, and showing an increment of growth from 9th to 16th May of 25 mm., or 1 inch. On 19th August this series comprised 300 long rough dabs, of which 207, ranging from 100 to 146 mm., were females, with an average size of 122·2 mm., ($4\frac{13}{16}$ inches), and 93 males, from 94 to 129 mm., and having an average length of 112·4 mm. The mean length of the series combined was 119·1, or $4\frac{11}{16}$ inches. On 22nd August the series was represented by 170 females and 90 males, the former varying in length from 88 to 146 mm., and with a mean length of 122·9 mm., while the males ranged from 97 to 140 mm., and had a mean size of 116·9 mm. Combining the hauls in August the series is represented by 560 fishes, the females numbering 377, ranging from 88 to 146 mm., and having a mean length of 122·5 mm., or $4\frac{13}{16}$ inches; 183 males varied from 94 to 140 mm., and had an average size of 114·6 mm., or $4\frac{1}{2}$ inches. The mean length of the combined sexes was 120·0 mm., or $4\frac{3}{4}$ inches, showing an apparent mean growth of 7·9 mm. during the twenty-eight days from the date of the July haul, and 32·9 mm. in the 101 days from the hauls in May.

At the outer station, in from 20 to 30 fathoms, this series was represented in the haul of 10th May by 565 specimens, ranging from 60 to 103 mm., and having an average size of 83·4 mm., or $3\frac{5}{16}$ inches; the mean size was thus 3·7 mm. under that of those taken at Station III. On 24th July the average of the series was 116·9 mm., the number of specimens being 334, and the range from 95 to 142 mm. On 16th August the average of the group was 124·6 mm. ($4\frac{7}{8}$ inches), the number of fishes being 326; of these the females, numbering 145, ranged from 110 to 147 mm., with an average length of 128·7 mm., and the males, which numbered 181, ranged from 106 to 136 mm., and had an average size of 121·3 mm. On 21st August the average size of 204 females was 129·0 mm., and the range from 101 to 148 mm., while the mean length of the males, 243 in number, was 122·8, and the range in size from 106 to 141 mm. The combined August hauls for this series gave an average for the 349 females of 128·9 mm., or $5\frac{1}{16}$ inches, and for the 424 males of 122·1 mm., or $4\frac{13}{16}$ inches, while the average of the combined sexes was 125·2 mm. ($4\frac{15}{16}$ inches), and that for the group as determined by the curve—including twenty-one males of the next series—was 125·7 mm. These averages are higher than those for the corresponding series in August at the inner station by 6·4, 7·5, and 5·2 mm.

respectively. This might be due to some extent to difference of rate of growth in the two localities; but the curve for the fish from the deeper water is rather better than the other.

The apparent increment of growth of the fishes in the group, as shown by these averages, is 33·5 mm. from 10th May to 24th July (75 days), and 8·3 mm. from 24th July to 19th August (27 days), or a total increase in the 102 days of 41·8 mm., or $1\frac{5}{8}$ inches. The corresponding increase in the same period at Station III. was very nearly the same, viz. 7·9 mm. and 32·9 mm., the total being 40·8 mm., or only 1 mm. less than the other. The number of fishes on which the former calculation is based was 1675, the number in the latter case being 1342, and the close agreement of the mean increase in the two cases proves, I think, that the amount of growth indicated very closely approximates to the truth.

Comparison of the average size for this and the preceding group in the various months shows an apparent annual rate of growth as follows :—

Month.	III.	V.
	Mm.	Mm.
May	45·1 (3 fish)	42·9 (2 fish)
June	...	...
July	...	73·6 (4 fish)
August (1)	67·8 (24 fish)	72·3 (31 fish)
August (2)	68·1 (19 fish)	71·7 (65 fish)

Larger series were present in these Forth hauls, but as usual the difficulty of differentiating some of them is considerable. The third group at the inner station in May was imperfectly represented. It comprised forty-five females varying from 159 to 201 mm., and having an average length of 183·7 mm., and fifteen males from 138 to 189 mm., with an average of 172·3 mm., the average for the combined group being 180·9 mm., or $7\frac{1}{8}$ inches. These averages are too large to represent accurately the real mean-size of the group. On June 20th twenty-seven females of this series had an average size of 178·6 mm., and a range from 154 to 208; and seven males varying from 151 to 198, and possessing a mean length of 171·9 mm., the average for the group with the sexes combined being 177·2 mm., or 7 inches., *i.e.* less than in May. On 24th July the average for the combined group, comprising twenty-nine fishes, appears as 177·8 mm.; on 19th August it was 183·5 mm. for 35 fishes, the mean length of the females being 190·9mm., and of the males 158·4 mm. The same series on 22nd August had an average size of 190·6 mm. for females—twenty-eight in number—and 173·7 for three males, and the averages for this series in the August hauls combined are for females 190·8 mm., with a range of from 155 to 213 mm., and for males 162·5 mm., ranging from 137 to 188 mm., the average for the group with the sexes combined being 186·1 mm., or $7\frac{5}{16}$ inches.

At the outer station in May this series, imperfectly represented, comprised 32 males and 90 females, the mean length of the former being 169·5 and the range from 143 to 185 mm., while the males ranged from 125 to 179 mm., and had an average of 149·1 mm. The average for the combined sexes was 154·5 mm. In July the mean size was 172·2 mm. for the group with the sexes mixed, and the combined hauls in August comprised ninety females with an average length of 189·0 mm., and seventy-four males with an average size of 156·2 mm., the mean for the group being 174·2.

It is clear from the variations in the averages, and from the curves, that the mean size is not truly represented. The apparent annual increment of growth from the previous or younger series indicated by the averages named is as follows:—

Month.	III.			V.		
	♀	♂	♀♂	♀	♂	♀♂
May	–	–	93·8	–	–	71·1
June	64·4	[62·2]	63·7	–	–	-
July	–	–	65·7	–	–	55·3
August (1) . . .	68·7	46·0	64·4	59·8	34	47·6
August (2) . . .	67·7	56·8	68·1	60·3	34·1	53·3
August (mean) . .	68·3	47·9	66·1	60·1	34·1	49·0

The differences in some of these cases are considerable, and may be partly ascribed to the imperfection of the third series, and partly perhaps to its limits not having been accurately determined. In May at Station III. the smaller fishes of the group, as already stated, were absent, and the average was consequently too high. In June there were only three males in the second group, and seven in the third.

Still older series were represented, but their limits are even more doubtful. In May at Station III. three additional groups appear to be present, the fishes in each consisting exclusively of females. The first of these, or Group IV., comprised thirty-nine specimens, with an average length of 225·8 mm., or $8\frac{7}{8}$ inches; the next contained seven specimens whose average length was 292·0 mm., and the next four specimens with an average size of 337 mm. The annual increments represented by these averages are 42·1, 66·2, and 45 mm. In the August hauls other two series were represented, also exclusively females; one (IV.) comprised 51 fishes ranging from 215 to 261 mm., and having an average length of 235·0 mm., the other (V.) comprised five from 260 to 289 mm. with an average size of 274·2 mm., or $10\frac{13}{16}$ inches. The apparent annual increments indicated are respectively 44·2 mm. and 37·2 mm.

At Station V. the fourth group, consisting of females only, gave in May an average of 211·1 mm., and the range was from 190 to 241 mm. There were two larger females measuring 267 and 312 mm. respectively. In the haul on 16th August the fourth group was represented by seventeen females with an average of 223·5 mm., and a range from 211 to 250 mm.; in the haul on 21st August it was represented by twenty-four females with a range from 212 to 251 mm., and an average of 225·3 mm. There were two females measuring 288 and 310 mm., and one measuring 354 mm. The averages given show either that the true limits of these older groups have not been established, or that the groups were imperfectly represented. While a study of the grouping and the curves in a given case appeared to indicate that a certain demarcation was natural, another case contradicted it; and it is evident that a large number of measurements of the older fishes would require to be made at the same time in order to determine the natural limits of the groups.

Very large long rough dabs were taken in the Firth of Forth. The largest female obtained in the hauls described at Station III. in June measured 387 mm., or $15\frac{1}{4}$ inches, another measured 349 mm. and others 310 and 312 mm. The largest male obtained was 210 mm. $8\frac{1}{4}$ (inches), the next in size measuring 197 and 198 mm.

IV. Moray Firth.

The long rough dabs obtained in certain hauls in the Moray Firth were also measured. On 4th July 1901 246 were caught in the small-meshed net in 83-85 fathoms, about $8\frac{1}{2}$ miles off Kinnaird Head, and their measurements indicated the presence of three groups. The first consisted of 92 females and 46 males, the former having a range of from 76 to 115 mm., with an average size of 98·6 mm., or $3\frac{7}{8}$ inches, while the males, varying from 87 to 113 mm., had an average size of 99·8 mm., or $3\frac{15}{16}$ inches, the average for the group with the sexes combined being 98·3 mm. The next group consisted of forty-nine females and fifteen males, the former ranging from 135 to 172 mm., with an average size of 153·9 mm., or $6\frac{1}{16}$ inches, while the males, measuring from 128 to 157 mm., had an average length of 140·9 mm., or $5\frac{9}{16}$ inches. The average for the group with sexes combined was 150·8 mm. A third series comprised forty-three females with an average size of 188·9 mm., and a range from 174 to 214, and one male 172 mm. long. The apparent annual increments of growth between the successive groups in this haul are, for females 55·3 and 35·0 mm., and for males 42·3 and 31·1 mm., the apparent increment for the second series with sexes combined being 52·5 mm.

Other hauls were made with the small shrimp-net of the "Garland" in April and May in about 35 fathoms, eighteen miles north of Macduff. On April 24th the first series consisted only of eight fishes, namely, five females ranging from 66 to 73 mm., and with an average size of 68·2 mm., or $2\frac{11}{16}$ inches, and three males from 67 to 73 mm., with a mean size of 69·3 mm. The next series consisted of nine females and fifteen males, the former varying from 127 to 153 mm., and having an average size of 139·9 mm., or $5\frac{1}{2}$ inches, and the latter ranging from 119 to 150 mm., with a mean size of 135·9 mm. With the sexes combined the first series had an average size of 68·6 mm., and the second one of 137·4 mm. The apparent annual increment of growth from the first to the second series was, for females 71·7 mm., for males 66·3 mm., and for the combined sexes 68·8 mm., or $2\frac{11}{16}$ inches.

The haul on 31st May yielded only two long rough dabs of the first series, a female measuring 96 mm., and a male 97 mm. The second series comprised eighteen females from 127 to 155 mm. long, and with an average size of 142·3 mm., or $5\frac{5}{8}$ inches, and seventeen males ranging from 124 to 152 mm., whose mean length was 138·7 mm. The annual increment of growth based on two fishes in one series is of little value alone, still here they correspond well with the facts in other cases, showing an increase of 46·3 mm. for females, and 41·7 for males. The same remark applies to the amount of growth in the interval of 38 days, as deduced from comparison of the averages. For the females of the first series it was 27·8 mm., and for the males 27·7 mm. For the second series the increment for females in the period was only 2·4 mm., and for the males 2·8 mm.

V. The Firth of Clyde.

A number of hauls were made in the Firth of Clyde between the island of Pladda and Turnberry Point in August, September, October, and December 1899, the shrimp-trawl of the "Garland" being used. The depth varied from about thirty to over forty fathoms. The measurements contrast with those obtained on the East Coast, and show that the long rough dab grows more slowly in the Clyde (Pl. XIX.).

The first series was represented in a haul on 30th August by four specimens, from 41 to 45 mm. in length, and having an average size of 43·5 mm. On 14th September ninety-one belonging to this series had an average length of 45·0 mm.; of these, forty-one were females ranging from 39 to 52 mm., the mean size being 45·8 mm., twenty-three were males from 41 to 50 mm., and having an average length of 45·6 mm. On 12th October the mean size of 232 specimens had increased to 48·9 mm., the range being from 40 to 57 mm. In December (15th to 18th) the mean length of twenty-nine specimens was 52·6 mm., the range extending from 46 to 59 mm. On 3rd April 1900, ninety-five specimens, varying from 49 to 64 mm., had an average size of 55·5 mm., or $2\frac{3}{16}$ inches, the females, fifty-seven in number, averaging 55·8 mm, and the males, numbering thirty-eight, averaging 55·1 mm.

Thus the increments of growth of this series in the intervals between the various hauls were as follows:—

Date.	No. of Days.	No. of Fish.	Average Size.	Increase.	Rate per 10 days in mm.
			Mm.	Mm.	
30th August to 14th Sept.	15	4 and 91	43·5 45·8	2·3	1·53
14th Sept. to 12th Oct. .	28	91 and 232	49·0	3·2	1·14
12th Oct. to 17th Dec. .	66	232 and 29	52·8	3·8	0·57
17th Dec. to 3rd April .	107	29 and 95	55·5	2·7	0·25
	216			12·0	0·55

The increase of 12 mm. (scarcely half an inch) in the period indicated is very small, and contrasts with the more rapid growth on the East Coast, as shown by the following particulars referring to the northern part of the North Sea, off the Shetland Isles (I.), and the deep water off Aberdeen (II.).

[Table.

Date.	No. of Days.	No. of Fish.	Average Size.	Increase.	Rate per 10 days.
			Mm.	Mm.	Mm.
I. 31st Aug. to 4th Sept. .	4	20 and 244	48·3 / 48·4	0·1	...
4th Sept. to 17th Oct. .	21	244 and 180	53·3	4·9	2·33
17th Oct. to 19th May .	213	180 and 141	68·4	15·1	0·71
	238			20·1	0·84
II. 21st Aug. to 5th Nov. .	76	11 and 6	53·0 / 63·0	10·0	1·31
5th Nov. to 28th Nov. .	23	6 and 11	66·1	3·1	1·34
28th Nov. to 16th Dec.	18	11 and 116	65·5	– 0·6	...
	117			12·5	1·07

The periods do not quite correspond, and that for the northern part of the North Sea includes a large part of May, a more favourable month for growth, but they serve to indicate a more rapid growth of the long rough dab in autumn and winter on the East Coast than in the Clyde, and the average size of the series at corresponding dates indicates the same thing. Thus at the end of August the mean size on the Clyde was 43·5 mm., compared with 48·3 mm. off the Shetlands and 53·0 mm. off Aberdeen; in October the Clyde average was 49·0 mm., while it was in that month 53·3 off the Shetlands; in December the Clyde average was 52·8 mm., compared with 65·5 mm. off Aberdeen. The causes of this difference are not clear, but the more tardy growth of the first series on the Clyde within the considerable part of the year referred to would suggest a smaller annual increment and tardy growth in the next larger series. Such is found to be the case, and it at first caused a little mystification. It is well shown in some of the curves (Pl. XIX.).

Considering the next older series or generation, the haul on 30th August yielded ninety-nine specimens from 65 to 87 mm. in length, and with an average size of 77·6 mm., or $3\frac{1}{16}$ inches. On the presumption that the rate of growth in the two periods was similar, the difference between the average for April and this avearge would indicate the amount of growth in summer, viz. from 3rd April to the end of August, a period of 150 days, and the difference is 22·1 mm. If the ascertained growth in the remainder of the year, from 30th August to 3rd April, given above, be added to this—namely, 12·0 mm.—it indicates an annual increment at this stage of about 34 mm., which closely corresponds to the increment deduced from comparison of the average size of the annual groups or series at a given date.

The particulars of the second series in the various hauls are as follow:—On 1st August twenty were taken with an average size of 76·5 mm., and a range from 67 to 88 mm. On 30th August the average for the ninety-nine specimens of both sexes was, as we have seen, 77·6 mm., and the range 65 to 87 mm. On 14th September the range of thirty-six specimens, of both sexes, was from 62 to 91 mm., and the average size 77·6 mm.; twenty-one were females averaging

79·4 mm., and fifteen were males averaging 75·2 mm. On 12th October the mixed series ranged from 66 to 97 mm., and averaged 81·6 mm., the females, eighty in number, having a mean size of 80·8 mm., and the 114 males a mean size of 82·2 mm. In December the average of the mixed series was 82·0 mm., and the range from 68 to 103 mm.; twenty-three females averaged 85·4 mm., and twenty-one males 78·4 mm. In April the average for the mixed series of forty-three fishes was 84·4 mm. and the range from 68 to 107 mm.; the twenty-nine females averaged 85·7 mm., and the fourteen males 80·6 mm. It will be seen from this that the rate of growth of the series was very slow, and although the number of specimens was not very large, I think the averages fairly well represent the facts. From 1st August to 3rd April the average growth amounted only to 7·7 mm. The sexes of the series in the early hauls were not completely determined; but from 14th September to 3rd April the females increased from an average size of 79·4 to 85·7 mm., and the males from 75·2 to 80·6 mm., an increase in the former case of 6·3 mm., and in the latter of 5·4 mm. In both cases it will be observed that the increment, whether for the mixed series throughout the whole period, or for the males and females from September to April, is less than with the first or younger series. They appear to grow relatively more in autumn and winter than the fishes a year older.

If we now compare the mean size of this series with the mean size of the previous series, the apparent increment of growth (in millimetres) in the course of a year, as shown in the various hauls, is as follows:—

30th August.	14th Sept.	12th Oct.	15th to 18th Dec.	3rd April.
34·1	32·6	32·7	29·4	28·9

The mean annual increment from these observations is thus about 31·5 mm., or $1\frac{1}{2}$ inches. The diminishing increment shown is due to the relatively greater growth of the first or younger series in autumn and winter above alluded to, which brings the averages closer together.

The growth of this series may now be compared with the growth of the corresponding group on the East Coast, and I have given below the particulars for the northern part of the North Sea (off the Shetlands) (I.) and the deep water off Aberdeen (II.):—

Date.	No. of Days.	No. of Fish.	Average Size.	Increase.	Rate per 10 days.
			Mm.	Mm.	Mm.
I. 31st Aug. to 4th Sept.	4	551 / 1334	103·2 / 103·6	0·4	1·0
4th Sept. to 17th Oct.	21	1334 / 1021	106·4	2·8	1·3
17th Oct. to 19th May	213	1021 / 24	126·7	20·3	0·91
	238			23·5	0·98
II. 21st Aug. to 28th Nov.	99	214 / 29	119·5 / 124·8	5·3	0·54
28th Nov. to 16th Dec.	18	29 / 448	129·2	4·4	2·4
	117			9·7	0·83

These increments are greater in relation to the period than is shown in he fish from the Clyde; and the annual increment deduced from comparison of the mean-size of this and the preceding series is, as already indicated, considerably greater also. Thus, for the fish off the Shetlands we have annual increments in millimetres as follows:—

31st August.	4th Sept.	16th to 19th Oct.	19th May.	11th Dec. 1901.
54·9	55·2	53·1	58·3	47·0

The mean increase in a year between this series and the younger one is therefore about 53·7 mm. ($2\frac{1}{8}$ inches), or 22·2 mm. ($\frac{7}{8}$ inch) more than the yearly growth in the corresponding series in the Clyde. The averages in the hauls off Aberdeen indicate the following annual increments in millimetres:—

21st August.	28th November.	16th December.
66·5	58·7	63·7

The mean increase in a year in these cases is about 63·0 mm., or $2\frac{1}{2}$ inches.

In the Firth of Forth the annual increment of growth is still greater, *i.e.* growth is more rapid, as I have already shown (p. 378), the mean increase from the previous series to this (in May, July, and August) being about 69·8 mm., or, excluding the two instances in May (five fishes) 70·7 mm. ($2\frac{3}{4}$ inches), more than double, therefore, the growth of the corresponding series in the Clyde. The average size of this series at nearly corresponding dates in the various localities shows the same thing, as indicated below:—

Month.	Forth.		Off Shetland.	Off Aberdeen.	Clyde.
April	...	...	...	...	55·5
May	87·1	83·4	68·4	...	...
June	...	...	...	99·7	...
July	112·1	116·9	...	...	...
August	120·0	125·2	103·2	119·5	{76·5 / 77·6
September	...	...	103·6	...	77·6
October	...	...	106·4	...	81·6
November	...	...	...	124·8	...
December	...	...	101·4	129·2	82·0

Finally, the older series which are present in the Clyde hauls show the same tardy growth compared with the East Coast fish, the increments in the interval between the various dates above-mentioned, from 1st August to 3rd April, being for the third series 1·3 mm., 1·4 mm., 1·8 mm., 0·5 mm., and 4·7 mm. respectively, or a total growth in the 345 days of 9·7 mm. ($\frac{3}{8}$ inch). The apparent annual increments of growth between this and the second series are respectively 30·6, 32·0, 29·8, 29·9, and 32·2 mm., or a mean of about 30·5 mm., or $1\frac{3}{16}$ of an inch.

From the facts above described it is clear that the growth may be very different in different places. At approximately the same age the long rough dab is larger, and grows quicker, in the Firth of Forth than in the deep water off Aberdeen; it is larger and grows quicker in the latter locality than in the deep water off the Shetlands, while it is still smaller and grows less quickly in the Clyde. The difference in the Clyde is so great as to justify the statement that there is there a dwarfed race of long rough dabs comparable to the dwarfed race of plaice to be found in the Baltic. The measurements and the curves (Pl. XIX.) sufficiently establish this, but in order to test it I have tabulated from the "Garland's" records the long rough dabs taken by the ordinary beam trawl-net of that vessel in a year in the Firth of Clyde and in the Firth of Forth, with the following result. Of 4716 caught in the Clyde, 200, or 4·2 per cent., were above nine inches in length, while in the Forth, of 2113 caught, 214 or 10·1 per cent. were above that size. Moreover, while in the Clyde there were only thirteen, or 0·27 per cent., above ten inches, there were in the Forth 113, or 5·4 per cent., above that size; in the Clyde there were two above eleven inches, in the Forth thirty-nine; in the Clyde one was above twelve inches, in the Forth nine; and while the one referred to was the largest taken in the Clyde, there were in the Forth three above thirteen inches and one above fourteen inches. They have been obtained in the Forth as large as $16\frac{1}{2}$ inches (420 mm.). Such large long rough dabs I never found in the deep water off the Shetlands.

THE WHITING (*Gadus merlangus*, L.).

In last year's report the results of the measurements of a considerable number of whitings caught in the autumn and winter of 1900 were described, and since then a large number of others have been measured at various dates, making a total of nearly 50,000 of this species. In 1900 hauls were made in the deep water off the Shetlands at the end of August, beginning of September, and in October, and in 1891 in May and December. The hauls in Aberdeen Bay in the former year comprised the months of September, October, and December. In 1891 collections were made in every month from May onward and one in January 1902, and similar collections were obtained from the deep water lying eight to twelve miles off Aberdeen. Collections were also made in the Firth of Forth in the summer, and in the Moray Firth occasionally.

While the general result is to confirm the conclusion previously reached as to the rate of growth of the whiting, the additional observations throw light upon the variation in growth at different seasons in the same locality, and at the same season in different localities, and the influence which temperature appears to exert in connection with such variations.

The earliest series, comprising the smallest fishes, were first caught with the small-meshed net, in Aberdeen Bay on the 31st July, in the Firth of Forth on 23rd July, and in the deep water off Aberdeen on 21st August. None were caught in hauls in Aberdeen Bay at the end of June and on 5th July, nor in the deep water off Aberdeen at the end of June (28th) or the end (30th) of July. A haul in 85 fathoms on 4th July off Kinnaird Head, at the entrance of the Moray Firth, failed to yield any whitings under about 8 inches; and in the deep water off the Shetlands none were procured in May, but a few were procured on 31st August, 4th September, 16th October, and 11th December.

Moreover, an examination of the appended Table (p. 388) will show that while the numbers at first caught were generally few, the sizes were relatively large, and that as the season advanced greater catches were obtained, and at the same time the minimum size became reduced and the maximum size increased. In Aberdeen Bay six were taken on 31st July, and the smallest was 95 mm. ($3\frac{3}{4}$ inches), and the largest 125 mm. ($4\frac{15}{16}$ inches); on 4th September, of 557, the smallest was 85 mm.

($3\frac{3}{8}$ inches), and the largest 148 mm. ($5\frac{13}{16}$ inches); in October the smallest was 67 mm. ($2\frac{5}{8}$ inches), and the largest 174 mm. ($6\frac{7}{8}$ inches), and they were caught in thousands. Much the same thing was observed in the hauls in deep water off Aberdeen, and here these small whitings were later in appearing than in the bay.

The increase in the maximum size in successive hauls is explicable by the growth of the fish in the interval; but the gradually increasing abundance of smaller and smaller whitings at the bottom and in the inshore waters, as the season advances, is no doubt due to the circumstance that they abandon their pelagic habit to a greater and greater extent as the upper layers of water become colder, and they then appear in the bay and shallower inshore waters in great numbers. Later, during winter, while still present in the bay, they to a large extent withdraw to the deeper water offshore, where the temperature is somewhat higher. In the deep water between the Shetlands and Norway very few young whitings were caught on the bottom—the greatest number in a drag was sixty, compared with thousands in Aberdeen Bay. This may be due to a prolonged pelagic habit, or to spawning taking place for the most part near the coast. In the latter case the distance traversed by the mature whitings must be considerable. The question will no doubt be settled when the upper layers of water are properly explored.

The growth of the young whiting is very rapid. The spawning season extends from the beginning of March to the end of June, or beginning of July, with its maximum about the end of April, and, at the temperature of the water at that time, the eggs will take about ten or twelve days to hatch. The bulk of the larval whitings may thus be regarded as beginning their independent pelagic life in the early part of May, at a length of about 3·5 mm. ($\frac{1}{7}$ inch). By the end of the summer they have grown thirty times longer, exceeding, on the average, four inches in length.

The ranges and averages derived from the measurements of the small whitings caught are given in the Table below.

In Aberdeen Bay the six whitings of this series caught on 31st July had an average length of 112 mm., or $4\frac{7}{16}$ inches, a size much too large for the date, owing to the absence of the smaller fishes. On 4th September 557 ranged from 85 mm., or $3\frac{3}{8}$ inches, to 148 mm., or $5\frac{13}{16}$ inches, the average being 109·8 mm., or $4\frac{5}{16}$ inches. On 10th September the range was from 76 to 157 mm. and the mean length 110·4 mm. ($4\frac{3}{8}$ inches). On 18th October the range was from 67 to 174 mm. and the average length 115·6 mm., or $4\frac{9}{16}$ inches. On 29th November the mean length was 136·7 mm., or $5\frac{3}{8}$ inches, the largest measuring 190 mm., or $7\frac{1}{2}$ inches.

We thus see that from 4th September until 29th November, an interval of 86 days, the young whiting (in 1901) apparently increased its length, on the average, by 26·9 mm. ($1\frac{1}{16}$ inch). The largest measured, as stated, about 190 mm. in November and 148 mm. on 4th September, which shows a maximum increase in the 86 days of 42 mm., or $1\frac{11}{16}$ inches.

[Table.

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
Aberdeen Bay.		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
1901										
5th July	...	...	...	...	...	...	...	...	...	...
31st do.	6	95	$3\frac{3}{4}$	125	$4\frac{15}{16}$	[112]	[$4\frac{7}{16}$]	...	...	...
4th September (1) ...	478	85	$3\frac{3}{8}$	143	$5\frac{5}{8}$	109·8	$4\frac{5}{16}$	...	...	...
4th do. (2) ...	79	88	$3\frac{1}{2}$	148	$5\frac{13}{16}$	109·6	$4\frac{5}{16}$	...	...	...
Combined (1, 2) ...	*557*	*85*	$3\frac{3}{8}$	*148*	$5\frac{13}{16}$	*109·8*	$4\frac{5}{16}$	...	...	...
10th September (1, 2)...	1861	76	3	157	$6\frac{3}{16}$	110·4	$4\frac{3}{8}$	0·6	...	6
18th October	1252	67	$2\frac{5}{8}$	174	$6\frac{7}{8}$	115·6	$4\frac{9}{16}$	5·2	...	39
6th November... ...	1298	71	$2\frac{13}{16}$	186	$7\frac{5}{16}$	134·0 [*130·0*]	$5\frac{1}{4}$ [$5\frac{1}{8}$]	18·4 [14·4]	$\frac{3}{4}$	20
29th November ...	716	92	$3\frac{5}{8}$	190	$7\frac{1}{2}$	136·7	$5\frac{3}{8}$	2·7	...	23
17th December ...	780	94	$3\frac{11}{16}$	178	7	135·5	$5\frac{5}{16}$	−1·2	...	18
1902										
15th January	915	88	$3\frac{1}{2}$	190	$7\frac{1}{2}$	130·4 [*139·0*]	$5\frac{1}{8}$ $5\frac{1}{2}$	−5·1 [3·5]	...	29

It is evident, however, that the range and the averages in many of these cases require correction, owing to the fact that the smaller fishes of the series are not, especially in the earlier months, properly represented in the collections. This is caused partly by the meshes of the net being too large to retain them, and chiefly by the fishes at this stage not living at the bottom but being dispersed in the water between bottom and surface. And it is clear that the numbers that thus escape capture may be considerable, although it would be difficult to assign the proportion for any given month. Small whitings much below the minimum sizes stated are procured in tow-nets late in the season. Thus, at the end of July specimens from 17 to 30 mm. were procured in the Moray Firth, and on 9th August others from 22 to 65 mm.; on 29th August four caught in the Forth measured 24, 26, and 59 mm.; one on 1st October was 19 mm., and on 3rd October four, measuring 41, 47, 70, and 72 mm., were taken in Aberdeen Bay in mid-water, and one of 56 mm. on 6th October. Clearly, therefore, the lower limit at the end of summer and in autumn is below what is represented by the catches of the small-meshed net. In January, however, we get, I believe, a fairly accurate idea as to the minimum size of the series at that time, because the hauls were then made with a smaller-meshed net (fig. 1, B), from which few, if any, whitings below the size of those taken could escape, and the limit then was 88 mm., or $3\frac{1}{2}$ inches. In July, when spawning has scarcely quite terminated, it is obvious that a considerable proportion of the young whitings must be small. In the Firth of Forth, as stated below, they ranged from 54 to 109 mm. on the 23rd of that month—a range of 55 mm.; and, looking to the fact that the ascertained range of the series late in autumn and in winter exceeds 100 mm., and may be 115 mm., I think the ranges and averages may be tentatively amended in the preceding months as follows:—

Month.	Range.	Approximate Mean Size.	
	Mm.	Mm.	Ins.
End of July	*25*–125	75·0	$2\frac{15}{16}$
End of August	*40*–148	94·0	$3\frac{3}{4}$
End of September . .	*50*–165	107·5	$4\frac{1}{4}$
End of October	*60*–180	120·0	$4\frac{3}{4}$
End of November . .	*70*–190	130·0	$5\frac{1}{8}$
End of December . .	80–190	135·0	$5\frac{5}{16}$

These ranges and averages must be regarded as tentative and approximate ; but at all events it is evident that the growth of the young whiting in the summer, and especially in May, June, and July, must be very rapid. From the beginning of September until the end of November the increase calculated from the measurements amounted to 26·9 mm., and, as amended, to 36·6 mm., and this increment, it must be noted, took place with a falling temperature of the water. At the beginning of September the mean size calculated was about 109·8 mm., or, as amended, 94 mm., and as the average whiting started life in the early part of May with a length of 3·5 mm., the increment of growth in May, June, July, and August—approximately 110–120 days—would be about 90 mm., or $3\frac{9}{16}$ inches, which is at the rate of 7·8 mm. for each ten days. The next older series of whitings (whose minimum size is not subject to the same doubt and qualification) increased in part of the same period, namely, from 30th May to 4th September—an interval of 97 days—by 54·9 mm. ($2\frac{3}{16}$ inches), or at the rate of 5·66 mm. for each ten days.

This circumstance alone, I think, would remove any doubt as to the real age of these whitings belonging to the first series. It seemed to me at first surprising that the whiting in the course of a single summer and autumn should, on the average, grow from a few millimetres to about five inches in length, and that some undoubtedly of the same series, although, no doubt, spawned earlier in the spring, should even reach an extreme length of about $7\frac{1}{2}$ inches at the end of autumn. The belief that they were really in their second and not in their first year seemed reasonable, and this view received some support from the grouping of the very smallest whitings in several hauls in the autumn* both in 1900

* *Nineteenth Ann. Rep.*, Part iii., p. 187.

and last year. In the haul on 18th October, for example, the fifty-two smallest whitings, measuring from 67 to 89 mm., formed a pretty distinct group by themselves, as represented in the adjoining figure, but the steepness of the upward slope of the large curve (*a*) showed that they belonged to the same series, and that a portion of the somewhat larger (but still small) fishes were absent, and perhaps had risen from the bottom. If the fish were in their second year they would have lived through two summers, a supposition contradicted by the proved rate of growth; and, moreover, no small whitings to represent such a hypothetical series were obtained in winter, spring, or early summer —not until July—either on the bottom or in midwater, although the large otter-trawl with the finest-meshed net was employed.

The young whitings taken in the deep water off Aberdeen also showed a considerable increment in length, the mean size, computed from the measurements, increasing from 105·1 mm. on 3rd September to 143·3 mm. on 15th January, an increase of 38·2 mm. ($1\frac{1}{2}$ inches), with a falling temperature. The particulars are given in the following Table, and it will be seen that the average size in the deep water in January was considerably greater than in Aberdeen Bay. This may be partly owing to the temperature in the former place being somewhat higher, but an examination of the curves for the two localities shows that it is for the most part caused by the larger fishes moving off from the shallow water in winter in greater proportion than the smaller fishes. The next older series (*see* Table, p. 431), *i.e.*, over one year, are fairly abundant in the bay in the summer, and they move offshore in September and October as the smaller whitings come in, the larger of these again moving off in winter. This is the main reason, as the curves indicate, of the actual diminution of the mean-size for the winter in Aberdeen Bay, although growth then is likewise retarded.

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
Off Aberdeen.		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
Deep Water.										
1901										
28th June	...	...	...	...	...	...	...	...	...	...
30th July	...	...	...	...	...	...	...	...	...	...
21st August	9	100	$3\frac{15}{16}$	156	$6\frac{3}{16}$	[129·9]	...	...	...	...
3rd September ...	94	81	$3\frac{3}{16}$	136	$5\frac{3}{8}$	[105·1]	...	...	...	...
5th November... ...	135	80	$3\frac{1}{8}$	160	$6\frac{5}{16}$	123·4	$4\frac{7}{8}$	...	...	...
28 do. ...	873	83	$3\frac{1}{4}$	184	$7\frac{1}{4}$	124·0	$4\frac{7}{8}$	0·6	...	23
16th December ...	778	85	$3\frac{3}{8}$	173	$6\frac{13}{16}$	129·3	$5\frac{1}{8}$	5·3	$\frac{3}{16}$	18
1902										
15th January	490	106	$4\frac{3}{16}$	183	$7\frac{3}{16}$	143·3	$5\frac{5}{8}$	14·0	$\frac{9}{16}$	30

The collections from the Firth of Forth also indicate the rapidity of growth of the young whiting in summer, and they show at the same time that they are first obtained in somewhat shallow water. A haul on 23rd July at Station III., which is situated well up the Firth (east of Inchkeith), in 8 to 10 fathoms of water, yielded 911 young whitings, while a haul on the following day at Station V., at the mouth of the Firth, in 20–30 fathoms, yielded only 34, and they were of larger size. In August, while then abundant at the outer station—although not so numerous as at the inner one—they were also of larger size, the smaller fishes, no doubt, being above the bottom and beyond the reach of the trawl.

At Station III. the whitings increased from 78·6 mm., or $3\frac{1}{8}$ inches (or, as amended, 75 mm.), on 23rd July to 103·4 mm. on 19th August an increase of 28·4 mm. ($1\frac{1}{8}$ inches) in twenty-seven days. The mean size of 3033 on 19th–22nd August was 103·6 mm., or, as amended, 105·0 mm. ($4\frac{1}{8}$ inches), an increase of 30 mm. in thirty days. The size of the largest fish of the series increased in the same period from 109 to 148 mm., an increment of 39 mm. At Station V. the 34 caught on 24th July had a mean size of 87·4 mm. (corrected to 80·0 mm.), while on 16th August the mean size of 100·6 was 116·8 mm. ($4\frac{5}{8}$ inches), or, as amended, 110·0 mm., showing an increment of about 30 mm. ($1\frac{3}{16}$ inches) in twenty-three days.

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
Firth of Forth.		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
III.										
1901										
23rd July	911	54	$2\frac{1}{8}$	109	$4\frac{5}{16}$	78·6 [*75·0*]	$3\frac{1}{8}$ [$2\frac{15}{16}$]	...	...	...
19th August (1) ...	1391	79	$3\frac{1}{8}$	148	$5\frac{13}{16}$	104 3	...	25·7	1	27
19th do. (2) ...	678	72	$2\frac{13}{16}$	148	$5\frac{13}{16}$	101·8	4	23·2	$\frac{15}{16}$	27
Combined (1, 2) ...	2069	*72*	$2\frac{13}{16}$	*148*	$5\frac{13}{16}$	*103·4*	$4\frac{1}{16}$	[*28·4*]	...	27
22nd August	964	67	$2\frac{5}{8}$	...	...	103·9	$4\frac{1}{8}$	0·5	...	3
19th, 22nd combined	*3033*	*67*	$2\frac{5}{8}$	*148*	$5\frac{13}{16}$	*103·6*	$4\frac{1}{16}$	...	...	30
						[*105·0*]	$4\frac{1}{8}$	[*30·0*]		30
V.										
24th July	34	69	$2\frac{3}{4}$	108	$4\frac{1}{4}$	87·4 [*80·0*]	$3\frac{7}{16}$ $3\frac{1}{8}$	...	...	...
16th August	1006	88	$3\frac{1}{2}$	160	$6\frac{5}{16}$	116·8 [*110·0*]	$4\frac{5}{8}$ $4\frac{5}{16}$	29·4 30·0	$1\frac{3}{16}$ $1\frac{3}{16}$	23 23

In the deep water off the Shetlands, as already mentioned, young whitings were taken only in small numbers. The increase (computed from the measurements) amounted to 21·2 mm. ($\frac{7}{8}$ inch) in the forty-six days from 31st August–4th September to 16th–19th October, but the number of fishes is too small to make the conclusion quite trustworthy, and the localities were about sixty miles apart, although the depth was the same. In May 1901 several hauls were made with the small-meshed net, but only a few of the smaller whitings were caught. On the 19th, about sixty miles E. by S. of Sumburgh Head, in 65 fathoms, four were taken apparently belonging to this series, and they measured 201, 202, 210, and 223 mm.; the next largest was 236 mm. On the 20th, in the same locality, other seven were caught, measuring from 200 to 229 mm., the next being 234 mm., and on the 21st, a few miles further north, in 65–70 fathoms, five were obtained ranging from 187 to 228 mm., the next being 251 mm. These whitings appear to form part of a series, but where the division occurs it is difficult to decide. Above 24 cm. the whitings are numerous, and form a well-defined group.*

On 11th December 1901 another haul was made with the small-meshed net in deep water off the Shetlands, and among the whitings obtained were sixty measuring from 80 to 164 mm. ($3\frac{1}{8}$–$6\frac{7}{16}$ inches), with a mean size of 125·1 mm. ($4\frac{15}{16}$ inches), or, as amended, 122·0 mm. ($4\frac{3}{4}$ inches). The curve in this case is good, except that the whitings between 10 and 11 cm. are not proportionally represented.

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
Off Shetlands. Deep Water.		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
1900										
31st August	10	79	$3\frac{1}{8}$	99	$3\frac{7}{8}$	92·1 [*80·0*]	$3\frac{5}{8}$ $3\frac{3}{16}$	...	...	...
4th September ...	14	79	$3\frac{1}{8}$	118	$4\frac{5}{8}$	99·1	$3\frac{7}{8}$	...	...	...
Combined	24	79	$3\frac{1}{8}$	118	$4\frac{5}{8}$	96·2	$3\frac{3}{4}$	...	...	...
16th October	3	116	$4\frac{9}{16}$	130	$5\frac{1}{8}$	[123·7]	$4\frac{7}{8}$	...	...	...
19th do.	22	98	$3\frac{7}{8}$	139	$5\frac{1}{2}$	116·5	$4\frac{9}{16}$	...	...	...
Combined	25	98	$3\frac{7}{8}$	139	$5\frac{1}{2}$	117·4	$4\frac{5}{8}$	21·2	$\frac{7}{8}$	47
1901										
19th May	4	210	$8\frac{1}{4}$	223	$8\frac{3}{4}$	[211·2]	...	...	...	...
20th do.	7	200	$7\frac{7}{8}$	229	9	[212·4]	...	...	...	...
21st do.	5	187	$7\frac{3}{9}$	228	9	[207·2]	...	...	...	...
11th December ...	60	80	$3\frac{1}{8}$	164	$6\frac{6}{16}$	125·1 [*122·0*]	$4\frac{15}{16}$	...	...	...
Moray Firth. 1901 Burghead Bay.										
25th December ...	601	85	...	180	...	137·4 [*132·5*]	$5\frac{3}{8}$	...	...	...

* The 2-mm. grouping is as follows:—

187—189	*—191*	*—193*	*—195*	*—197*	*—199*	*—201*	*—203*	*—205*	*—207*	*—209*	*—211*	*—213*	*—215*	*—217*
1						1	3	2	1	1	1		1	1

219—221	*—223*	*—225*	*—227*	*—229*	*—231*	*—233*	*—235*	*—237*	*—239*	*—241*	*—243*	*—245*	*—247*	*—249*
		1	1	1	1			1	1	1			1	

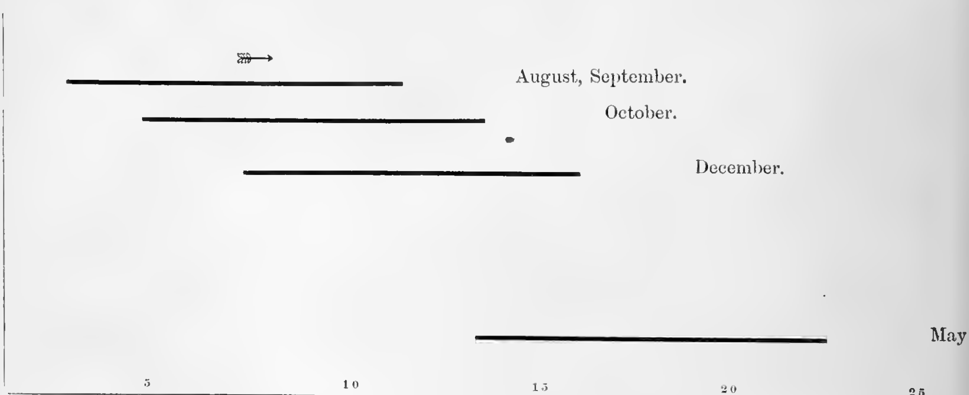
If this average and range be compared with those for the corresponding date at Aberdeen Bay and the deep water off Aberdeen, it will be seen that the latter are larger, the difference in mean-size being over 13 mm. and 6·7 mm. respectively. This is in agreement with the results derived from the measurements of haddocks and long rough dabs, growth in summer and autumn being less rapid in the deep water in the northern part of the North Sea, as one might expect from the more tardy cycle of temperature changes. Growth in winter and spring is, however, more rapid in the deep water than near the shore; but the evidence on this point in the case of the whiting is slender, owing to the imperfection of the hauls in May. If we assume that the conditions were essentially similar in December 1900 as in December 1901, then we would have the following ranges and averages for the respective dates, as computed from the measurements and as amended :—

Month.	No.	Range.	Average Size.	
			Computed.	Amended.
		Mm.	Mm.	Mm.
31st August, 4th September ...	24	79 (*35*)–118	96·2	76·5
16th to 19th October...	25	98 (*55*)–139	117·4	97·0
16th December	60	80 –164	125·1	125·1
19th, 20th May	16	187 (140)–229	210·5	184·5

The maximum size from the first to the third case increased by 46 mm., and I have assumed an increase of 45 mm. for the minimum size in the same period. The mean-size, uncorrected, increased by 28·9 mm., and, as amended, by 48·6 mm. in the 102 days to December. In Aberdeen Bay, from 4th September to 17th December (in 1901), the apparent increment amounted to 25·7 mm. and the amended increment to about 39 mm., so that during this period the rate of growth seems to be only slightly more rapid in the deep water than in Aberdeen Bay. But the average sizes, whether directly computed or amended, differ considerably at the corresponding dates. In the beginning of September it was 96·2 (or 76·5) off the Shetlands, while in Aberdeen Bay it was 109·8 (or 94·0), a difference of 13·6 (or 17·5 mm.); in the middle of December it was 125·1 mm. off the Shetlands, while in Aberdeen Bay it was 135·5 (133, *cd*). It is not improbable that the spawning season in the two areas may vary to some extent—and in that case the facts point to its being later in the north—but it is pretty certain, I think, that the seasonable rate of growth differs in the two regions.

It would be of interest to test the relative increments during winter. In Aberdeen Bay it amounted in the period from 17th–21st December 1900 (8059 fish) to 30th May 1901 (366 fish) to 17·1 mm. in the 160 days, showing very slow growth, which, we may feel sure, was made up in April, and especially in May. As stated, the collections from the deep water off the Shetlands in May were imperfect; but since a series begins before 250 mm. (extending to about 330 mm.), and the interval from the end of the first series in December to the beginning of this series in May—five months later—amounts to less than 86 mm. (thus excluding the possibility of an intermediate series), it appears certain that the few whitings obtained in May, ranging from 187 to about 230 mm., represent the first series present in the preceding autumn, the bulk of the shoal having probably risen from the bottom and escaped capture. If we construct such a series, with the usual range, in front of the one beginning about 24 cm., viz., back to about 140 mm., then the mean-size of these whitings when about a year old, in May, would be approximately 184·5 mm., or $7\frac{1}{4}$ inches, the smallest measuring about $5\frac{1}{2}$ inches and the largest about 9 inches. On this hypothesis, the growth in the five months (about 155 days) December to May, would amount, on the average, to about 59·4 mm. ($2\frac{3}{8}$ inches), compared with the 17 or 18 mm. ($\frac{11}{16}$ inch) of increment for the corresponding series for the same time in Aberdeen Bay; and the deep-water whitings in May would correspond in length to those got in Aberdeen Bay in July. The increase is great, but in the case of the haddock, where the series are somewhat better represented in December and May (p. 404), the increase in the five months amounted for this series during the same period to 62 mm. in the deep water off the Shetlands and to 35·3 mm. for Aberdeen Bay, calculated in the average size derived directly from the measurements. Since the whole annual increment between Series I. and Series II. in the deep-sea haddock, calculated on the December curves (which are extremely good), is 128·9 mm., it follows that the remaining 69·5 mm. must be made up during the other seven months of the year, from the middle of May to the middle of December, so that the winter and spring growth in the deep water is approximately at the same rate as during summer and autumn. This forms a marked contrast to the growth in the two seasons exhibited in Aberdeen Bay, and is, no doubt, due to the greater uniformity of the conditions throughout the year, and especially to the much slighter seasonal changes of temperature that occur in the deep northern waters. In connection with this it may be further remarked that the distinctiveness and separation of the early Series I. and II. are much greater in the deep water than in the inshore waters, and this is true not only of the whiting, but also of the haddock, the Norway Pout, and the long rough dab.

The range and relative growth of the 1st Series of Whitings at the different dates is represented in the adjoining figure.



In its second year the growth of the whiting is also rapid, and in inshore waters, as Aberdeen Bay, it exhibits the same variation with the season as in the earlier series.

In the following Table I have given the particulars of the ranges and averages in the various months, tracing the series from the early part of

October 1900, when it was about six months old, to January 1902, when it was approaching its third year. On 30th May, when over a year old, the average length was 151·3 mm., or $5\frac{15}{16}$ inches, and the range from 113 mm. to 189 mm. From the end of May until the end of July they increased in mean length from 151·3 mm. to 192·5 mm. or $7\frac{9}{16}$ inches, an increment in the sixty-two days of 41·2 mm. ($1\frac{5}{8}$ inches). The smallest of the series increased by 24 mm., and the largest by 55 mm. ($2\frac{3}{16}$ inches).

SERIES I. (8th October 1900) to SERIES II. (15th January 1892).

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
Aberdeen Bay.		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
1900										
8th October	2223	69	$2\frac{3}{4}$	173	$6\frac{13}{16}$	119·5	$4\frac{11}{16}$	...	...	...
13th do.	278	72	$2\frac{13}{16}$	180	$7\frac{1}{8}$	133·7	$5\frac{5}{16}$	...	...	...
Combined	*2501*	*69*	$2\frac{3}{4}$	*180*	$7\frac{1}{8}$	*121·0*	$4\frac{3}{4}$	...	...	...
31st October	3702	60	$2\frac{4}{8}$	(196)	...	126·7	$4\frac{15}{16}$	5·7	$\frac{1}{4}$	20
Average, October ...	*6203*	*60*	$2\frac{3}{8}$	*(196)*	...	*124·4*	$4\frac{7}{8}$	...	...	...
17th to 21st December	8059	77	3	(197)	...	134·2	$5\frac{1}{4}$	9·8	$\frac{3}{8}$	59
1901										
30th May	366	113	$4\frac{6}{16}$	189	$7\frac{7}{16}$	151·3	$5\frac{15}{16}$	17·1	$\frac{11}{16}$	160
13th June (1)	431	107	$4\frac{3}{16}$	203	8	156·3	$6\frac{1}{8}$	5·0	$\frac{3}{16}$	14
13th do. (2)	3579	113	$4\frac{7}{16}$	207	$8\frac{3}{16}$	158·8	$6\frac{1}{4}$	7·5	$\frac{5}{16}$	14
Combined (1, 2) ...	*4010*	*107*	$4\frac{3}{16}$	*207*	$8\frac{13}{16}$	*158·5*	$6\frac{1}{4}$	7·2	$\frac{5}{16}$	14
5th July	246	124	$4\frac{7}{8}$	224	$8\frac{13}{16}$	163·4 (*174·0*)	$6\frac{7}{16}$	4·9	$\frac{3}{16}$	22
31st do.	411	137	$5\frac{3}{8}$	244	$9\frac{5}{8}$	192·5	$7\frac{9}{16}$	29·1	$1\frac{3}{16}$	26
4th September (1, 2)...	70	158	$6\frac{1}{4}$	235	$9\frac{1}{4}$	206·2	$8\frac{1}{8}$	13·7	$\frac{9}{16}$	35
10th do. (1) ...	105	158	$6\frac{1}{4}$	252	$9\frac{15}{16}$	[204·1]	$8\frac{1}{16}$	...	...	...
10th do. (2) ...	309	163	$6\frac{7}{16}$	245	$9\frac{5}{8}$	[201·9]	...	...	...	...
Combined (1, 2) ...	*414*	*158*	$6\frac{1}{4}$	*252*	$\frac{15}{16}$	*[202·4]*	...	...	...	...
18th October (1) ...	71	179	$7\frac{1}{16}$	256	$10\frac{1}{16}$	222·6	$8\frac{3}{4}$	16·4	$\frac{5}{8}$	44
18th do. (2) ...	144	185	$7\frac{5}{16}$	267	$10\frac{1}{2}$	223·6	$8\frac{13}{16}$	17·4	$\frac{11}{16}$	44
Combined	*215*	*179*	$7\frac{1}{16}$	*267*	$10\frac{1}{2}$	*223·2*	$8\frac{13}{16}$	17·0	$\frac{11}{16}$	44
6th November... ...	19	190	$7\frac{1}{2}$	242	$9\frac{1}{2}$	[209·1]	...	...	...	...
29th do.	76	192	$7\frac{9}{16}$	268	$10\frac{9}{16}$	[217·6]	...	...	...	...
17th December ...	42	189	$7\frac{7}{16}$	254	10	[201·7]	...	...	...	...
1902										
15th January	5	209	$8\frac{1}{4}$	258	$10\frac{3}{16}$	227·2	$8\frac{15}{16}$	4·0	$\frac{3}{16}$	89

From 31st July to 18th October, when the mean size was 223·2 mm., or $8\frac{13}{16}$ inches, the increase amounted to other 30·7 mm., or $1\frac{1}{4}$ inches, the total mean increment in the 141 days being 71·9 mm. ($2\frac{13}{16}$ inches). In the same period of 141 days the smallest grew from 113 mm. to 179 mm., an increase of 66 mm., while the largest increased from 189 to 267 mm., an increment of 78 mm. ($3\frac{1}{16}$ inches). In some of the hauls in autumn the average size, as computed from the measurements, exhibited not an increase, but a decrease. An examination of the curves, and in some cases of the range alone, makes it clear, however, that this diminution is owing to the imperfect representation of the larger fishes. The numbers of the whitings of this series caught in autumn diminishes owing to offshore migration, and the earliest to go are the larger ones. On 15th January only five were taken, and their average size was 227·2 mm., or close upon nine inches. On 30th May the same group—then beginning their third year—measured from 219 to 311 mm., the computed mean size being 251·9 mm., or $9\frac{15}{16}$ inches. Since the mean size of the previous series on 30th May was 151·3 mm., the increment in a year amounted to almost exactly 100 mm., or about four inches. It will also be seen from the Table that from 8th–13th October 1900 to 18th October 1901 the increase in the mean length was from 121·0 mm. to 223·2 mm., a similar increment in the year of about 100 mm., or 4 inches, and this amount agrees with the mean annual increment deduced from comparison of the averages.

This series of whitings in their second year was represented in hauls elsewhere. In the Cromarty Firth on 1st June 78 whitings belonged to the series, ranging from 119 to 198 mm., the average size being 161·4 mm., or $6\frac{3}{8}$ inches, and the curve formed is symmetrical. In the deep water off Aberdeen on 28th June, in 65 fathoms, 114, ranging from 141 to 212 mm., had a mean size of 181·1 mm. ($7\frac{1}{8}$ inches). The curve, however, is imperfect, the fishes not being present in due proportion, and a more accurate mean size would be about 186 mm. At the same place on 30th July very few whitings were taken, and only seven apparently belonging to this series. On 21st August seventy were taken, measuring from 174 to 252 mm., and with an average length of 214·9 mm., or $8\frac{1}{2}$ inches. On 3rd September eight caught had a range from 150 to 212 mm., and a mean size of 182·6 mm.—obviously unrepresentative. On 5th November nine, ranging from 223 to 283 mm., had an average size of 255·7 mm. On 28th November nineteen ranged from 198 to 287 mm., the mean size being 242·3 mm. On 16th December they were more abundant, and the curves are satisfactory, the 207 fishes ranging from 192 to 278 mm. and having a mean size of 231·8 mm., or $9\frac{1}{8}$ inches. On 15th January 1902, 126 of this series ranged from 194 to 277 mm., the average size being 231·1 mm.

It will be observed that this series was scantily present in the deep water off Aberdeen in the summer and more abundant in the bay, while the opposite occurred in December and January. More correct averages and ranges would probably be obtained by combining the series from the two localities. Owing to the very small numbers taken in the deep water in summer the combination would only slightly affect the averages for the bay, but in November, December, and January the combination gives the following ranges and means :—

28–29 November,	95	from	192	to	287	:	average	224·8 mm.
16–17 December,	249	,,	189	,,	278	:	,,	226·7 ,,
15 January,	131	,,	194	,,	277	:	,,	230·9 ,,

In the collections from the Firth of Forth this series (II.) was well represented in some of the hauls. At Station III., on 9th–13t h May 740 ranged from 71 to 171 mm. ($2\frac{13}{16}$ inches to $6\frac{3}{4}$ inches), the average size being 124·9 mm., or $4\frac{15}{16}$ inches. At Station V., in deeper water, on 10th May, 1148 ranged from 77 to 173 mm., the mean being 130 mm., or $5\frac{1}{8}$ inches. The two combined, numbering 1888 fishes, had an average size of 128·0 mm., or $5\frac{1}{16}$ inches, and this may be taken as the average length of the whiting in that locality when about one year old.

At Station III., on 23rd July, 569 had a range from 116 to 248 mm. and an average size of 174·9 mm. At the outer station on the following day 340 ranged from 133 to 243 mm., the mean being 168·8 mm. The average size for the combined measurements of the 909 whitings is 172·5 mm. or $6\frac{13}{16}$ inches, the increment of growth indicated in the 83 or 84 days from the May hauls thus being 44·5 mm., or $1\frac{3}{4}$ inches. The largest had increased by 75 mm., or $2\frac{15}{16}$ inches, and the smallest by 45 mm.

On 19th and 22nd August, at Station III., 461 ranged from 153 to 279 mm., and had a mean size of 200·6 mm. At Station V., on 16th August, 153 ranged from 149 to 265 mm., the mean being 186·5 mm. The mean for the series combined is 200·6 mm., showing an apparent growth from the July hauls of 25·7 mm., and from the May hauls of 75·7 mm., or 3 inches.

The larger whitings collected from the deep water off the Shetlands have been found difficult to group satisfactorily. In the hauls in August and September none were procured between 118 mm. and about 290 mm. ($11\frac{1}{2}$ inches). In October the interval was from 139 to 222 mm., and only one was got at this size, the next being 257 mm. In December the interval was from 164 to 236 mm., and the next largest was 257 mm., then 262, 266 mm., after which they were numerous. In May the interval was much less, but very few were taken between 22 and 25 cm. The curve of the great bulk of the whitings measured forms a high column with a base extending from about 29 to 41 cm. in September, 25 to 39 or 40 cm. in October, 25 to 38 cm. in December, and 24 or 25 to 36 or 37 cm. in May. Obviously these do not represent a natural series, and when the measurements are plotted out in ·5 cm. groups little further light is given. The condition contrasts with that shown by the haddocks, and it appears that most of the whitings of the second series are not as a rule present on the bottom, and are therefore not caught, or only occasionally an odd specimen. The question of the growth of the older series of whitings in the deep water must be left for further investigation.

The third year's fish were not caught in such numbers as the second series, and their rate of growth is less rapid. In the following Table I give the particulars of those taken in Aberdeen Bay and off Aberdeen at the various dates mentioned :—

[TABLE.

SERIES II. to SERIES III.

Place and Date.	No.	Smallest.		Largest.		Average Size.		Increase.		
1900		Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.	Days.
17th to 21st December	128	197	$7\frac{3}{4}$	294	$11\frac{9}{16}$	239·0	$9\frac{7}{16}$	...	...	...
1901										
30th May	107	219	$8\frac{5}{8}$	311	$12\frac{1}{4}$	262·7 (*265*)	$10\frac{3}{8}$	23·7	$\frac{15}{16}$	160
13th June	603	211	$8\frac{5}{16}$	337	$13\frac{1}{4}$	267·7	$10\frac{9}{16}$	5·0	...	14
5th July	3	250	$9\frac{7}{8}$	256	$10\frac{1}{16}$	(253·0)	...	...	...	...
31st July	150	246	$9\frac{11}{16}$	354	$13\frac{15}{16}$	293·2	$11\frac{9}{16}$	25·5	1	62
4th September ...	2	267	$10\frac{1}{2}$	292	$11\frac{1}{2}$	(279·5)	...	...	...	...
10th do. ...	2	298	$11\frac{3}{4}$	319	$12\frac{9}{16}$	(308·5)	...	...	...	...
18th October	...	...	...	...	...	...	...	...	...	...
6th November... ...	...	...	...	...	...	...	...	...	...	...
17th December ...	...	...	...	...	...	...	...	...	...	...
15th January	...	...	...	...	...	...	...	...	...	...
Deep Water off Aberdeen.										
1901										
28th June	458	214	$8\frac{7}{16}$	329	$12\frac{15}{16}$	255·8 (*266·5*)	$10\frac{1}{16}$	...	...	...
30th July	53	221	$8\frac{11}{16}$	337	$13\frac{1}{4}$	281·8	$11\frac{1}{8}$	26·0	1	32
21st August	53	257	$10\frac{1}{8}$	347	$13\frac{5}{8}$	289·8	$11\frac{7}{16}$	8·0	$\frac{5}{8}$	22
5th November... ...	4	293	$11\frac{9}{16}$	316	$12\frac{7}{16}$	(304·5)	...	14·7	$\frac{9}{16}$	76
28th do.	2	312	$12\frac{1}{4}$	321	$12\frac{5}{8}$	316·5	$12\frac{7}{16}$	26·3	$1\frac{1}{16}$	99
16th December ...	5	294	$11\frac{9}{16}$	359	$14\frac{1}{8}$	320·	$12\frac{5}{8}$	3·5	$\frac{1}{8}$	18
15th January	10	293	$11\frac{9}{16}$	353	$13\frac{7}{8}$	318·3	$12\frac{1}{2}$	–1·7	...	30

In most of the cases the numbers caught are not very large. In Aberdeen Bay none were caught in the latter part of the year, but the growth from Series II. in December to Series III. in May (160 days) amounted to about 23·7 mm., or $\frac{15}{16}$ of an inch. In the interval of fourteen days, from 30th May to 13th June, 5·0 mm. was added, and in the 62 days to 31st July 25·5 mm., or 1 inch. The increase from December to July was thus about 54 mm. ($2\frac{1}{8}$ inches).

In the deeper water off Aberdeen the apparent increase from 28th June to 30th July was 26 mm., or 1 inch; other 8 mm. were added from that date to 13th August, and the apparent whole increase from the end of June to 16th December was 64·2 mm.

The mean size of the whitings in Aberdeen Bay which had just entered upon their third year (in May) was about $10\frac{1}{4}$ inches.

In the deep water off Kinnaird Head 110 whitings of this series were taken on 4th July. They ranged from 238 to 328 mm., and had an average size of 279·5 mm., or $10\frac{1}{8}$ inches. In the Firth of Forth the series was scantily represented, and the limits are sometimes difficult to determine. On 23rd July thirty-three ranged from 253 to 340 mm., having a mean size of 280·4 mm., or eleven inches. On 22nd August the average size of seven, ranging from 276 to 304 mm., was 289 mm.

The observations show that the rate of growth of the whiting varies in different regions (*see* Pl. XX., XXI.). It is most markedly rhythmic in such places as the Firth of Forth, where the summer and winter temperatures have the greatest range. In winter growth is greatly retarded there, or almost quite arrested, while in May, June, July, and August it is very rapid, about three-quarters of the total increase in the year taking place in these months.

In an open bay, such as Aberdeen Bay, with deep water off the shore, the growth, while still markedly cyclical, is less so than in the former case. In winter growth is slower, but it continues. The most rapid increase also takes place here in May, June, July, and August.

In the deep water towards the middle of the northern part of the North Sea, it may be said that, although the observations on the whiting, except with regard to the first series, are imperfect, growth loses much of its cyclical character. It seems to take place almost as quickly in the winter as in the summer, and is thus more uniform. The phenomenon is consistent with the comparatively slight seasonal change of temperature that occurs in these depths, and the later period when the minimum temperature is reached. There is evidence that the growth at some part of the period between December and May is a little slower, but further observations are required.

Moreover, it will be noticed from the curves that the young whitings in their first summer are largest in the Firth of Forth and smallest in the deep northern waters, while those at Aberdeen are of intermediate size. This might be partly due to a possible difference in the spawning season; but it is, no doubt, also due to the fact that in such places as the Forth the larval fishes, on issuing from the egg, begin their life in a rapidly rising temperature and grow quickly, while in the deep water off the Shetlands at the same time they encounter a temperature just beginning to rise, and which rises sluggishly. In August, for example, the young whitings are as large in the Forth as they are in Aberdeen Bay in September, and considerably larger than they are in the northern waters, but in the following January they are rather smaller, and they are considerably smaller when one year old.

Another deduction from the curves is that the whitings of an area do not appear to migrate far from it—*i.e.*, the curves show the same features for fish one, two, and three years old.

With regard to the age of the whiting when it first attains maturity, the observations which have been hitherto made as to the average size when maturity is reached are not very extensive, and the areas in which the fish were taken were not always sufficiently well determined, a point, as will be seen from the Table given below, of some importance.

In the Firth of Forth and neighbourhood both females and males were found mature when nine inches in length.* On the west coast of Ireland Holt examined a number of whiting, all the males being over nine inches and all the females over eleven inches, and all were mature;† and the same observer, from the examination of fish at Grimsby, has fixed nine inches as the size at which the majority of females first become mature in the North Sea.‡ While the average size of the female and

* *Tenth Ann. Rep. Fishery Board for Scotland*, Part iii., p. 239*a*.
† *Rep. Council Ry. Dub. Soc.*, 1891. App. C, p. 277.
‡ *Journ. Marine. Biol. Assoc.*, iii., p. 377.

male whiting (all sizes together) closely correspond (that of 423 males examined being 11·29 inches, that of 895 females 11·78 inches) there do not appear to be exact observations as to the average size at first-maturity in the two sexes.

From the investigations detailed in this paper it appears that some whitings, before the conclusion of the spawning season in the year after that in which they were themselves born—*i.e.*, when they are a little over one year of age—may attain a size about equal to the size above stated at which maturity is first reached. But the size of the whitings at corresponding ages may, as we have seen, differ considerably in different places, and the size at which maturity is attained will, no doubt, differ in the same way. Such cases, however, of large whitings one year old are exceptional, and represent only the few biggest fish of the generation; while the average size, and still more, of course, the minimum size, of the series are very much lower. In Aberdeen Bay, for example, whitings one year old may vary from about $3\frac{1}{2}$ inches to $7\frac{1}{2}$ inches, the average size being $5\frac{3}{4}$ inches. In the Firth of Forth the range is from about $2\frac{3}{4}$ inches to $6\frac{5}{8}$ inches, the average being $4\frac{15}{16}$ inches. The whitings from the deep water off the Shetlands (according to the computation previously made, grow more quickly during winter and spring, and may be regarded as ranging in May from about five to nine inches, with an average of seven inches; but further observations are required in this case. There is little doubt that none of these whitings spawn at the sizes stated—*i.e.*, when one year old.

When two years old the whitings at Aberdeen range from about seven and three-quarter inches to over twelve inches, the average size being about $9\frac{7}{8}$ inches. In the Forth they are somewhat smaller, ranging from under seven to nearly $11\frac{1}{2}$ inches, the average size being about $8\frac{7}{8}$ inches. It is this series, then, I think without any doubt, that must be regarded as that which spawns for the first time; and on the assumption discussed elsewhere (p. 359) it is probable that all the whitings spawn when two years old, the larger fishes probably earliest in March, and the smaller towards the end of the spawning season in June, when they will have added considerably to their length. One would expect to find therefore, among these spawning whitings a variation in the size at first-maturity corresponding to the limits of the group—*i.e.*, from about eight to over twelve inches.

I have given in the following Table the approximate length and weight of the whitings at one and two years of age in the localities referred to:—

[TABLE.

No. of Years Old.		Smallest.				Largest.				Average.			
		Length.		Weight.		Length.		Weight.		Length.		Weight.	
		Mm.	Ins.	Grms.	Oz.	Mm.	Ins.	Grms.	Oz.	Mm.	Ins.	Grms.	Oz.
I.	Forth ...	70	$2\frac{3}{4}$	2·8	$\frac{1}{10}$	168	$6\frac{5}{8}$	31	1	125	$4\frac{15}{16}$	14	$\frac{1}{2}$
	Aberdeen ...	90	$3\frac{1}{2}$	5·0	$\frac{1}{6}$	190	$7\frac{1}{2}$	43	$1\frac{1}{2}$	145	$5\frac{3}{4}$	21	$\frac{3}{4}$
	Off Shetlands	130	$5\frac{1}{8}$	16·0	$\frac{1}{2}$	230	$9\frac{1}{8}$	87	3	180	$7\frac{1}{16}$	36	$1\frac{1}{4}$
II.	Forth ...	173	$6\frac{1}{16}$	33	$1\frac{1}{4}$	290	$11\frac{3}{8}$	187	$6\frac{1}{2}$	225	$8\frac{7}{8}$	77	$2\frac{3}{4}$
	Aberdeen ...	195	$7\frac{11}{16}$	47	$1\frac{3}{4}$	310	$12\frac{1}{4}$	234	$8\frac{1}{4}$	250	$9\frac{7}{8}$	115	4
	Off Shetlands	...	...	...	...	...	...	...	...	...	...	...	...
III.	Forth ...	*270*	*$10\frac{5}{8}$*	*150*	*$5\frac{1}{4}$*	*370*	*$14\frac{1}{2}$*	*405*	*$14\frac{1}{4}$*	*320*	*$12\frac{5}{8}$*	*285*	*10*
	Aberdeen ...	...	...	...	...	...	...	...	...	...	...	...	...
	Off Shetlands	...	...	...	...	...	...	...	...	...	...	...	...

The weights, as already explained (p. 334), are given from the curve obtained by weighing a number of whitings at different sizes, and they show more impressively than the measurement of the length the variations in growth that may exist within the limits of one generation, at Aberdeen, for example, from five to forty-three grammes in the first series, and from 47 to 234 in the second. While the average length of a whiting in the Forth when one year old is about $4\frac{15}{16}$ inches and its weight about half an ounce, at Aberdeen its length is about $5\frac{3}{4}$ inches and its weight approximately three-quarters of an ounce. Growth during the following year adds scarcely four inches to the length of the whiting in the Forth, but its weight is increased between five and six-fold, viz., to nearly $2\frac{3}{4}$ ounces; at Aberdeen its length is increased by over four inches and its weight to slightly over four ounces. When three years old the Forth whiting measures about $12\frac{1}{2}$ inches and weighs slightly over ten ounces, having increased its weight in the year by about $7\frac{1}{4}$ ounces.

THE HADDOCK (*Gadus æglefinus*, L.).

The haddock spawns on the East Coast in February, March, and April, and for the most part in March, but spawning fishes may be obtained sometimes as early as the end of January and as late as the beginning of May. The great bulk of the larval haddocks are probably hatched in the early part of April, when they have a length of about 4 mm. Their growth subsequently is rapid, and, as is the case with the whiting, they are at first pelagic and do not frequent the bottom until of considerable size.

The earliest collections of the young haddocks made with the small-meshed bottom net were obtained at the end of July; none were taken at the end of June or beginning of July. In Aberdeen Bay on 31st July twenty-two were secured, the largest measuring 125 mm., or $4\frac{15}{16}$ inches, and the smallest 98 mm., or $3\frac{7}{8}$ inches, the average computed being 108·7 mm. On the day before, in a haul in 62 fathoms off Aberdeen, sixty-five were taken, the smallest measuring 96 mm. and the largest 131 mm., or $5\frac{1}{8}$ inches, the average being very nearly what it was in Aberdeen Bay, viz. 109·5 mm. Haddocks somewhat smaller were obtained a few days earlier at the mouth of the Firth of Forth (Station V.), but none were found at this time at the inner station in shallower water (III.), the condition in regard to the whiting at these two stations being thus reversed (*see* p. 391). These young haddocks ranged from 72 mm. ($2\frac{7}{8}$ inches) to 107 mm., and had an average size of 91·3 mm.

In Aberdeen Bay 103 were taken on the 10th September with the small-meshed net, the smallest measuring 109 mm. and the largest 185 mm., the average size being 147·3 mm., or $5\frac{13}{16}$ inches. Further collections were obtained in October, November, and December, and the particulars in regard to these hauls are given in the following Table:—

Date.	No.	Range.	Average Size.		Increase.		No. of Days.
1901		Mm.	Mm.	Ins.	Mm.	Ins.	
31st July	22	98–125	108·7	$4\frac{5}{16}$	...	...	...
*4th September	36	118–194	151·7	6	*43·0	$1\frac{11}{16}$	35
10th do.	103	109–185	147·3	$5\frac{13}{16}$	38·6	$1\frac{1}{2}$	41
18th October	767	122–197	169·8	$6\frac{11}{16}$	22·5	$\frac{7}{8}$	38
6th November	168	133–210	172·7	$6\frac{13}{16}$	2·9	...	20
29th do.	3	173–193	180·7	$7\frac{1}{8}$	8·0	$\frac{5}{16}$	23
17th December	15	157–200	179·9	$7\frac{1}{8}$	−0·8	...	18
15th January	3	170–197	182·5	$7\frac{3}{16}$	2·6	...	30
1900							
8th October	478	118–199	159·7	$6\frac{5}{16}$	...	...	...
13th do.	37	130–187	160·3	$6\frac{5}{16}$	...	...	...
31st do.	127	127–205	166·2	$6\frac{6}{16}$	...	...	...
1st November	483	135–222	170·5	$6\frac{11}{16}$	...	...	...
Combined	610	127–222	169·6	$6\frac{11}{16}$	9·3	$\frac{3}{8}$	18
17th to 19th December...	471	143–224	181·4	$7\frac{1}{8}$	11·8	$\frac{7}{16}$	48

* Only 18 in small-meshed net.

In most of these hauls the series is well represented, as shown by the curves and the ranges, except in the case of the July collection, in which obviously only the larger fishes of the series were taken. A more accurate range would probably be from 45 or 50 mm. to 130, giving a mean size of about 80 or 90 mm. ($3\frac{1}{2}$ inches) for the end of July; and from 85 or 90 mm. to 195 mm., with an average of about 140 mm., or $5\frac{1}{2}$ inches, towards the middle of September.

It will be observed that the number of these small haddocks taken in November and December 1901 in Aberdeen Bay was very small, although the averages agree very well with those in the corresponding months of the previous year, when larger numbers were caught.

The measurements attest the rapid growth of the haddock in its first year. Even taking the mean size in July as it stands, there is shown an increase to December of about 72 mm., or $2\frac{7}{8}$ inches; while if the amended mean-size for the end of July be adopted the increase becomes about 90 mm. or $3\frac{1}{2}$ inches, about half the growth in length occurring between the hatching in April and the end of July.

It will also be noticed that in late autumn and in winter the growth is much slower, the greatest increase occurring, in the series represented, in August and the early part of September.

The particulars regarding this series of small haddocks obtained in the deep water off Aberdeen show a similar rapidity of growth, as indicated in the following Table:—

Date.	No.	Range.	Average Size.		Increase.		No. of Days.
1901		Mm.	Mm.	Ins.	Mm.	Ins.	
30th July	65	96–131	109·5	$4\frac{5}{16}$	...	...	...
21st August	244	96–150	121·9	$4\frac{13}{16}$	12·4	$\frac{1}{2}$	22
*3rd September	20	98–158	*(125·4)	...	(3·5)	...	...
5th November	31	120–199	172·4	$6\frac{13}{16}$	50·5	2	76
28th do.	102	147–208	176·8	7	4·4	...	23
16th December... ...	1219	137–214	180·2	$7\frac{1}{8}$	3·4	...	18
1902							
†15th January	775	150–210	180·5	$7\frac{1}{8}$	0·3	...	30

* Small-meshed net only. † $\frac{1}{4}$-inch mesh.

It will be observed that the averages for corresponding dates agree very closely with those for Aberdeen Bay, and that whereas the young haddocks were almost absent in the bay in December and January, they were abundant in the deep water. The range and averages for July and August require correction, as before, owing to the non-representation of the smaller fishes of the series; but as they stand they show an increment of length of 71 mm., or $2\frac{13}{16}$ inches, from 30th July to 16th December and 15th January. Growth is obviously also slow here in winter, but the average for January is probably too low, although the curve is good, very few fish (27) larger than 210 mm. being taken in the nets—the next largest measuring 240 mm.

It will be observed that the largest fishes of the series increased from 131 mm. ($5\frac{3}{16}$ inches) at the end of July to 214 mm. ($8\frac{7}{16}$ inches) in December, an increase of 83 mm.

In the Firth of Forth the young haddocks procured during July, August, and September were somewhat smaller than those taken off Aberdeen, but they also exhibited a rapid growth, the mean size increasing from 91·3 mm., or $3\frac{5}{8}$ inches, on 24th July to 119·9 mm., or $4\frac{3}{4}$ inches, on 3rd September, an apparent increment of 28·6 mm. or $1\frac{1}{8}$ inches in the forty-two days. The real increase, for the reason already indicated —the want of a due proportion of the smaller haddocks in July—was probably over an inch and a half.

[Table.

Date.	No.	Range.	Average Size.		Increase.		No. of Days.
Station V.		Mm.	Mm.	Ins.	Mm.	Ins.	
24th July	49	72–107	91·3	$3\frac{5}{8}$	...	...	...
16th August	288	82–133	108·1	$4\frac{1}{4}$	...	...	...
21st do.	403	90–147	112·9	$4\frac{7}{16}$	...	...	...
Combined	691	82–147	110·9	$4\frac{3}{8}$	19·6	$\frac{3}{4}$	26
3rd September	336	95–157	119·9	$4\frac{3}{4}$	9·0	$\frac{1}{4}$	17
Station III.							
23rd July	...	...	...	...	...	...	...
19th August	260	75–130	105·9	$4\frac{3}{16}$	...	...	...
22nd do.	106	85–142	111·3	$4\frac{3}{8}$	...	...	...
Combined	366	75–142	107·3	$4\frac{1}{4}$	...	...	...

In the deep water off the Shetlands the young haddocks under one year of age were obtained in August, September, and October 1900, December 1901, and March 1902, and the same series, then over one year old, were taken in May 1901. The various months are not in sequence, and the ranges and averages cannot therefore be compared with strict accuracy, since the growth in one year, or at a given period of one year, may not correspond with another year. The places, moreover, where the haddocks were caught were sometimes a considerable distance apart (*see* p. 407). The variation in this respect is, however, probably not so great as to impair the value of comparison. The particulars of the series are given in the Table on p. 408).

On 31st August–4th September, 263 ranging from 61 to 148 mm. had an average size of 88·4 mm., or $3\frac{1}{2}$ inches; on 16th–19th October 235 ranged from 82 to 167 mm., the average being 119·2 mm., or $4\frac{11}{16}$ inches; on 11th December 265 ranged from 91 to 185 mm., the mean being 135·4 mm., or $5\frac{5}{16}$ inches; and on 10th March (1902) 36 ranged from 153 to 205 mm., with an average size of 173·0 mm., or $6\frac{13}{16}$ inches. Some of these ranges and averages require slight correction, and the range for March (52 mm.) is obviously much too small; it ought to be from about 120 to 210 mm., and the average should be 8 or 10 mm. lower.

In any case the contrast in size between these young deep-sea haddocks and those of Aberdeen Bay at corresponding dates is marked. At the beginning of September they are more than two inches smaller in the deep water, an inferiority no doubt largely due, as indicated also in the whiting, to the slower rate of growth in the lower summer temperature prevailing there as well as to a later spawning period. But this inferiority is gradually diminished during the following winter and spring, so that while the September average differs by about 53 mm. the December average differs by about 46 mm., and in May the difference is reduced to something like ten millimetres. (*See* Curves, Plate XXI.).

It is clear that the young haddocks described above are fish which were hatched at the last spawning season, and not fish of the previous year—that is to say, that they are only some months old. We know that growth in inshore waters is more rapid before the end of July than afterwards, and yet from that period to the end of the year the young haddocks at Aberdeen added about three inches to their length. Moreover, the use of a fine-meshed net ($\frac{1}{4}$ inch) both on the bottom and in midwater yielded no haddocks smaller than 150 mm. ($5\frac{7}{8}$ inches) in January, and none smaller than 137 mm. in December. It seems surprising that a haddock should grow, on the average, to a length of $7\frac{1}{8}$ inches from the time it was hatched from the egg early in April until December, when it is about eight months old, and that others, no doubt hatched a month or so earlier, should in the same period reach a length of over $8\frac{1}{2}$ inches.

With regard to the haddock when one year old, or in its second year, the only haul made during the spawning season was the one in the deep water off the Shetlands on 10th March, and the computed size of the series was 173 mm., or $6\frac{13}{16}$ inches, while the corrected average is about 165 mm., or $6\frac{1}{2}$ inches.

In the hauls made in Aberdeen Bay and in the deep water off Aberdeen, this series was well represented on some occasions, but on others the haddocks of the second year were not abundant. It was, moreover, difficult in some cases to differentiate this group from the next older generation, and there is therefore not the same certainty in regard to the increase at different periods as with the first series.

In Aberdeen Bay the average size of 58 taken on 30th May was 215·3 mm., or $8\frac{1}{2}$ inches, the range being from 174 to 241 mm. These haddocks were a little under fourteen months old. On 13th June 110 ranged from 181 to 263 mm., the mean size being 224·5 mm., or $8\frac{7}{8}$ inches, the increase in the fourteen days amounting to 9·2 mm. On 10th September 206 varied in length from 197 to 317 mm., the average size being 264·7 mm., or $10\frac{7}{16}$ inches, showing an increase in the ninety days of 40·2 mm. The hauls in October, November, and December yielded very few haddocks of this series, viz. 49, 3, 4, and 4, and the averages were small. These haddocks, like the whitings of corresponding age, apparently moved out from the inshore waters in the months named. In 1890, however, they were more abundant, and gave higher averages. Thus 516 on 8th–13th October had a mean size of 281·9 mm.; and 1001 on 31st October–1st November a mean size of 293·3 mm. On December 17th–19th 263, ranging from 237 to 345 mm., had an average size of 295·3 mm., or $11\frac{5}{8}$ inches. This would represent a growth of about 80 mm. ($3\frac{1}{8}$ inches) from the end of May.

In the deep water off Aberdeen 750 taken on 28th June ranged from 168 to 278 mm., and the average size was 230·2 mm., or a little over nine inches. On 30th July the mean size of 311 was 244·5 mm., and the range from 184 to 293 mm.; on 21st August 540 ranged from 202 to 308 mm., the average size being 250·8 mm. On 5th November the mean size of 219 was 273·2 mm., and the range between 230 and 312 mm.; and on 16th December the mean size of 457 was 277·4 mm., and the range from 223 to 325. Only 24 were taken on 15th January, and they ranged from 240 to 334 mm., the average being 286·8 mm. In the 202 days, from 28th June, the apparent increase amounted to 56·6 mm., or about $2\frac{1}{4}$ inches.

The information in regard to the growth of the haddocks in their third year in Aberdeen Bay is less complete, owing partly to the comparatively small number of specimens taken and also to the difficulty in many cases of precisely defining the limits of the group. On 30th May seventy-one ranged from 262 to 372 mm., the average being 315·7 mm., or $12\frac{3}{8}$ inches. On 6th June 486 taken with the ordinary otter-trawl ranged from 264 to 371 mm., the average being 319·3 mm. On 13th June the corresponding average was 328·7 mm., on 31st July 246·6 mm., and on 10th September 367·6 mm., showing an apparent increment in the 103 days of 51·9 mm. None of this series were got in the later hauls.

In the deep water off Aberdeen 179 taken on 28th June had an average size of 317·4 mm., but the range (280–388) and the curve shows the true mean should be considerably higher. On 30th July 81 had a range from 296 to 396 and an average of 334·7 mm.; on 21st August the mean size of 59 was 348·7 mm.; on 5th November the mean of 22 was 346·2 mm., but as amended it should be about 366 mm.; on 16th December fifteen had a mean size of 379·1 mm.; and on 15th January three averaged 353 mm. The apparent increment in the 172 days, from 28th June to 16th December, amounted to 61·7 mm.

The haddocks older than three years were not procured in great numbers, but they were fairly well represented in some hauls. On 6th June, in Aberdeen Bay, sixty-six, ranging from 373 to 465 mm., had an average size of 403·8 mm., or $15\frac{7}{8}$ inches. There were other two at 502 and 503 mm. which may be regarded as representing another series; one at 582 and one at 648 probably representing fish over four, five, and six years of age, possibly more. On 13th June forty-five, measuring from 387 to 463 mm., had an average size of 408 mm. There were two at 505 and 506 mm., two at 552 and 578 mm., and three from 615 to 619 mm., with an average of 617·3 mm. ($24\frac{1}{4}$ inches). On 31st July eight ranged from 393 to 468 mm., the average being 416·2 mm.; on 4th September six, ranging from 420 to 436 mm., had a mean size of 426·8 mm.; on 10th September the mean size of six, measuring from 421 to 445 mm., was 431·1 mm., and there were other three 574, 582, and 658 mm. ($25\frac{7}{8}$ inches). In October, November, December, and January none of these large haddocks were caught in Aberdeen Bay, nor, with the exception of three in November (with an average of 406·7 mm.), in the deep water off Aberdeen. On 28th June, at the latter place, twelve, ranging from 392 to 427 mm., had an average size of 405·2 mm.; on 30th July ten, measuring from 412 to 452 mm., had an average size of 428·6 mm. ($16\frac{7}{8}$ inches), and the average of three, ranging from 502 to 528 mm., was 517 mm. ($20\frac{3}{8}$ inches). On 21st August two measured 450 and 462 mm., the average being 456 mm. ($17\frac{7}{8}$ inches).

Large haddocks were also procured in some hauls in the Moray Firth. On 1st June, off Lossiemouth, forty, just over three years old, ranged from 281 to 363 mm., the average being 324·4 mm., or $12\frac{3}{4}$ inches, and forty-three varied from 371 to 457 mm., the average being 407·3 mm., or about 16 inches. In this haul there were a considerable number of larger haddocks, ranging from 469 mm. ($18\frac{1}{2}$ inches) to 835 mm. ($32\frac{7}{8}$ inches), but they cannot at present be satisfactorily grouped into series. The deepest sulci in the curves are at 51, 57·5, 64, 67, and 74 cm.* While it is difficult to define the series to which these large haddocks belong, it is evident that the larger ones must be of considerable age. Since a haddock when three years old measures about $14\frac{3}{4}$ or 15 inches in length, and growth is slower after maturity is reached, it is probable the largest haddocks in this haul were at least about nine years old.

Hauls were also made at Smith Bank in the Moray Firth in June and November, and in Sinclair Bay on the coast of Caithness at the beginning of June, but the curves of the measurements are not satisfactory.

At Sinclair Bay on 4th June the haddocks of the preceding year were

* The centimetre grouping is as follows:—

47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
1	3	1	1	1	4	3	4	4	4	1	4	4	5	5	4	6	3	7
66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
10	2	6	2	3	3	5	4	1	4	–	–	–	2	–	–	1	1	–

represented by five specimens from 214 to 266 mm. in length, the average being 217·8 mm., or $8\frac{5}{8}$ inches. The next series—fish a little over two years old—numbered 135, and measured from 280 to 365 mm., the average being 323·6 mm., or $12\frac{3}{4}$ inches. The fourth series, or fish a little over three years old, numbered 114, and had an average size of 408·1 mm., or $16\frac{1}{8}$ inches, the range being from 375 to 462 mm. There were other fifteen, measuring from 465 to 538 mm., with an average of 490·6 mm. ($19\frac{1}{4}$ inches), representing fish about four years and two months old, and another measuring 570 mm.

In the haul on Smith Bank on 5th June, in 22 fathoms, seventeen haddocks represented the fish of the preceding year; they measured from 217 to 246 mm., and had an average size of 231 mm., which is too high. The next series comprised 224 haddocks from 256 to about 363 mm., the average size being 309·7 mm., or $12\frac{3}{16}$ inches. Other 82 ranged from 365 to 444 mm., with an average of 393·8 mm., or about $15\frac{1}{2}$ inches, and seven measured from 458 to 524 mm., the average being 486·9 mm., or a little over 19 inches. There was also one at 711 mm.

On November 8th the haddocks of the year were represented by eleven from 186 to 206 mm., with an average of 197·6 mm., or $7\frac{3}{4}$ inches.

A haul in 83–85 fathoms on 4th July off Kinnaird Head yielded 105 haddocks of the previous year which gave a good curve, the sizes ranging from 174 to 263 mm., the average being 215·5 mm., or $8\frac{1}{2}$ inches. The mean size is considerably below that of the haddocks off Aberdeen at nearly the same date and approximates to that of the haddocks caught further north-east, off the Shetlands. The remainder of the curve is irregular, but the second series—over two years of age—appears to comprise 94 haddocks ranging from 273 to 374 mm., the average being 319·8 mm., or $12\frac{5}{8}$ inches. Other thirteen measured from 383 to 474 mm. with an average of 408·7 mm., or a little over sixteen inches, and one measured 502 mm.

The young haddocks from the deep water off the Shetlands have been already referred to (p. 404). The definition of the limits of the older series presents greater difficulties, although not so much as was found to be the case with the whiting. The places where the hauls were taken are approximately as follows:—

(1) 31 Aug.–4 Septr., 1900.—Lat. 59° 35′ N., long. 1° 5′ E.; 70 miles S.E. by E. of Sumburgh Head, Shetland, 65 fathoms.

(2) 16–19 October, 1900.—Lat. 59° 24′ N., long. 1° 8′ W.; 16 miles S.E. of Fair Isle, 60–65 fathoms.

(3) 19–20 May, 1901.—Lat. 59° 55′ N. to 60° 10′ N., long. 0° 50′ E.; 60 miles E. by S. of Sumburgh Head; 65–70 fathoms.

(4) 11 December, 1901.—Lat. 59° 16′ N., long. 0° 53′ E.; about 75 miles S.E. of Sumburgh Head; 75 fathoms.

(5) 10 March, 1902.—Lat. 60° 42′ N., long. 1° 45′ E.; nearly midway between Unst, Shetland, and Norway; 75 fathoms.

In most of the hauls the curves of measurements are not very satisfactory. The measurements of the larger haddocks in August and September, 1900, were made on the inch scale (to quarters), and the great bulk of them formed a curve whose base extended from about 28 to 42 or 43 cm., with little indication of a sulcus until about 37 cm. More than one series were really comprised in this group.

In October, when all the haddocks were measured on the millimetre scale, two distinct groups were present—those of the year and the series of the year before. The older fishes formed a group ranging from about 30 cm. to 44 or 48 cm., the downward slope of the curve being prolonged and broken, but clear indication of a division between series existing, usually high up on the curve, about 36 cm., and which when prolonged to the base line reached to about 39 cm.

In the May hauls the first series was imperfectly represented, but a clear division existed between 24 and 25 cm., while the fish above the latter size formed a more or less slumped group, the tall peaked column formed by the curve resting on a base extending from 25 cm. to 47 or 48 cm. The curves of individual hauls, however, indicated a division about 34 or 35 cm. and another about 43 cm.

On 11th December a haul was taken by Captain Caie, of the "Star of Peace," and all the fish caught were brought to the Marine Laboratory, those from the otter trawl in ice, and those from the small-meshed net in one per cent. formaline solution. The curves of the measurements in this case were very satisfactory up to about 42 cm., a first, second, and third series being well defined.

The haul on 10th March was obtained in the same way, but about 100 miles further in a north-easterly direction. The two first series were well defined, but the separation between the second and the third was not so distinct, and the curve of the measurements of the haddocks still larger was irregular.

In the following Table I have given the particulars referring to these various hauls, as well as they can be made out, and have placed in brackets the amended ranges and averages in cases where part of the series was absent :—

Date.	Series I.			Series II.			Series III.		
	No.	Range.	Average.	No.	Range.	Average.	No.	Range.	Average.
		Mm.	Mm.		Mm.	Mm.		Mm.	Mm.
31st Aug. to 4th Sept.	263	61–148	88·4	92	180–286	239·3 (233·0)	1585	292–390	343·3
16th to 19th October...	235	82–167 (70–167	119·2 118·5)	866	202–299 (195-300)	260·6 247·5)	1051	300–409	357·4
11th December ...	265	91–185	135·4	346	213–306	264·3	134	318–419	370·9
10th March	36	153–205 (120–210	173·0 165·0)	352	223–317	274·6	...	...	...
19th, 20th May ...	201	160–238	197·4	390	247–346	311·8 (296·5)	692	348–459	384·0

The growth of the first series, very distinctly represented in the curves, has been already referred to. Neglecting the possible variation due to different years and difference of places, the growth indicated from the beginning of September until 11th December, an interval of about one hundred days, amounted to about 47 mm., or $1\frac{7}{8}$ inches; while the apparent growth from 11th December to 10th March, an interval of about 90 days, amounted to 37·6 mm., or $1\frac{1}{2}$ inches. With the amended average for March the increment amounted to 29·6 mm. From 11th

March to 20th May, 71 days, the apparent increase was 24·4 mm., or on the amended average 32·4 mm. The increase in length in the whole period from the beginning of September till the third week in May amounted to about 109 mm., or $4\frac{5}{16}$ inches.

The increase in the second series over the whole period was 72·5 mm. ($2\frac{7}{8}$ inches), or with the amended averages 63·5 mm. ($2\frac{1}{2}$ inches), while the apparent increment in the third series was 40·7 mm., or $1\frac{5}{8}$ inches.

The differences between the average size of the various series may now be considered. The mean length of the haddock at Aberdeen when one year of age we have seen to be about $7\frac{1}{2}$ inches, but the growth in length during the second year is less. The mean of the differences between the average size of the first and second series in twelve collections in the autumn of 1900 was about $4\frac{3}{4}$ inches. The mean of the thirteen hauls in 1901 in which the series were represented was 108 mm. or $4\frac{1}{2}$ inches, which represents the apparent average growth from the first to the second series in the course of a year. The difference varies considerably according to the time of year, being between 130 and 134 mm. in July, when the first series appears, and diminishing in the latter part of the year, owing to the relatively more rapid growth of the first series. And since the growth during the first year in the deep water off the Shetlands is less than at Aberdeen, while it is relatively greater in the second year, the difference between the averages is greater, the mean of the five cases having 126·2 mm., or $\frac{15}{16}$ inches.

The growth in length from the second to the third series is slower. At Aberdeen the mean of ten cases in 1901 was 95·5 mm., or $3\frac{3}{4}$ inches; in several of these instances, however, the number of haddocks was small and the larger ones not proportionally well represented. In the deep-sea haddocks practically the same difference was shown, the mean of the four cases being 94·9 mm.

The growth in length from the third to the fourth series is less precisely determined. The eight cases at Aberdeen in which comparison can be made gives a mean of 81·3 mm., or $3\frac{3}{16}$ inches. In four cases in the Moray Firth the mean amounts to 85·1 mm., or $3\frac{3}{8}$ inches.

I have represented in the curves on Plate XXI. the average growth of the haddock at Aberdeen and in the deep water off the Shetlands; in the former case by taking the mean of the measurements for the bay and the deeper water offshore, while in the latter case the measurements themselves are represented. The averages for Aberdeen Bay and off Aberdeen coincide very closely for the young haddocks from July, in which they were first caught, until the following summer, when they were over a year old, but in the autumn and winter the averages vary and diverge, owing, as explained, to the unequal representation of the larger fishes, but the curve substantially represents the size at different periods.

The following Table is based upon the curve, and represents the approximate mean length and weight of the haddock when one, two, and three years old at Aberdeen and in the deep water of the northern part of the North Sea respectively, as well as the approximate range of length and weight in the same series in the early part of April. The weights are derived from a curve formed by weighing a large number of haddocks; its accuracy is greater for the smaller-sized fishes than for the larger, of which fewer were weighed.

[TABLE.

No. of Years Old.		Smallest.				Largest.				Average.			
		Length.		Weight.		Length.		Weight.		Length.		Weight.	
		Mm.	Ins.	Grms.	Oz.	Mm.	Ins.	Grms.	Oz.	Mm.	Ins.	Grms.	Oz.
I.	Aberdeen ...	145	$5\frac{3}{4}$	26	$\frac{9}{10}$	230	$9\frac{1}{8}$	103	$3\frac{5}{8}$	187	$7\frac{3}{8}$	55	2
	Off Shetlands	130	$5\frac{1}{8}$	17·5	$\frac{3}{5}$	215	$8\frac{1}{2}$	84	3	175	$6\frac{7}{8}$	45	$1\frac{5}{8}$
II.	Aberdeen ...	245	$9\frac{5}{8}$	125	$4\frac{3}{8}$	340	$13\frac{3}{8}$	345	$12\frac{1}{4}$	295	$11\frac{5}{8}$	224	8
	Off Shetlands	235	$9\frac{1}{4}$	110	$3\frac{7}{8}$	330	13	306	$10\frac{7}{8}$	283	$11\frac{1}{8}$	198	7
III.	Aberdeen ...	340	$13\frac{3}{8}$	345	$12\frac{1}{4}$	420	$16\frac{1}{2}$	...	...	380	$14\frac{15}{16}$	470	$16\frac{5}{8}$
	Off Shetlands	...	...	...	...	...	...	...	...	384	$15\frac{1}{8}$	495	$17\frac{1}{2}$

It will be seen that at Aberdeen the year-old haddock is, on the average, about $7\frac{3}{8}$ inches long and weighs nearly two ounces; when two years old it measures about $11\frac{5}{8}$ inches in length and weighs almost half a pound; and when three years of age it is nearly fifteen inches long and weighs over a pound. The deep-sea haddock is smaller and weighs less than the inshore fish of corresponding age until it is about three years old, when it is, according to these measurements, slightly larger; but the observations with regard to the large fish, as already stated, are less complete.

With regard to the age at which maturity is reached, the observations which have been made respecting the average size at first-maturity have not been very extensive. On the East Coast of Scotland males have been found ripe at twelve inches and females at fourteen inches, and females nearly mature at twelve inches.* Holt found that the average size at which the female begins to spawn was about 13 or 14 inches. He says the largest immature and the smallest nearly mature females measured 16 and 11 inches respectively, and the smallest fully mature specimen 15 inches; all males less than ten inches were immature, and all those above twelve inches were mature, or nearly so.† The haddocks which were caught off the Shetlands in March and brought to the Marine Laboratory were gutted, except the smaller ones, measuring up to about twelve inches. I found no ripe or nearly ripe females among those examined, and the males were also immature up to 290 mm., which was the largest ungutted.

Considering these facts, and looking at the curve of measurements (Plate XXI.), it may be said that while some haddocks may reach or exceed the minimum size at maturity when they are two years of age, it is evident the great majority do not spawn until they are three years old, and it is probable that none do so before they are about that age. At Aberdeen the average size when three years old is approximately 15 inches, while the apparent range of size in the series is from about 13 to $16\frac{1}{2}$ inches.

The appended Tables give the particulars of the series of fishes dealt with :—

* *Tenth Ann. Rep. Fishery Board for Scot.*, Part iii., p. 239*a*.
† *Journ. Mar. Biol. Assoc.*, iii., 80.

I.—Plaice.

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1900. Aberdeen Bay.											
Oct. 31, - - III.	8–15	♀♂	46	165	$6\frac{1}{2}$	247	$9\frac{3}{4}$	82	$3\frac{1}{4}$	226·5	$8\frac{15}{16}$
Nov. 1, - - IV.	—	,,	302	250	$9\frac{7}{8}$	369	$14\frac{1}{2}$	119	$4\frac{9}{16}$	309·7	$12\frac{3}{16}$
V.	—	,,	71	370	$14\frac{9}{16}$	438	$5\frac{1}{4}$	68	$2\frac{11}{16}$	397·4	$15\frac{5}{8}$
VI.	—	,,	11	447	$17\frac{5}{8}$	495	$19\frac{1}{2}$	48	$1\frac{7}{8}$	471·2	$18\frac{1}{2}$
VII.	—	,,	2	555	$21\frac{7}{8}$	593	$22\frac{3}{8}$	38	—	—	—
1901 May 30, - II.	8–15	♀	3	127	5	194	$7\frac{11}{16}$	67	—	[166·3]	—
	—	♂	2	182	$7\frac{3}{16}$	198	$7\frac{13}{16}$	16	—	[190]	—
	—	—	5	127	5	198	$7\frac{13}{16}$	71	$2\frac{13}{16}$	175·8	$6\frac{15}{16}$
III.	—	♀	31	212	$8\frac{3}{8}$	299	$11\frac{3}{4}$	87	—	260·4	$10\frac{1}{4}$
	—	♂	34	201	$7\frac{15}{16}$	300	$11\frac{13}{16}$	99	—	262·3	$10\frac{5}{16}$
	—	—	65	201	$7\frac{15}{16}$	300	$11\frac{13}{16}$	99	$3\frac{7}{8}$	261·4	$10\frac{5}{16}$
IV.	—	♀	72	304	12	408	$16\frac{1}{16}$	104	$4\frac{1}{8}$	351·8	$13\frac{7}{8}$
	—	♂	52	304	12	376	$14\frac{13}{16}$	72	$2\frac{7}{8}$	341·3	$13\frac{7}{16}$
V.	—	♀	2	454	$17\frac{7}{8}$	472	$18\frac{9}{16}$	—	—	[463]	—
	—	♂	14	379	$14\frac{15}{16}$	409	$16\frac{1}{8}$	30	—	390·4	$15\frac{3}{8}$
VII.	—	♀	4	521	$20\frac{1}{2}$	584	23	—	—	[552·0]	—
June 6, 7, - II.	8–20	♀♂	28	123	$4\frac{7}{8}$	196	$7\frac{3}{4}$	73	$2\frac{7}{8}$	176·2	$6\frac{15}{16}$
III.	—	♀	247	203	8	307	$12\frac{1}{16}$	104	$4\frac{1}{8}$	262·1	$10\frac{5}{16}$
	—	♂	276	201	$7\frac{15}{16}$	302	$11\frac{7}{8}$	101	4	252·5	$9\frac{15}{16}$
	—	♀♂	513	201	$7\frac{15}{16}$	302	$11\frac{7}{8}$	101	4	256·1	$10\frac{1}{16}$
IV.	—	♀	469	308	$12\frac{1}{8}$	413	$16\frac{1}{4}$	105	$4\frac{1}{8}$	357·9	$14\frac{1}{8}$
	—	♂	333	303	$11\frac{15}{16}$	385	$15\frac{1}{8}$	82	$3\frac{1}{4}$	346·6	$13\frac{5}{8}$
	—	♀♂	850	303	$11\frac{15}{16}$	413	$16\frac{1}{4}$	105	$4\frac{1}{8}$	355·3	14
V.	—	♀	84	414	$16\frac{1}{4}$	491	$19\frac{5}{16}$	77	$3\frac{1}{8}$	445·4	$17\frac{1}{8}$
	—	♂	43	386	$15\frac{1}{8}$	455	$17\frac{15}{16}$	69	$2\frac{1}{4}$	400·9	$15\frac{13}{16}$
	-	♀♂	87	414	$16\frac{1}{4}$	491	$19\frac{5}{16}$	77	$3\frac{1}{8}$	441·1	$17\frac{3}{8}$

I.—PLAICE—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size	
	Fms.			Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901. ABERDEEN BAY—*continued.* June 13, - II.	9–$12\frac{1}{2}$	♀♂	6	173	$6\frac{13}{16}$	207	$8\frac{3}{16}$	34	—	193·3	$7\frac{5}{8}$
III.	—	,,	46	229	9	301	$11\frac{7}{8}$	72	$2\frac{13}{16}$	273·2	$10\frac{3}{4}$
IV.	—	,,	103	303	$11\frac{15}{16}$	407	16	104	$4\frac{1}{8}$	352·6	$13\frac{7}{8}$
V.	—	,,	6	423	$16\frac{5}{8}$	461	$18\frac{3}{16}$	38	—	439·8	$17\frac{5}{16}$
July 31, - III.	$11\frac{1}{2}$–$12\frac{1}{2}$	♀	3	250	$9\frac{7}{8}$	299	$11\frac{3}{4}$	49	—	275·7	$10\frac{7}{8}$
	—	♂	10	262	$10\frac{3}{8}$	298	$11\frac{3}{4}$	36	—	284·8	$11\frac{3}{16}$
	—	—	13	250	$9\frac{7}{8}$	299	$11\frac{3}{4}$	49	$1\frac{15}{16}$	282·7	$11\frac{1}{8}$
IV.	—	♀	12	322	$12\frac{3}{4}$	416	$16\frac{3}{8}$	94	$3\frac{11}{16}$	367·2	$14\frac{7}{8}$
	—	♂	22	306	12	394	$15\frac{1}{2}$	88	$3\frac{1}{2}$	344·2	$13\frac{9}{16}$
	—	—	34	306	12	416	$16\frac{3}{8}$	94	$3\frac{11}{16}$	352·4	$13\frac{7}{8}$
V.	—	♀	1	—	—	—	—	—	—	[450]	--
Sept. 4, - - III.	10	♀♂	12	255	$10\frac{1}{16}$	317	$12\frac{1}{2}$	62	$2\frac{7}{16}$	292·2	$11\frac{1}{2}$
IV.	—	♂	28	327	$12\frac{7}{8}$	411	$16\frac{3}{16}$	84	$3\frac{5}{16}$	359·4	$14\frac{3}{16}$
Oct. 18, - - -	16	—	—	—	—	—	—	—	—	—	—
II.	—	♀	1	—	—	—	—	—	—	[84]	—
	—	♂	1	--	—	—	—	—	—	[88]	—
III.	—	♀	24	165	$6\frac{1}{2}$	242	$9\frac{1}{2}$	77	$3\frac{1}{16}$	201·1	$7\frac{15}{16}$
	—	♂	33	156	$6\frac{1}{8}$	247	$9\frac{3}{4}$	91	$3\frac{9}{16}$	199·3	$7\frac{7}{8}$
	—	—	57	156	$6\frac{1}{8}$	247	$9\frac{3}{4}$	91	$3\frac{9}{16}$	200·1	$7\frac{15}{16}$
IV.	—	♀	40	267	$10\frac{1}{2}$	356	14	89	$3\frac{1}{2}$	320·2	$12\frac{5}{8}$
	—	♂	33	268	$10\frac{9}{16}$	359	$14\frac{1}{8}$	91	$3\frac{9}{16}$	316·9	$12\frac{1}{2}$
	—	—	73	267	$10\frac{1}{2}$	359	$14\frac{1}{8}$	92	$3\frac{5}{8}$	318·7	$12\frac{9}{16}$
Nov. 6, - - II.	6–13	—	1	—	—	84	$3\frac{5}{16}$	—	—	—	—
II.	—	♀	76	92	$3\frac{5}{16}$	162	$6\frac{3}{8}$	70	$2\frac{3}{4}$	118·9	$4\frac{11}{16}$
	—	♂	108	91	$3\frac{9}{16}$	160	$6\frac{5}{16}$	69	$2\frac{3}{4}$	117·9	$4\frac{5}{8}$
	—	♀♂	184	91	$3\frac{9}{16}$	162	$6\frac{3}{8}$	71	$2\frac{13}{16}$	118·1	$4\frac{5}{8}$

I.—Plaice—*continued.*

Place and Date.	Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. Inches.	Largest. Mm.	Largest. Inches.	Range. Mm.	Range. Inches.	Average Size. Mm.	Average Size. Inches.
1901.											
Aberdeen Bay—*continued.*											
Nov. 6, - - III.	—	♀	288	164	$6\frac{7}{16}$	262	$10\frac{5}{16}$	98	$3\frac{7}{8}$	218·7	$8\frac{5}{8}$
	—	♂	331	166	$6\frac{9}{16}$	257	$10\frac{1}{8}$	91	$3\frac{9}{16}$	214·5	$8\frac{7}{16}$
	—	♀♂	619	164	$6\frac{7}{16}$	260	$10\frac{1}{4}$	96	$3\frac{13}{16}$	216·5	$8\frac{1}{2}$
IV.	—	♀	336	263	$10\frac{3}{8}$	361	$14\frac{3}{16}$	98	$3\frac{7}{8}$	316·2	$12\frac{7}{16}$
	—	♂	310	259	$10\frac{3}{16}$	357	$14\frac{1}{16}$	98	$3\frac{7}{8}$	314·9	$12\frac{3}{8}$
	—	♀♂	640	261	$10\frac{5}{16}$	359	$14\frac{1}{8}$	98	$3\frac{7}{8}$	315·3	$12\frac{3}{8}$
V.	—	♀	220	363	$14\frac{5}{16}$	442	$17\frac{3}{8}$	79	$3\frac{1}{8}$	400·3	$15\frac{3}{4}$
	—	♂	150	358	$14\frac{1}{16}$	405	$15\frac{15}{16}$	47	$1\frac{7}{8}$	375·9	$14\frac{13}{16}$
	—	♀♂	392	360	$14\frac{1}{8}$	443	$17\frac{3}{8}$	83	$3\frac{1}{4}$	391·6	$15\frac{7}{16}$
VI.	—	♀	46	444	$17\frac{1}{2}$	479	$18\frac{7}{8}$	35	$1\frac{3}{8}$	459·7	$18\frac{1}{8}$
	—	♂	18	411	$16\frac{3}{16}$	446	$17\frac{9}{16}$	35	$1\frac{3}{8}$	425·0	$16\frac{3}{4}$
	—	♀♂	48	444	$17\frac{1}{2}$	480	$18\frac{7}{8}$	36	$1\frac{7}{16}$	459·4	$18\frac{1}{8}$
VII.	—	♀	11	490	$19\frac{1}{4}$	540	$21\frac{1}{4}$	50	2	507·4	$19\frac{15}{16}$
	—	♂	1	—	—	—	—	—	—	[460]	—
VIII.	—	♀	2	572	$22\frac{1}{2}$	587	$23\frac{1}{8}$	—	—	579·5	$22\frac{13}{16}$
	—	♂	—	—		—	—	—	—	—	—
1900.											
Dornoch Firth.											
Oct. 11, - III.	8–12	♀♂	80	143	$5\frac{5}{8}$	196	$7\frac{3}{4}$	53	$2\frac{1}{8}$	170·6	$6\frac{3}{4}$
IV.	—	,,	165	200	$7\frac{7}{8}$	278	$10\frac{15}{16}$	78	$3\frac{1}{16}$	240·1	$9\frac{1}{2}$
V.	—	,,	36	287	$11\frac{5}{16}$	350	$13\frac{3}{4}$	63	$2\frac{1}{2}$	314·2	$12\frac{3}{8}$
VI.	—	,,	41	360	$14\frac{3}{16}$	420	$16\frac{1}{2}$	60	$2\frac{3}{8}$	383·4	$15\frac{1}{16}$
VII.	—	,,	7	433	$17\frac{1}{16}$	494	$19\frac{7}{16}$	61	$2\frac{3}{8}$	458·4	18
VIII.	—	,,	1	?	—	?	—	?	—	544·0	$21\frac{7}{16}$
IX.	—	,,	2	578	$22\frac{3}{4}$	578	$22\frac{3}{4}$	—	—	[578·0]	—
X.	—	,,	2	660	26	679	$26\frac{3}{4}$	—	—	669·5	$26\frac{3}{8}$

I.—Plaice—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1900. Dornoch Firth—*continued.* Nov. 5, 7, - II.	—	♀♂	7	76	3	88	$3\frac{1}{2}$	12	—	[82·7]	—
III.	—	,,	126	132	$5\frac{3}{16}$	201	$7\frac{15}{16}$	69	$2\frac{3}{4}$	171·4	$6\frac{3}{4}$
IV.	—	,,	266	204	$8\frac{1}{16}$	282	$11\frac{1}{4}$	78	$3\frac{1}{16}$	249·1	$9\frac{13}{16}$
V.	—	,,	211	283	$11\frac{3}{16}$	349	$13\frac{3}{4}$	66	$2\frac{5}{8}$	313·9	$12\frac{3}{8}$
VI.	—	,,	121	350	$13\frac{3}{4}$	403	$15\frac{7}{8}$	53	$2\frac{1}{8}$	373·5	$14\frac{11}{16}$
VII.	—	,,	36	405	$15\frac{15}{16}$	452	$17\frac{13}{16}$	47	$1\frac{7}{8}$	421·6	$16\frac{9}{16}$
1901. Dornoch Firth. Nov. 11, - III.	8–10	♀	15	165	$6\frac{1}{2}$	203	8	38	$1\frac{1}{2}$	182·9	$7\frac{3}{16}$
	—	♂	18	138	$5\frac{7}{16}$	195	$7\frac{11}{16}$	57	$2\frac{1}{4}$	176·8	7
	—	—	33	138	$5\frac{7}{16}$	203	8	65	$2\frac{9}{16}$	179·6	$7\frac{1}{16}$
IV.	—	♀	62	209	$8\frac{1}{4}$	290	$11\frac{7}{16}$	81	$3\frac{3}{16}$	254·1	10
	—	♂	81	209	$8\frac{1}{4}$	292	$11\frac{1}{2}$	83	$3\frac{1}{4}$	246·4	$9\frac{11}{16}$
	—	—	143	209	$8\frac{1}{4}$	292	$11\frac{1}{2}$	83	$3\frac{1}{4}$	249·8	$9\frac{7}{8}$
V.	—	♀	22	294	$11\frac{5}{8}$	369	$14\frac{1}{2}$	75	$2\frac{15}{16}$	323·6	$12\frac{3}{4}$
	—	♂	17	297	$11\frac{11}{16}$	364	$14\frac{5}{16}$	67	$2\frac{5}{8}$	324·7	$12\frac{3}{4}$
	—	—	39	294	$11\frac{5}{8}$	369	$14\frac{1}{2}$	75	$2\frac{15}{16}$	324·1	$12\frac{13}{16}$
VI.	—	♀	4	380	$14\frac{15}{16}$	423	$16\frac{11}{16}$	43	$1\frac{11}{16}$	407·0	16
	—	♂	12	371	$14\frac{5}{8}$	424	$16\frac{11}{16}$	53	$2\frac{1}{8}$	385·2	$15\frac{1}{8}$
	—	—	16	371	$14\frac{5}{8}$	424	$16\frac{11}{16}$	53	$2\frac{1}{8}$	390·9	$15\frac{3}{8}$
VII.	—	♀	8	443	$17\frac{7}{16}$	495	$19\frac{1}{2}$	—	—	469·6	$18\frac{1}{2}$
?	—	♀	1	—	—	—	—	—	—	[662]	—
Nov. 11, - III.	8–12	♀	16	168	$6\frac{5}{8}$	202	$7\frac{15}{16}$	34	$1\frac{3}{8}$	186·2	$7\frac{3}{8}$
(Ord. Haul.) IV.	—	,,	261	206	$8\frac{1}{8}$	292	$11\frac{1}{2}$	86	$3\frac{3}{8}$	249·1	$9\frac{13}{16}$
V.	—	,,	72	294	$11\frac{9}{16}$	370	$14\frac{9}{16}$	76	3	321·2	$12\frac{5}{8}$
VI.	—	,,	10	375	$14\frac{3}{4}$	431	$16\frac{15}{16}$	56	$2\frac{1}{4}$	390·4	$15\frac{3}{8}$
VII.	—	,,	6	450	$17\frac{11}{16}$	470	$18\frac{1}{2}$	20	$\frac{13}{16}$	460·2	$18\frac{1}{8}$
1900. Off Lossiemouth. Nov. 3, - - III.	11–15	♀♂	71	152	6	223	$8\frac{13}{16}$	71	$2\frac{13}{16}$	188·3	$7\frac{7}{16}$
IV.	—	,,	123	228	9	310	$12\frac{3}{16}$	82	$3\frac{1}{4}$	275·7	$10\frac{15}{16}$
V.	—	,,	164	313	$12\frac{5}{16}$	401	$15\frac{13}{16}$	88	$3\frac{7}{16}$	358·2	$14\frac{1}{16}$
VI.	—	,,	92	402	$15\frac{13}{16}$	464	$18\frac{1}{4}$	62	$2\frac{7}{16}$	422·4	$16\frac{5}{8}$

II.—Common Dab.

Place and Date.		Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In.
1900												
Aberdeen Bay.												
Sept 18–26, -	I.	—	(?)	47	26	1 1/16	69	2 3/4	43	1 11/16	37·5	1 7/16
	II.	—	♀	396	97	3 13/16	173	6 13/16	76	3	127·0	5
	II.	—	♂	307	91	3 9/16	172	6 13/16	81	3 3/16	127·1	5
	III.	—	♀	278	176	6 15/16	267	10 1/2	91	3 9/16	213·4	8 7/16
	III.	—	♂	52	175	6 7/8	246	9 11/16	71	2 13/16	205·9	8 1/8
	IV.	—	♀	9	290	11 7/16	333	13 1/8	43	—	304·8	12
Oct. 9–13, -	I.	—	(?)	34	30	1 3/16	78	3 1/16	48	1 14/16	56·7	2 1/4
	II.	—	♀	205	96	3 13/16	179	7 1/16	83	3 1/4	131·8	5 3/16
	II.	—	♂	186	101	4	173	6 13/16	72	2 13/16	133·1	5 1/4
	III.	—	♀	86	181	7 1/8	278	10 15/16	97	3 13/16	214·9	8 1/2
	III.	—	♂	31	177	6 15/16	257	10 1/8	80	3 3/16	199·3	7 13/16
	IV.	—	♀	3	293	11 9/16	312	13 5/16	19	3/4	299·7	11 13/16
Oct. 8, -	I.	12–14	(?)	33	50	2	80	3 3/16	30	1 3/16	63·1	2 1/2
	II.	—	♀	123	92	3 5/8	157	6 3/16	65	2 9/16	120·0	4 3/4
	II.	—	♂	114	98	3 7/8	152	6	54	2 1/8	118·3	4 5/8
	III.	—	♀	5	192	7 9/16	218	8 9/16	26	1	211·4	8 5/16
	III.	—	♂	2	185	7 1/4	229	9	44	1 3/4	207·0	8 3/16
Oct. 13, -	I.	8–18	♀	23	48	1 7/8	80	3 3/16	32	1 5/16	64·4	2 9/16
	I.	—	♂	9	49	1 15/16	77	3 1/16	28	1 1/8	63·2	2 1/2
	II.	—	♀	458	102	4	173	6 13/16	71	2 13/16	130·6	5 3/16
	II.	—	♂	574	102	4	175	6 7/8	73	2 7/8	126·1	4 15/16
	III.	—	♀	98	179	7 1/8	261	10 1/4	82	3 1/4	216·4	8 1/2
	III.	—	♂	21	178	7 1/8	253	10	75	2 15/16	199·0	7 13/16
	IV.	—	♀	6	280	11	309	12 3/16	29	1 3/16	293·7	11 9/16
	V.	—	♀	2	332	13 1/8	342	13 1/2	10	3/8	337·0	13 1/4
Oct. 31, -	I.	8–10	♀	12	68	2 11/16	89	3 1/2	21	13/16	80·0	3 3/16
	I.	—	♂	3	79	3 1/8	81	3 3/16	2	1/16	80·0	3 3/16
	II.	—	♀	404	100	3 15/16	180	7 1/8	80	3 1/8	137·5	5 3/8
	II.	—	♂	323	102	4	173	6 13/16	71	2 13/16	134·3	5 1/4
	III.	—	♀	159	182	7 3/16	275	10 13/16	93	3 5/8	223·9	8 13/16
	III.	—	♂	53	178	7	264	10 3/8	96	3 3/4	208·2	8 3/16
	IV.	—	♀	4	292	11 1/2	310	12 3/16	18	11/16	301·5	11 7/8
	V.	—	♀	1	—	—	—	—	—	—	340	13 3/8

II.—Common Dab—*continued.*

Place and Date.		Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In.
1900.												
ABERDEEN BAY—*continued.*												
Dec. 17–21,	I.	5–15	♀	986	43	1 11/16	87	3 3/8	44	1 3/4	61·1	2 3/8
	I.	—	♂	893	38	1 1/2	88	3 11/16	50	1 15/16	61·4	2 3/8
	I	—	—	1879	—	—	—	—	50	1 15/16	61·3	2 3/8
	II.	—	♀	183	96	3 13/16	184	7 1/4	88	3 1/2	132·1	5 1/4
	II.	—	♂	173	92	3 5/8	180	7 1/8	88	3 1/2	127·4	5 1/16
	III.	—	♀	49	202	7 15/16	275	10 13/16	73	2 7/8	[250·3]	[9 7/8]
	III.	—	♂	4	201	7 15/16	268	10 9/16	67	2 5/8	[241·8]	[9 1/2]
	IV.	—	♀	30	277	10 7/8	316	12 7/16	39	1 9/16	296·4	11 11/16
	V.	—	♀	14	317	12 1/2	362	14 1/4	45	1 3/4	361·4	14 1/4
	VI.	—	♀	2	385	15 1/8	397	15 5/8	12	1/2	391·5	15 6/16
	VII.	—	♀	1	—	—	—	—	—	—	[432]	[17]
June 13, 1901,	II.	9–14½	♀	1	—	—	—	—	—	—	[119]	4 11/16
	II.	—	♂	3	85	3 3/8	99	3 7/8	14	1/2	[94]	3 11/16
	III.	—	♀	21	136	5 3/8	218	8 9/16	82	3 3/16	173	6 13/16
	III.	—	♂	7	135	5 5/16	193	7 9/16	58	2 1/4	162	6 3/8
	IV.	—	♀	17	230	9 1/16	279	11	49	1 15/16	258·2	10 3/16
	IV.	—	♂	4	223	8 3/4	268	10 9/16	45	1 13/16	245·5	9 11/16
June 13,	II.	11	♀♂	83	70	2 3/4	128	5 1/16	58	2 5/16	[106·8]	4 3/16
	III.	—	,,	308	131	5 1/8	219	8 5/8	88	3 1/2	167·3	6 9/16
	IV.	—	,,	40	224	8 13/16	285	11 1/4	61	2 7/16	252·4	9 15/16
	V.	—	,,	2	302	11 7/8	343	13 1/2	41	1 5/8	322·5	12 11/16
June 13, (combined).	III.	—	♀♂	336	131	5 1/8	219	8 5/8	88	3 1/2	167·6	6 9/16
	IV.	—	,,	61	223	8 3/4	285	11 3/16	62	2 7/16	253·6	10
July 5,	II.	10	♀	152	77	3 1/16	141	5 9/16	64	2 1/2	106·3	4 3/16
	II.	—	♀	137	73	2 7/8	139	5 1/2	66	2 5/8	105·1	4 1/8
(combined).		—	♂	289	73	2 7/8	141	5 9/16	68	2 11/16	105·8	4 1/8
	III	—	♀	79	148	5 13/16	224	8 13/16	76	3	178·7	7
	III.	—	♂	41	143	5 5/8	222	8 3/4	79	3 1/8	176·9	6 15/16
(combined).		—	♂	120	143	5 5/8	224	8 13/16	81	3 3/16	178·1	7
	IV.	—	♀	7	240	9 7/16	288	11 5/16	48	1 7/8	264·7	10 7/16
	IV.	—	♂	4	243	9 9/16	264	10 3/8	21	13/16	254·2	10
(combined).		—	♂	11	240	9 7/16	288	11 5/16	48	1 7/8	260·9	10 1/4
	V.	—	♀	2	310	12 3/16	310	12 3/16	0	0	310	12 3/16
	V.	—	♂	1	—	—	—	—	—	—	290	11 7/16

II.—Common Dab—*continued.*

Place and Date.		Depth.	Sex.	No.	Smallest.		Largest.		Range		Average Size.	
		Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm	In.
1901. ABERDEEN BAY—*continued.*												
July 31, -	II.	$11\frac{1}{2}$–	♀	216	88	$3\frac{1}{2}$	156	$6\frac{1}{8}$	68	$2\frac{11}{16}$	177	$4\frac{5}{8}$
	II.	$12\frac{1}{2}$	♂	212	86	$3\frac{3}{8}$	152	6	66	$2\frac{5}{8}$	114·5	$4\frac{1}{2}$
(combined).		—	♀♂	428	86	$3\frac{3}{8}$	160	$6\frac{5}{16}$	74	$2\frac{15}{16}$	115·8	$4\frac{9}{16}$
	III.	—	♀	109	163	$6\frac{3}{8}$	239	$9\frac{3}{8}$	76	3	195·7	$7\frac{11}{16}$
	III.	—	♂	31	164	$6\frac{7}{16}$	224	$8\frac{13}{16}$	60	$2\frac{3}{8}$	185·3	$7\frac{5}{16}$
(combined).		—	♀♂	140	163	$6\frac{3}{8}$	239	$9\frac{3}{8}$	76	3	193·0	$7\frac{5}{8}$
	IV.	—	♀	24	245	$9\frac{5}{8}$	313	$12\frac{3}{8}$	68	$2\frac{3}{4}$	272·7	$10\frac{3}{4}$
	IV.	—	♂	1	—	—	—	—	—	—	258	$10\frac{1}{8}$
(combined).		—	♀♂	25	245	$9\frac{5}{8}$	313	$12\frac{3}{8}$	68	$2\frac{3}{4}$	272·1	$10\frac{11}{16}$
	V.	—	♀	3	338	$13\frac{5}{16}$	376	$14\frac{13}{16}$	38	$1\frac{1}{2}$	353·3	$13\frac{7}{8}$
Sept. 4, -	II.	10	♀	51	107	$4\frac{3}{16}$	167	$6\frac{9}{16}$	60	$2\frac{3}{8}$	136·9	$5\frac{3}{8}$
	II.	—	♂	37	115	$4\frac{1}{2}$	167	$6\frac{9}{16}$	52	$2\frac{1}{16}$	138·8	$5\frac{1}{2}$
(combined).		—	♀♂	88	107	$4\frac{3}{16}$	167	$6\frac{9}{16}$	60	$2\frac{3}{8}$	137·7	$5\frac{7}{16}$
	III.	—	♀	137	173	$6\frac{13}{16}$	257	$10\frac{1}{8}$	84	$3\frac{5}{16}$	205	$8\frac{1}{16}$
	III.	—	♂	43	174	$6\frac{7}{8}$	224	$8\frac{13}{16}$	50	$1\frac{15}{16}$	19·01	$7\frac{1}{2}$
(combined).		—	♀♂	180	173	$6\frac{13}{16}$	257	$10\frac{1}{8}$	84	$3\frac{5}{16}$	201·4	$7\frac{15}{16}$
	IV.	—	♀	10	265	$10\frac{7}{16}$	318	$12\frac{1}{2}$	53	$2\frac{1}{16}$	291·4	$11\frac{7}{16}$
	IV.	—	♂	5	246	$9\frac{11}{16}$	277	$10\frac{15}{16}$	31	$1\frac{1}{4}$	262·2	$10\frac{5}{16}$
(combined).		—	♀♂	15	246	$9\frac{11}{16}$	318	$12\frac{1}{2}$	72	$2\frac{13}{16}$	281·7	$11\frac{1}{16}$
Sept. 10, -	I.	7–9	♀♂	20	47	—	73	—	—	—	60·8	$2\frac{3}{8}$
Oct. 18, -	I.	16	♀	17	47	$1\frac{7}{8}$	82	$3\frac{1}{4}$	35	$1\frac{3}{8}$	62·4	$2\frac{7}{16}$
	I.	—	♂	22	45	$1\frac{3}{4}$	72	$2\frac{13}{16}$	27	$1\frac{1}{16}$	59·6	$2\frac{5}{16}$
(combined).		—	♂	39	45	$1\frac{3}{4}$	82	$3\frac{1}{4}$	37	$1\frac{1}{2}$	60·8	$2\frac{3}{8}$
	II.	—	♀	86	94	$3\frac{11}{16}$	150	$5\frac{7}{8}$	56	$2\frac{3}{16}$	119·3	$4\frac{11}{16}$
	II.	—	♂	70	101	4	143	$5\frac{5}{8}$	42	$1\frac{5}{8}$	119·3	$4\frac{11}{16}$
(combined).		—	♀♂	156	94	$3\frac{11}{16}$	150	$5\frac{7}{8}$	56	$2\frac{3}{16}$	119·3	$4\frac{11}{16}$
	III.	—	♀	93	156	$6\frac{1}{8}$	252	$9\frac{15}{16}$	96	$3\frac{13}{16}$	205·1	$8\frac{1}{16}$
	III.	—	♂	10	160	$6\frac{5}{16}$	231	$9\frac{1}{16}$	71	$2\frac{3}{4}$	187·6	$7\frac{3}{8}$
(combined).		—	♂	103	156	$6\frac{1}{8}$	252	$9\frac{15}{16}$	96	$3\frac{13}{16}$	203·4	8
	IV.	—	♀	49	262	$10\frac{5}{16}$	330	13	68	$2\frac{11}{16}$	296·9	$11\frac{11}{16}$
	V.	—	♀	3	344	$13\frac{9}{16}$	348	$13\frac{3}{4}$	4	$\frac{3}{16}$	345·7	$13\frac{5}{8}$
Nov 29, -	I.	11–18	♀♂	144	47	$1\frac{7}{8}$	87	$3\frac{9}{16}$	45	$1\frac{3}{4}$	61·0	$2\frac{3}{8}$
	II.	—	♀♂	28	106	$4\frac{3}{16}$	147	$5\frac{13}{16}$	41	$1\frac{5}{8}$	122·9	$4\frac{13}{16}$
Jan. 15, 1902, -	I.	—	♀♂	214	28	$1\frac{1}{8}$	80	$3\frac{1}{8}$	52	2	47·8	$1\frac{7}{8}$

II.—Common Dab—*continued.*

Place and Date.	Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In
1901.											
Dog Hole, off Aberdeen.											
Aug. 21, - II.	58	♀	2	93	3 11/16	129	5 1/16	36	1 3/8	[111·0]	4 3/8
II.	—	♂	2	92	3 5/8	126	4 15/16	34	1 5/16	[109·0]	4 5/16
III.	—	♀	89	143	5 5/8	230	9 1/16	87	3 7/16	191·3	7 9/16
III.	—	♂	46	141	5 9/16	226	8 7/8	85	3 5/16	182·4	7 3/16
(combined).	—	♀♂	135	141	5 9/16	239	9 3/8	98	3 13/16	187·5	7 3/8
IV.	—	♀	18	234	9 3/16	283	11 1/8	49	1 15/16	248·9	9 13/16
IV.	—	♂	2	234	9 3/16	239	9 3/8	5	3/16	236·5	9 5/16
(combined).	—	♀♂	20	234	9 3/16	283	11 1/8	49	1 15/16	247·7	9 3/4
V.	—	♀	1	—	—	—	—	—	—	[340·]	13 3/8
V.	—	♂	1	—	—	—	—	—	—	[296·]	11 5/8
Nov. 5, - - II.	70	♀♂	2	114	4 1/2	123	4 7/8	9	3/8	[118·5]	4 11/16
III.	—	♀	19	155	6 1/16	241	9 1/2	86	3 7/16	202·0	7 15/16
III.	—	♂	13	151	5 15/16	228	9	77	3 1/16	187·2	7 3/8
(combined),	—	♀♂	32	151	5 15/16	241	9 1/2	90	3 9/16	196·0	7 11/16
IV.	—	♀	2	254	10	332	13 1/16	78	3 1/16	293·0	11 9/16
Nov. 28, - II.	68	♀	11	105	4 1/8	158	6 1/4	53	2 1/8	131·2	5 3/16
II.	—	♂	14	115	4 1/2	156	6 1/8	41	1 5/8	133·0	5 1/4
(combined).	—	♀♂	25	105	4 1/8	158	6 1/4	53	2 1/8	132·2	5 3/16
III.	—	♀	9	181	7 1/8	213	8 3/8	32	1 1/4	197·9	7 13/16
III.	—	♂	2	193	7 5/8	212	8 5/16	19	11/16	202·5	8
(combined).	—	♀♂	11	181	7 1/8	213	8 3/8	32	1 1/4	198·7	7 13/16
Dec. 16, - II.	57	♀	140	103	4 1/16	179	7 1/16	76	3	132·9	5 1/4
II.	—	♂	174	107	4 3/16	162	6 3/8	55	2 3/16	133·8	5 1/4
(combined).	—	♀♂	314	103	4 1/16	179	7 1/16	76	3	133·4	5 1/4
III.	—	♀	41	184	7 1/4	242	9 1/2	58	2 1/4	205·3	8 1/16
III.	—	♂	32	166	6 9/16	224	8 13/16	58	2 1/4	188·1	7 3/8
IV.	—	♂	5	231	9 1/8	267	10 1/2	36	1 3/8	242·2	9 9/16
Jan. 15, 1902, II.	57	♀	5	116	4 9/16	155	6 1/16	39	1 1/2	132·2	5 3/16
II.	—	♂	4	134	5 1/4	147	5 13/16	13	9/16	137·0	5 3/8
(combined).	—	♀♂	9	116	4 9/16	155	6 1/16	39	1 1/2	134·3	5 5/16
III.	—	♀	2	177	6 15/16	222	8 3/4	45	1 13/16	[199·5]	[7 7/8]
III.	—	♂	1	—	—	—	—	—	—	[178·0]	[7]
IV.	—	♀	1	—	—	—	—	—	—	[306·0]	[12 1/16]

II.—Common Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
1901.											
FIRTH OF FORTH Station III.											
May 9–13, 1901, I.	8–10	♀♂	84	42	1 5/8	98	3 7/8	56	2 1/4	67·5	2 5/8
II.	—	♀	26	109	4 5/16	178	7	69	2 11/16	148·0	5 13/16
II.	—	♂	21	111	4 3/8	181	7 1/8	70	2 3/4	151·4	5 15/16
(combined).	—	♀♂	47	109	4 5/16	181	7 1/8	72	2 13/16	149·5	5 7/8
July, 23, - I.	—	♀♂	103	32	1 1/4	49	1 15/16	17	11/16	40·7	1 5/8
II.	—	♀♂	498	68	2 11/16	127	5	59	2 3/8	101·1	4
III.	—	♀♂	37	137	5 3/8	205	8 1/16	68	2 11/16	179·1	7 1/16
IV.	—	♀♂	22	213	8 3/8	276	10 7/8	63	2 1/2	236·6	9 5/16
Aug. 19–22, - I.	—	♀♂	188	37	1 7/16	75	2 15/16	38	1 1/2	52·3	2 1/16
II.	—	♀	65	84	3 5/16	137	5 3/8	53	2 1/16	100·4	3 15/16
II.	—	♂	45	88	3 1/2	134	5 1/4	46	1 3/4	105·5	4 1/8
(combined).	—	♀♂	110	84	3 5/16	137	5 3/8	53	2 1/16	102·5	4 1/16
III.	—	♀	15	152	6	194	7 5/8	42	1 5/8	[170·7]	[6 3/4]
III.	—	♂	8	149	5 7/8	195	7 11/16	46	1 13/16	[170·7]	[6 3/4]
(combined).	—	♀♂	23	149	5 7/8	195	7 11/16	46	1 13/16	[170·	[6 3/4]
IV.	—	♀	4	232	9 1/8	255	10 1/16	23	15/16	247·2	9 3/4
MORAY FIRTH, E. of Smith Bank.	35	—	—	—	—	—	—	—	—	—	—
Nov. 8, - - I.	—	♀♂	1	—	—	—	—	—	—	[58]	[2 1/4]
II	—	♀♂	337	97	3 13/16	181	7 1/8	84	3 5/16	138·8	5 7/16
III.	—	♀♂	14	184	7 1/4	219	8 5/8	35	1 3/8	[180·4]	[7 1/8]
DORNOCH.											
Dec. 25, - - I.	—	♀	1	—	—	—	—	—	—	[84]	3 5/16
II.	—	♀	30	106	4 3/16	192	7 9/16	86	3 3/8	139·6	5 1/2
II.	—	♂	13	102	4	156	6 1/8	54	2 1/8	122·9	4 13/16
(combined).	—	♀♂	43	102	4	192	7 9/16	90	3 9/16	134·6	5 5/16
III.	—	♀	1	—	—	—	—	—	—	[207]	[8 1/8]
CROMARTY,											
Outside Souters.	12	—	—	—	—	—	—	—	—	—	—
Dec. 11, 1900, I.	—	♀♂	17	23	7/8	66	2 5/8	43	1 3/4	49·5	1 15/16
II.	—	♀♂	14	85	3 3/8	107	4 3/16	22	13/16	91·4	3 9/16
Jan. 10, 1901, I.	6½–7	♀♂	3	41	1 5/8	52	2 1/16	11	7/16	44·7	1 3/4
II.	—	♀♂	3	124	4 7/8	136	5 3/8	12	1/2	130·0	5 1/8

II.—Common Dab—*continued.*

Place and Date.		Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
		Fms.			Mm.	In.	Mm.	In.	Mm.	In	Mm.	In.
Dornoch.												
Nov. 11, 1901,	I.	8–10	♀♂	14	51	2	98	$3\frac{7}{8}$	47	$1\frac{7}{8}$	77·6	$3\frac{1}{16}$
	II.	—	♀♂	416	100	$3\frac{15}{16}$	192	$7\frac{9}{16}$	92	$3\frac{5}{8}$	142·2	$5\frac{9}{16}$
	III.	—	♀♂	43	194	$7\frac{5}{8}$	243	$9\frac{9}{16}$	49	$1\frac{15}{16}$	210·7	$8\frac{5}{16}$
	IV.	—	♀♂	6	256	$10\frac{1}{16}$	272	$10\frac{11}{16}$	16	$\frac{5}{8}$	263·3	$10\frac{3}{8}$
Solway Firth.												
	I.	3–8	♀♂	60	33	$1\frac{5}{16}$	57	$2\frac{1}{4}$	24	$\frac{15}{16}$	47·0	$1\frac{7}{8}$
Sept. 11, 1899,	II.	—	♀♂	8	67	$2\frac{5}{8}$	87	$3\frac{7}{16}$	20	$\frac{13}{16}$	79·0	$3\frac{1}{8}$
Sept. 27, 1899,	I.	—	♀♂	157	33	1[illegible]	63	$2\frac{1}{2}$	30	$1\frac{3}{16}$	48·0	$1\frac{7}{8}$
	II.	—	♀	15	68	$2\frac{11}{16}$	97	$3\frac{13}{16}$	29	$1\frac{1}{8}$	78·4	$3\frac{1}{16}$
	II.	—	♂	14	68	$2\frac{11}{16}$	83	$3\frac{1}{4}$	15	$\frac{9}{16}$	75·2	$2\frac{15}{16}$
(combined).		—	♀♂	29	68	$2\frac{11}{16}$	97	$3\frac{13}{16}$	29	$1\frac{1}{8}$	76·9	3
Oct. 10, 1899,	I.	—	♀♂	179	35	$1\frac{3}{8}$	63	$2\frac{1}{2}$	28	$1\frac{1}{8}$	50·7	2
	II.	—	♀	76	66	$2\frac{5}{8}$	95	$3\frac{3}{4}$	29	$1\frac{1}{8}$	77·1	$3\frac{1}{16}$
	II.	—	♂	69	68	$2\frac{11}{16}$	97	$3\frac{13}{16}$	29	$1\frac{1}{8}$	80·7	$3\frac{3}{16}$
Oct. 26, 1899,	I.	—	♀♂	90	37	$1\frac{7}{16}$	62	$2\frac{7}{16}$	25	1	58·2	$2\frac{1}{4}$
	II.	—	♀	97	65	$2\frac{9}{16}$	112	$4\frac{7}{16}$	47	$1\frac{7}{8}$	81·6	$3\frac{3}{16}$
	II.	—	♂	82	66	$2\frac{5}{8}$	106	$4\frac{3}{16}$	40	$1\frac{9}{16}$	81·8	$3\frac{3}{16}$
Nov. 27, 1899,	I.	—	♀♂	17	37	$1\frac{7}{16}$	62	$2\frac{7}{16}$	25	1	54·2	$2\frac{1}{8}$
	II.	—	♀	81	66	$2\frac{5}{8}$	106	$4\frac{3}{16}$	40	$1\frac{9}{16}$	83·9	$3\frac{5}{16}$
	II.	—	♂	75	70	$2\frac{3}{4}$	107	$4\frac{3}{16}$	37	$1\frac{7}{16}$	83·7	$3\frac{5}{16}$
March 14, 1900,	I.	—	♀♂	50	36	$1\frac{7}{16}$	62	$2\frac{7}{16}$	26	1	45·0	$1\frac{3}{4}$
	II.	—	♀♂	9	78	$3\frac{1}{16}$	118	$4\frac{5}{8}$	40	$1\frac{9}{16}$	93·9	$3\frac{11}{16}$
April 30, 1900,	I.	—	♀♂	2	50	2	54	$2\frac{1}{8}$	4	$\frac{1}{8}$	52·0	$2\frac{1}{16}$
	II.	—	♀♂	1	—	—	—	—	—	—	[106·0]	$4\frac{3}{16}$
Sept. 28, 1900,	I.	—	♀♂	198	36	$1\frac{7}{16}$	61	$2\frac{3}{8}$	25	1	45·6	$1\frac{13}{16}$
	II.	—	♀	9	64	$2\frac{1}{2}$	96	$3\frac{13}{16}$	32	$1\frac{1}{4}$	79·2	$3\frac{1}{8}$
	II.	—	♂	6	76	3	89	$3\frac{1}{2}$	13	$\frac{1}{2}$	82·8	$3\frac{1}{4}$
Oct. 31, 1900,	I.	—	♀♂	171	38	$1\frac{1}{2}$	60	$2\frac{3}{8}$	22	$\frac{7}{8}$	46·5	$1\frac{13}{16}$
	II.	—	♀♂	16	66	$2\frac{5}{8}$	92	$3\frac{5}{8}$	26	1	79·6	$3\frac{1}{8}$

II.—Common Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
Solway Firth—*contd.*											
Nov. 27, 1900, I.	—	♀♂	85	38	$1\frac{1}{2}$	62	$2\frac{7}{16}$	24	$\frac{15}{16}$	49·4	$1\frac{15}{16}$
II.	—	♀	66	70	$2\frac{3}{4}$	92	$3\frac{5}{8}$	22	$\frac{7}{8}$	82·6	$3\frac{1}{4}$
II.	—	♂	59	68	$2\frac{11}{16}$	108	$4\frac{1}{4}$	40	$1\frac{9}{16}$	79·6	$3\frac{1}{8}$
Dec. 30, 1900, I.	—	♀♂	98	37	$1\frac{7}{16}$	57	$2\frac{1}{4}$	20	$\frac{13}{16}$	45·3	$1\frac{3}{4}$
II.	—	♀♂	62	67	$2\frac{5}{8}$	98	$3\frac{7}{8}$	31	$1\frac{1}{4}$	84·8	$3\frac{3}{8}$
Loch Fyne.*											
July 30, 1900, I.	—	♀♂	1	—	—	—	—	—	—	[35]	[$1\frac{3}{8}$]
Sept. 10, I.	—	♀♂	8	25	1	48	$1\frac{7}{8}$	23	$\frac{7}{8}$	34·5	$1\frac{3}{8}$

* Push-net on beach.

III.—Long Rough Dab.

Place and Date.		Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In.
DEEP WATER. off Shetland. Aug. 31, 1900,	I.	62	♀♂	20	28	$1\frac{1}{8}$	57	$2\frac{1}{4}$	29	$1\frac{1}{8}$	48·3	$1\frac{7}{8}$
	II.	—	,,	551	82	$3\frac{1}{4}$	122	$4\frac{13}{16}$	40	$1\frac{9}{16}$	103·2	$4\frac{1}{16}$
	III.	—	,,	367	124	$4\frac{7}{8}$	174	$6\frac{7}{8}$	50	2	153·4	$6\frac{1}{16}$
	IV.	—	,,	74	175	$6\frac{7}{8}$	201	$7\frac{15}{16}$	26	1	187·1	$7\frac{3}{8}$
	V.	—	,,	4	208	$8\frac{3}{16}$	210	$8\frac{1}{4}$	2	—	209·5	$8\frac{1}{4}$
Sept. 4, - -	I.	65	♀♂	244	31	$1\frac{1}{4}$	63	$2\frac{1}{2}$	32	$1\frac{1}{4}$	48·4	$1\frac{7}{8}$
	II.	—	♀	552	82	$3\frac{1}{4}$	128	$5\frac{1}{16}$	46	$1\frac{13}{16}$	105·8	$4\frac{3}{16}$
		—	♂	782	77	3	119	$4\frac{5}{8}$	42	$1\frac{5}{8}$	102·0	4
		—	—	1334	77	3	128	$5\frac{1}{16}$	51	2	103·6	$4\frac{1}{16}$
		—	♀♂	1326	77	3	122	$4\frac{13}{16}$	45	$1\frac{3}{4}$	103·5	$4\frac{1}{16}$
	III.	—	♀	325	130	$5\frac{1}{8}$	174	$6\frac{7}{8}$	44	$1\frac{3}{4}$	154·0	$6\frac{1}{16}$
		—	♂	145	121	$4\frac{3}{4}$	153	6	32	$1\frac{1}{4}$	136·9	$5\frac{3}{8}$
	IV.	—	♀	85	175	$6\frac{7}{8}$	201	$7\frac{15}{16}$	26	1	182·9	$7\frac{3}{16}$
		—	♂	18	155	$6\frac{1}{8}$	173	$6\frac{13}{16}$	18	$\frac{3}{4}$	156·1	$6\frac{3}{16}$
	V.	—	♀	23	204	$8\frac{1}{16}$	238	$9\frac{3}{8}$	34	$1\frac{1}{2}$	222·8	$8\frac{3}{4}$
	VI.	—	♀	1	—	—	—	—	—	—	261	—
Oct. 16, 19, -	I.	60–65	♀♂	180	40	$1\frac{9}{16}$	68	$2\frac{11}{16}$	28	$1\frac{1}{8}$	53·3	$2\frac{1}{8}$
	II.	—	♀	464	79	$3\frac{7}{8}$	136	$5\frac{3}{8}$	57	$2\frac{1}{4}$	111·4	$4\frac{3}{8}$
		—	♂	557	81	$3\frac{3}{16}$	123	$4\frac{1}{8}$	42	$1\frac{5}{8}$	102·5	$4\frac{1}{16}$
		—	—	1021	79	$3\frac{1}{8}$	136	$5\frac{3}{8}$	57	$2\frac{1}{4}$	106·4	$4\frac{3}{16}$
	III.	—	♀	198	137	$5\frac{3}{8}$	175	$6\frac{7}{8}$	38	$1\frac{1}{2}$	155·6	$6\frac{1}{8}$
		—	♂	125	124	$4\frac{7}{8}$	158	$6\frac{1}{4}$	—	—	137·6	$5\frac{7}{16}$
	IV.	—	♀	23	176	$6\frac{15}{16}$	203	8	27	$1\frac{1}{8}$	184·5	$7\frac{1}{4}$
		—	♂	3	166	$6\frac{9}{16}$	183	$7\frac{3}{16}$	—	—	[172·0]	—
May 19, 1901,-	I.	65	♀♂	141	52	$2\frac{1}{16}$	92	$3\frac{5}{8}$	40	$1\frac{9}{16}$	68·4	$2\frac{11}{16}$
	II.	—	♀	15	98	$3\frac{7}{8}$	146	$5\frac{3}{4}$	48	$1\frac{7}{8}$	127·9	5
		—	♂	9	113	$4\frac{7}{16}$	138	$5\frac{7}{16}$	25	1	124·8	$4\frac{15}{16}$
		—	—	24	98	$3\frac{7}{8}$	146	$5\frac{3}{4}$	48	$1\frac{7}{8}$	126·7	5

III.—Long Rough Dab—*continued.*

Place and Date.		Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
					Mm.	In.	Mm.	In.	Mm.	In	Mm.	In.
Deep Water—*contd.*												
May 19, 1901,	III.	—	♀	6	152	6	198	$7\frac{13}{16}$	46	$1\frac{13}{16}$	170·2	$6\frac{11}{16}$
		—	♂	4	151	$5\frac{15}{16}$	179	$7\frac{1}{16}$	28	$1\frac{1}{8}$	167·0	$6\frac{9}{16}$
Dec. 11, 1901,	I.	75	♀♂	28	45	$1\frac{3}{4}$	61	$2\frac{3}{8}$	24	$\frac{15}{16}$	54·4	$2\frac{1}{8}$
	II.	—	♀	614	79	$3\frac{1}{8}$	134	$5\frac{1}{4}$	55	$2\frac{3}{16}$	104·8	$4\frac{1}{8}$
		—	♂	635	81	$3\frac{3}{16}$	118	$4\frac{5}{8}$	37	$1\frac{7}{16}$	98·4	$3\frac{7}{8}$
		—	—	1249	79	$3\frac{1}{8}$	134	$5\frac{1}{4}$	55	$2\frac{3}{16}$	101·4	4
	III.	—	♀	263	138	$5\frac{7}{16}$	173	$6\frac{13}{16}$	35	$1\frac{3}{8}$	155·7	$6\frac{1}{8}$
		—	♂	108	121	$4\frac{3}{4}$	157	$6\frac{3}{16}$	36	$1\frac{3}{8}$	138·7	$5\frac{1}{2}$
	IV.	—	♀	140	174	$6\frac{7}{8}$	219	$8\frac{5}{8}$	35	$1\frac{3}{8}$	198·6	$7\frac{13}{16}$
		—	♂	21	158	$6\frac{3}{16}$	178	7	20	$\frac{13}{16}$	166·0	$6\frac{9}{16}$
	V.	—	♀	21	221	$8\frac{11}{16}$	257	$10\frac{1}{8}$	36	$1\frac{7}{16}$	229·2	9
Deep Water off Aberdeen.												
June 28, 1901,	II.	65	♀	19	78	$3\frac{1}{16}$	113	$4\frac{7}{16}$	35	$1\frac{3}{8}$	97·5	$3\frac{7}{8}$
		—	♂	11	90	$3\frac{9}{16}$	117	$4\frac{5}{8}$	27	$1\frac{1}{16}$	103·4	$4\frac{1}{16}$
Aug. 21,	I.	58	♀♂	11	48	$1\frac{7}{8}$	57	$2\frac{1}{4}$	—	—	53·0	$2\frac{1}{8}$
Nov. 5,	I.	76	♀	2	63	$2\frac{1}{2}$	67	$2\frac{5}{8}$	—	—	65·0	$2\frac{9}{16}$
		—	♂	4	60	$2\frac{3}{8}$	64	$2\frac{1}{2}$	—	—	62·0	$2\frac{7}{16}$
		—	—	6	60	$2\frac{3}{8}$	67	$2\frac{5}{8}$	7	—	63·0	$2\frac{1}{2}$
Nov. 28,	I.	68	♀♂	11	61	$2\frac{3}{8}$	75	$2\frac{15}{16}$	14	—	66·1	$2\frac{9}{16}$
	II.	—	♀	18	110	$4\frac{5}{16}$	142	$5\frac{9}{16}$	32	$1\frac{1}{4}$	125·6	$4\frac{15}{16}$
		—	♂	11	107	$4\frac{3}{16}$	135	$5\frac{5}{16}$	28	$1\frac{1}{8}$	123·6	$4\frac{7}{8}$
		—	—	29	107	$4\frac{3}{16}$	142	$5\frac{9}{16}$	35	$1\frac{3}{8}$	124·8	$4\frac{15}{16}$
	III.	—	♀	22	150	$5\frac{7}{8}$	196	$7\frac{3}{4}$	44	$1\frac{3}{4}$	175·9	$6\frac{15}{16}$
		—	♂	26	141	$5\frac{9}{16}$	174	$6\frac{7}{8}$	33	$1\frac{5}{16}$	155·4	$6\frac{1}{8}$

III.—Long Rough Dab—*continued.*

Place and Date.		Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
		Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
Deep Water off Aberdeen—*contd.*												
Dec. 16, 1901,	I.	57	♀♂	116	53	$2\frac{1}{8}$	80	$3\frac{1}{8}$	27	$1\frac{1}{16}$	65·5	$2\frac{9}{16}$
	II.	—	♀	389	106	$4\frac{3}{16}$	157	$6\frac{3}{16}$	51	2	130·6	$5\frac{1}{8}$
		—	♂	448	101	4	142	$5\frac{9}{16}$	42	$1\frac{5}{8}$	128·7	$5\frac{1}{16}$
	III.	—	♀	219	158	$6\frac{1}{4}$	198	$7\frac{13}{16}$	40	$1\frac{9}{16}$	178·5	7
		—	♂	578	143	$5\frac{5}{8}$	180	$7\frac{1}{8}$	37	$1\frac{7}{16}$	157·1	$6\frac{3}{16}$
	IV.	—	♀	51	200	$7\frac{7}{8}$	227	$8\frac{15}{16}$	27	—	210·5	$8\frac{1}{4}$
		—	♂	16	181	$7\frac{1}{8}$	201	$7\frac{15}{16}$	40	—	187·1	$7\frac{3}{8}$
	V.	—	♀	5	245	$9\frac{5}{8}$	265	$10\frac{7}{16}$	—	—	259·0	$10\frac{1}{4}$
		—	♂	1	—	—	—	—	—	—	[214]	—
Jan. 15, 1902,	II.	57	♀	31	106	$4\frac{3}{16}$	145	$5\frac{3}{4}$	39	$1\frac{1}{2}$	123·9	$4\frac{7}{8}$
		—	♂	15	109	$4\frac{5}{16}$	137	$5\frac{3}{8}$	28	$1\frac{1}{8}$	125·1	$4\frac{15}{16}$
		—	—	46	106	$4\frac{3}{16}$	145	$5\frac{3}{4}$	39	$1\frac{1}{2}$	124·3	$4\frac{7}{8}$
	III.	—	♀	26	160	$6\frac{5}{16}$	208	$8\frac{3}{16}$	48	$1\frac{7}{8}$	184·9	$7\frac{5}{16}$
		—	♂	5	147	$5\frac{13}{16}$	180	$7\frac{1}{8}$	33	$1\frac{5}{16}$	157·4	$6\frac{3}{16}$
		—	—	31	147	$5\frac{13}{16}$	208	$8\frac{3}{16}$	61	$2\frac{3}{8}$	159·4	—
Firth of Forth. Station III.												
May 9, 16, 1901,	I.	8–10	♀♂	3	32	$1\frac{1}{4}$	52	$2\frac{1}{16}$	20	$\frac{13}{16}$	42·0	$1\frac{5}{8}$
	II.	—	♀♂	504	57	$2\frac{1}{4}$	123	$4\frac{7}{8}$	66	$2\frac{9}{16}$	87·1	$3\frac{7}{16}$
	III.	—	♀	45	159	$6\frac{1}{4}$	201	$7\frac{15}{16}$	42	$1\frac{5}{8}$	[183·7]	—
	III.	—	♂	15	138	$5\frac{7}{16}$	189	$7\frac{7}{16}$	51	2	[172·3]	—
	III.	—	♀♂	60	138	$5\frac{7}{16}$	201	$7\frac{15}{16}$	63	$2\frac{1}{2}$	[180·9]	—
	IV.	—	♀	39	203	8	258	$10\frac{1}{8}$	55	$2\frac{3}{16}$	225·8	$8\frac{7}{8}$
	V.	—	♀	7	277	$10\frac{7}{8}$	307	$12\frac{1}{16}$	—	—	292·0	—
	VI.	—	♀	4	327	$12\frac{7}{8}$	349	$13\frac{3}{4}$	—	—	337	—
July 24,	II.	—	♀♂	278	83	$3\frac{1}{4}$	135	$5\frac{5}{16}$	52	$2\frac{1}{16}$	112·1	$4\frac{7}{16}$
	III.	—	,,	29	140	$5\frac{1}{2}$	199	—	59	$2\frac{5}{16}$	177·8	7
	IV.	—	,,	18	202	$7\frac{15}{16}$	242	—	40	$1\frac{9}{16}$	223·5	$8\frac{13}{16}$
	V.	—	,,	8	253	10	284	—	31	$1\frac{1}{4}$	264·6	$10\frac{7}{16}$
	VI.	—	,,	1	—	—	—	—	—	—	[303]	—

III.—Long Rough Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
FIRTH OF FORTH. STATION III.—*contd.*											
Aug. 19, 1901, I.	—	♀♂	24	46	$1\frac{13}{16}$	75	$2\frac{15}{16}$	29	$1\frac{1}{8}$	51·3	2
II.	—	♀	207	100	$3\frac{15}{16}$	146	$5\frac{3}{4}$	46	$1\frac{13}{16}$	122·2	$4\frac{13}{16}$
II.	—	♂	93	94	$3\frac{11}{16}$	129	$5\frac{1}{16}$	36	$1\frac{3}{8}$	112·4	$4\frac{7}{16}$
II.	—	♀♂	300	94	$3\frac{11}{16}$	146	$5\frac{3}{4}$	52	$2\frac{1}{16}$	119·1	$4\frac{11}{16}$
III.	—	♀	27	158	$6\frac{1}{4}$	216	$8\frac{1}{2}$	58	$2\frac{1}{4}$	190·9	$7\frac{1}{2}$
III.	—	♂	8	137	$5\frac{3}{8}$	183	$7\frac{3}{16}$	46	$1\frac{13}{16}$	158·4	$6\frac{1}{4}$
III.	—	♀♂	35	137	$5\frac{3}{8}$	216	$8\frac{1}{2}$	79	$3\frac{1}{8}$	183·5	$7\frac{1}{4}$
IV.	—	♀	30	215	$8\frac{7}{16}$	261	$10\frac{1}{4}$	46	$1\frac{13}{16}$	235·8	$9\frac{5}{16}$
V.	—	♀	1	—	—	—	—	—	—	[289]	—
Aug. 22, " I.	—	♀♂	19	45	$1\frac{3}{4}$	59	$2\frac{5}{16}$	14	—	52·8	$2\frac{1}{16}$
II.	—	♀	170	88	$3\frac{1}{2}$	146	$5\frac{3}{4}$	58	$2\frac{1}{4}$	122·9	$4\frac{7}{8}$
	—	♂	90	97	$3\frac{13}{16}$	140	$5\frac{1}{2}$	43	$1\frac{11}{16}$	116·9	$4\frac{5}{8}$
	—	♀♂	260	88	$3\frac{1}{2}$	146	$5\frac{3}{4}$	58	$2\frac{1}{4}$	120·9	$4\frac{3}{4}$
III.	—	♀	28	155	$6\frac{1}{8}$	213	$8\frac{3}{8}$	58	$2\frac{1}{4}$	190·6	$7\frac{1}{2}$
	—	♂	3	158	$6\frac{1}{4}$	188	$7\frac{3}{8}$	30	$1\frac{3}{16}$	173·7	$6\frac{7}{8}$
	—	♀♂	31	155	$6\frac{1}{8}$	213	$8\frac{3}{8}$	58	$2\frac{1}{4}$	189·0	$7\frac{7}{16}$
IV.	—	♀	21	218	$8\frac{9}{16}$	251	$9\frac{7}{8}$	33	$1\frac{5}{16}$	233·9	$9\frac{3}{16}$
V.	—	♀	4	260	$10\frac{1}{4}$	278	$10\frac{15}{16}$	18	$\frac{3}{4}$	270·5	$10\frac{5}{8}$
Aug. 19 and 22. (combined) I.	—	♀♂	43	45	$1\frac{3}{4}$	75	$2\frac{15}{16}$	30	$1\frac{3}{16}$	51·9	$2\frac{1}{16}$
II.	—	♀	377	88	$3\frac{1}{2}$	146	$5\frac{3}{4}$	58	$2\frac{1}{4}$	122·5	$4\frac{13}{16}$
	—	♂	183	94	$3\frac{11}{16}$	140	$5\frac{1}{2}$	46	$1\frac{13}{16}$	114·6	$4\frac{1}{2}$
	—	♀♂	560	88	$3\frac{1}{2}$	146	$5\frac{3}{4}$	58	$2\frac{1}{4}$	120·0	$4\frac{3}{4}$
III.	—	♀	55	155	$6\frac{1}{8}$	213	$8\frac{3}{8}$	58	$2\frac{1}{4}$	190·8	$7\frac{1}{2}$
	—	♂	11	137	$5\frac{3}{8}$	188	$7\frac{3}{8}$	51	2	162·5	$6\frac{7}{16}$
	—	♀♂	66	137	$5\frac{3}{8}$	213	$8\frac{3}{8}$	76	3	186·1	$7\frac{5}{16}$
IV.	—	♀	51	215	$8\frac{7}{16}$	261	$10\frac{1}{4}$	46	$1\frac{13}{16}$	235·0	$9\frac{1}{4}$
V.	—	♀	5	260	$10\frac{1}{4}$	289	$11\frac{3}{8}$	29	$1\frac{1}{8}$	274·2	$10\frac{1}{16}$
Station V.											
May 10, - I.	20–30	♀♂	2	32	$1\frac{1}{4}$	49	$1\frac{15}{16}$	17	—	40·5	$1\frac{9}{16}$
II.	—	♀♂	565	60	$2\frac{3}{8}$	103	$4\frac{1}{16}$	43	$1\frac{11}{16}$	83·4	$3\frac{5}{16}$
III.	—	♀	32	143	$5\frac{5}{8}$	185	$7\frac{5}{16}$	42	$1\frac{5}{8}$	169·5	$6\frac{11}{16}$
	—	♂	90	125	$4\frac{15}{16}$	179	$7\frac{1}{16}$	54	$2\frac{1}{8}$	149·1	$5\frac{7}{8}$
	—	—	122	125	$4\frac{15}{16}$	185	$7\frac{5}{16}$	60	$2\frac{3}{8}$	154·5	$6\frac{1}{8}$

III.—Long Rough Dab—*continued.*

Place and Date.		Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In.
FIRTH OF FORTH. STATION V.—*contd.*												
May 10, 1901,	IV.	—	♀	31	190	7 1/2	241	9 1/2	51	2	211·1	8 5/16
	V.	—	♀	2	267	10 1/2	312	12 1/4	—	—	[289·5]	—
July 24, -	I.	—	♀♂	4	39	1 1/2	51	2	12	—	43·3	1 11/16
	II.	—	,,	334	95	3 6/4	142	5 9/16	47	1 7/8	116·9	4 5/8
	III.	—	,,	33	148	5 13/16	196	7 3/4	48	1 7/8	172·2	6 3/4
	IV.	—	,,	6	202	7 15/16	247	9 3/4	45	1 3/4	214·2	8 7/16
Aug. 16, -	I.	—	♀♂	31	44	1 3/4	59	2 5/16	15	—	52·3	2 1/16
	II.	—	♀	145	110	4 5/16	147	5 13/16	37	1 7/16	128·7	5 1/16
		—	♂	181	106	4 7/16	136	5 3/8	30	1 3/16	121·3	4 3/4
		—	—	326	106	4 3/16	147	5 13/16	41	1 5/8	124·6	4 7/8
	III.	—	♀	32	165	6 1/2	205	8 1/8	40	1 9/16	188·5	7 6/16
		—	♂	31	139	5 1/2	178	7	39	1 1/2	155·3	6 1/8
		—	—	63	139	5 1/2	205	8 1/8	66	2 9/16	172·2	6 3/4
	IV.	—	♀	17	211	8 5/16	250	9 7/8	39	1 1/2	223·5	8 3/4
		—	♂	9	180	7 1/8	197	7 3/4	17	—	187·3	7 3/8
Aug. 21, -	I.	—	♀♂	65	36	1 3/8	63	2 1/2	27	1 1/16	54·4	2 1/8
	II.	—	♀	204	101	4	148	5 13/16	47	1 7/8	129·0	5 1/16
		—	♂	243	106	4 3/16	141	5 9/16	35	1 3/8	122·8	4 7/8
		—	—	457	101	4	148	5 13/16	47	1 7/8	126·1	4 15/16
	III.	—	♀	58	157	6 3/16	208	8 3/16	51	2	189·3	7 7/16
		—	♂	43	144	5 11/16	173	6 13/16	29	1 1/8	156·9	6 3/16
		—	—	111	144	5 11/16	208	8 3/16	64	2 1/2	179·4	7 1/16
	IV.	—	♀	24	212	8 3/8	251	9 7/8	39	1 1/2	225·3	8 7/8
		—	♂	19	174	6 7/8	201	7 15/16	27	1 1/16	183·4	7 3/16
	V.	—	♀	2	288	11 3/8	310	12 3/16	—	—	299	11 3/4
	VI.	—	♀	1	—	—	—	—	—	—	[354]	—

III.—Long Rough Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
Firth of Forth. Station V.—*contd.*											
Aug. 16–21, 1901, I. (combined).	—	♀♂	96	36	1 3/8	63	2 1/2	27	1 1/16	54·8	2 3/16
II.	—	♀	349	101	4	148	5 13/16	47	1 7/8	128·9	5 1/16
	—	♂	424	106	4 3/16	141	5 9/16	35	1 3/8	122·1	4 13/16
	—	—	773	101	4	148	5 13/16	47	1 7/8	125·2	4 15/16
	—	♀♂	794	101	4	148	5 13/16	47	1 7/8	125·7	4 15/16
III.	—	♀	90	157	6 3/16	208	8 3/16	51	2	189·0	7 7/16
	—	♂	74	139	5 1/2	178	7	39	1 1/2	156·2	6 3/16
	—	—	164	139	5 1/2	208	8 3/16	69	2 3/4	174·2	6 7/8
	—	♀♂	168	151	5 15/16	208	8 3/16	57	2 1/4	180·0	7 1/8
Clyde, between Pladda & Turnberry.											
Aug. 1, 1899, - I.	30–40	♀♂	—	—	—	—	—	—	—	—	—
II.	—	,,	20	67	2 5/8	88	3 1/2	21	13/16	76·5	3
III.	—	,,	28	92	3 5/8	122	4 13/16	30	1 3/16	106·9	4 3/16
IV.	—	,,	9	140	5 1/2	171	6 3/4	31	1 1/4	156·3	6 3/16
V.	—	,,	5	190	7 1/2	207	8 3/16	17	—	197·2	7 3/4
Aug. 30, - I.	—	♀♂	4	41	1 5/8	45	1 3/4	4	—	43·5	1 11/16
II.	—	♀	32	69	2 3/4	87	3 7/16	18	3/4	77·6	3 1/16
	—	♂	36	65	2 9/16	84	3 5/16	19	3/4	78·3	3 1/16
	—	♀♂	31	68	2 11/16	87	3 7/16	19	3/4	76·8	3
	—	—	99	65	2 9/16	87	3 7/16	22	7/8	77·6	3 1/16
III.	—	♀	5	104	4 1/8	116	4 9/16	12	—	110·4	4 5/16
	—	♂	17	92	3 5/8	124	4 7/8	30	1 3/16	107·0	4 3/16
	—	♀♂	36	90	3 9/16	127	5	37	1 7/16	108·5	4 1/4
	—	—	58	90	3 9/16	127	5	37	1 7/16	108·2	4 1/4

III.—Long Rough Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
Clyde, between Pladda&Turnberry—*continued.*											
Sept. 14, 1899, I.	—	♀	41	39	$1\frac{1}{2}$	52	$2\frac{1}{16}$	13	—	45·8	$1\frac{13}{16}$
	—	♂	23	41	$1\frac{5}{8}$	50	2	9	—	45·6	$1\frac{13}{16}$
	—	♀♂	27	35	$1\frac{3}{8}$	48	$1\frac{7}{8}$	13	—	43·3	$1\frac{11}{16}$
	—	—	91	35	$1\frac{3}{8}$	52	$2\frac{1}{16}$	17	—	45·0	$1\frac{3}{4}$
II.	—	♀	21	71	$2\frac{13}{16}$	91	$3\frac{9}{16}$	19	$\frac{3}{4}$	79·4	$3\frac{1}{8}$
	—	♂	15	62	$2\frac{7}{16}$	88	$3\frac{1}{2}$	26	1	75·2	$2\frac{15}{16}$
	—	—	36	62	$2\frac{7}{16}$	91	$3\frac{9}{16}$	29	$1\frac{1}{8}$	77·6	$3\frac{1}{16}$
III.	—	♀	8	101	4	127	5	26	1	115·1	$4\frac{1}{2}$
	—	♂	31	94	$3\frac{11}{16}$	123	$4\frac{7}{8}$	29	$1\frac{1}{8}$	108·2	$4\frac{1}{4}$
	—	—	39	94	$3\frac{11}{16}$	127	5	33	$1\frac{5}{16}$	109·6	$4\frac{5}{16}$
Oct. 12, „ I.	—	♀	115	40	$1\frac{9}{16}$	57	$2\frac{1}{4}$	17	—	49·0	$1\frac{15}{16}$
	—	♂	95	40	$1\frac{9}{16}$	56	$2\frac{3}{16}$	16	—	50·1	2
	—	♀♂	22	42	$1\frac{5}{8}$	53	$2\frac{1}{8}$	13	—	47·4	$1\frac{7}{8}$
	—	—	232	40	$1\frac{9}{16}$	57	$2\frac{1}{4}$	17	—	48·9	$1\frac{15}{16}$
II.	—	♀	80	67	$2\frac{5}{8}$	97	$3\frac{13}{16}$	30	$1\frac{3}{16}$	80·8	$3\frac{3}{16}$
	—	♂	114	66	$2\frac{9}{16}$	93	$3\frac{11}{16}$	27	$1\frac{1}{16}$	82·2	$3\frac{1}{4}$
	—	—	194	66	$2\frac{9}{16}$	97	$3\frac{13}{16}$	31	$1\frac{1}{4}$	81·6	$3\frac{1}{4}$
III.	—	♀	36	102	4	134	$5\frac{1}{4}$	32	$1\frac{1}{4}$	117·1	$4\frac{5}{8}$
	—	♂	82	94	$3\frac{11}{16}$	126	$4\frac{15}{16}$	32	$1\frac{1}{4}$	108·1	$4\frac{1}{4}$
	—	—	118	94	$3\frac{11}{16}$	134	$5\frac{1}{4}$	40	$1\frac{9}{16}$	111·4	$4\frac{3}{8}$
IV.	—	♀	29	137	$5\frac{3}{8}$	158	$6\frac{1}{4}$	21	$\frac{13}{16}$	145·2	$5\frac{3}{4}$
	—	♂	4	130	$5\frac{1}{8}$	147	$5\frac{13}{16}$	17	—	136·5	$5\frac{3}{8}$
	—	—	31	130	$5\frac{1}{8}$	158	$6\frac{1}{4}$	28	$1\frac{1}{8}$	145·0	$5\frac{3}{4}$

III.—Long Rough Dab—*continued.*

Place and Date.	Depth. Fms.	Sex.	No.	Smallest. Mm.	Smallest. In.	Largest. Mm.	Largest. In.	Range. Mm.	Range. In.	Average Size. Mm.	Average Size. In.
Clyde, between Pladda&Turnberry—*continued.*											
Dec. 15–18, 1899, I.	—	♀	15	46	1 13/16	59	2 5/16	13	—	52·8	2 1/8
	—	♂	11	48	1 7/8	59	2 5/16	11	—	52·4	2 1/16
	—	♀♂	3	52	2 1/16	53	2 1/8	—	—	52·3	2 1/16
	—	—	29	46	1 13/16	59	2 5/16	13	—	52·6	2 1/16
II.	—	♀	23	71	2 13/16	103	4 1/16	32	1 1/4	85·4	3 3/8
	—	♂	21	68	2 11/16	89	3 1/2	21	13/16	78·4	3 1/16
	—	—	44	68	2 11/16	103	4 1/16	35	3/8	82·0	3 1/4
III.	—	♀	10	111	4 3/8	135	5 5/16	24	15/16	119·6	4 3/4
	—	♂	19	98	3 7/8	126	4 15/16	28	1 1/8	111·7	4 7/16
	—	—	29	98	3 7/8	135	5 5/16	37	1 7/16	115·1	4 1/2
IV.	—	♀	5	140	5 1/2	144	5 11/16	4	—	142·6	5 5/8
	—	♂	2	137	5 3/8	140	5 1/2	—	—	138·5	5 7/16
	—	—	7	137	5 3/8	144	5 11/16	9	—	140·4	5 1/2
April 3, 1900, - I.	—	♀	57	49	1 15/16	64	2 1/2	15	—	55·8	2 3/16
	—	♂	38	51	2	63	2 1/2	12	—	55·1	2 3/16
	—	—	95	49	1 15/16	64	2 1/2	15	—	55·5	2 3/16
II.	—	♀	29	73	2 7/8	107	4 3/16	34	1 3/8	85·7	3 3/8
	—	♂	14	68	2 11/16	94	3 11/16	22	7/8	80·6	3 3/16
	—	—	43	68	2 11/16	107	4 3/16	39	1 1/2	84·4	3 5/16
III.	—	♀	27	110	4 5/16	145	5 3/4	35	1 3/8	125·4	4 15/16
	—	♂	10	98	3 7/8	128	5 1/16	30	1 3/16	109·1	4 5/16
	—	—	37	98	3 7/8	145	5 3/4	47	1 7/8	116·6	4 5/8

III.—Long Rough Dab—*continued.*

Place and Date.	Depth.	Sex.	No.	Smallest.		Largest.		Range.		Average Size.	
	Fms.			Mm.	In.	Mm.	In.	Mm.	In.	Mm.	In.
Moray Firth, Station XVI.											
April 24, 1900, I.	—	♀	5	66	$2\frac{9}{16}$	73	$2\frac{7}{8}$	7	—	68·2	$2\frac{11}{16}$
	—	♂	3	67	$2\frac{5}{8}$	73	$2\frac{7}{8}$	6	—	69·3	$2\frac{3}{4}$
	—	—	8	66	$2\frac{9}{16}$	73	$2\frac{7}{8}$	7	—	68·6	$2\frac{11}{16}$
II.	—	♀	9	127	5	153	$6\frac{1}{16}$	26	1	139·9	$5\frac{1}{2}$
	—	♂	15	119	$4\frac{5}{8}$	150	$5\frac{7}{8}$	31	$1\frac{1}{4}$	135·9	$5\frac{3}{8}$
	—	—	24	119	$4\frac{5}{8}$	153	$6\frac{1}{16}$	34	$1\frac{3}{8}$	137·4	$5\frac{3}{8}$
Station XVI.											
May 31, - I.	—	♀	1	—	—	—	—	—	—	[96]	—
	—	♂	1	—	—	—	—	—	—	[97]	—
II.	—	♀	18	127	5	155	$6\frac{1}{8}$	28	$1\frac{1}{8}$	142·3	$5\frac{5}{8}$
	—	♂	17	124	$4\frac{7}{8}$	152	6	28	$1\frac{1}{8}$	138·7	$5\frac{7}{8}$
	—	—	35	124	$4\frac{7}{8}$	155	$6\frac{1}{8}$	31	$1\frac{1}{4}$	140·5	$5\frac{9}{16}$
Deep Hole, 8 miles off Kinnaird Head.											
July 4, 1901, - II.	83–85	♀	92	76	3	115	$4\frac{1}{2}$	39	$1\frac{1}{2}$	98·6	$3\frac{7}{8}$
	—	♂	46	87	$3\frac{7}{16}$	113	$4\frac{7}{16}$	26	1	99·8	$3\frac{15}{16}$
	—	—	138	76	3	115	$4\frac{1}{2}$	39	$1\frac{1}{2}$	98·3	$3\frac{7}{8}$
III.	—	♀	49	135	$5\frac{5}{16}$	172	$6\frac{3}{4}$	37	$1\frac{7}{16}$	153·9	$6\frac{1}{16}$
	—	♂	15	128	$5\frac{1}{16}$	157	$6\frac{3}{16}$	29	$1\frac{1}{8}$	140·9	$5\frac{9}{16}$
	—	—	64	128	$5\frac{1}{16}$	172	$6\frac{3}{4}$	44	$1\frac{3}{4}$	150·8	$5\frac{15}{16}$
IV.	—	♀	43	174	$6\frac{7}{8}$	214	$8\frac{7}{16}$	40	$1\frac{9}{16}$	188·9	$7\frac{7}{16}$
	—	♂	1	—	—	—	—	—	—	[172]	—

IV.—Whiting.

Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1900. ABERDEEN BAY.											
Sept. 20, - -	I.	4–5$\frac{1}{2}$	317	82	3$\frac{1}{4}$	158	6$\frac{1}{4}$	76	3	115·2	4$\frac{9}{16}$
	II.	—	32	212	8$\frac{3}{8}$	298	11$\frac{3}{4}$	86	3$\frac{3}{8}$	239·1	9$\frac{7}{16}$
Oct. 9, - -	I.	13–16	231	62	2$\frac{7}{16}$	149	5$\frac{7}{8}$	87	3$\frac{7}{16}$	115·9	4$\frac{9}{16}$
	II.	—	7	220	8$\frac{5}{8}$	263	10$\frac{3}{8}$	43	1$\frac{3}{4}$	240·7	9$\frac{1}{2}$
Oct. 23, - -	I.	36$\frac{1}{2}$–49	82	62	2$\frac{7}{16}$	169	6$\frac{5}{8}$	107	4$\frac{3}{16}$	114·1	4$\frac{1}{2}$
	II.	—	4	234	9$\frac{3}{16}$	264	10$\frac{3}{8}$	30	1$\frac{3}{16}$	242·5	9$\frac{9}{16}$
Oct. 8, - -	I.	12–14	2223	69	2$\frac{11}{16}$	173	6$\frac{13}{16}$	104	4$\frac{1}{8}$	119·5	4$\frac{11}{16}$
	II.	—	679	183	7$\frac{3}{16}$	297	11$\frac{11}{16}$	114	4$\frac{1}{2}$	233·1	9$\frac{3}{16}$
Oct. 13, - -	I.	8–18	278	72	2$\frac{13}{16}$	185	7$\frac{1}{4}$	113	4$\frac{7}{16}$	133·7	5$\frac{5}{16}$
	II.	—	414	205	8$\frac{1}{16}$	292	11$\frac{1}{2}$	87	3$\frac{7}{16}$	247·4	9$\frac{3}{4}$
Average of Oct. 8 and 13, -	I.	—	2501	69	2$\frac{11}{16}$	185	7$\frac{1}{4}$	116	4$\frac{9}{16}$	121·0	4$\frac{3}{4}$
	II.	—	1093	183	7$\frac{3}{16}$	297	11$\frac{11}{16}$	114	4$\frac{1}{2}$	238·5	9$\frac{3}{8}$
Oct. 31, - -	I.	8–10	3702	60	2$\frac{3}{8}$	196	7$\frac{11}{16}$	136	5$\frac{6}{16}$	126·7	5
	II.	—	75	202	7$\frac{15}{16}$	275	10$\frac{13}{16}$	73	2$\frac{7}{8}$	229·2	9$\frac{1}{16}$
Average of Oct. 8, 13, and 31,	I.	—	6203	60	2$\frac{3}{8}$	196	7$\frac{11}{16}$	136	5$\frac{5}{16}$	124·4	4$\frac{7}{8}$
	II.	—	1168	183	7$\frac{3}{16}$	297	11$\frac{11}{16}$	114	4$\frac{1}{2}$	237·9	9$\frac{3}{8}$
Dec. 17, - -	I.	8–15	1315	94	3$\frac{11}{16}$	195	7$\frac{11}{16}$	101	4	139·5	5$\frac{1}{2}$
	II.	—	81	197	7$\frac{3}{4}$	294	11$\frac{9}{16}$	97	3$\frac{13}{16}$	243·2	9$\frac{9}{16}$
Dec. 18, - -	I.	8–9	666	82	3$\frac{1}{4}$	186	7$\frac{5}{16}$	104	4$\frac{1}{16}$	121·3	4$\frac{3}{4}$
Dec. 19, - -	I.	6–8$\frac{1}{2}$	554	77	3	177	6$\frac{15}{16}$	100	3$\frac{15}{16}$	123·4	4$\frac{7}{8}$
Dec. 19 (2nd Haul),	I.	5–12	3424	78	3$\frac{1}{16}$	196	7$\frac{11}{16}$	118	4$\frac{5}{8}$	136·9	5$\frac{3}{8}$
	II.	—	30	202	7$\frac{15}{16}$	273	10$\frac{3}{4}$	71	2$\frac{13}{16}$	232·7	9$\frac{3}{16}$
Dec. 21, - -	I.	7–9	2100	87	3$\frac{7}{16}$	197	7$\frac{3}{4}$	110	4$\frac{5}{16}$	133·8	5$\frac{5}{16}$
	II.	—	17	214	8$\frac{7}{16}$	248	9$\frac{3}{4}$	34	1$\frac{5}{16}$	229·1	9$\frac{1}{16}$
Average Dec., -	I.	—	8059	77	3	197	7$\frac{3}{4}$	120	4$\frac{3}{4}$	134·2	5$\frac{1}{4}$
	II.	—	128	197	7$\frac{3}{4}$	294	11$\frac{9}{16}$	97	3$\frac{13}{16}$	239·0	9$\frac{7}{16}$

IV.—Whiting—*continued.*

Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901.											
Aberdeen Bay—*continued.*											
May 30, -	I.	12–16	366	113	$4\frac{7}{16}$	189	$7\frac{7}{16}$	76	3	151·3	6
	II.	—	107	219	$8\frac{5}{8}$	328	$12\frac{7}{8}$	109	$4\frac{1}{4}$	262·7	$10\frac{5}{16}$
June 13, -	I.	9–14½	431	107	$4\frac{3}{16}$	203	8	96	$3\frac{13}{16}$	156·3	$6\frac{3}{16}$
	II.	—	27	211	$8\frac{5}{16}$	336	$13\frac{3}{16}$	125	$4\frac{7}{8}$	272·2	$10\frac{11}{16}$
June 13 (2nd Haul), -	I.	11	3579	113	$4\frac{7}{16}$	207	$8\frac{1}{8}$	94	$3\frac{11}{16}$	158·8	$6\frac{1}{4}$
	II.	—	576	212	$8\frac{3}{8}$	337	$13\frac{1}{4}$	125	$4\frac{7}{8}$	267·4	$10\frac{9}{16}$
Average of June 13, -	I.	—	4010	107	$4\frac{3}{16}$	207	$8\frac{1}{8}$	100	$3\frac{15}{16}$	158·5	$6\frac{1}{4}$
	II.	—	603	211	$8\frac{5}{16}$	337	$13\frac{1}{4}$	126	$4\frac{15}{16}$	267·7	$10\frac{9}{16}$
July 5, -	II.	10	246	124	$4\frac{7}{8}$	224	$8\frac{13}{16}$	100	$3\frac{15}{16}$	163·4	$6\frac{7}{16}$
	III.	—	3	250	$9\frac{13}{16}$	256	$10\frac{1}{16}$	6	$\frac{1}{4}$	253·0	10
July 31, -	I.	13	6	95	$3\frac{3}{4}$	125	$4\frac{15}{16}$	30	$1\frac{3}{16}$	112·0	$4\frac{3}{8}$
	II.	—	411	137	$5\frac{3}{8}$	244	$9\frac{5}{8}$	107	$4\frac{1}{4}$	192·5	$7\frac{9}{16}$
	III.	—	154	246	$9\frac{11}{16}$	365	$14\frac{3}{8}$	119	$4\frac{11}{16}$	295·0	$11\frac{5}{8}$
Sept. 4, -	I.	10	478	85	$3\frac{3}{8}$	143	$5\frac{5}{8}$	58	$2\frac{1}{4}$	109·8	$4\frac{5}{16}$
	II.	—	70	158	$6\frac{3}{16}$	235	$9\frac{1}{4}$	77	$3\frac{1}{16}$	206·2	$8\frac{1}{8}$
	III.	—	2	267	$10\frac{1}{2}$	292	$11\frac{1}{2}$	25	1	279·5	11
Sept. 4, - (2nd Haul)	I.	9–10	79	88	$3\frac{7}{16}$	148	$5\frac{13}{16}$	60	$2\frac{3}{8}$	109·6	$4\frac{5}{16}$
Sept. 10, -	I.	7–9	1861	76	3	157	$6\frac{3}{16}$	81	$3\frac{3}{16}$	110·4	$4\frac{5}{16}$
	II.	—	105	158	$6\frac{3}{16}$	252	$9\frac{15}{16}$	94	$3\frac{3}{4}$	204·1	8
	III.	—	2	298	$11\frac{3}{4}$	319	$12\frac{9}{16}$	21	$\frac{13}{16}$	308·5	$12\frac{1}{8}$
Sept. 10, - (2nd Haul)	II.	9	309	163	$6\frac{7}{16}$	245	$9\frac{5}{8}$	82	$3\frac{5}{16}$	201·9	$7\frac{15}{16}$
Average of Sept. 10, -	II.	—	414	158	$6\frac{3}{16}$	252	$9\frac{15}{16}$	94	$3\frac{3}{4}$	202·4	8
Oct. 18, -	I.	16	1252	67	$2\frac{5}{8}$	174	$6\frac{7}{8}$	107	$4\frac{1}{4}$	115·6	$4\frac{9}{16}$
	II.	—	71	179	$7\frac{1}{16}$	256	$10\frac{1}{16}$	77	3	222·6	$8\frac{3}{4}$
	III.	—	Nil.	—	—	—	—	—	—	—	—

IV.—Whiting—*continued.*

Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901. Aberdeen Bay—*continued.*											
Oct. 18, - - (2nd Haul)	II.	15	144	185	$7\frac{1}{4}$	267	$10\frac{1}{2}$	82	$3\frac{1}{4}$	223·6	$8\frac{13}{16}$
Average of Oct. 18, - -	II.	—	215	179	$7\frac{1}{16}$	267	$10\frac{1}{2}$	88	$3\frac{7}{16}$	223·2	$8\frac{13}{16}$
Nov. 6, - -	I.	6–13	1292	71	$2\frac{13}{16}$	186	$7\frac{5}{16}$	115	$4\frac{1}{2}$	134·0	$5\frac{1}{4}$
	II.	—	19	190	$7\frac{1}{2}$	242	$9\frac{1}{2}$	52	2	209·1	$8\frac{1}{4}$
1901. Dog Hole, off Aberdeen. June 28, -	II.	65	216	141	$5\frac{9}{16}$	212	$8\frac{3}{8}$	71	$2\frac{13}{16}$	181·1	$7\frac{1}{8}$
	III.	—	458	214	$8\frac{7}{16}$	329	$12\frac{15}{16}$	115	$4\frac{1}{2}$	255·8	$10\frac{1}{16}$
July 30, - -	II.	62	7	195	$7\frac{11}{16}$	212	$8\frac{3}{8}$	17	$\frac{11}{16}$	204·1	$8\frac{1}{16}$
	III.	—	53	—	—	—	—	—	—	281·8	$11\frac{1}{16}$
Aug. 21, -	I.	58	9	100	$3\frac{15}{16}$	156	$6\frac{1}{8}$	56	$2\frac{3}{16}$	129·9	$5\frac{1}{8}$
	II.	—	70	174	$6\frac{7}{8}$	252	$9\frac{15}{16}$	78	$3\frac{1}{16}$	214·9	$8\frac{1}{2}$
	III.	—	56	257	$10\frac{1}{8}$	363	$14\frac{5}{16}$	106	$4\frac{3}{16}$	293·4	$11\frac{9}{16}$
Nov. 5, - -	I.	70	135	80	$3\frac{1}{8}$	160	$6\frac{5}{16}$	80	$3\frac{3}{16}$	123·4	$4\frac{7}{8}$
	II.	—	9	223	$8\frac{3}{4}$	283	$11\frac{1}{8}$	60	$2\frac{3}{8}$	255·7	$10\frac{1}{16}$
	III.	—	4	293	$11\frac{9}{16}$	316	$12\frac{7}{16}$	23	$\frac{7}{8}$	304·5	12
Nov. 28, -	I.	68	875	83	$3\frac{1}{4}$	190	$7\frac{1}{2}$	107	$4\frac{1}{4}$	124·0	$4\frac{7}{8}$
	II.	—	19	198	$7\frac{13}{16}$	287	$11\frac{5}{16}$	89	$3\frac{1}{2}$	242·3	$9\frac{5}{8}$
	III.	—	3	312	$12\frac{1}{4}$	370	$14\frac{9}{16}$	58	$2\frac{5}{16}$	334·3	$13\frac{1}{8}$
Jan. 15, - -	I.	57	497	106	$4\frac{13}{16}$	192	$7\frac{9}{16}$	86	$3\frac{3}{8}$	143·9	$5\frac{11}{16}$
	II.	—	126	194	$7\frac{5}{8}$	277	$10\frac{7}{8}$	83	$3\frac{1}{4}$	231·1	$9\frac{1}{16}$
	III.	—	10	293	$11\frac{9}{16}$	353	$13\frac{7}{8}$	60	$2\frac{5}{16}$	318·3	$12\frac{1}{2}$
Firth of Forth, Station III. May 9, - -	I.	8–10	427	82	$3\frac{1}{4}$	171	$6\frac{3}{4}$	89	$3\frac{1}{2}$	129·4	$5\frac{1}{8}$
	III.	—	44	173	$6\frac{13}{16}$	281	$11\frac{1}{16}$	108	$4\frac{1}{4}$	205·4	$8\frac{1}{16}$
	IV.	—	10	301	$11\frac{13}{16}$	344	$13\frac{9}{16}$	43	$1\frac{3}{4}$	312·8	$6\frac{1}{8}$
May 13, - -	I.	8–10	313	71	$2\frac{13}{16}$	171	$6\frac{3}{4}$	100	$3\frac{15}{16}$	118·9	$4\frac{11}{16}$
	III.	—	10	174	$6\frac{7}{8}$	235	$9\frac{1}{4}$	61	$2\frac{3}{8}$	187·1	$7\frac{3}{8}$
May combined,	I.	—	740	71	$2\frac{13}{16}$	171	$6\frac{3}{4}$	100	$3\frac{15}{16}$	124·9	$4\frac{15}{16}$
	III.	—	54	173	$6\frac{13}{16}$	281	$11\frac{1}{16}$	108	$4\frac{1}{4}$	202·0	$7\frac{15}{16}$

IV.—Whiting—*continued.*

Place and Date.	Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
			Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901.										
Firth of Forth, Station III.—*contd.*										
July 23, - - I.	8–10	911	54	$2\frac{1}{8}$	109	$4\frac{5}{16}$	55	$2\frac{3}{16}$	78·6	$3\frac{1}{16}$
II.	—	569	116	$4\frac{9}{16}$	248	$9\frac{3}{4}$	132	$5\frac{3}{16}$	114·9	$6\frac{7}{8}$
III.	—	33	253	$9\frac{15}{16}$	340	$13\frac{3}{8}$	87	$3\frac{7}{16}$	280·4	$11\frac{1}{16}$
Aug. 19,- - I.	8–10	1391	79	$3\frac{1}{8}$	148	$5\frac{13}{16}$	69	$2\frac{11}{16}$	104·3	$4\frac{1}{8}$
II.	—	232	153	6	279	11	126	5	185·5	$7\frac{11}{16}$
Aug. 19,- - I. (2nd Haul.)	8–10	678	72	$2\frac{13}{16}$	148	$5\frac{13}{16}$	76	3	101·8	4
II.	—	147	185	$7\frac{1}{4}$	279	11	94	$3\frac{3}{4}$	204·3	$8\frac{1}{16}$
Aug. 19,- - I. (combined.)	—	2069	72	$2\frac{13}{16}$	148	$5\frac{13}{16}$	76	3	103·4	$4\frac{1}{16}$
Aug. 22,- - I.	8–10	964	67	$2\frac{5}{8}$	145	$5\frac{11}{16}$	78	$3\frac{1}{16}$	103·9	$4\frac{1}{16}$
II.	—	229	153	6	267	$10\frac{1}{2}$	114	$4\frac{1}{2}$	206·0	$8\frac{1}{8}$
III.	—	7	276	$10\frac{7}{8}$	304	12	28	$1\frac{1}{8}$	289·0	$11\frac{3}{8}$
Aug. 22,- - I. (2nd Haul.)	8–10	183	160	$6\frac{5}{16}$	267	$10\frac{1}{2}$	107	$4\frac{3}{16}$	210·8	$8\frac{5}{16}$
Aug. 19 and 22, I. (combined.)	—	3033	67	$2\frac{5}{8}$	148	$5\frac{13}{16}$	81	$3\frac{3}{16}$	103·6	$4\frac{1}{16}$
II.	—	461	153	6	279	11	126	5	200·6	$7\frac{7}{8}$
Aug. 19 and 22. 2nd Hall combined,- - II.	—	330	155	$6\frac{1}{16}$	279	11	124	$4\frac{15}{16}$	207·9	$8\frac{3}{16}$
Station V.										
May 10, - - I.	20–30	1148	77	$3\frac{1}{16}$	173	$6\frac{13}{16}$	96	$3\frac{3}{4}$	130·0	$5\frac{1}{8}$
III.	—	81	178	7	290	$11\frac{7}{16}$	112	$4\frac{7}{16}$	225·6	$8\frac{7}{8}$
IV.	—	2	322	$12\frac{11}{16}$	350	$13\frac{3}{4}$	28	$1\frac{1}{16}$	336·0	$13\frac{1}{4}$
July 24, - - I.	20–30	34	69	$2\frac{3}{4}$	108	$4\frac{1}{4}$	39	$1\frac{1}{2}$	87·4	$3\frac{7}{16}$
II.	—	340	133	$5\frac{1}{4}$	243	$9\frac{9}{16}$	110	$4\frac{5}{16}$	168·8	$6\frac{5}{8}$
III.	—	7	250	$9\frac{13}{16}$	298	$11\frac{3}{4}$	48	$1\frac{13}{16}$	265·3	$10\frac{7}{16}$
Aug. 16,- - I.	20–30	1006	88	$3\frac{7}{16}$	148	$5\frac{13}{16}$	60	$2\frac{3}{8}$	116·1	$4\frac{9}{16}$
II.	—	153	149	$5\frac{7}{8}$	265	$10\frac{7}{16}$	116	$4\frac{9}{16}$	186·5	$7\frac{5}{16}$
III.	—	5	295	$11\frac{5}{8}$	309	$12\frac{1}{8}$	14	$\frac{1}{2}$	300·2	$11\frac{13}{16}$

IV.—Whiting—*continued.*

Place and Date.	Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
			Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1902.										
Deep Hole, off Kinnaird Head.										
July 4, - - II.	84-85	7	201	7 15/16	227	8 15/16	26	1	210·4	8¼
III.	—	110	238	9⅜	355	14	117	4⅝	283·6	11⅛
IV.	—	5	364	14 5/16	378	14⅞	14	9/16	371·6	14⅝
Deep Water, 60 miles E. by S. of Sumburgh Head.										
May 20, - - I.	65-70	15	200	7⅞	249	9 13/16	49	1 15/16	228·1	9
II.	—	1072	250	9 13/16	362	14¼	112	4 7/16	305·1	12
III.	—	94	363	14¼	468	18 7/16	105	4 3/16	394·4	15½
IV.	—	1	—	—	—	—	—	—	511·0	20⅛
May 21, - - I.	65-70	5	187	7⅜	228	9	41	1⅝	207·2	8⅛
II.	—	626	251	9⅞	362	14¼	111	4⅜	305·3	12
III.	—	66	363	14¼	471	18 9/16	108	4 5/16	392·2	15 7/16
IV.	—	4	491	19 5/16	541	21 5/16	50	2	512·7	20 3/16
May combined, I.	—	20	187	7⅜	249	9 13/16	62	2 7/16	222·8	8¾
II.	—	1698	250	9 13/16	362	14¼	112	4 7/16	305·2	12
III.	—	160	363	14¼	471	18 9/16	108	4 5/16	393·5	15½
IV.	—	5	491	19 5/16	541	21 5/16	50	2	512·4	20 3/16
1901.										
Burghead Bay.										
Dec. 25, - - I.	7½-18	601	85	3⅜	180	7 1/16	95	3 11/16	137·4	5⅜
II.	—	9	184	7¼	234	9 3/16	50	1 15/16	197·3	7¾

V.—Haddock.

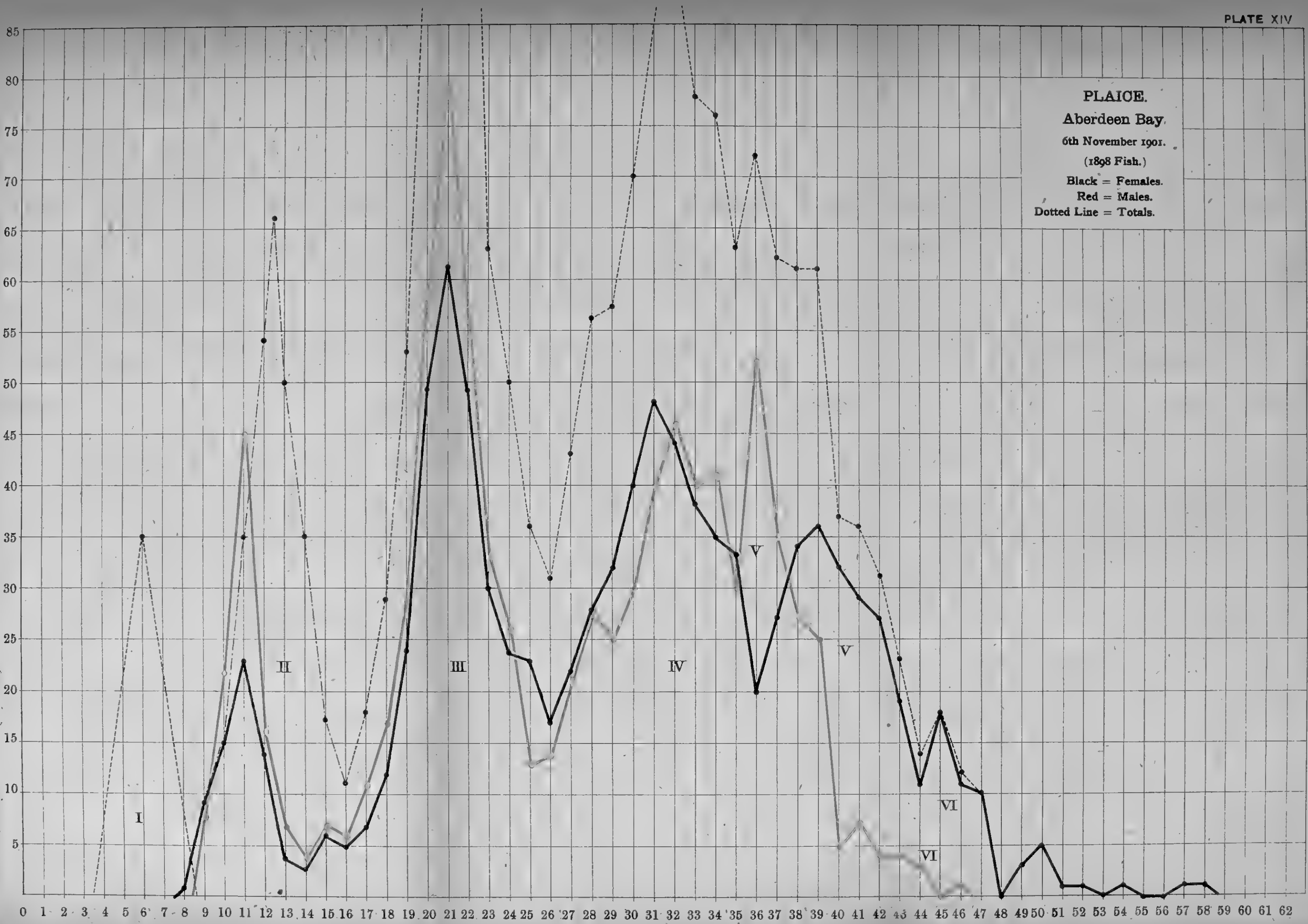
Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
Aberdeen Bay. 30th May, 1901.											
	II.	12-16	58	174	$6\frac{13}{16}$	241	$9\frac{1}{2}$	67	$2\frac{11}{16}$	215·3	$8\frac{1}{2}$
	III.	—	71	262	$10\frac{5}{16}$	372	$14\frac{5}{8}$	110	$4\frac{5}{16}$	315·7	$12\frac{7}{16}$
	IV.	—	3	392	$15\frac{7}{16}$	433	$17\frac{1}{16}$	41	$1\frac{5}{8}$	409·0	$16\frac{1}{16}$
May 30, - -	II.	12-16	27	183	$7\frac{7}{16}$	259	$10\frac{3}{16}$	76	3	226·2	$8\frac{7}{8}$
	III.	—	58	270	$10\frac{5}{8}$	349	$13\frac{3}{4}$	79	$3\frac{1}{8}$	312·1	$12\frac{1}{4}$
	IV.	—	1	—	—	—	—	—	—	407·0	16
May 30, - - (combined.)	III.	—	129	262	$10\frac{5}{16}$	372	$14\frac{5}{8}$	110	$4\frac{5}{16}$	314·0	$12\frac{3}{8}$
June 6, - -	II.	15	416	178	7	258	$10\frac{1}{8}$	80	$3\frac{1}{8}$	218·7	$8\frac{5}{8}$
	III.	—	486	264	$10\frac{3}{8}$	371	$14\frac{5}{8}$	107	$4\frac{1}{4}$	319·3	$12\frac{9}{16}$
	IV.	—	66	373	$14\frac{11}{16}$	465	$18\frac{5}{16}$	92	$3\frac{5}{8}$	403·8	$15\frac{7}{8}$
	V.	—	2	502	$19\frac{3}{4}$	503	$19\frac{13}{16}$	1	$\frac{1}{16}$	502·5	$19\frac{3}{4}$
	VI.	—	1	—	—	—	—	—	—	582·0	$22\frac{15}{16}$
	VII.	—	1	—	—	—	—	—	—	648·0	$25\frac{1}{2}$
June 13,- -	II.	11	110	181	$7\frac{1}{8}$	263	$10\frac{3}{8}$	82	$3\frac{1}{4}$	224·5	$8\frac{13}{16}$
	III.	—	241	268	$10\frac{9}{16}$	384	$15\frac{1}{8}$	116	$4\frac{9}{16}$	328·7	$12\frac{15}{16}$
	IV.	—	45	387	$15\frac{1}{4}$	463	$18\frac{3}{16}$	76	$2\frac{15}{16}$	408·0	$16\frac{1}{16}$
	V.	—	2	505	$19\frac{7}{8}$	506	$19\frac{15}{16}$	1	$\frac{1}{16}$	505·5	$19\frac{7}{8}$
	VI.	—	2	552	$21\frac{3}{4}$	578	$22\frac{3}{4}$	26	1	565·0	$22\frac{1}{4}$
	VII.	—	3	615	$24\frac{3}{16}$	619	$24\frac{3}{8}$	4	$\frac{3}{16}$	617·3	$24\frac{1}{4}$
July 31,- -	I.	13	22	98	$3\frac{7}{8}$	125	$4\frac{15}{16}$	27	$1\frac{1}{16}$	108·7	$4\frac{1}{4}$
	II.	—	33	212	$8\frac{5}{16}$	273	$10\frac{3}{4}$	61	$2\frac{7}{16}$	236·1	$9\frac{5}{16}$
	III.	—	79	281	$11\frac{1}{16}$	387	$15\frac{1}{4}$	106	$4\frac{3}{16}$	346·8	$13\frac{5}{8}$
	IV.	—	8	293	$11\frac{1}{2}$	468	$18\frac{7}{16}$	175	$6\frac{15}{16}$	416·2	$16\frac{3}{8}$
Sept. 4, - -	I.	10	36	118	$4\frac{5}{8}$	194	$7\frac{5}{8}$	76	3	151·7	6
	II.	—	363	218	$8\frac{9}{16}$	320	$12\frac{5}{8}$	102	$4\frac{1}{16}$	270·4	$10\frac{5}{8}$
	III.	—	184	324	$12\frac{3}{4}$	413	$16\frac{1}{4}$	89	$3\frac{1}{2}$	360·7	$14\frac{3}{16}$
	IV.	—	6	420	$16\frac{1}{2}$	436	$17\frac{3}{16}$	16	$\frac{11}{16}$	426·8	$16\frac{13}{16}$
Sept. 10, -	I.	7-9	100	118	$4\frac{5}{8}$	185	$7\frac{1}{4}$	67	$2\frac{5}{8}$	147·3	$5\frac{13}{16}$
	II.	—	44	218	$8\frac{9}{16}$	313	$12\frac{5}{16}$	95	$3\frac{3}{4}$	254·3	10
Oct. 18, - -	I.	16	772	122	$4\frac{13}{16}$	223	$8\frac{3}{4}$	101	$3\frac{15}{16}$	170·0	$6\frac{11}{16}$
	II.	—	44	232	$9\frac{1}{8}$	312	$12\frac{1}{4}$	80	$3\frac{1}{8}$	262·2	$10\frac{9}{16}$

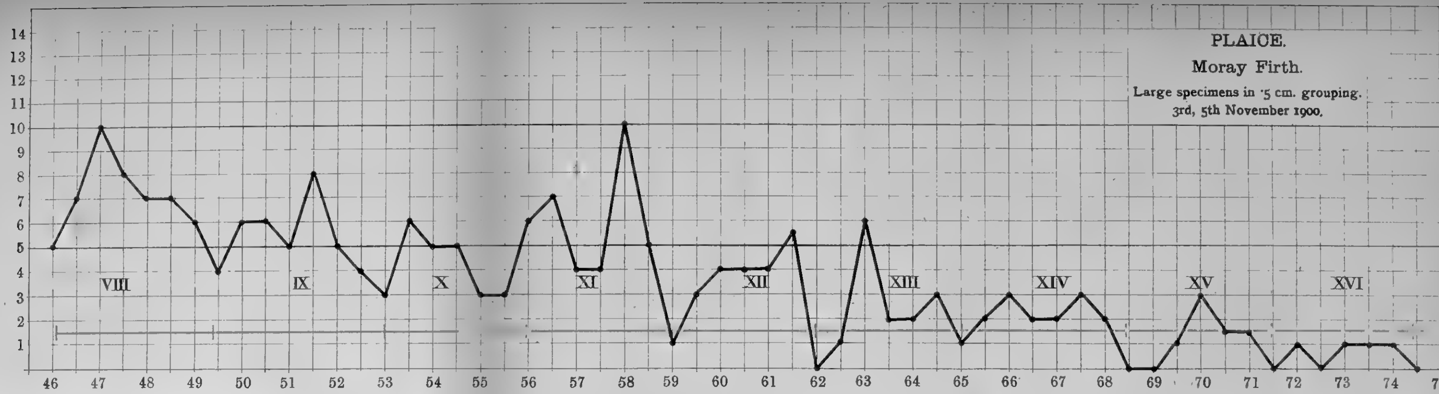
V.—Haddock—*continued.*

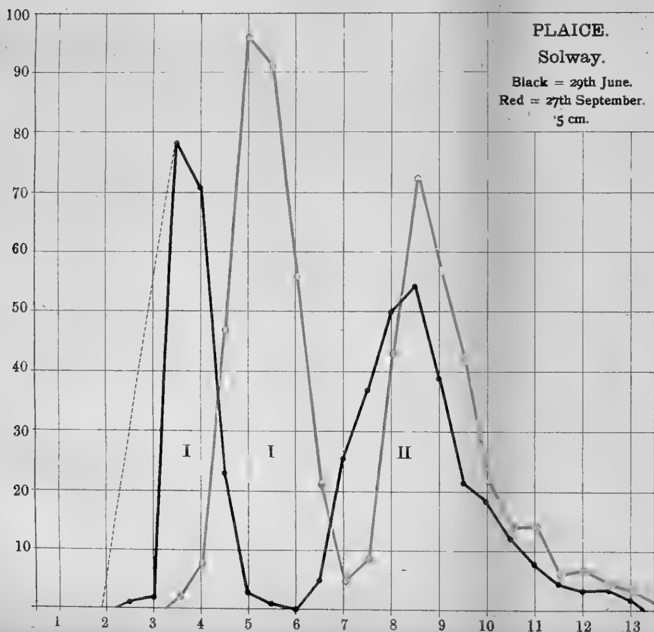
Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901. Aberdeen Bay—*continued.* Nov. 6, -	I.	6–13	168	133	5 1/4	208	8 3/16	75	2 15/16	172·7	6 13/16
	II.	—	3	233	9 3/16	282	11 1/16	49	1 7/8	255·0	10 1/16
Nov. 26, -	I.	—	3	173	6 13/16	193	7 9/16	20	3/4	180·7	7 1/8
	II.	—	4	286	11 1/4	318	12 1/2	32	1 1/4	296·7	11 11/16
	III.	—	3	380	14 15/16	444	17 7/16	64	2 1/2	408·7	16 1/8
Dec. 17, -	I.	9 1/2–15	15	157	6 3/16	200	7 7/8	43	1 11/16	179·9	7 1/16
	II.	—	4	258	10 1/8	280	11	22	7/8	266·2	10 1/2
Dog Hole, off Aberdeen. June 28, -	II.	65	660	168	6 5/8	284	11 3/16	116	4 9/16	265·8	10 7/16
July 30, -	I.	62	65	96	3 3/4	131	5 1/8	35	1 3/8	109·5	4 5/16
	II.	—	311	184	7 1/4	293	11 9/16	109	4 5/16	244·5	9 5/8
	III.	—	81	296	11 5/8	396	15 9/16	100	3 15/16	334·7	13 1/8
	IV.	—	10	412	16 3/16	452	17 13/16	40	1 5/8	428·6	16 7/8
	V.	—	3	502	19 3/4	528	20 3/4	26	1	517·0	20 3/8
Aug. 21, -	I.	58	244	96	3 3/4	150	5 7/8	54	2 1/8	121·9	4 13/16
	II.	—	540	202	7 15/16	308	12 1/8	106	4 3/16	250·8	9 7/8
	III.	—	59	312	12 1/4	420	16 1/2	1 8	4 1/4	348·7	6 7/8
	IV.	—	2	450	17 11/16	462	18 3/16	12	1/2	456·0	18
Sept. 3, -	I.	58	20	98	3 7/8	158	6 3/16	60	2 5/16	125·4	4 15/16
	II.	—	1	—	—	—	—	—	—	221·0	8 11/16
Nov. 5, -	I.	70	31	120	4 3/4	199	7 13/16	79	3 1/16	172·4	6 13/16
	II.	—	219	230	9 1/16	312	12 1/4	82	3 3/16	273·2	10 3/4
	III.	—	22	321	12 5/8	413	16 1/4	92	3 5/8	346·2	6 13/16
Nov. 28, -	I.	68	102	147	5 13/16	208	8 3/16	61	2 3/8	176·8	6 15/16
	II.	—	66	224	8 13/16	303	11 15/16	79	3 1/8	270·6	10 5/8
	III.	—	3	389	15 5/16	428	16 13/16	39	1 1/2	406·7	16
Dec. 16, -	I.	57	1219	137	5 3/8	214	8 7/16	77	3 1/16	180·2	7 1/8
	II.	—	457	223	8 3/4	325	12 13/16	102	4 1/16	277·4	10 15/16
	III.	—	15	334	13 1/8	428	16 13/16	94	3 11/16	379·1	14 15/16
Jan. 15, 1902,	I.	57	775	150	5 7/8	210	8 1/4	60	2 3/8	180·5	7 1/8
	II.	—	24	240	9 7/16	324	12 3/4	84	3 5/16	286·8	11 5/16
	III.	—	3	332	13 1/16	374	14 11/16	42	1 5/8	353·0	13 7/8

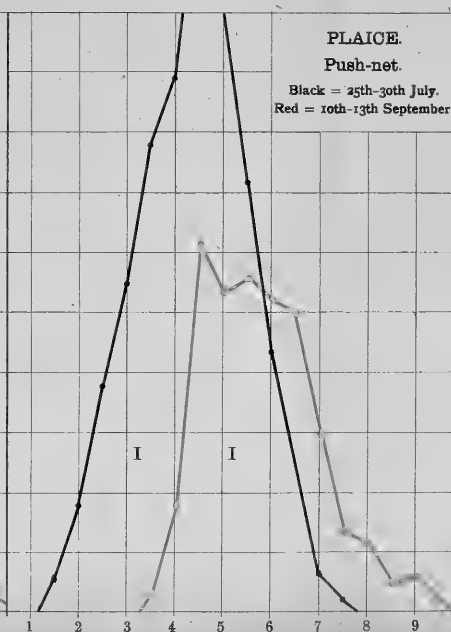
V.—HADDOCK—*continued.*

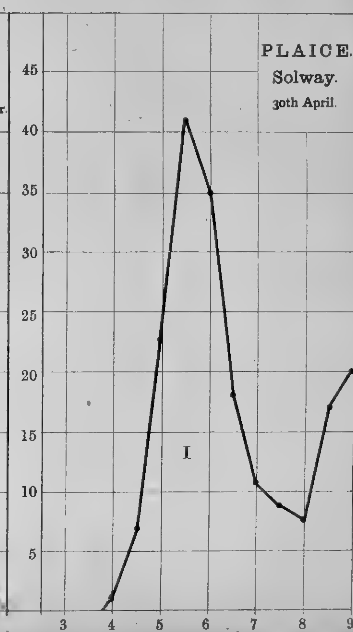
Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches.	Mm.	Inches.
1901. MORAY FIRTH, off Lossiemouth.											
June 1, - -	II.	12–15	2	259	$10\frac{3}{16}$	264	$10\frac{3}{8}$	5	$\frac{3}{16}$	[261·5]	[$10\frac{5}{16}$]
	III.		40	281	$11\frac{1}{16}$	363	$14\frac{1}{4}$	82	$3\frac{3}{16}$	324·4	$12\frac{3}{4}$
	IV.		43	371	$14\frac{5}{8}$	457	18	86	$3\frac{3}{8}$	407·3	$16\frac{1}{16}$
	V.		—	469	$18\frac{7}{16}$	—	—	—	—	—	—
SMITH BANK.											
June 5, - -	II.	22	17	217	$8\frac{9}{16}$	246	$9\frac{11}{16}$	29	$1\frac{1}{8}$	[231·0]	[$9\frac{1}{16}$]
	III.		224	256	$10\frac{1}{16}$	363	$14\frac{1}{4}$	107	$4\frac{3}{16}$	309·7	$12\frac{3}{16}$
	IV.		82	365	$14\frac{3}{8}$	444	$17\frac{7}{16}$	79	$3\frac{1}{16}$	393·8	$14\frac{11}{16}$
	V.		7	458	$18\frac{1}{16}$	524	$20\frac{5}{8}$	66	$2\frac{9}{16}$	486·9	$19\frac{1}{8}$
	VIII.	-	1	—	—	—	—	—	—	711	$26\frac{7}{16}$
Nov. 8, - -	I.	26	11	186	$7\frac{5}{16}$	206	$8\frac{1}{8}$	20	$\frac{13}{16}$	197·6	$7\frac{3}{4}$
	II.	—	3	285	$11\frac{3}{16}$	297	$11\frac{11}{16}$	12	$\frac{1}{2}$	291·7	$11\frac{1}{2}$
	III.	—	7	313	$12\frac{5}{16}$	388	$15\frac{1}{4}$	75	$2\frac{15}{16}$	346·3	$13\frac{5}{8}$
SINCLAIR BAY.											
June 4, - -	II.	9–15	5	214	$8\frac{7}{16}$	266	$10\frac{1}{2}$	52	$2\frac{1}{16}$	217·8	$8\frac{9}{16}$
	III.	—	135	280	11	365	$14\frac{3}{8}$	85	$3\frac{3}{8}$	323·6	$12\frac{3}{4}$
	IV.	—	114	375	$14\frac{3}{4}$	462	$18\frac{3}{16}$	87	$3\frac{7}{16}$	408·1	$16\frac{1}{16}$
	V.	—	15	465	$18\frac{5}{16}$	538	$21\frac{3}{16}$	73	$2\frac{7}{8}$	490·6	$19\frac{5}{16}$
	VI.	—	1	—	—	—	—	—	—	570·0	$22\frac{7}{16}$
DEEP WATER, off Kinnaird Head.											
July 4, - -	II.	83–85	105	174	$6\frac{13}{16}$	263	$15\frac{3}{8}$	89	$3\frac{6}{16}$	215·6	$8\frac{1}{2}$
	III.	—	94	273	$10\frac{3}{4}$	374	$14\frac{11}{16}$	101	$3\frac{15}{16}$	319·8	$12\frac{9}{16}$
	IV.	—	13	383	$15\frac{1}{16}$	474	$18\frac{5}{8}$	91	$3\frac{9}{16}$	408·7	$16\frac{1}{16}$
	V.	—	1	—	—	—	—	—	—	502·0	$19\frac{3}{4}$
Off Shetlands.											
Dec. 11, 1901,	I.	75	265	91	$3\frac{9}{16}$	185	$7\frac{1}{4}$	94	$3\frac{11}{16}$	135·4	$5\frac{5}{16}$
	II.	—	246	213	$8\frac{3}{8}$	306	12	93	$3\frac{5}{8}$	264·3	$10\frac{3}{8}$
	III.	—	134	318	$12\frac{1}{2}$	419	$16\frac{1}{2}$	101	4	370·9	$14\frac{5}{8}$
	IV.	—	20	427	$16\frac{13}{16}$	487	$19\frac{3}{16}$	60	$2\frac{3}{8}$	444·9	$17\frac{1}{2}$
	V.	—	2	510	$20\frac{1}{16}$	545	$21\frac{7}{16}$	35	$1\frac{3}{8}$	527·7	$20\frac{3}{4}$

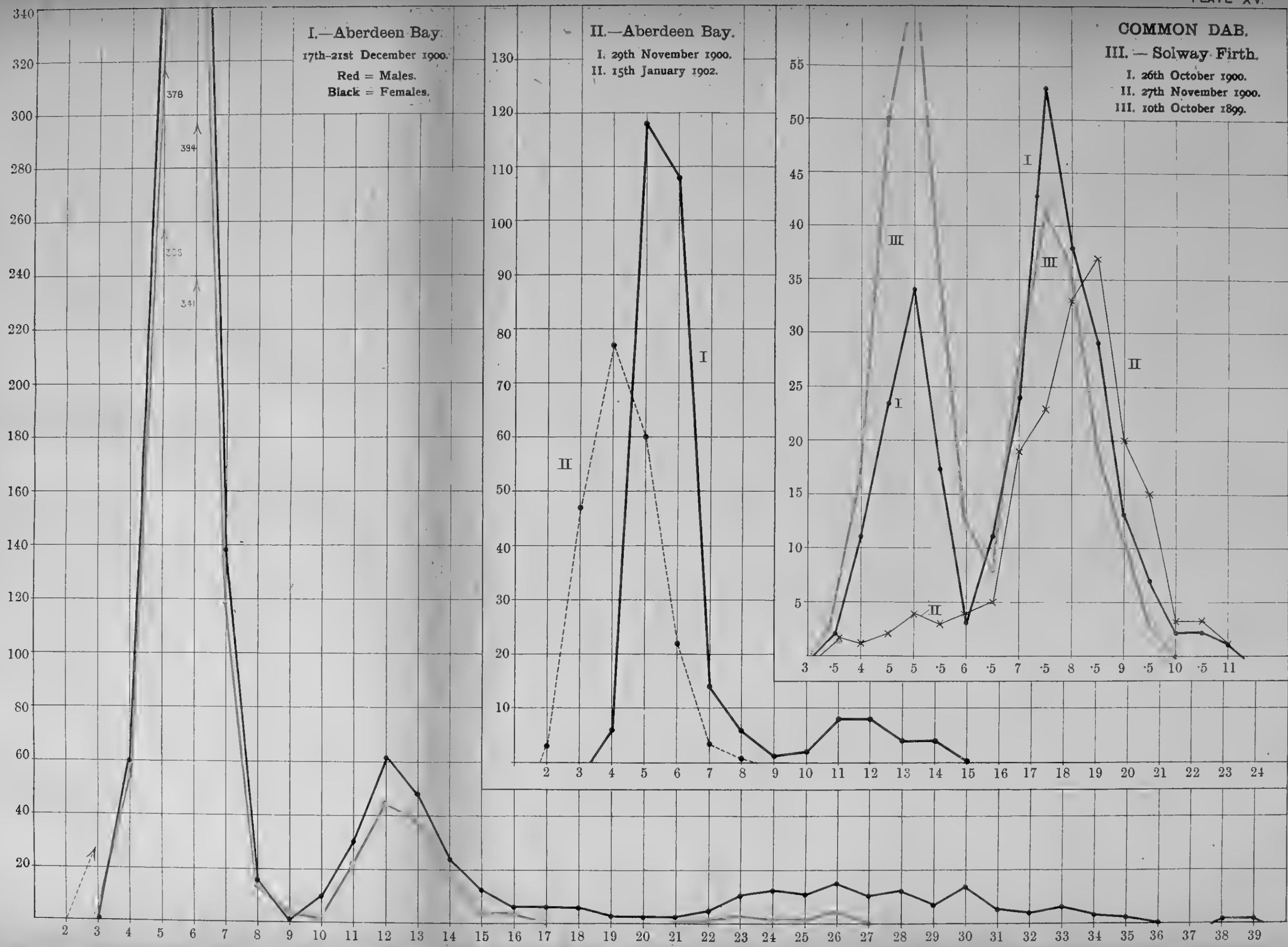

PLAICE.
Aberdeen Bay.
6th November 1901.
(1898 Fish.)
Black = Females.
Red = Males.
Dotted Line = Totals.
I
II
III
IV
V
V
VI
VI
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62

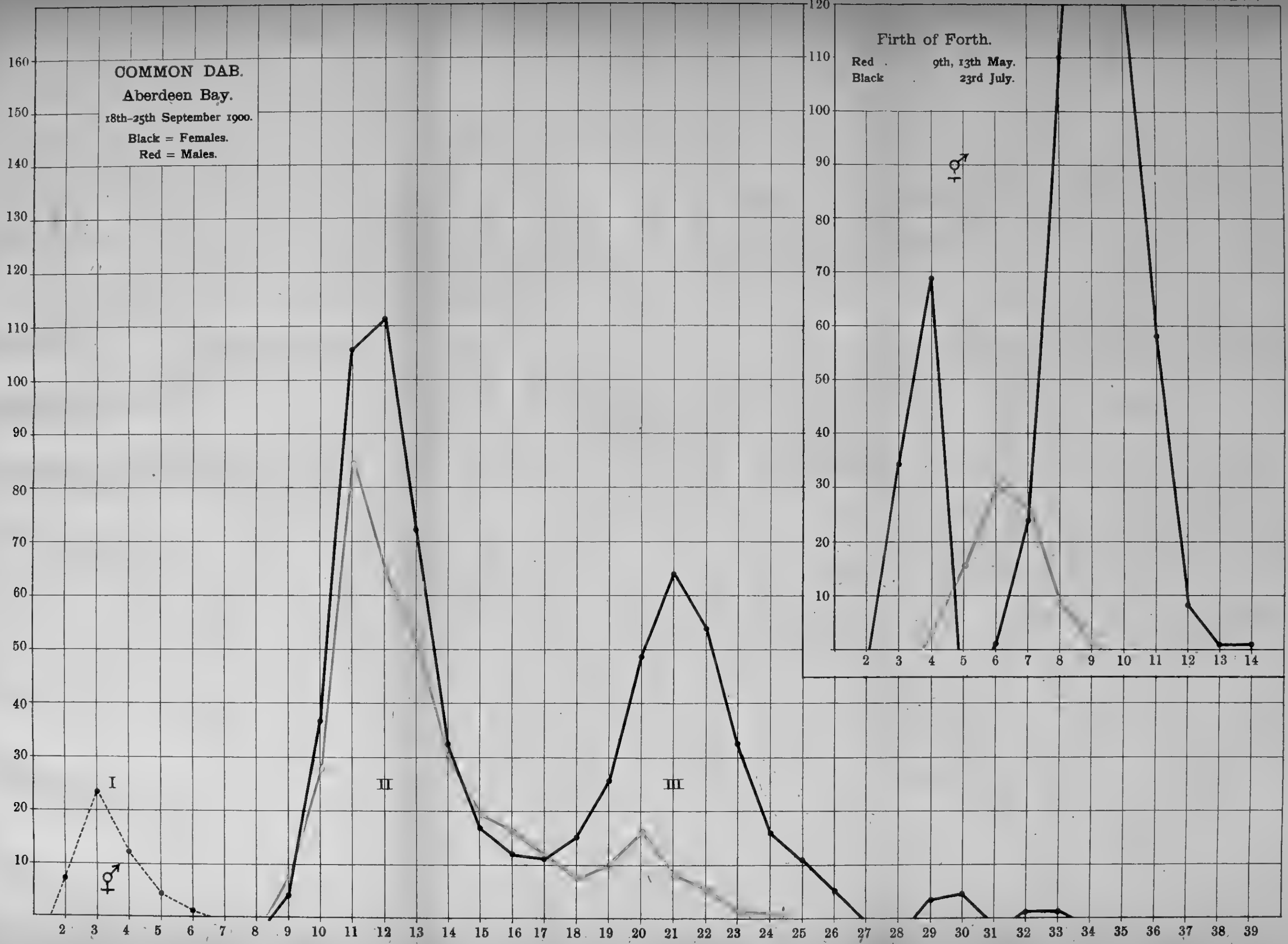

PLAICE.
Moray Firth.
Large specimens in ·5 cm. grouping.
3rd, 5th November 1900.
VIII
IX
X
XI
XII
XIII
XIV
XV
XVI

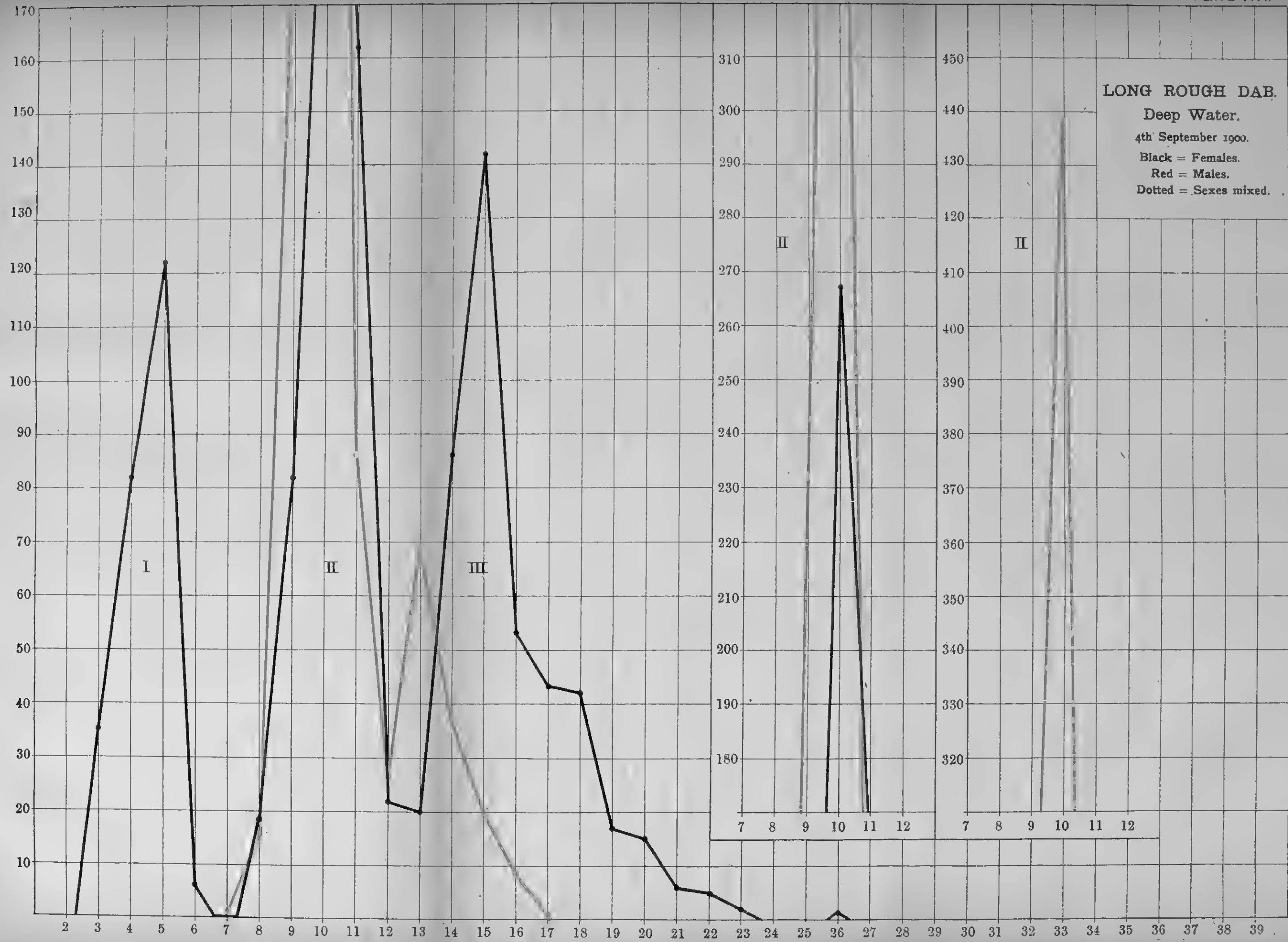

PLAICE.
Solway.
Black = 29th June.
Red = 27th September.
·5 cm.
I
I
II


PLAICE.
Push-net.
Black = 25th–30th July.
Red = 10th–13th September.
I
I


PLAICE.
Solway.
30th April.
I


COMMON DAB.
I.—Aberdeen Bay.
17th–21st December 1900.
Red = Males.
Black = Females.
II.—Aberdeen Bay.
I. 29th November 1900.
II. 15th January 1902.
III. — Solway Firth.
I. 26th October 1900.
II. 27th November 1900.
III. 10th October 1899.
378
394
308
341


COMMON DAB.
Aberdeen Bay.
18th–25th September 1900.
Black = Females.
Red = Males.
I
II
III
Firth of Forth.
Red . 9th, 13th May.
Black . 23rd July.


LONG ROUGH DAB.
Deep Water.
4th September 1900.
Black = Females.
Red = Males.
Dotted = Sexes mixed.
I
II
III
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
310
300
290
280
270
260
250
240
230
220
210
200
190
180
450
440
430
420
410
400
390
380
370
360
350
340
330
320
7
8
9
10
11
12
2
3
4
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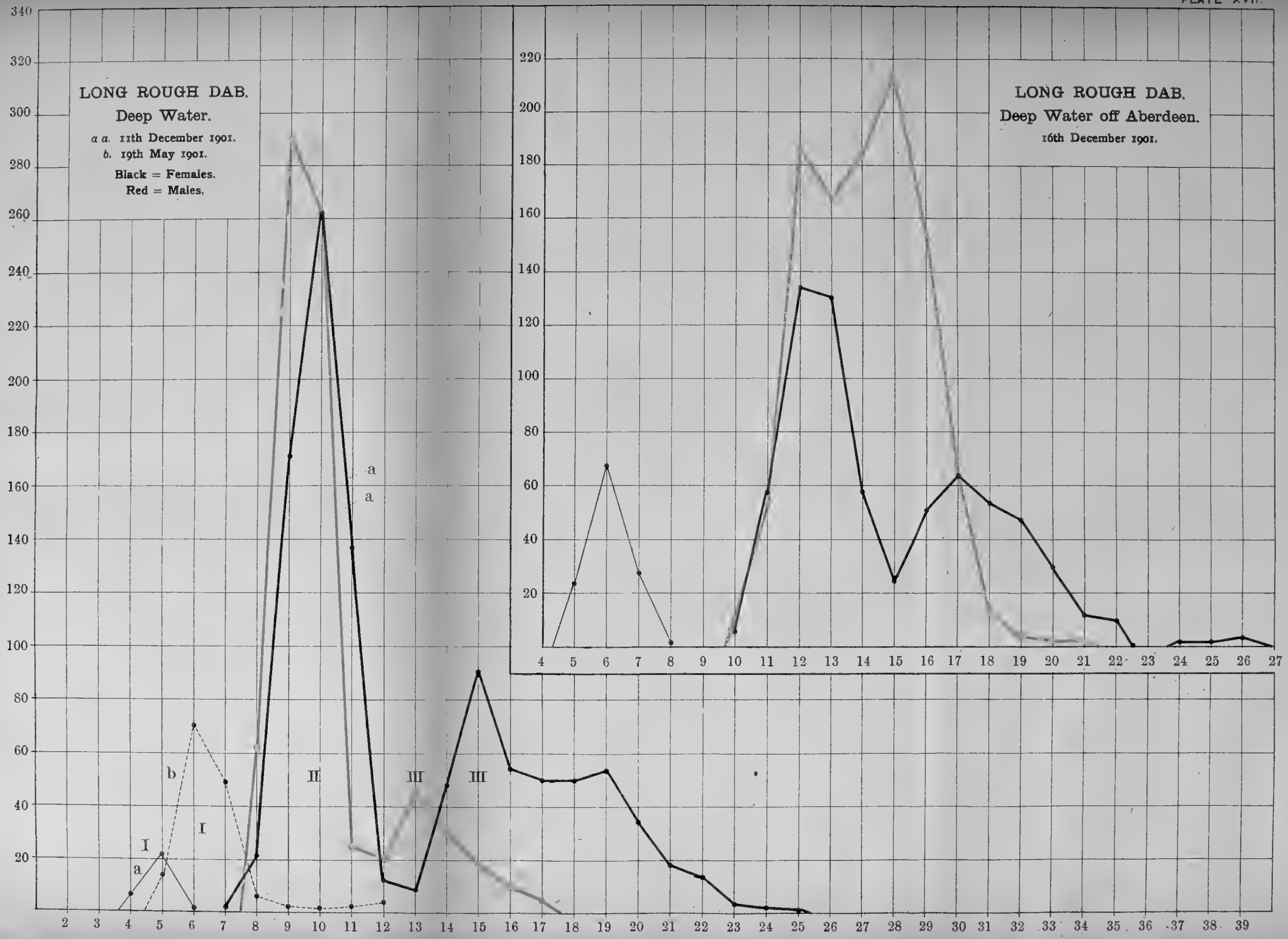
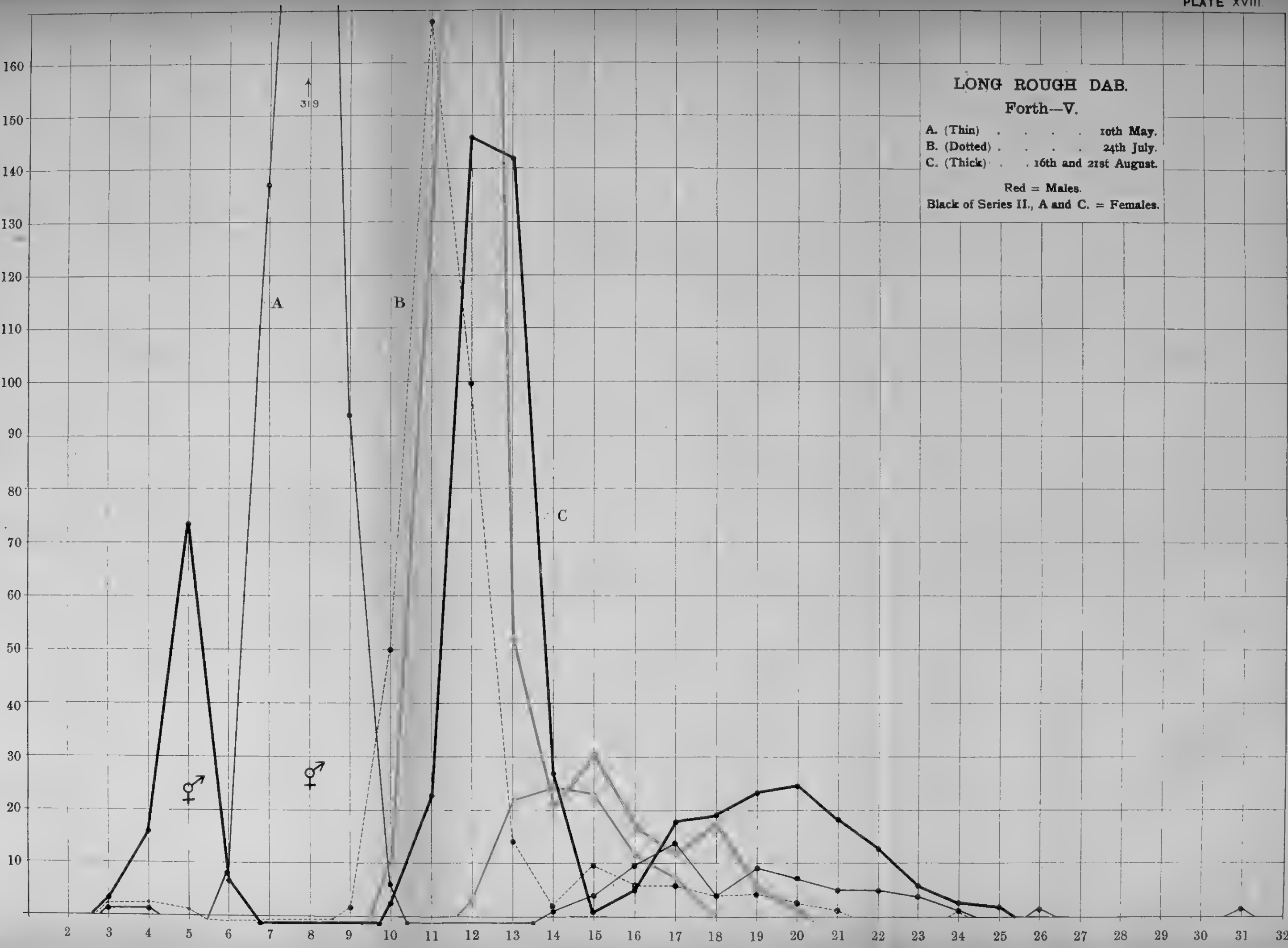
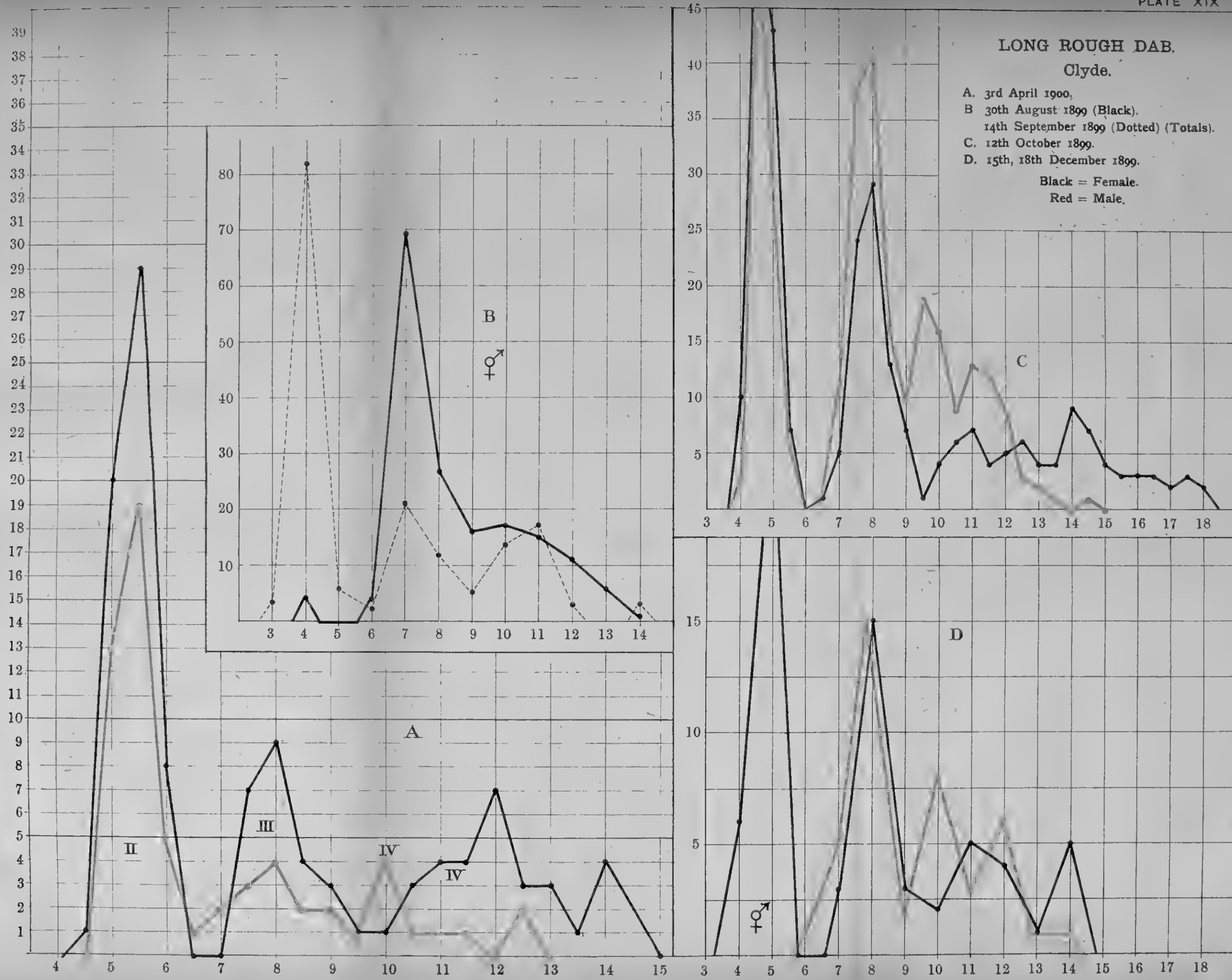
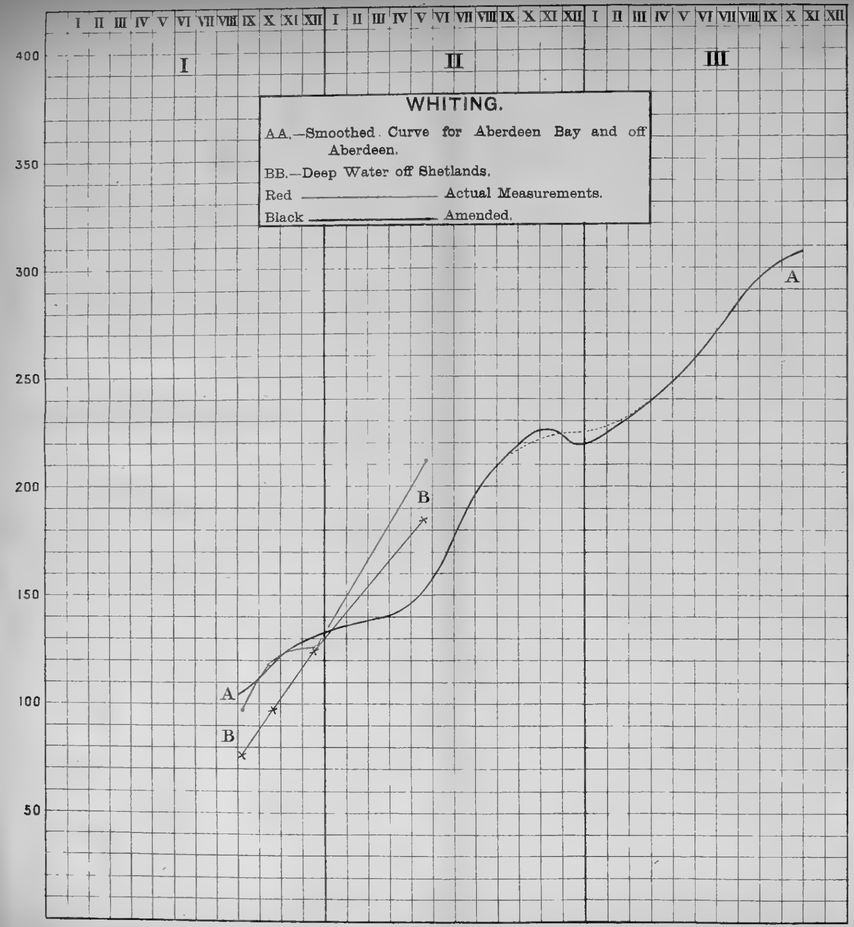
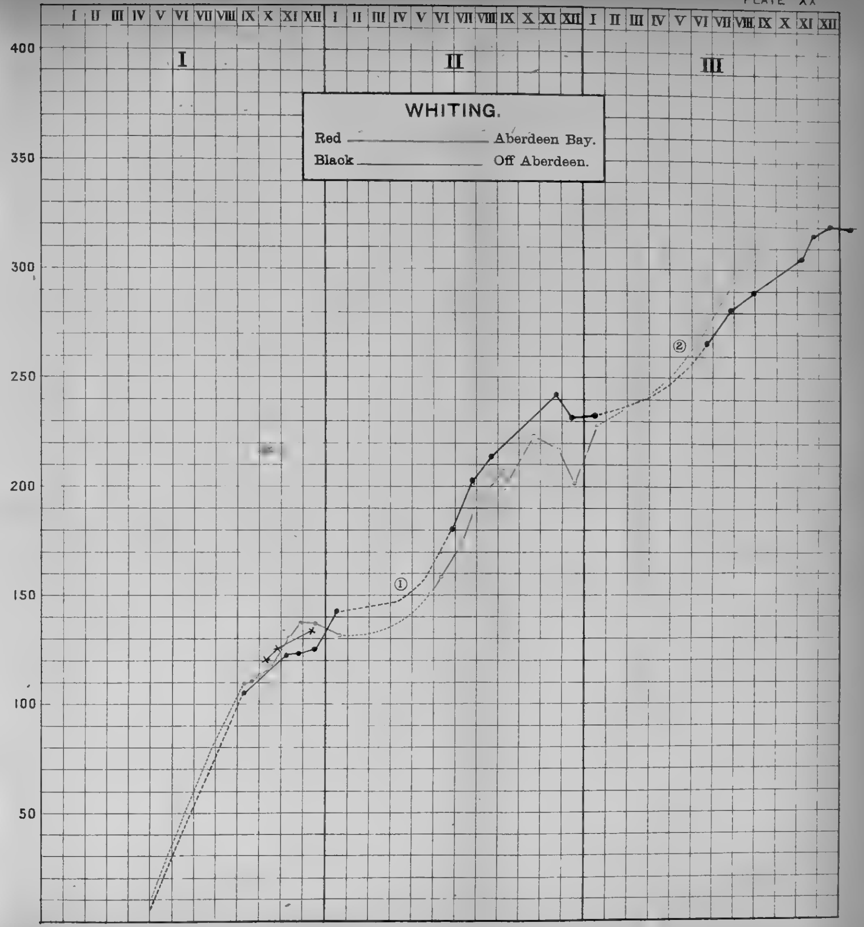
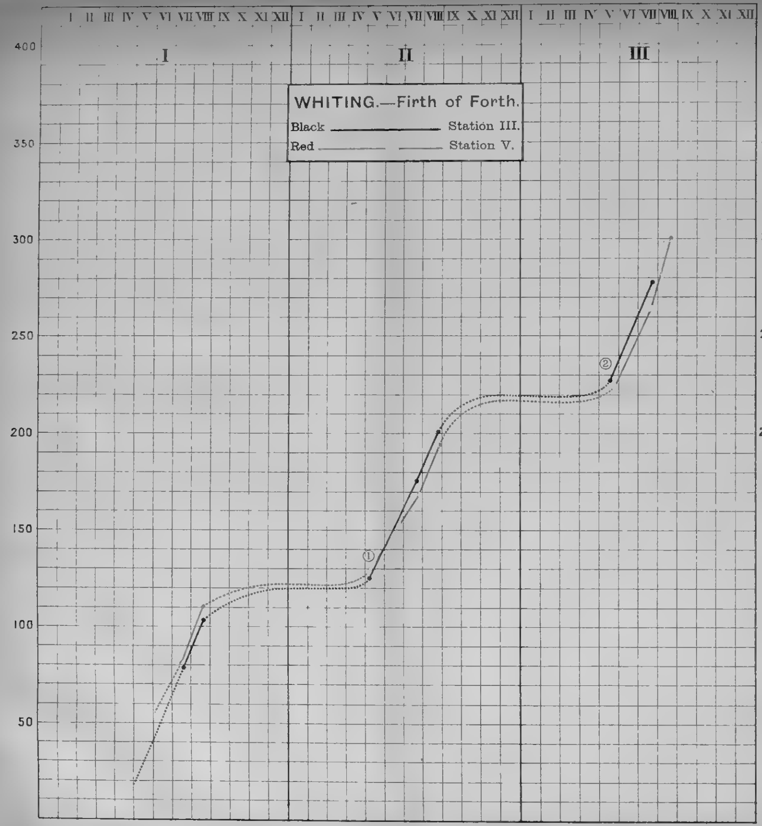

LONG ROUGH DAB.
Deep Water.
a a. 11th December 1901.
b. 19th May 1901.
Black = Females.
Red = Males.
LONG ROUGH DAB.
Deep Water off Aberdeen.
16th December 1901.

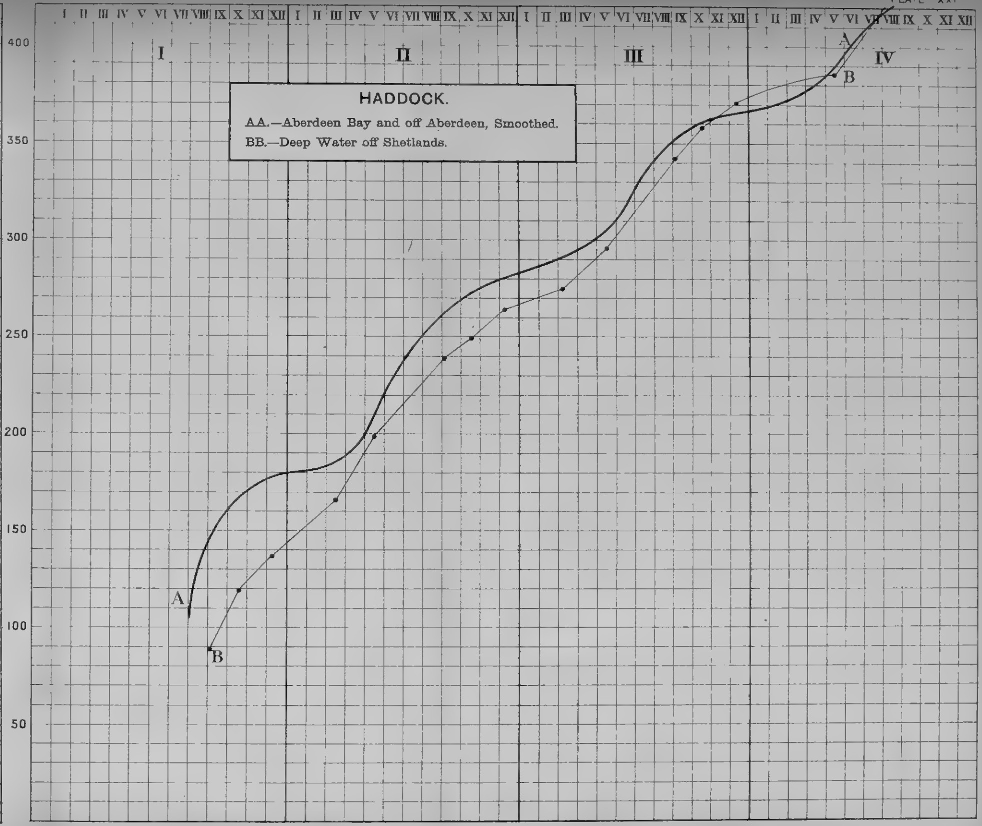

LONG ROUGH DAB.
Forth—V.
A. (Thin) . . . . . 10th May.
B. (Dotted) . . . . 24th July.
C. (Thick) . . 16th and 21st August.
Red = Males.
Black of Series II., A and C. = Females.
319
A
B
C
♂
♀
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32


LONG ROUGH DAB.
Clyde.
A. 3rd April 1900.
B 30th August 1899 (Black).
14th September 1899 (Dotted) (Totals).
C. 12th October 1899.
D. 15th, 18th December 1899.
Black = Female.
Red = Male.
A
B
C
D
II
III
IV
IV


WHITING.
AA.—Smoothed Curve for Aberdeen Bay and off Aberdeen.
BB.—Deep Water off Shetlands.
Red ———— Actual Measurements.
Black ———— Amended.
I
II
III
I II III IV V VI VII VIII IX X XI XII
400
350
300
250
200
150
100
50
A
B


WHITING.
Red ———— Aberdeen Bay.
Black ———— Off Aberdeen.
I
II
III
I II III IV V VI VII VIII IX X XI XII
400
350
300
250
200
150
100
50
①
②


WHITING.—Firth of Forth.
Black Station III.
Red Station V.
I
II
III
400
350
300
250
200
150
100
50


HADDOCK.
AA.—Aberdeen Bay and off Aberdeen, Smoothed.
BB.—Deep Water off Shetlands.
I
II
III
IV
A
B
400
350
300
250
200
150
100
50

V.—Haddock—*continued.*

Place and Date.		Depth.	No.	Smallest.		Largest.		Range.		Average Size.	
				Mm.	Inches.	Mm.	Inches.	Mm.	Inches	Mm.	Inches.
Deep Water, off Shetlands—*contd.*											
May 15, 1901,	I.	75–78	11	173	$6\frac{13}{16}$	218	$8\frac{9}{16}$	45	$1\frac{3}{4}$	194·7	$7\frac{5}{8}$
	II.	—	32	239	$9\frac{3}{8}$	320	$12\frac{9}{16}$	81	$3\frac{3}{16}$	283·5	$11\frac{3}{16}$
	III.	—	—	324	$12\frac{3}{4}$	430	$16\frac{15}{16}$	106	$4\frac{3}{16}$	—	—
Firth of Forth. Station III.											
May 10, 1901,	II.	8–10	11	210	$8\frac{1}{4}$	252	$9\frac{15}{16}$	42	$1\frac{11}{16}$	226·3	$8\frac{7}{8}$
	III.	—	2	296	$11\frac{5}{8}$	297	$11\frac{11}{16}$	1	$\frac{1}{16}$	[296·5]	[$11\frac{11}{16}$]
Aug. 19, -	- I.	—	260	75	$2\frac{15}{16}$	130	$5\frac{1}{8}$	55	$2\frac{3}{16}$	105·9	$4\frac{3}{16}$
Aug. 22, -	- I.	—	106	85	$3\frac{3}{8}$	142	$5\frac{5}{8}$	57	$2\frac{1}{4}$	111·3	$4\frac{3}{8}$
Aug. 19 and 22 combined, - - -		—	366	75	$2\frac{15}{16}$	142	$5\frac{5}{8}$	67	$2\frac{11}{16}$	107·3	$4\frac{1}{4}$
Station V.											
July 24, -	- I.	20–30	49	72	$2\frac{13}{16}$	107	$4\frac{3}{16}$	35	$1\frac{3}{8}$	91·3	$3\frac{9}{16}$
	II.	—	48	193	$7\frac{9}{16}$	286	$11\frac{1}{4}$	93	$3\frac{11}{16}$	245·9	$9\frac{11}{16}$
Aug. 16, -	- I.	—	288	82	$3\frac{1}{4}$	133	$5\frac{1}{4}$	51	2	108·1	$4\frac{1}{4}$
	II.	—	9	228	9	283	$11\frac{1}{8}$	55	$2\frac{1}{8}$	259·9	$10\frac{1}{4}$
	III.	—	3	376	$14\frac{13}{16}$	393	$15\frac{1}{2}$	17	$\frac{11}{16}$	383·0	$15\frac{1}{16}$
	IV.	—	1	—	—	448	$17\frac{5}{8}$	—	—	[448·0]	$17\frac{5}{8}$
Aug. 21, -	- I.	—	403	90	$3\frac{9}{16}$	147	$5\frac{3}{4}$	57	$2\frac{3}{16}$	112·9	$4\frac{7}{16}$
	II.	—	39	217	$8\frac{9}{16}$	280	11	63	$2\frac{7}{16}$	256·5	$10\frac{1}{16}$
	III.	—	6	327	$12\frac{7}{8}$	393	$15\frac{1}{2}$	66	$2\frac{5}{8}$	374·2	$14\frac{3}{4}$
	IV.	—	2	420	$16\frac{9}{16}$	422	$16\frac{5}{8}$	2	$\frac{1}{16}$	[421·0]	$16\frac{9}{16}$
Aug. 16 and 21, (combined).	I.	—	691	82	$3\frac{1}{4}$	147	$5\frac{3}{4}$	65	$2\frac{1}{2}$	110·9	4[illegible]
	II.	—	48	217	$8\frac{9}{16}$	283	$11\frac{1}{8}$	66	$2\frac{9}{16}$	257·2	$10\frac{1}{8}$
	III.	—	9	327	$12\frac{7}{8}$	393	$15\frac{1}{2}$	66	$2\frac{5}{8}$	377·1	$14\frac{13}{16}$
	IV.	—	3	—	—	—	—	—	—	430·0	$16\frac{15}{16}$
Sept. 3, -	- I.	—	336	95	$3\frac{3}{4}$	157	$6\frac{3}{16}$	62	$2\frac{7}{16}$	119·9	$4\frac{3}{4}$
	II.	—	9	248	$9\frac{3}{4}$	300	$11\frac{13}{16}$	52	$2\frac{1}{16}$	269·7	$10\frac{5}{8}$

VII.—REPORT ON THE OPERATIONS AT THE BAY OF NIGG HATCHERY DURING THE SPRING SEASON OF 1901. By Harald C. Dannevig.

In several earlier reports on the work at the hatchery reference was made to the desirability of being able to preserve the spawners from the one year to the other. By so doing the difficulties attending the work with newly confined fish would be avoided, while it was also anticipated that a much greater number of eggs would be obtained. This anticipation had not been confirmed at Dunbar, owing in particular to the want of a sufficiently large pond. The outcome of experiments pointed to a negative result being due to such unsatisfactory conditions as would not exist in a large pond, and no fears were entertained as regards ultimate success in this respect. After the close of the spawning season at Bay of Nigg in May 1900, the remaining large plaice were retained in the pond, where they were regularly fed on shelled mussels, and already during the latter part of the summer a development of the ovaries of the females could be observed. This became more noticeable as the season advanced. On October 26th twenty female plaice were examined, and of these eleven were found to have been spawning during the previous season and were again developing eggs normally; seven more were in a similar state, but were young fishes that apparently developed eggs for the first time. The remaining two females had been egg-bound during the previous season, and their ovaries were not visibly developed at that date. The total number of plaice in the pond at this period was 625 of both sexes. During the third week of December another 397 were obtained from Aberdeen Bay; these were young fishes, mostly about the age of maturity. And at the end of the same month 184 larger plaice were brought from the Dornoch Firth. As will always happen in consequence of injuries sustained during the capture, a portion of these new fishes died soon after being put into the pond; and on January 8th, when all the plaice were examined, the total number was 1071. Of the females 560 were considered likely to spawn normally during the following two or three months, while about 240 were uncertain, and for the greater part immature fishes.

The first sign of spawning was observed on January 12th, when a few eggs were found in the water. The number was yet small, and continued so for another week. On January 22nd the hatchery was started for the season with 60,000 eggs which were collected from the surface-water of the pond and placed in the hatching-apparatus for development. This early commencement of the spawning corresponded very closely with the ordinary period in the open sea, and since in previous years the spawning at the hatchery was always much later, while at the same time new fishes only had been used, the normal spawning on the present occasion may safely be attributed to the presence in the pond of a considerable number of old plaice that had already become thoroughly acclimatised to confinement. Additional evidence in this respect must also be recognised in the circumstance, that while in previous years the spawning increased very rapidly—with a rush as it were—the season this year was more gradual. Disregarding the temporary variations following upon extreme changes in the temperature of the pond-water, it will be seen from Table I. that the spawning as a whole continued to increase for about one and a half months, and the climax then reached was maintained for another five weeks. This period, during which the greater bulk of the eggs were produced, was most prolific about the end of the first week in April, and it continued until the 22nd of the same month. By this time, however, the number of eggs decreased rapidly in the pond : most of the fishes had clearly become spent during the heavy production of eggs in April, and the spawning came to a close early in May. As regards the temporary variation in the spawning, subsequent to changes in the temperature, several instances may be observed in Table I. Five days after the hatchery was started the spawning ceased altogether for six or seven days. This was caused by a reduction of the temperature of the water in the pond in consequence of a fall of snow. For several days part of the pond was covered with thin boards, supported on large beams, so as to save the surface-water from exposure to the strong and cold winds. A similar fall of temperature occurred at the middle of February, when, in addition to being covered, the water in the pond was artificially heated with waste steam from the boiler. Cold weather with snow set in again at the end of March, but probably owing to the advanced state of the ovarian development the spawning on this occasion was less affected.

The daily progress of the hatching season will be seen from Table I. In regard to the specific gravity of the sea-water on the beach a considerable variation will be observed. This variation, which is due to the river Dee and in some measure to the fresh ground-water from the surrounding hills, does not usually extend to the deeper layers, from which the supply for the pond is taken. On 14 out of 110 days it was below 27, and on one occasion below 26. Thus the specific gravity of the pond-water was usually higher than the surface-water on the beach, of which a very striking instance may be seen from the records for the end of the second week of February. The difficulties previously experienced with water of a low salinity, owing to a leak in the inflow pipe, have thus been remedied, and are not likely to recur again as long as the main supply pipe remains undamaged. Owing to the increased supply of eggs, the storage tank of water for the hatchery was unable to serve the hatching apparatus for the whole night at the most busy part of the season, and an increased death-rate amongst the more advanced eggs was the consequence. During the present year this tank has been heightened considerably, and will be able to serve the present number of hatching apparatus for about ten hours.

During the season a total of 65,377,000 eggs were collected from the pond, from which 51,800,000 plaice fry were obtained and planted in the upper area of Loch Fyne. The particulars in connection with the distribution of the fry will be seen from Table II. As in the previous year the transport was effected at night, and ordinary carboy jars were used.

[TABLE.

TABLE I.—Showing the Daily Progress of the Hatching Operations, as well as the Temperature and the Specific Gravity of Water in the Hatchery, the Pond, and on the Beach.

Date.	Number of Eggs Collected.	Number of Eggs found Dead in Boxes.	Number of Fry put out.	Total Stock in Boxes.	The Sea Water in the Hatchery at Noon.		The Sea Water in the Pond at Noon.		The Sea Water on the Beach at Noon.	
					Temp.	Sp. gr.	Temp.	Sp. gr.	Temp.	Sp. gr.
					Cent.		Cent.		Cent.	
Jan. 22	60,000	...	...	60,000	6·2	27·1	5·7	27·3	...	...
,, 23	82,000	...	...	142,000	4·8	27·3	4·8	27·3	5·8	27·0
,, 24	45,000	...	...	187,000	4·8	27·5	3·8	27·6	5·6	27·3
,, 25	35,000	...	...	222,000	2·8	27·3	3·5	27·2	5·5	26·8
,, 26	30,000	...	...	252,000	3·8	27·3	3·7	27·2	5·2	26·8
,, 27	...	...	...	252,000	3·8	27·1	...	...	...	...
,, 28	...	...	...	252,000	2·7	27·2	3·5	27·4	5·2	27·0
,, 29	...	...	...	252,000	2·4	27·0	3·4	27·3	4·8	26·8
,, 30	...	...	...	252,000	1·8	27·2	1·6	27·2	3·0	27·0
,, 31	...	...	...	252,000	2·0	27·1	2·2	27·0	3·2	26·8
Feb. 1	...	...	...	252,000	2·0	27·1	2·0	27·3	3·4	26·8
,, 2	...	...	...	252,000	3·6	27·2	3·4	27·2	4·1	...
,, 3	...	...	...	252,000	2·1	27·4	2·7	27·4	4·4	25·8
,, 4	180,000	...	...	432,000	3·7	27·2	3·6	27·3	4·2	26·6
,, 5	128,000	15,000	...	545,000	2·8	27·1	3·0	27·2	5·0	27·0
,, 6	30,000	...	...	575,000	3·1	27·4	3·0	27·3	4·8	26·5
,, 7	75,000	11,000	...	639,000	3·3	27·5	3·4	27·2	4·6	26·8
,, 8	180,000	...	...	819,000	4·2	27·3	4·0	27·3	4·2	27·1
,, 9	60,000	...	...	879,000	4·3	27·3	4·6	27·7	4·4	27·2
,, 10	...	...	...	...	...	...	3·4	*27·7	4·6	27·0
,, 11	15,000	...	...	894,000	3·3	27·3	4·0	*27·7	5·2	26·7
,, 12	85,000	...	...	979,000	2·2	27·4	3·0	27·6	5·2	26·8
,, 13	75,000	...	...	1,054,000	2·1	27·3	3·0	*27·7	4·0	26·6
,, 14	...	...	...	1,054,000	1·5	...	1·4	27·4	4·0	26·2
,, 15	...	...	...	1,054,000	2·8	27·0	3·0	27·3	3·8	27·2
,, 16	...	62,000	...	992,000	4·2	27·2	3·1	27·2	4·0	27·0
,, 17	...	...	...	...	...	...	3·1	27·2	4·1	27·0
,, 18	300,000	...	...	1,292,000	4·3	27·0	4·0	27·4	4·0	26·8
,, 19	225,000	...	...	1,517,000	4·2	27·1	4·0	27·2	4·2	26·8
,, 20	262,000	...	...	1,779,000	4·1	27·1	4·2	27·2	4·2	26·8
,, 21	180,000	...	...	1,959,000	4·1	27·0	4·4	27·3	4·2	26·6
,, 22	120,000	...	...	2,079,000	4·2	27·0	4·6	27·5	5·0	26·8
,, 23	350,000	...	...	2,429,000	4·4	27·1	4·9	27·5	4·6	26·9

* The salinity on this occasion was the highest ever recorded at the Bay of Nigg Hatchery.

TABLE I.—*continued.*

Date.	Number of Eggs Collected.	Number of Eggs found Dead in Boxes.	Number of Fry put out.	Total Stock in Boxes.	The Sea Water in the Hatchery at Noon.		The Sea Water in the Pond at Noon.		The Sea Water on the Beach at Noon.	
					Temp.	Sp. gr.	Temp.	Sp. gr.	Temp.	Sp. gr.
					Cent.		Cent.		Cent.	
Feb. 24	...	...	...	2,429,000	4·5	27·0	5·2	27·3	4·8	27·0
,, 25	450,000	...	...	2,879,000	4·2	27·1	4·6	27·4	4·3	27·2
,, 26	355,000	47,000	...	3,187,000	5·1	27·0	5·2	27·2	5·1	27·2
,, 27	435,000	...	...	3,622,000	5.1	26·8	5·3	27·2	5·0	27·2
,, 28	400,000	...	...	4,022,000	...	...	4·8	27·2	5·1	27·0
Mar. 1	313,000	...	...	4,335,000	4·7	...	4·6	27·0	5·7	26·9
,, 2	495,000	...	...	4,830,000	4·9	...	4·8	27·0	5·6	26·8
,, 3	565,000	...	...	5,395,000	4·7	...	4·6	27·0	5·4	26·0
,, 4	722,000	...	...	6,117,000	4·8	...	5·0	27·0	5·2	26·8
,, 5	510,000	...	...	6,627,000	5·8	...	5·6	27·2	5·4	26·8
,, 6	285,000	...	...	6,912,000	...	...	5·6	27·4	5·5	26·8
,, 7	720,000	32,000	...	7,600,000	6·0	27·1	5·7	27·3	5·5	26·4
,, 8	538,000	...	...	8,138,000	5·7	26·8	5·7	27·3	6·0	27·0
,, 9	900,000	...	...	9,038,000	5·8	27·0	6·0	27·2	5·8	27·0
,, 10	1,100,000	...	...	10,138,000	7·0	26·9	6·4	27·1	5·8	26·8
,, 11	1,350,000	...	...	11,488,000	6·9	27·0	6·7	27·2	5·4	27·1
,, 12	1,125,000	...	...	12,613,000	6·8	26·9	7·0	27·3	6·0	27·0
,, 13	800,000	...	...	13,413,000	6·5	26·8	7·3	27·2	5·8	27·0
,, 14	1,000,000	...	...	14,413,000	6·3	26·8	5·8	27·1	5·6	26·4
,, 15	1,075,000	...	...	15,488,000	6·4	26·8	6·0	27·0	5·8	26·0
,, 16	1,350,000	780,000	...	16,058,000	6·1	26·8	5·4	26·9	6·1	25·0
,, 17	810,000	...	...	16,868,000	6·4	26·7	6·4	26·8	6·0	26·8
,, 18	1,080,000	...	...	17,948,000	6·0	27·1	6·1	26·9	6·2	26·6
,, 19	990,000	...	...	18,938,000	5·7	26·6	5·8	26·9	6·5	27·0
,, 20	810,000	...	...	19,748,000	5·5	26·7	5·7	26·9	6·4	27·0
,, 21	1,030,000	...	...	20,778,000	6·0	26·5	5·9	27·1	5·4	27·0
,, 22	1,080,000	525,000	...	21,333,000	6·3	26·6	6·2	27·0	6·2	27·1
,, 23	...	...	*1,750,000	19,583,000	5·3	26·5	5·8	27·2	5·8	27·2
,, 24	2,423,000	...	...	22,006,000	5·5	27·0	5·4	27·2	5·0	27·2
,, 25	1,310,000	...	...	23,316,000	4·2	27·0	4·9	27·4	5·0	27·2
,, 26	1,287,000	...	3,500,000	21,603,000	3·0	27·2	3·5	27·4	5·0	27·0
,, 27	960,000	...	...	22,063,000	1·5	27·2	2·8	27·3	4·8	26·2

* In this number is included 450,000 fry which were put out from March 7th to 16th in the Bay, off the Hatchery at Aberdeen.

TABLE I.—*continued.*

Date.		Number of Eggs Collected.	Number of Eggs found Dead in Boxes.	Number of Fry put out.	Total Stock in Boxes.	The Sea Water in the Hatchery at Noon.		The Sea Water in the Pond at Noon.		The Sea Water on the Beach at Noon.	
						Temp.	Sp. gr.	Temp.	Sp. gr.	Temp.	Sp. gr.
						Cent.		Cent.		Cent.	
Mar.	28	950,000	...	...	23,013,000	3·0	27·2	3·2	27·3	4·4	26·8
,,	29	813,000	...	...	23,826,000	3·0	27·1	2·9	27·2	4·4	26·6
,,	30	740,000	575,000	...	23,991,000	2·7	26·9	2·7	27·3	4·6	27·4
,,	31	970,000	...	...	24,961,000	3·5	26·8	3·9	27·1	4·5	27·2
Apl.	1	850,000	...	...	25,811,000	4·6	27·0	3·5	27·0	5·5	27·6
,,	2	1,425,000	590,000	2,750,000	23,896,000	4·8	26·9	4·6	27·0	5·4	27·0
,,	3	1,450,000	...	...	25,346,000	6·1	26·7	5·8	27·0	6·0	27·2
,,	4	1,437,000	...	...	26,783,000	5·7	26·7	5·7	27·2	6·2	27·0
,,	5	1,470,000	1,050,000	...	27,203,000	6·2	27·0	6·2	27·2	6·4	27·2
,,	6	1,450,000	...	...	28,653,000	5·8	27·0	6·0	27·2	6·4	26·8
,,	7	1,350,000	...	...	30,003,000	6·2	27·0	6·1	27·0	6·4	26·9
,,	8	2,160,000	1,338,000	...	30,825,000	5·7	27·0	6·2	27·0	6·4	26·7
,,	9	2,150,000	...	...	32,975,000	7·5	27·0	...	...	..	...
,,	10	2,125,000	...	4,700,000	30,400,000	6·9	26·8	6·2	27·0	6·3	26·6
,,	11	1,625,000	1,275,000	...	30,750,000	6·7	26·8	...	...	...	...
,,	12	1,620,000	...	...	32,370,000	6·8	26·3	6·2	27·0	6·3	27·0
,,	13	1,350,000	...	4,750,000	28,970,000	...	...	...	...	...	...
,,	14	1,080,000	...	...	30,050,000	...	...	...	...	...	...
,,	15	1,390,000	...	...	31,440,000	6·5	27·2	6·3	27·0	6·4	27·1
,,	16	1,215,000	850,000	...	31,805,000	7·0	26·8	6·5	27·0	7·8	26·4
,,	17	1,160,000	...	...	32,965,000	7·1	26·7	6·8	27·0	8·1	26·8
,,	18	800,000	1,625,000	...	32,140,000	7·3	26·8	...	...	...	...
,,	19	1,040,000	...	...	33,180,000	7·5	27·0	...	...	...	...
,,	20	1,000,000	1,810,000	...	32,370,000	7·9	27·0	...	...	...	...
,,	21	1,075,000	...	...	33,445,000	8·2	26·8	...	...	...	...
,,	22	1,038,000	2,460,000	10,150,000	21,873,000	8·8	26·5	...	...	8·1	26·8
,,	23	...	...	...	21,873,000	9·6	26·5	8·4	27·0	8·0	26·8
,,	24	1,350,000	500,000	...	22,723,000	9·8	26·3	8·7	26·4	8·2	26·4
,,	25	550,000	...	...	23,273,000	9·7	25·0	9·6	26·0	8·6	26·4
,,	26	...	...	...	23,273,000	...	...	9·8	26·0	8·8	25·4
,,	27	...	...	8,000,000	15,273,000	9·6	25·3	9·8	26·8	...	...
,,	28	...	20,000	...	15,253,000	9·8	25·0	9·7	26·0	8·7	26·0

TABLE I.—*continued.*

Date.	Number of Eggs Collected.	Number of Eggs found Dead in Boxes.	Number of Fry put out.	Total Stock in Boxes.	The Sea Water in the Hatchery at Noon.		The Sea Water in the Pond at Noon.		The Sea Water on the Beach at Noon.	
					Temp.	Sp. gr.	Temp.	Sp. gr.	Temp.	Sp. gr.
					Cent.		Cent.		Cent.	
Apl. 29	750,000	...	...	16,003,000	9·6	25·7	9·6	25·7	8·0	26·0
,, 30	...	...	...	16,003,000	...	...	9·8	26·0	8·1	26·8
May 1	200,000	...	7,300,000	8,903,000	...	...	8·6	26·6	8·0	26·8
,, 2	9,000	12,000	...	8,900,000	...	...	8·6	26·8	8·1	26·4
,, 3	...	...	...	8,900,006	..	...	8·6	27·0	8·2	27·2
,, 4	...	...	5,400,000	3,500,000	9·6	26·8	8·4	27·2	8·4	27·0
,, 5	...	...	...	3,500,000	10·2	27·0	8·7	27·2	8·4	27·2
,, 6	...	...	...	3,500,000	...	...	9·4	27·2	8·4	27·2
,, 7	...	...	...	3,500,000	...	...	10·0	27·1	8·7	27·0
,, 8	...	...	...	3,500,000	...	...	10·0	27·1	8·4	27·0
,, 9	...	...	...	3,500,000	...	...	10·1	27·0	8·4	27·0
,, 10	...	...	.	3,500,000	...	...	10·2	27·0	8·6	26·6
,, 11	...	...	3,500,000	...	...	...	10·0	27·0	8·7	26·6
Totals,	65,377,000	13,577,000	51,800,000							

TABLE II.—Showing particulars in connection with the Distribution of Fry in Loch Fyne.

Date.	Locality.	Sp. gravity and Temp. of the Water at Surface.	Sp. gravity and Temp. of the Water at 3 Fath.	State of the Tide.	Wind, Rain, &c.	Number of Fry Planted.
Mar. 23rd	In the middle off the Loch: off Inveraray.	1026·7 / 7·0°	...	...	North breeze.	*1,750,000
,, 26th	,, ,, ,,	1026·9 / 7·9°	...	...	Strong breeze from N.W.	3,500,000
April 2nd	Off Strone Point.	1027·0 / 5·6°	...	...	S.E. gale.	2,750,000
,, 10th	Off St. Catherine's.	1011·5 / 5·7°	1022·0 / 6·3°	...	Calm, rain.	4,700,000
,, 13th	Strone Point (North Side).	1023·3 / 6·2°	...	...	S.W. light breeze.	4,750,000
,, 22nd	Inveraray to Strone Point.	1017·9 / 11·4°	1024·3 / 9·1°	...	S.W. light breeze.	10,150,000
,, 27th	Loch Shira and east of Strone Point.	1026·5 / 7·4°	...	...	Calm, rain.	8,000,000
May 1st	Off St. Catherine's.	1025·8 / 8·6°	...	L.-W.	E. light breeze.	7,300,000
,, 4th	Two miles below Inveraray.	1025·3 / 8·8°	...	...	Calm.	5,400,000
,, 11th	Off Inveraray.	1025·4 / 8·0°	...	...	W. light breeze.	3,500,000

* See footnote to Table I., March 23rd.

VIII.—NOTES ON GATHERINGS OF CRUSTACEA COLLECTED BY THE FISHERY STEAMER "GARLAND," AND THE STEAM TRAWLERS "STAR OF PEACE" AND "STAR OF HOPE," OF ABERDEEN, DURING THE YEAR 1901.

By Thomas Scott, F.L.S., Mem. Soc. Zool. de France.

(Plates XXII.—XXV.)

In continuation of my notes on the new and rare Crustaceans which have been obtained in tow-net gatherings, and in gatherings of dredged and other materials collected at different times and in various places during the past year, I have to acknowledge my indebtedness to the Naturalist on board the Fishery steamer "Garland," and to Mr. Dannevig and others who have carried on from time to time a considerable amount of interesting fishery research work during 1901. The collections of Crustacea forwarded to the Laboratory at Bay of Nigg, in connection with these investgations, have in a number of instances proved to be extremely interesting. Several apparently undescribed forms have been obtained, while others, though they may have been recorded elsewhere, have not previously been obtained in Scottish waters. Moreover, the distribution of a number of rare species described in former papers has by these researches been still further extended.

A number of rare Crustaceans—Copepods and others—have occurred in gatherings collected by the "Garland" in the Firth of Forth on the East of Scotland, and in Loch Etive on the West Coast. Other rare forms have been obtained in gatherings collected by the steam trawler "Star of Peace" while working to the east and north of the Shetland Islands; and one or two species, rarely met with, were also captured in deep water (58 to 65 fathoms) about nine to ten miles to the eastward of Aberdeen by the steam trawler "Star of Hope."

There is one point in connection with these investigations which seems to be of peculiar interest, and which it may not be out of place to refer to here; it is this, that localities which have already been subjected to prolonged and careful examination should still continue to yield not only rare but even new forms of life. I do not refer to those minute microscopical species which are difficult to distinguish, and which may easily be overlooked even by those who have acquired a fairly extensive and special knowledge, but species which from their size and shape or colour are sufficiently conspicuous to attract the attention of even the casual observer. Whether these forms, which are turning up in places where they have not been seen before, are recent or new arrivals, or whether they have escaped notice hitherto owing to their distribution being limited to some particular area more or less out of the reach of the dredge or the tow-net, and that, having for some reason left their old haunts, and made their way to a place more accessible, have ultimately been captured, is a question that may not be easily answered. The following two examples will indicate more clearly the aspect of the question concerning the distribution of species to which I refer:—

For many years previous to 1886-87, when arrangements were made by the Fishery Board for the scientific investigation of the Firth of Forth, special efforts had from time to time been put forth by not a few eminent naturalists to study the invertebrate fauna of the Forth estuary, and a considerable number of species of Crustacea, including several Schizopods, were made known to science, yet none of these investigators appears to have noticed *Erythrops goesii*, G.O.S. (= *E. erythrophthalmus*, Goes). Now this Schizopod, though probably one of the largest of the species belonging to the genus *Erythrops*, is under half an inch in length, and might on account of its small size be overlooked by an ordinary observer, but, like its confrères, it possesses eyes of such a brilliant red colour as to make the little creature quite conspicuous even in a crowded tow-net gathering, especially if the gathering be examined soon after it is collected; it is therefore scarcely likely that this *Erythrops* would have escaped being noticed by naturalists so experienced as Goodsir, Henderson, Leslie, and others, had it been present in any of their collections. Other and less conspicuous Schizopods were recorded by these early investigators: then why not this one? When, on the other hand, we turn to the work of the Fishery steamer "Garland," as described in the various Annual Reports of the Board, we find that mention is made of *Erythrops* as early as October 3rd, 1888, when it was obtained in a bottom tow-net gathering collected at Station V.,* while in a paper on the fauna of the Firth of Forth published in 1889 *Erythrops goesii* is described as "frequent all over the Forth from Inchkeith to May Island,"† and as being new to Britain; but since that time it has been found to be of moderately common occurrence, especially in the part of the Firth described above. The question which naturally suggests itself here is—Was the recognition of *Erythrops* in the Firth of Forth in 1888, and every year since, the result of a recent migration of the species, or had it simply been overlooked by former observers?

The second example is even more interesting than the one just referred to—viz., the occurrence of *Calocaris macandreæ* in the Firth of Forth. *Calocaris* was for a long time considered to be a rare species and to have a very limited distribution; subsequent investigations have shown, however, that its distribution is not so restricted as it was formerly believed to be; but till as recently as the past summer it had never been known to occur in the Firth of Forth, notwithstanding the fact that the Crustacean fauna of that estuary has been very carefully examined by the various methods of tow-netting, dredging, and trawling, as well as by the examination of the organisms contained in the stomachs of fishes captured within its limits. About the end of May of the present year (1901), when the Fishery steamer "Garland" was engaged in carrying on some special work, a number of specimens of the Crustacean referred to were obtained, along with several other organisms, at Station III.—to the east of Inchkeith—in a small-mesh net which was being employed for the capture of small fishes; and it was also about the same time obtained in the stomach of a Long Rough Dab, *Drepanopsetta platessoides*, from about the same place. Other specimens of *Calocaris* were obtained by Mr. Pearcey, the Naturalist on board the "Garland," in the stomachs of large Witch Soles, *Pleuronectes cynoglossus*, captured on the 28th of June and 15th July at Station V.—to the west of May Island—in 25 to 27 fathoms. These various captures of *Calocaris* within such a short time would almost warrant the belief that this Crustacean was not uncommon in the Firth of Forth; and should that be found to be really the case, the fact that no trace of the species had been noticed by any previous observer is of considerable interest. Of course, if the species be of true fossorial habits—and any evidence we have concerning it seems to support such a con-

* Seventh Annual Report of the Fishery Board for Scotland (1889), Part III., p. 57.
† Op. cit., p. 322.

clusion—it might easily escape capture by the dredge or the trawl by burrowing deep into the soft mud which forms the floor of the more central portion of the estuary of the Forth; but its occurrence in the stomachs of the Long Rough Dab and the Witch Sole indicates that it does not always remain in hiding, but occasionally comes to the surface of the mud in which it burrows, and though it may have escaped being captured by the dredge or the trawl, it apparently does not always escape the fishes that happens to be on the look-out for food, yet we can find no reference to its ever having been observed even in the stomachs of fishes taken within the estuary. *Calocaris* is considered to be somewhat sluggish in its habits, because specimens are occasionally found overgrown with a small zoophyte; but such habits should make its capture by trawl or dredge of more easy accomplishment. Moreover, it is not such a small species as to be easily passed over, and it is sufficiently distinct that any one with a fair knowledge of the Crustacea would be likely to recognise it as different from the more common forms, yet the fact remains that not one of the many students who have investigated the Crustacean fauna of the Firth of Forth appears to have obtained any evidence to lead them to regard it as even of doubtful occurrence within the limits of the estuary.

Whether *Calocaris* be a recent introduction or not, there is apparently no doubt as to its having now a right to be reckoned amongst the Crustacean fauna of the Forth.

The number of Crustacea recorded in the present paper is scarcely so large as in that published last year, but there are included several species apparently undescribed, and others which are new or rare in the Scottish seas. The following are the more interesting of the species recorded:—

Xanthocalanus (?) *borealis*, G. O. Sars.
(?) *Phænna zetlandica* T. Scott (sp. n.)
Scolecithrix (?) *brevicornis*, G. O. Sars.
Platypsyllus minor, T. Scott (gen. et sp. n.).
Nereicola concinna, T. Scott (sp. n.).
Stenhelia confusa, T. Scott (sp. n.).
Ameira tenuicornis, T. Scott (sp. n.).
Ameira propinqua, T. Scott (sp. n.).
Pseudomesochra longifurcata, T. Scott (gen. et sp. n.).
Leptopontia curvicauda, T. Scott (gen. et sp. n.).
Normanella attenuata, A. Scott.
Fultonia hirsuta, T. Scott (gen. et sp. n.).
Monstrilla longiremis, Giesbrecht.
Thaumaleus thompsoni, Giesbrecht.
Pseudopsyllus elongatus, T. Scott (gen. et sp. n.).
Acontiophorus ornatus (Brady and Robertson).
Cancerilla tubulata, Dalyell.
Salenskya tuberosa, Giard and Bonnier.

It will be observed from the above list that five new genera and ten new species are described in the present paper. There were a few other interesting organisms observed, such as *Arca pectunculoides* and *Cadulus subfusiformis* (two species of Mollusca), but valves only of the first, and a recently dead specimen of the other, were obtained.

The following is a detailed description of the more interesting of the species of Crustacea observed in the numerous gatherings examined during the year:—

CRUSTACEA.

Sub-Class ENTOMOSTRACA.

Order I.—COPEPODA.

Calanidæ.

Calanus hyperboreus, Kröyer.

1838. *Calanus hyperboreus*, Kr., Danske Selsk. Afh., vol. 7 p. 310, t. 4.

A few specimens were obtained in a gathering collected about 22 miles to the north of Shetland on May 17th, 1901. One or two specimens were also found in another gathering collected to the east of the Shetland Islands on the 22nd of the same month, and as both these localities are within the British area, this northern *Calanus* is entitled to be regarded as a member of the copepod fauna of the British Islands. This appears to be the only *Calanus* in the North Atlantic or Arctic seas in which the last segment of the thorax has the postero-lateral margins distinctly angular. The size of specimens appears to vary a good deal, but one or two of the largest of those now recorded measured one-fifth of an inch (5 mm.) in length.

Rhincalanus (?) gigas, Brady.

I have again to record this copepod from the Moray Firth. It does not appear to differ much except in size from the form described by Dr. Brady under the name given above.

Pseudocalanus elongatus, Boeck.

I include this common species in these notes in order to mention the occurrence of a form somewhat smaller than the ordinary one. These two forms have been observed in the Firth of Forth and in the Moray Firth as well as off the Aberdeenshire coast. They were first noticed a good many years ago, and they are still occasionally noticed. Though the two forms have been carefully examined no important difference has been observed between them.

Stephus minor, T. Scott.

1892. *Stephus minor*, T. Scott, 10th Ann. Rept. Fishery Board for Scot., pt. iii., p. 245, pl. vii., figs. 1, 2, 10–13.

This species occurred in a bottom gathering from Smith Bank, Moray Firth, collected on February 15th, 1901, at a depth of about 24 fathoms. *Stephus minor*, though apparently widely distributed, seems to be a rare species, as seldom more than one or two specimens are obtained in any single gathering.

Stephus scotti, G. O. Sars.

1896. *Stephus gyrans*, T. Scott (not Giesbrecht), 15th Ann. Rept. of the Fishery Board for Scot., pt. iii., p. 146, pl. ii., fig. 9, pl. iii., figs. 17, 18.

Recently, when re-examining some copepoda collected in the Firth of Forth in 1892, I obtained a single female specimen of this species.

This is the first time the species has beeen observed on the east coast, but on the west coast it has been taken in Loch Fyne and in the Sound of Mull; it appears to be a very scarce species. Prof. G. O. Sars informs me *in lit.* that this species has long ago been found by him off the Norwegian coast, and that, though the female resembles somewhat the female of *Stephus gyrans*, Giesbrecht, the male (which I have not seen) differs very considerably from the male of the form described by that author. He also informs me that the name he proposes for this species is *Stephus scotti*, a full description of which will be found in vol iv of his work on the Crustacea of Norway, now in course of publication.

Pseudocyclopia caudata, T. Scott.

1894. *Pseudocyclopia caudata*, T. Scott, 12th Ann. Rept. Fishery Board for Scot, pt. iii., p. 236, pl. v., figs. 1–8.

This is a smaller and rarer species than *Pseudocyclopia crassicornis*; it has been taken in the Firth of Clyde as well as in the Firth of Forth, and I now record its occurrence in the deep water (60 fathoms) about 10 miles off Aberdeen, where it was collected on July 30th, 1901. In this species the caudal furca are distinctly more elongate than in the other described species.

Ætidius armatus, Brady.

The female specimen of a copepod which I regard as identical with the species described by Dr. Brady under the above name in his Report on the Challenger Copepoda, occurred in a mid-water tow-net gathering collected off the east side of the Shetland Islands on May 22nd, 1901. Professor Sars, in his new work on the Copepoda of Norway, remarks that the *Pseudocalanus armatus* of Boeck is probably identical with the *Ætidius armatus* described by Professor G. S. Brady, and if so, the name of the species would stand as *Ætidus armatus* (Boeck).

Bradyidius armatus (Vanhöffen).

1878. *Pseudocalanus armatus*, Brady (not Boeck), Brit. Copep., vol. i., p. 46, pl. iv., figs. 1–11.

1899. *Bradyidius armatus* (Vanhöffen). *Vide* Das Tierreich, p. 32.

(?) 1884. *Undinopsis Bradyi*, G. O. Sars, in Sp. Schneider's Rept. of Invertebrata from the Kvænangen Fjord.

A set of drawings showing the structural differences between the male and female of this species, with descriptive notes, was published in the 14th Annual Report of the Fishery Board for Scotland. It is a species that is of frequent occurrence in the Clyde, where it was first obtained by Dr. Brady many years ago, and it is also found on other parts of the Scottish coasts—its distribution extending to the north of the Shetland Islands, where it was collected on the 17th of May of the present year (1901). *Undinopsis Bradyi*, G. O. Sars, may be identical with this species, but it differs somewhat in the structure of the fifth thoracic feet of the male.

Scolecithrix hibernica, A. Scott.

1896. *Scolecithrix hibernica*, A. Scott, Ann. and Mag. Nat. Hist., (6), vol. 18, p. 362, pl. xvii., figs. 1–9; pl. xviii., figs. 1–9.

This species was obtained in Loch Etive in about 60 fathoms on September 17th, 1901; Loch Etive is a new station for this *Scolecithrix*.

(?) *Scolecithrix brevicornis*, G. O. Sars. Pl. XXV., figs. 1 and 2.

1900. *Scolecithrix brevicornis*, G. O. Sars, The Norw. N. Polar Exped. (1893–96), p. 49, pl. x.

Description of the Male.—Length 1·5 mm. (about $\frac{1}{17}$ of an inch). Body viewed from above, elongate-oval; equal to rather more than two-thirds of the entire length, widest behind the middle. The anterior somite is equal to nearly twice the entire length of the next three: abdomen, slender, scarcely half as long as the thorax. Antennules moderately short, scarcely reaching to the first abdominal segment, the first seven joints very short, the eighth to the (?) twelfth coalescent, the remaining joints somewhat similar to those of the female.

The fifth thoracic feet were slightly damaged, and the following description of them is to some extent imperfect. The left leg is composed of four joints, the first is swollen but scarcely as long as the next, the third and fourth, which are sub-equal, are also rather shorter as well as being more slender than the second. The right leg consists of three (? or four) joints, the first and second are moderately elongate, the third is somewhat shorter and narrower, alongside of third joint and articulated with it to the end of the second is a slender branch-like appendage equal in length to the third joint (fig. 2).

Habitat.—Collected about sixty miles to the east of the Shetland Islands on May 22nd, 1901. In the same gathering were obtained *Metridia longa*, *Xanthocalanus* (?) *borealis*, and one or two other rare copepods. The copepod which I have provisionally ascribed to *Scolecithrix brevicornis* agrees with the female described by Professor G. O. Sars in its general form, in the proportional lengths of the thoracic segments, and in the comparatively short antennules. Sars did not obtain the male of his species, and there is therefore some uncertainty as to whether our specimen belongs to that species or not. This gathering was from moderately deep water.

Xanthocalanus (?) *borealis*, G. O. Sars. Pl. XXII., figs. 8 and 9.

1900. *Xanthocalanus borealis*, G. O. Sars, Crust. of Norw. N. Polar Exped., p. 49, pl. xi.

A female specimen of a *Xanthocalanus* was obtained in a tow-net gathering collected to the eastward of the Shetland Islands on May 22nd, 1901. It was thought at first that this specimen might belong to the *Xanthocalanus minor*, Giesbrecht, but on a careful comparison of it with the description and figures of that species and with the description and figures of G. O. Sars' *Xanthocalanus borealis* it was found to agree much better with the latter than with the former species. Prof. G. O. Sars, in the portion of his new work on the Crustacea of Norway, just published,* gives a figure of the fifth pair of thoracic feet of a slightly immature female, which agrees fairly well with the drawing of the fifth pair of the Shetland specimen (fig. 9).

This specimen (fig. 8) measures 2·89 mm. (rather less than an eighth of an inch) in length. The cephalothorax is moderately robust, and when viewed from above the width is seen to be equal to more than a third of its entire length, the sides are evenly rounded, and the posterior thoracic segment is produced on each side into acute angular processes which reach beyond the middle of the first abdominal segment. A minute seta springs from each side of the second-last thoracic somite.

*Crustacea of Norway, by G. O. Sars, vol. iv. (Copepoda), parts iii. and iv. (1902), p. 46, pl. xxxi., xxxii.

The abdomen is narrow and short, being scarcely more than a fifth of the entire length of thorax and abdomen.

The caudal furca are very short. No furcal setæ are shown in the figure, as they had all been broken off.

The fifth pair of thoracic feet are of moderate size, the first joint is equal to rather more than half the length of the second one, and is slightly gibbous on the interior aspect, the inner margin is also densely fringed with minute hairs; the second joint is slightly distorted, being bent inward somewhat abruptly near the middle; this joint is armed with three moderately stout setiferous terminal spines, and is also furnished with a few minute setæ on the lateral aspect and near where the joint is bent as shown in the drawing (fig. 9).

The occurrence of *Xanthocalanus borealis* in the neighbourhood of the Shetland Islands adds another species to the copepod fauna of Scotland. The distribution of this species appears to be somewhat restricted, as, with the exception of a single young female obtained in a gathering collected north of the New Siberian Islands, Prof. Sars has only found it in Stavanger Fjord, and in a few other places off the west coast of Norway, but its occurrence in this Shetland gathering seems to indicate that it may after all have an extensive distribution.

Phænna zetlandica, sp. n. Pl. XXII., figs. 5–7.

A male specimen of a (?) *Phænna*, which I have provisionally named *P. zetlandica*, was obtained in the same gathering with the *Xanthocalanus* just described, agrees in some respects very closely with *Phænna spinifera*, Claus, and may probably be only a form of that species. The specimen (fig. 5) measures nearly two and a half millimetres ($\frac{1}{10}$ of an inch) in length. The thorax is moderately robust, and when seen from above is broadest behind the middle. The cephalo-thoracic segment, which is about equal to half the entire length of the animal, tapers gradually to the broadly rounded forehead, the next three thoracic segments are short. The abdomen is narrow, and its length is equal to little more than a third of that of the cephalo-thorax; it consists of five segments, the genital segment is slightly longer than any of the others, the last is very short; the caudal furca are very short (the furcal hairs are not shown, as they had accidentally been broken off).

The antennules, which appear to be the same on both sides, do not reach to the end of the abdomen, the first six joints are short, the seventh, eighth, and ninth are partly coalescent, the tenth to the fifteenth joints, which are of moderate length, are sub-equal, the seventeenth joint is also nearly equal to these in length, but the remaining joints are rather shorter; the antennules are only sparingly setiferous, as shown by the drawing (fig. 5).

The fifth pair of feet, in which both branches are developed, are very similar to those of *Phænna spinifera*, Claus. The right branch is elongated and slender and composed of four joints, the first three are of nearly equal length, but the last is about one and a half times the length of the preceding joint and considerably attenuated so as to resemble a spine rather than a joint (fig. 6). The left branch is rather longer than the right one and apparently five-jointed; the terminal portion of this branch consists of two appendages, the inner one being short and moderately broad, rounded at the end and fringed with setæ, the other is narrow and longer than the inner one and forms with it a kind of finger and thumb-like arrangement, as shown in figure 7.

The fifth thoracic feet of this Shetland specimen are seen to differ somewhat from the fifth pair of the male of *Phænna spinifera*, Claus, especially in the terminal part of the left branch, when compared with the figure of the male fifth pair in Dr. Giesbrecht's work *; and I have therefore provisionally retained it under a separate specific name.

Centropagidæ.

Metridia longa (Lubbock). Pl. XXII., figs. 1–4.

One or two specimens of Lubbock's *Metridia (Calanus) longa* were found in a gathering collected about 22 miles to the north and in another collected about 60 miles to the east of the Shetland Islands; the first was collected on May 17th, and the other on May 22nd, 1901. One of the largest specimens taken in the first gathering measured 4 mm., or about one-sixth of an inch in length. The male and female specimens represented by the drawings (figs. 1 to 4) were obtained in the second of the two gatherings mentioned above; this female, which is scarcely so large as the largest specimen found in the first gathering, measured about 3·7 mm. and the male 2·8 mm. in length. The fifth pair of thoracic feet of the male and female, as represented by the figures 3 and 4, are practically identical with the figures of the same appendages given by Dr. Giesbrecht.†

Metridia lucens, Boeck.

This species was moderately frequent in the same gatherings with the last, as well as in gatherings from the Moray Firth and from other parts of the Scottish coasts.

Pseudocyclopidæ.

Pseudocyclops obtusatus, G. S. Brady.

One or two specimens of this curious species occurred in the washings of some dredged material from the north-west end of Inchkeith, Firth of Forth, collected on May 23rd, 1901. *Pseudocyclops obtusatus* has already been recorded from the Forth estuary, but has not been very often met with.

Pontellidæ.

Acartia bifilosa, Giesbrecht.

Acartia bifilosa was obtained along with the two species of *Metridia* mentioned above in the gatherings from the north and east of Shetland, and also in gatherings from the Firth of Forth recently collected.

Cyclopidæ.

Oithona (?) *setiger*, Dana.

Several specimens of an *Oithona* which I ascribe to *Oithona setiger*, Dana, occurred in a tow-net gathering from the Firth of Forth collected on April 22nd, and also in a similar gathering collected to the east of the Shetland Islands on the 22nd of May, 1901. In these specimens the rostrum, which projects forward instead of downward as in *O. helgolandica*, Claus (*O. similis*, Giesbrecht), tapers gradually to an acute

* Fauna u. Flora d. Golfes v. Neapel, vol. 19, p. 293, t. 12, fig. 5.
† Pelagischen Copepoden des Golfes von Neapel, pl. 33, figs. 20 and 23.

point, and not abruptly as in *O. plumifera*, Baird. This same *Oithona* was recorded from the Firth of Forth in 1891 under Dana's name—*Oithona setiger.**

Ascidicolidæ.

Doropygus normani, G. S. Brady.

1898. *Doropygus normani*, G. S. Brady, Mon. Brit. Copep., vol. i., p. 136, pl. xxxii., figs. 1–14.

This large and distinct species was obtained in some material dredged in 8 fathoms off the North Craig, Firth of Forth, on July the 4th, 1901. Though the branchial chamber of the larger ascidians is the usual habitat of this species, it sometimes happens that the test of the ascidian is ruptured by the dredge, and the copepods that may be contained within the branchial chamber are then set free. Probably this may explain the reason why the specimens of a somewhat peculiar type of copepod, which I now describe, were obtained "free" amongst the same dredged material from the North Craig in which the *Doropygus* occurred.

Platypsyllus, T. Scott (gen. nov.).

Body flat and sub-ovate. Antennules rudimentary. Antennæ (?) obsolete. Mouth consisting of a small suctorial tube. Mandibles, maxillæ, and maxillipeds (?) obsolete. No thoracic feet observed. Abdomen scarcely distinguishable from the thorax. Ovisacs two, elongated.

Platypsyllus minor, T. Scott (sp. nov.). Pl. XXV., figs. 15–16.

Description of Female.—Length 1·7 mm. (nearly $\frac{1}{15}$ of an inch) in length. Body, seen from above, flat, oblong-ovate, greatest width near the posterior end, but the form varies somewhat in different specimens. Colour (after a short immersion in alcohol), opaque-white. Antennule obsolete or nearly so, reduced to a minute lobe on each side of the forehead, and bearing one or two extremely minute setæ. Antennæ obsolete. Mouth suctorial, and consisting of a small trumpet-shaped tube (fig. 16). Mandibles and other mouth appendages wanting. Thoracic feet also wanting. Abdomen indistinct from thorax. Ovisacs two, elongated, and containing numerous small ova; each ovisac originates from a small lateral angular process at the posterior end of the body (fig. 15).

Habitat.—Vicinity of North Craig, Firth of Forth, dredged in 8 fathoms on July 4th, 1901. No males have been observed.

Remarks.—The first specimens of this curious copepod observed were without ovisacs, and from their shape, their colour, and the apparent entire absence of appendages, there was at first considerable doubt regarding them, but ere long a specimen turned up with two long ovisacs attached to it, and then their true character was revealed.

From the simple and unarmed structure of these copepods it is fairly evident, I think, that if they are not commensals of some ascidian they must receive from some other host the shelter and protection necessary to organisms apparently so helpless as these animals seem to be.

Nereicola concinna, T. Scott (sp. nov.). Pl. XXV., figs. 8–14.

Description of the Female.—Length, 1·6 mm. (about $\frac{1}{16}$ of an inch) Body considerably dilated, rather more than one and a half times longer

* Ninth Annual Report of the Fishery Board for Scotland, Part III., p. 301.

than broad, widest in the middle. The cephalo-thoracic segment scarcely distinct, being indicated by a simple constriction; thoracic segments all coalescent. Abdomen very small, and apparently consisting of two somites; the first somite is short but moderately broad; the second is also short, and tapers abruptly to the slightly bilobed extremity. Caudal furca extremely small. Ovisacs (two) large (fig. 8).

The antennules are short, moderately slender, and five-jointed; the first and the last three are sub-equal in length, but the second is about one and a half times the length of the third; all the joints are sparingly setiferous (fig. 9).

The antennæ are short and three jointed, the end joint is armed with one small marginal and three or four stout terminal spines, which are slightly hooked (fig. 10); they are not provided with secondary branches.

The mandibles are large and elongated; proximally they are somewhat dilated, but they taper gradually to the distal extremity, where they are armed with two rows of short but stout tooth-spines as shown in the drawing (fig. 11). No maxillæ could be observed.

The first and second maxillipeds are very stout but of a somewhat rudimentary structure; the terminal claws are very short, but stout and tooth-like (figs. 12, 13). No thoracic feet were observed.

Habitat.—Parasitic on specimens of a marine annelid, *Eulalia viridis* Œrsted, dredged by the "Garland" in 55 to 65 fathoms in Loch Etive, west coast of Scotland, on September 17th, 1901. Several specimens, including old and young, were observed; one or two of the specimens occurred still adhering to fragments of the annelid, on which they appeared to be able to take a very firm hold.

At first I was not sure but that these Loch Etive specimens might belong to the same species as those found by Professor M'Intosh on *Nereis cultrifera*, Grube,* on the shores of the Channel Islands. I therefore sent a specimen to him for his opinion as to whether it was the same as those he had discovered; in replying to me he pointed out certain differences observed by him, and also very kindly sent me an example of the form from the Channel Islands so that I might more easily observe the differences he referred to. He stated further that the form found by him was the *Nereicola ovata* described by Keferstein in 1860.† I am also indebted to Professor M'Intosh for the name of the annelid from Loch Etive on which the copepods described here were obtained.

The difference in the form of immature specimens of *Nereicola concinna* from that of similar specimens of *N. ovat* is even more marked than in the adults (fig. 14).

Harpacticidæ.

Eucanuella spinifera, T. Scott.

1901. *Eucanuella spinifera*, T. Scott, 19th Ann. Rept. Fishery Board for Scotland., pt. iii., p. 245, pl. xviii., figs. 1–10.

This species, described in Part iii. of the 19th Annual Report, has again been observed in a gathering of bottom material collected to the east of the Shetland Islands in 60 to 70 fathoms on May 22nd, 1901. *Eucanuella* is apparently a deep-water species.

* On a Crustacean parasite of *Nereis cultrifera*, Grube, by W. C. MacIntosh, M.D., *Micr. Journ.*, vol. x., N.S., p. 39, pl. v.

† Zeit. f. w. Zool., bd. xii. (1860), taf. xliii., f. 1–4, p. 461.

Ectinosoma melaniceps, Boeck, (?) var. Pl. XXII., figs. 10–16.

1864. *Ectinosoma melaniceps*, Boeck, Overs. Norg. Copep., p. 20.

A few specimens of an *Ectinosoma* obtained in some dredged material from Station VI., Firth of Forth, have such a general resemblance to *Ectinosòma melanicèps*, Boeck, that though they differ in some details of structure they may after all be only a form of that species. The following description will indicate a few of the more important points of difference:—

The antennules are six-jointed, the basal joint appears to be the largest, being nearly twice the length of the next one, but the others are comparatively small (fig. 11). The antennæ appear to be similar to those of *Ectinosoma melaniceps*. The mandibles and mandible-palps are slender (fig. 12). The other mouth organs and swimming feet are somewhat similar to the same appendages in *E. melaniceps* (figs. 13, 14).

The fifth pair of the present form have the basal joints not very broad, the inner produced part scarcely reaches to the middle of the secondary joints, and is abruptly truncate at the apex; a short and a moderately long seta spring from the apex, the inner seta being the longest. The secondary joints are sub-cylindrical, and about one and a half times longer than broad; they are furnished with three terminal setæ, the middle one, which springs from a slightly produced lobe, is considerably longer than the other two; a small lateral hair is observed between the elongated middle seta and the outer one as shown in the figure (fig. 15). No males were observed.

Stenhelia ima, G. S. Brady.

1872. *Canthocamptus imus*, Brady, Nat. Hist. Northumb. and Durham, vol. iv., p. 432, pl. xix., figs. 1–5.

This species occurred very sparingly in washings from dredged material collected near Inchkeith, Firth of Forth, on July 4th, 1901. Though *Stenhelia ima* is apparently widely distributed, I have not found it to be very common.

Stenhelia intermedia, T. Scott.

1897. *Stenhelia intermedia*, T. Scott, 15th Ann. Rept. Fishery Board for Scotland, pt. iii., p. 169, pl. ii., figs. 10–21.

This somewhat rare species was dredged in Loch Etive in about 60 fathoms on September 17th, 1901.

Stenhelia hirsuta, I. C. Thompson.

1893. *Stenhelia hirsuta*, I. C. Thompson, Trans. L'pool Biol. Soc., vol. vii., p. 20, pl. xxi., fig. 2, d.e.f. (separate reprint).

Specimens of *Stenhelia hirsuta* were occasionally observed in gatherings of dredged material from the Firth of Forth collected in July, 1901.

(?) *Stenhelia hispida*, G. S. Brady. Pl. XXIV., figs. 19–26.

1880. *Stenhelia hispida*, Brady, Mon. Brit. Copep., vol. ii., p. 32, pl. xlii., figs. 1–14.

Description of the Female.—Length about 1 mm. ($\frac{1}{25}$ of an inch). The body is in general appearance somewhat similar to *Stenhelia ima* (fig. 19).

Antennules scarcely reaching to the end of the cephalo-thoracic segment, eight-jointed; the first four joints are large, but the last four are very small (fig. 20).

Antennæ short and moderately stout; secondary branches small and three-jointed (fig. 21).

Mandibles robust, with a broadly truncate biting edge which is armed with several small and somewhat irregular teeth; palp well developed, two-branched, but the posterior branch is very small (fig. 22).

Second maxillipeds stout, and armed with a moderately strong terminal claw (fig. 23).

First pair of thoracic feet stout; the proximal joint of the inner branches scarcely reach beyond the ends of the outer ones, second joint small, the third is about twice the length of the second, while the second and third together are scarcely equal to half the length of the first joint; the outer branches are composed of three sub-equal joints (fig. 24). The second, third, and fourth pairs are slender and moderately elongated, and the branches are all three-jointed; figure 25, which represents the fourth pair, shows that the inner branches are only slightly longer than the outer ones.

The fifth pair are foliaceous, the basal joints being broadly sub-triangular, and furnished with five moderately stout but not very long setæ on the somewhat rounded apex. The secondary joints are sub-rotund, and scarcely reach beyond the apex of the basal joints; they are each provided with five setæ of unequal lengths, the second and third, counting from the inside, being considerably longer than the other three (fig. 26).

The caudal furca are very short.

Habitat.—This species was obtained in some dredged material from Station VII., Firth of Forth (between Fidra and the Bass Rock), on July 9th, 1901; it appears to be somewhat rare. No males were observed.

Remarks.—The *Stenhelia* just described, and which I have referred to *Stenhelia hispida*, G. S. Brady, while differing in a few particulars from the species named, agrees very well with it in several important particulars. The structure of the antennules, for example, is almost identical with that of the antennules in *Stenhelia hispida* as described and figured by Professor G. S. Brady, and the first and fifth pairs of feet are also nearly alike in both.

Stenhelia confusa, T. Scott (sp. n.). Pl. XXII., figs. 17–25.

Description of the Female.—Length about 9 mm. (about $\frac{1}{28}$ of an inch). Body moderately stout, tapering slightly towards the posterior end; rostrum prominent (fig. 17).

Antennules shorter than the cephalo-thoracic segment, moderately stout, and composed of eight joints; the first, second, and end joints are the longest, while the fifth and sixth are very small (fig. 18). The approximate proportional lengths of the various joints are shown in the formula—

Proportional lengths of the joints, .	22	14	8	6	3	4	7	14
Numbers of the joints, ...	1	2	3	4	5	6	7	8

All the joints with the exception of the first are moderately setiferous.

The antennæ are somewhat similar to those of *Stenhelia ima*, Brady (fig. 19).

The mandibles are also somewhat similar to those of the same species, but the branches of the mandible-palp appear to be shorter (fig. 20).

The second maxillipeds resemble the same organs in *Stenhelia hispida*, G. S. Brady (fig. 21).

The first pair of thoracic feet are moderately stout, the inner branches are about one and a half times the length of the outer branches, first joint is equal to the entire length of the second and third, while the second is equal to about two-thirds the length of the end joint; the joints of the outer branches are sub-equal (fig. 22).

The remaining three pairs of feet do not differ very materially from the same appendages of *Stenhelia ima*, except that they are scarcely so elongated (fig. 23).

The fifth pair is foliaceous, but comparatively short; the secondary joints do not extend much beyond the produced inner portion of the basal joints, which in outline is broadly triangular, and furnished with three setæ of unequal length on the bluntly rounded apex, while two dagger-like spines spring from the inner margins; the secondary joints are also somewhat triangular, but they are rather narrower than the produced inner portion of the basal joints; the apex of the secondary joints, which is somewhat truncate, bears three small setæ, and three small hairs spring from the outer margin (fig. 24).

Caudal furca slender, and about as long as the last abdominal segment (fig. 25).

Habitat.—The species occurred very sparingly in some washings of dredged material from Station III., Firth of Forth (to the east of Inchkeith), collected on June 7th, 1901. No males were observed.

Remarks.—This species resembles *Stenhelia hirsuta*, I. C. Thompson, in some respects, and especially in the structure of the antennules, and in the length of the caudal furca; but in that species the inner branches of the first pair of thoracic feet are long and slender, much more so than the present form. The two species differ also in the form of the fifth pair. And though the structure of the antennules of *Stenhelia confusa* bears a certain resemblance to those of *Stenhelia hirsuta*, it differs very distinctly in this as well as in some other respects from almost every other species of the genus.

Ameira tenuicornis, T. Scott (sp. n.). Pl. XXIV., figs. 1–9.

Description of the Female.—Length ·67 mm. (about $\frac{1}{37}$ of an inch). Body moderately slender and sub-cylindrical; rostrum small (fig. 1).

Antennules slender and elongated, exceeding in length the cephalothoracic segment, and composed of eight joints; the first and second joints are sub-equal; the third and fourth are also sub-equal, but smaller than the preceding joints (fig. 2). The approximate proportional lengths of the various joints are shown by the formula. All the joints with the exception of the first one are sparingly setiferous.

Proportional lengths of the joints,	24	25	18	15	10	9	6	9
Number of the joints,	1	2	3	4	5	6	7	8

The antennæ are very slender, and the secondary branches are small and two-jointed, the end joint being the smallest (fig. 3).

The mandibles are of moderate size, narrow-cylindrical, and obliquely truncate at the apex, which is armed with a few minute spinules; the basal portion of the mandible-palp is small but slightly dilated, and carries two branches; the marginal branch is small and one-jointed and furnished with a few setæ; the end joint is long and very slender, and is minutely serrated at the extremity (fig. 4).

The second maxillipeds (posterior foot-jaws) are moderately stout and armed with strong terminal claws (fig. 5).

The first pair of thoracic feet are elongated and slender, and especially the inner branches, the first joint being about as long as the entire length of the outer branches; the other joints are small, but the end one is about twice the length of the penultimate joint (fig. 6). The following three pairs have the outer branches long and slender; the inner branches are also slender, but they are shorter than the outer, as shown by the figure (fig. 7) which represents one of the fourth pair.

The fifth pair are small and somewhat foliaceous, the basal joints are sub-triangular and provided with about four setæ on the rounded apex. The secondary joints are subovate, and the inner margins are fringed with minute hairs, while one or two moderately long setæ spring from the apex, and one or two others from the outer margin (fig. 8).

Caudal furca shorter than the last abdominal segment (fig. 9).

Habitat.—Dredged at Station VI., Firth of Forth (off St. Monans), in July 1901; only one or two specimens were obtained, but no males were observed.

Remarks.—This species is readily distinguished by the elongated antennules and the long and slender first pair of feet; it differs in both of these appendages from *Ameira longipes*, Boeck, as well as from the other described species of *Ameira* known to me.

Ameira propinqua, T. Scott (n. sp.). Pl. XXIV., figs. 10–18.

Description of the Female.—Length about ·6mm. (nearly $\frac{1}{40}$ of an inch). Body slender, sub-cylindrical, the cephalo-thoracic segment about equal to the entire length of the next three segments, rostrum very small (fig. 10).

Antennules slender and rather longer than the cephalo-thoracic segment, eight-jointed; the second joint is the longest, the first and third are sub-equal and about two-thirds the length of the second; the remaining joints are small (fig. 11). The formula shows approximately the proportional lengths of the various joints:—

Proportional lengths of the joints,	12	17	12	4	4	5	3	5
Numbers of the joints, . .	1	2	3	4	5	6	7	8

Antennæ elongate and moderately stout, secondary branches small, slender, and one-jointed (fig. 12).

Mandibles cylindrical and not very broad, the truncate apex is armed with a stout spine on the outer angle and a few small spiniform setæ, as shown by the drawing (fig. 13). The mandible-palp is of moderate size, the basal joint is provided with a single one-jointed and terminal branch.

The second maxillipeds (posterior foot-jaws) are small but with well-developed terminal claws, which are rather longer than the joints to which they are articulated (fig. 14).

The first four pairs of thoracic feet are slender and elongated. In the first pair the inner branches are narrow and considerably longer than the outer branches, the length of the first joint is equal to that of the second and third combined, but the second and third joints are sub-equal in length; a single small seta springs from the inner margins of the first and second joints, while the end joints are provided with three terminal hairs, the middle one being the longest. The outer branches, which are composed of three sub-equal joints, reach to a little beyond the end of the first joint of the inner branches (fig. 15). The inner branches of the next three pairs are considerably shorter than the outer branches, which are slender and elongated (fig. 16). In all the four pairs the outer and inner branches are three-jointed.

In the fifth pair the basal joints are broadly foliaceous and subtriangular in outline, with the apex truncate and provided with four spiniform setæ, the outermost of which is very small; the secondary joints are long, narrow, and cylindrical, being about four times longer than broad, the extremity, which is obliquely truncate, carries several setæ, the two inner ones being longer than the others (fig. 17).

The caudal furca are shorter than the last abdominal segment; the furcal setæ are elongated (fig. 19).

Habitat.—Station VI. (off St. Monans), Firth of Forth, dredged on July 8th, 1901. The species is apparently very rare. (For drawings of what may be the male of this species, *see* Pl. XXII., figs. 36–42, and Pl. XXIII., fig. 1.)

Remarks.—In some respects *Ameira propinqua* comes rather near to *Ameira longiremis*, T. Scott, the fifth feet especially being very similar to those of that species, as well as to those of *Ameira longipes*, Boeck, but the structure of the antennules and of the first pair of feet separate it distinctly from both the species named.

Pseudotachidius coronatus, T. Scott

1898. *Pseudotachidius coronatus*, T. Scott, 16th Ann. Rept. Fishery Board for Scot., pt. iii., p. 267, pl. xiii., figs. 12–26; pl. xv., figs. 1–4.

This distinct species has been obtained in a gathering of small crustacea dredged in Loch Etive in 55 to 65 fathoms on September 17th, 1901. *Pseudotachidius coronatus* has not previously been recorded out of the Clyde district.

Pterinopsyllus insignis, G. S. Brady.

1868. *Lophophorus insignis*, G. S. Brady, Mon. Brit. Copep., vol. i., p. 122, pl. xiii., figs. 1–10. (See also *op. cit.*, vol. iii., p. 23, where the generic name is changed to *Pterinopsyllus*,—"*Lophophorus*" being preoccupied.)

This fine species was obtained in the same gathering as the *Pseudotachidius* just recorded, and appears to be the first record of it from the West of Scotland. It has in previous years been obtained in the Firth of Forth and the Moray Firth. Although *Pterinopsyllus insignis* and *Pseudotachidius coronatus* have a general resemblance to one another they may be readily distinguished by the difference in the lengths of the antennules—those of the first-named species being distinctly longer and more slender than in the other.

Mesochra macintoshi, T. and A. Scott.

1895. *Mesochra macintoshi*, T. and A. Scott, Ann. and Mag. Nat. Hist., (6), vol. xv., p. 53, pl. vi., figs. 1–7.

Mesochra macintoshi, which was first observed amongst a number of peculiarly slender copepods collected on the south shore of the Firth of Forth near Musselburgh, has lately been obtained at Station VI. (off St. Monans). It is apparently a rare species, but being one of those forms which live upon the bottom it may from its small size be easily overlooked.

Pseudomesochra, T. Scott (gen. nov).

This genus is somewhat intermediate between *Mesochra*, Boeck, and *Cletodes*, G. S. Brady. The antennules (anterior antennæ) are composed of six joints. The secondary branches of the antennæ (posterior antennæ) are small and two-jointed. Mandibles stout, mandible-palp well developed and provided with two branches, Other mouth organs similar to those in *Mesochra* and *Cletodes*. The first four pairs of thoracic feet have the outer branches three- and the inner branches all two-jointed. Fifth somewhat rudimentary and composed of a single lamelliform joint. Ovisacs apparently double.

Pseudomesochra differs from *Mesochra*, *Cletodes*, and allied genera chiefly in the structure of the mandible-palp and fifth pair of feet.

Pseudomesochra longifurcata, T. Scott (sp. nov.) Pl. XXIV., figs. 27–35.

Description of the Female.—Length about ·5mm. ($\frac{1}{50}$ of an inch). Body moderately stout, tapering slightly towards the posterior end; abdomen not distinct from thorax; rostrum small; caudal furca elongated, being nearly equal to the entire length of the last three abdominal segments (fig. 27).

Antennules short, moderately stout, and composed of six joints, the first two and the last being each considerably longer than any of the other three (fig. 28). The approximate proportional lengths of the various joints are shown by the formula:—

Proportional lengths of the joints, -	23	20	8	5	4	15
Numbers of the joints, - - -	1	2	3	4	5	6

The antennæ are of moderate size; secondary branches two-jointed and provided with several marginal and terminal setæ (fig. 2~~4~~). 9

Mandibles robust and having the biting end armed with several stout teeth; mandible-palp well developed and the basal part furnished with two branches (fig. 30).

Second maxillipeds short and moderately stout, but the terminal claw is rather feeble, and fringed with a few minute hairs (fig. 31).

The first four pairs of thoracic feet slender. In the first pair both branches are about the same length; the joints of the inner branches are sub-equal, and a single seta springs from the inner margin and three from the end of the second joint, the proximal joint appears to be unprovided with setæ or spines (fig. 32). In the second, third, and fourth pairs the inner branches in each are rather shorter than the outer branches, and the end joints somewhat longer than the proximal ones, and in these three pairs of feet the inner branches are more setiferous than the inner branches of the first pair (fig. 33). The fifth pair, which are small and somewhat rudimentary, appear to be composed of a single lamelliform joint, bearing three long apical setæ (fig. 34).

Habitat.—Upper Loch Etive, where it was dredged by the "Garland" in over 60 fathoms on September 17th, 1901. It appears to be a rare species, as only a single specimen (a female) was observed, but as the species is a very small one it may be easily overlooked.

Leptopontia, T. Scott (gen. nov.).

Body slender and cylindrical. Antennules (anterior antennæ) seven-jointed, slender. The secondary branches of the antennæ are entirely wanting or reduced to a single seta. Mandibles slender and moderately elongate; mandible-palp also slender and one-branched. Other mouth organs somewhat as in *Mesochra*, Boeck. The first four pairs of thoracic feet slender, outer branches three- and inner branches all two-jointed. The inner branches of the first pair elongated—the end joint being the shortest, the outer branches short, the inner branches of the other three pairs very short, and the outer elongated. Fifth pair small, foliaceous, two-branched; secondary branches (or joints) minute.

Leptopontia curvicauda, T. Scott (sp. n.). Pl. XXII., figs. 26–35.

Description of the Female.—Length ·6mm. (about $\frac{1}{42}$ of an inch). Body slender, cylindrical; cephalo-thoracic segment moderately short, scarcely three times the length of the next one; rostrum short (fig. 26).

The antennules are slender and longer than the cephalo-thoracic segment, seven-jointed, the first joint is longer than any of the others, the second and third are sub-equal, the fourth, fifth, and sixth joints are each about half the length of the third, while the end joint is about twice the length of the one next to it (fig. 27). The formula shows approximately the proportional lengths of the different joints :—

$$\text{Proportional lengths of the joints, -}\ \frac{28 \cdot 18 \cdot 17 \cdot 8 \cdot 7 \cdot 7 \cdot 14}{1 \cdot 2 \cdot 3 \cdot 4 \cdot 5 \cdot 6 \cdot 7}$$
Numbers of the joints, - - -

Antennæ slender, consisting of two elongated joints; the secondary branches are represented by a single minute hair (fig. 28).

Mandibles slender and elongated, the biting end is obliquely truncated and armed with a number of small teeth; the mandible-palp is also elongated, and one branched, the basal joint is moderately stout, and about twice the length of the single-jointed branch, and is furnished with a few small setæ (fig. 29).

The posterior foot-jaws (fig. 30) are not unlike those of *Tetragoniceps incertus*, T. Scott. The inner branches of the first pair of thoracic feet are slender, elongated, and two-jointed, the end joint being only about one-third the length of the other; the outer branches, which are three-jointed, are scarcely half the length of the inner branches (fig. 31). In the second, third, and fourth pairs the outer branches are long and slender, and three-jointed; the joints of the outer branches of the second pair are sub-equal in length, but in the outer branches of the third and fourth pairs the first and second joints are sub-equal and rather longer than the end joints. The inner branches of the same three pairs are short and two-jointed; in the second pair the inner branches are rather longer than the first joint of the outer branches; but in the third and fourth pairs the inner branches are shorter than the first joint of the outer branches, as shown by the drawing (figs. 32, 33).

In the fifth pair the basal joints are moderately large and foliaceous, the inner produced part is broadly rounded, and bears three apical setæ, and the secondary joints, which are very small, also carry three setæ (fig. 34).

The last abdominal segment is armed on the median dorsal aspect with a backward-pointing tooth as shown in figures 26 and 35.

The caudal furca, which are nearly as long as the last abdominal segment, become gradually attenuated towards the distal extremity; and in all the specimens that have been obtained the furca are distinctly recurved as shown in the habitus drawing (fig. 1).

Habitat.—Dredged in the Firth of Forth at Station VI. (off St. Monans) on July 8th, 1901; not very common.

Remarks.—Odd specimens of this species have been observed from time to time for a considerable while past, but the first specimens were put aside as being probably immature forms of some species already described. I am now, however, convinced that they are distinct *Leptopontia* in some respects resembles both *Mesochra*, Boeck, and *Tetragoniceps*, G. S. Brady, in its structural details, but in the absence of a secondary branch to the antennæ, in the elongate and slender form of the mandibles, and the one-branched mandible-palp, it does not agree very well with either of the genera named, which are its nearest allies.

Laophonte similis (Claus).

This species was obtained in the same material with the last, collected off St. Monans; and it was also taken from the swimmerets of a Spider Crab (*Hyas arenarius*) from the Bay of Nigg on May 23rd, 1901.

Laophonte curticauda, Boeck.

Specimens of this species were obtained on several occasions on the swimmerets of the common Shore Crab (*Carcinus mænas*), but whether its occurrence on the swimmerets of the Crab was accidental or whether the copepod is associated with the Crab as a commensal, is a question that will require further research to determine. It may be mentioned, however, the *Laophonte* was obtained as described on almost ever Crab examined.

Normanella attenuata, A. Scott. Pl. XXIII., figs. 2–4.

1896. *Normanella attenuata*, A. Scott, Rept. for 1895, on Lancashire Sea-Fisheries Laboratory, p. 47, pl. iv., figs. 8–20.

This species, which was first discovered in a gathering collected one mile off Spanish Head, Isle of Man, from a depth of 16 fathoms, is now added to the fauna of the Firth of Forth; it was obtained in dredged material from Station VI. (off St. Monans), at a depth of about 10 fathoms. *Normanella attenuata* is a slender species, measuring about a millimetre in length. The rostrum is very small; the antennules are slender, somewhat elongated, and nine-jointed, The outer branches of the first four pairs of thoracic feet are all three-jointed, but the inner branches of the first three pairs are two-jointed, while in the fourth pair the inner branches, like the outer ones, are three-jointed. The inner branches of the first pair, which are considerably longer than the outer ones, have the end joints short (fig. 3), and armed at the apex with an elongate spine, and two setæ of unequal length. The inner branches of the second, third, and fourth pairs are shorter than the elongate outer branches.

The fifth pair are broadly foliaceous and of moderate size, as shown by the drawing (fig. 4).

In the female the first segment of the abdomen is larger than those which follow, being composed of two coalescent joints, as shown by the habitus figure (fig. 2).

In this species the thoracic portion of the body is rather shorter than the abdomen, and gives to the animal a more than usually slender appearance.

Though, from its occurrence in the Forth, *Normanella attenuta* would appear to have a moderately extensive distribution, it does not seem to be very common. This species differs from *Normanella dubia*, Brady and Robertson, in its general conformation, by its elongated antennules, and by the form of the fifth pair of thoracic feet; but it differs more particularly in that the inner branches of the fourth pair are three-jointed. In this respect it disagrees with the generic definition of *Normanella*, and may for this, and perhaps one or two other reasons, require to be removed to another genus.

Cletodes longicaudata, Brady and Robertson. Pl. XXIII., figs. 26–33.

1875. *Cletodes longicaudata*, Brady and Robertson, Brit. Assoc. Rept., p. 196.

1880. *Cletodes longicaudata*, Brady, Mon. Brit. Copep., vol. iii., p. 92, pl. lxxix., figs. 13–19.

A perfect specimen—a female with ova—was obtained in a gathering from the west end of Station III., Firth of Forth, collected on June 7th, 1901. As the species is somewhat rare I give a short description of it, along with figures of some of the principal appendages. The female specimen referred to measured about ·84 mm. ($\frac{1}{30}$ of an inch) in length from the forehead to the end of the caudal furca, but the caudal furca, which are very long, are about equal to a fourth of the entire length of the animal; the rostrum is of moderate length (fig. 26).

The antennules are short, moderately stout, and composed of five joints. Professor G. S. Brady describes the antennules of his specimen as six-jointed, but this difference may be due to a slight local variation. The fourth joint is very small and carries an asthetask or sensory filament (fig. 27). The formula shows approximately the proportional lengths of all the joints:—

Proportional lengths of the joints,	6	13	20	4	23
Numbers of the joints,	1	2	3	4	5

The antennæ (fig. 28) are of moderate size, but the secondary branches are small and one-jointed.

In the first four pairs of thoracic feet, the outer branches, which are all three-jointed, are all of them somewhat similar in structure; the first joint is slightly longer than the second, while the end joint is distinctly longer than either of the other two; the marginal armature consists also of setæ rather than spines. The inner branches of all the four pairs are slender and two-jointed, the first joints being very short. In the first pair the end joints of the inner branches extend somewhat beyond the outer branches and are furnished with two long terminal setæ (fig. 29). In the second pair the end joints of the inner branches are, like those of the first pair, long and slender, but they do not reach to the extremity of the outer branches; they bear two long terminal setæ (fig. 30). In the third and fourth pairs, the inner branches are considerably shorter than the outer and bear one sub-terminal and two apical setæ (fig. 31).

The fifth pair are moderately large; the secondary branches are elongated, narrow-cylindrical, and about four times longer than broad; they are armed with two terminal and three strong marginal setæ, as shown in the figure; the inner produced portion of the basal joint is nearly as long as the secondary joint, and provided with three moderately elongated setæ near the distal end; a long slender seta also springs from the outer aspect of the basal as shown (fig. 32).

Cletodes longicaudata does not appear to be a very common species anywhere, although it seems to be widely distributed.

Fultonia, T. Scott (gen. nov.).

This genus is somewhat like *Cletodes*, G. S. Brady, in general appearance. The abdomen in not distinctiy separated from the thorax. The antennules are moderately short and composed of about eight joints. The antennæ are each furnished with a small secondary branch. The mouth organs are similar to the same appendages in *Cletodes*. The outer branches of the first four pairs of thoracic feet are all three-jointed, while the inner branches of the first pair are composed of two, and of the second, third, and fourth pairs of three joints. The fifth pair are nearly as in *Cletodes.* The copepods for which I have instituted this genus do not correspond to any described form known to me. The genus is named in compliment to Dr. T. Wemyss Fulton, Superintendent of the Scientific Work of the Fishery Board for Scotland.

Fultonia hirsuta, T. Scott (sp. nov.). Pl. XXIII., figs. 5–12.

Description of the Female.—Length about ·63 mm. ($\frac{1}{40}$ of an inch). Body somewhat slender and sub-cylindrical, the posterior margins of abdominal segments fringed with short projecting hairs, which give to this part of the animal a peculiarly hirsute appearance, caudal furca short, rostrum small (fig. 5).

Antennules rather slender, and shorter than the cephalo-thoracic segment, eight-jointed; the first three joints are moderately large, but the others are short; all the joints, with the exception of the first, are more or less setiferous; an elongated and slender asthetask springs from the upper distal angle of the fourth joint (fig. 6). The approximate proportional lengths of all the joints are shown by the formula—

Proportional lengths of the joints, .	10 ·	14 ·	11 ·	6 ·	5 ·	7 ·	6 ·	6
Numbers of the joints	1 ·	2 ·	3 ·	4 ·	5 ·	6 ·	7 ·	8

The antennæ are similar to those of *Cletodes*; the secondary branches are very small, and one-jointed, and furnished with a single terminal hair (fig. 7).

Mouth organs somewhat similar to those of *Cletodes*; the second maxillipeds, which are moderately elongated, are provided with long slender terminal claws (fig. 8).

The thoracic feet are all moderately slender; the outer branches of the first four pairs and the inner branches of the second, third, and fourth pairs are all three-jointed, while the inner branches of the first pair are only two-jointed. All the inner branches are short; those of the first pair are just about half the length of the outer branches and carry three small terminal setæ or spines (fig. 9). The inner branches of the other three pairs are scarcely more than a third of the length of the outer branches (fig. 10). The outer branches of the same three pairs are rather more elongated than those of the first pair.

In the fifth pair the basal consists of a narrow plate articulated to the last thoracic segment, and bearing one or two small marginal setæ; the exterior extremity of the basal joint is produced into a very narrow lobe which forms the base of a small seta. The secondary joints are narrow and sub-cylindrical, and about four times longer than broad, and furnished with about half-a-dozen small marginal and terminal setæ (fig. 11).

Habitat.—Station VI., Firth of Forth (off St. Monans), dredged in 13 to 15 fathoms, on May 22nd, 1901.

Remarks.—This species somewhat resembles *Cletodes irrasa,* T. Scott, in its hirsute appearance, but in that species the antennules are six-jointed, the inner branches of all the first four pairs of thoracic feet are only two-jointed, while the caudal furca are moderately long and slender. The species does not resemble any described form known to me.

Nannopus palustris, G. S. Brady. Pl. XXIII., figs. 13–25.

1880. *Nannopus palustris,* Brady, Mon. Brit. Copep., vol. ii., p. 101, pl. lxxvii., figs. 18–20.

This curious and rather interesting copepod, which Professor G. S. Brady discovered living in brackish water pools in a salt march at Seaton Sluice, Northumberland, and which has subsequently been found in similar situations in various parts of the British Islands as well as on the Continent, was during the preceding summer (1901) obtained near Newburgh on the Ythan, Aberdeenshire. Both the males and females of *Nannopus palustris* were obtained in the brackish water pools at this Aberdeenshire Station, and as no description or drawing of the male has yet, so far as I know, been published, the following notes on both of the sexes may be of interest.

The body of the female seen from the dorsal aspect is moderately stout anteriorly, but tapers gradually and evenly towards the posterior end (fig. 13); the female specimen represented by the drawing measures about ·9 mm. ($\frac{1}{28}$ of an inch) in length.

The antennules, which are short and stout, are composed of five joints, the penultimate joint being very small; the last four joints are densely setiferous, but the sensory filament (æsthetask) which springs from the end of the third joint is comparatively short and slender (fig. 15).

The antennæ are very small, though comparatively moderately stout; the secondary branch is small and one-jointed and provided with a few apical setæ (fig. 16).

The mandibles are moderately stout, their biting end is somewhat truncate and provided with a few stout teeth; the mandible-palp consists of a one-jointed and somewhat dilated appendage articulated near the base of the mandible and provided with a few short setæ (fig. 17).

The second maxillipeds are small, the terminal claws are moderately stout and carry a few minute hairs on their inner margins (fig. 18).

In the first four pairs of thoracic feet the outer branches, which are moderately stout, are all three-jointed and armed with elongate though somewhat slender spines on their outer margins; the inner branches of the first, second, and third pairs are considerably shorter than the outer, and each composed of two joints, but the inner branches of the first pair are rather smaller than those of the second and third (fig. 19). The inner branches of the fourth pair are rudimentary and consist of a single minute joint which carries a very small and a moderately elongated seta (fig. 20).

The fifth pair resemble somewhat closely the fifth pair in *Enhydrosoma curvatum*, Brady and Robertson, the basal joint is very broad and short, they form short lamelliform plates along the postero-ventral margin of the last thoracic segment, four moderately stout plumose setæ spring from the edge of the inner half of each basal joint; the secondary joints are small and sub-rotund, and each furnished with five moderately long setæ round the distal margin (fig. 21).

The caudal furca are very short.

Description of the Male.—The male differs little from the female except in the following points; it is, when seen from above, distinctly narrower than the female, especially towards the anterior end (fig. 14). The antennules are shorter and less prominent, the basal joints are also more dilated, but the antennules taper quickly towards the distal end, the penultimate joint is considerably swollen and assumes a utricule-like form, while the end joint is very small (fig. 23).

The mouth organs in the male appear to be very similar to those of the female. The thoracic feet are also similar in both sexes, except that the inner branches of the third pair are provided with a short but stout terminal spine slightly hooked at the end, and a single plumose seta instead of a moderately long slender spine and two plumose setæ as in the third pair in the female (fig. 24). The fifth pair in the male resemble those of the female, except that the secondary joint appears to be almost obsolete (fig. 25); the appendages to the first abdominal segment in the male are small and carry three setæ—two moderately long and one short.

Dr. Eugene Canu has given a very full series of figures of the female, but he refers to the male as being unknown.*

Dactylopus coronatus, T. Scott.

1894. *Dactylopus coronatus*, T. Scott, 12th Ann. Rept. of the Fishery Board for Scot., pt. iii., p. 255, pl. ix., figs. 12–20.

This species was dredged off the North Craig, Inchkeith, Firth of Forth, in 8 fathoms, on July 4th, 1901. The first specimens from which the species were described were also obtained in the Firth of Forth, but in the vicinity of the Bass Rock, near the mouth of the estuary. The Firth of Forth appears to be the only Scottish locality where this *Dactylopus* has been hitherto obtained.

Cylindropsyllus lævis, G. S. Brady.

1880. *Cylindropsyllus lævis*, G. S. Brady, Mon. Brit. Copep., vol. iii., p. 30, pl. lxxxiv., figs. 1–8.

A male specimen of this large and somewhat remarkable species was obtained in some bottom material from Smith Bank, Moray Firth, on February 15th, 1901.

MONSTRILLIDÆ.

The Family Monstrillidæ is represented in the copepod fauna of our seas from the English Channel to the Shetland Islands; a few of the species appear to be somewhat local in their distribution, while others are co-extensive with the seas that surround our shores. The family comprises the two genera *Monstrilla*, Dana, and *Thaumaleus*, Kröyer, and both are represented in the marine fauna of Scotland. Specimens belonging to this curious group of copepods have been captured at odd times in the Firth of Forth almost every year since 1888.† The first specimens obtained were ascribed to *Cymbasoma rigida*, I. C. Thompson, but they were shortly afterwards submitted to Mr. Gilbert C. Bourne, who was preparing a revision of the various forms which had recently been observed in the British seas, and his opinion of these specimens from the Forth estuary was that they were identical with *Monstrilla helgolandica*, Claus.‡ Other specimens have been obtained at odd times which appeared to belong to the same species, and also one or two belonging to a different species, and which were subsequently identified as the true *Monstrilla rigida* of I. C. Thompson. Two apparently adult specimens of a *Monstrilla* were obtained in some tow-net gatherings collected by the "Garland" on the 24th of July, 1901, and as they seem to differ from those previously mentioned as occurring in the Forth estuary, I give here a short description of them—they appear to be identical with the form described by Dr. Giesbrecht under the name of *Monstrilla longiremis*.

Specimens of *Monstrilla* have also in recent years been obtained in the Firth of Clyde, and though usually they have occurred very sparingly, yet on one or two occasions large numbers have been obtained in a single tow-net gathering. In a small gathering of material, in which there was

* Les Copép. du Boulonnais, p. 166, pl. iv., fig. 6–21 (1892).

† Annual Report of the Fishery Board for Scotland, Part III., p. 316 (1889).

‡ Notes on the genus *Monstrilla*, Dana; Quart. Journ. Micr. Sci., (2), vol. 30, p. 515 pl. xxxvii., figs. 14, 15 (1890).

a good deal of fibrous matter, collected in Loch Fyne on September 29th, 1899, over eighty specimens of *Monstrilla* were obtained, while in another, collected on the 28th of November, twenty-seven specimens were found.* All these specimens, which appear to belong to the one species, I have recorded as *Monstrilla* (?) *danæ*, Claparède.† It may be remarked, however, that Dr. Giesbrecht seems to think that the species described by Claparéde is not a *Monstrilla*, but should be placed in the genus *Thaumaleus*.‡

In a tow-net gathering collected in Lerwick Harbour in October last year (1900), a specimen belonging to the group of copepods under consideration was obtained, but owing to some doubt concerning its identification it was left over for further examination. I now find that this specimen belongs to the genus *Thaumaleus* of Kröyer, and a short description of it follows that of *Monstrilla*.

But besides the specimens alluded to above, others have been obtained in the Moray Firth, which have still to be examined; but the study of the group is a somewhat difficult one, and the more so as some of the descriptions and figures of the earlier writers are sometimes wanting in that fulness necessary for certain identification.

Monstrilla longiremis, Giesb. Pl. XXV., figs. 3, 4.

1892. *Monstrilla longiremis*, Giesbrecht, Pelagischen Copepoden des Golfes von Neapel, p. 589, pl. 46, figs. 10, 14, 22, 37, 41.

The *Monstrilla* which I now record from the Firth of Forth was obtained in a bottom tow-net gathering collected at Station V. (to the west of May Island) on July 24th, 1901. The antennules (first antennæ) are moderately elongated, but with the exception of an articulation near the base, the joints are very indistinct; the setæ were imperfect, and did not show the branched structure exhibited in Dr. Giesbrecht's figure of the antennule of *Monstrilla longiremis*. In the general form of the body and of the thoracic appendages the Forth specimen agrees very well with the species named. The abdomen consists of four segments, but the articulation between the first and second is not very marked, the third and fourth are short and distinct. The furca are of moderate size, and are each provided with five setæ as shown in the figure; no trace of a sixth seta could be observed.

The fifth feet consist each of a short, one-jointed sub-cylindrical branch, the proximal half of which is somewhat delated interiorly; each branch is furnished with three apical setæ, the inner one being much shorter than the other two, and a fourth seta springs from the inner margin as shown in the figure.

From these descriptive notes on this specimen from the Firth of Forth there seems to be little doubt that it is identical with the species described by Dr. Giesbrecht under the name of *Monstrilla longiremis*. The Forth specimen certainly does not show the branching setæ exhibited in Dr. Giesbrecht's figure; but this is not very surprising when it is remembered how delicate these long branching setæ are, and the friction they may be subjected to while in the tow-net. The specimen I have described is a female; no male was observed.

* Eighteenth Annual Report of the Fishery Board for Scotland, Part III., pp. 398–99, pl. xiii., figs. 15–20 (1890).

† This species has also recently been observed in a gathering from the Firth of Forth collected at Station V. in 1901.

‡ Pelagischen Copepoden des Golfes von Neapel, p. 578 *et seq.*

Dr. Giesbrecht, in his great work on the Pelagic Copepoda of the Gulf of Naples, seems to be in doubt as to whether the Forth specimens considered by Mr. Bourne as belonging to the *Monstrilla helgolandica*, Claus, can really be identical with that species, and is rather inclined to ascribe them to his *M. longiremis*; the chief difficulty in the way of accepting this conclusion, however, is that Bourne, in describing the specimens, states that they possessed six furcal setæ, whereas in *M. longiremis* there are only five; unfortunately the mounted preparations from which the original description and figures were prepared were accidentally destroyed, and I am therefore unable to throw any light on the subject; but the occurrence of the specimen of *Monstrilla longiremis* just recorded seems to lend some support to the doubt expressed by Dr. Giesbrecht. Moreover it is interesting to note that none of the species mentioned by Mr. Bourne appear to have been provided with five furcal setæ, the number observed being either three or six.

Thaumaleus thompsoni, Giesb. Pl. XXV., figs. 5, 6.

1892. *Thaumaleus thompsoni*, Pelagischen Copepoden des Golfes von Neapel, p. 584, pl. 46, figs. 7, 27, 31, 36, 40.

A male specimen of a Copepod, which is apparently identical with *Thaumaleus thompsoni*, Giesbrecht, was obtained in a tow-net gathering collected in Lerwick Harbour, Shetland, on October 15th, 1901. In the male of this species the first of the two abdominal somites is shorter than the second, while in the female the first abdominal segment is, according to Dr. Giesbrecht, distinctly more dilated than the other. The caudal furca in the male are each provided with three setæ (fig. 5), but the female, according to Giesbrecht, has four.

One of the more obvious differences between the genus *Thaumaleus* and *Monstrilla* is that in the first the abdomen is composed of not more than two segments, exclusive of the caudal furca, whereas in *Monstrilla* the abdomen is composed of three, and sometimes of four, segments. Moreover, in *Thaumaleus* the number of hairs on the caudal furca is usually three or four, while *Monstrilla*, on the other hand, is provided with five or six furcal setæ.

Lichomolgidæ.

Lichomolgus furcillatus, Thorell.

This species was obtained in the washings of some dredged material collected at the north end of Inchkeith on May 23rd, 1901.

Lichomolgus hirsutipes, T. Scott.

1893. *Lichomolgus hirsutipes*, T. Scott, 11th Ann. Rept. of the Fishery Board for Scotland, pt. iii., p. 206, pl. iv., figs. 1–12.

This was dredged off the North Craig, Firth of Forth, on July 4th, 1901; the species was described from specimens collected in the vicinity of the Bass Rock at the mouth of the estuary in 1893; it appears to be a rare species.

Pseudanthessius liber (Brady and Robertson).

1875. *Lichomolgus liber*, B. and R., Brit. Assoc. Report, p. 197.

This species was obtained in the same gathering with the last. It appears to be a more common and more widely distributed species than *Lichomolgus hirsutipes*.

Pseudopsyllus, T. Scott (gen. nov.).

Somewhat like *Clausia*, Claparède, in general appearance; the abdomen scarcely distinct from the thorax; antennules composed of six short but stout joints. The antennæ are somewhat similar to those of *Hersiliodes*, Canu. Second maxillipeds apparently two-jointed, and armed with extremely long and powerful terminal claws; other mouth organs unknown. The first four pairs of thoracic feet have both branches three-jointed as in *Hersiliodes*. Fifth pair short, and composed of a single lamelliform joint. Male unknown.

Pseudopsyllus elongatus, T. Scott (sp. nov.). Pl. XXIV., figs. 36–42.

Description of the Female.—Length 1·4 mm. ($\frac{1}{18}$ of an inch). Body elongate-narrow; when viewed from above the anterior thoracic portion is slightly broader than the abdomen, but the distinction between thorax and abdomen is not very marked (fig. 36). The cephalo-thoracic segment is about equal to the entire length of the next four; rostrum short.

Antennules very short and stout and composed of six sub-equal joints; moderately setiferous and provided with three sensory filaments—one on the fourth joint, one on the fifth, and one on the end of the last joint (fig. 37). The formula shows approximately the lengths of the different joints:—

Proportional lengths of the joints,	15 · 11 · 9 · 12 · 10 · 13
Numbers of the joints,	1 · 2 · 3 · 4 · 5 · 6

The antennæ are small but moderately stout, the first joint is the largest, the second and third are small, while the fourth is nearly as long as the second and third combined; the exterior angle of the joint extends forward to near the middle of the end joint and terminates in a small spine; the end joint seems, for the reason just stated, to arise from slightly beneath the penultimate one, somewhat similar to the structure of the same appendages in species of *Hersiliodes* (fig. 38).

The second maxillipeds—the only mouth organs obtained—are robust and armed with long and powerful terminal claws (fig. 39).

The first four pairs of thoracic feet are stout, moderately elongated, and with both branches three-jointed and of nearly equal length. In the outer branches of the first pair (fig. 40) a stout and moderately long spine springs from the outer distal angle of the first and second joints, while the end joint carries three similar spines on the outer margin and apex; a plumose seta springs from the inner margin of the second joint, and five from the inner margin and apex of the last joint; the first and second joints of the inner branches are each provided with one plumose seta on the inner margin, while the end joint carries two marginal and two apical setæ, in addition an elongate spine which springs from its outer distal angle. In the fourth pair the armature of the first and second joints of the outer branches is similar to that of the first and second joints of the outer branches of the first pair except that the marginal spines are not so elongated; but the armature of the end joint differs from that of the same end joint of the first pair in that it carries only one small spine on the distal half of the outer margin and a moderately long but slender sub-apical spine, while round the inner margin and apex there are six instead of five plumose setæ; the armature of the inner branches differs from that of the inner branches of the first pair, the second joint is provided with two setæ on its inner margin instead of one, while the end joint bears only three apical setæ, instead of four setæ and an elongate spine as in the first pair (fig. 41).

The fifth pair consist each of a single one-jointed lamelliform branch, sub-cylindrical in outline and fully twice as long as broad; they are each furnished with a single seta on the outer margin, while two setæ and a small spine spring from the truncated apex—the spine being articulated at the inner angle; a seta also springs from the exterior angle of the last thoracic segment, to which the fifth foot is articulated (fig. 42).

The caudal furca are moderately broad and nearly as long as the last abdominal segment (fig. 36).

Habitat.—Dredged at Station VII., Firth of Forth (between Fidra and the Bass Rock), on July 9th, 1901. Only a single female specimen was observed.

Remarks.—The specimen described above has such a close general resemblance to *Clausia cluthae,* T. and A. Scott,* that it was at first considered to belong to the same genus, but when closely examined it is found to differ in several important points, *i.e.* the structure of the antennæ and the form and armature of the second maxillipeds. The inner branches of the first four pairs of thoracic feet are all three-jointed, and thus differ very distinctly from those of *Clausia.*

I do not know of any genus or species to which this copepod could be ascribed.

Asterocheridæ.

Asterocheres violaceus (Claus).

This somewhat rare species was obtained in a bottom gathering collected about 60 miles to the east of Shetland (or 180 miles north-east of Buchan-ness), on May 22nd, 1901. This species has been taken by my son, Mr. Andrew Scott, in the Irish Sea,† and it has also been obtained in the Firth of Clyde.‡

Rhynchomyzon purpurocinctum (T. Scott).

This distinct and widely distributed species was observed in some material dredged at the north end of Inchkeith on May 23rd, 1901. The specimens from which the species was described were also obtained in the Firch of Forth, but nearer the mouth of the estuary. *Rhynchomyzon purpurocinctum,* though widely distributed, is not very common, and occurs only very sparingly.

Acontiophorus ornatus (Brady and Robertson).

1875. *Ascomyzon ornatum,* Brady and Robertson, Brit. Assoc. Rept., 1875, p. 197.
1880. *Acontiophorus armatus,* G. S. Brady, Mon. Brit. Copep., vol. iii., p. 71, pl. lxxxvii., figs. 8–15.

A few specimens of this fine species were obtained in the washings of some dredged material collected near North Craig, Firth of Forth, on July 4th, 1901. This is the first time *Acontiophorus ornatus* has been observed in the Firth of Forth. It is a moderately large species, being not only robust in form bnt reaching a length of about one and a half millimetres.

* Ann. and Mag. Nat. Hist., (6), vol. xviii., p. 1, pl. 1, figs. 1–12.

† Report for 1895 on the Lancashire Sea-Fisheries Laboratory, p. 54, pl. v., figs. 16–26 described under the name of *Ascomyzon thompsoni*), pub. 1896.

‡ Sixteenth Annual Report of the Fishery Board for Scotland. Part III., p. 270 (1898).

Cribropontius Normani (Brady and Robertson).

1875. *Dyspontius Normani,* Brady and Robertson, Brit. Assoc. Report (1875), p. 197.
1880. *Artotrogus Normani,* G. S. Brady, Mon. Brit. Copep., vol. iii., p. 63, pl. xci., figs. 12–15; pl. xcii., fig. 14; pl. xciii., fig. 10.
1897. *Bradypontius Normani,* T. Scott, 15th Ann. Rept. Fishery Board for Scotland, pt. iii., p. 154, pl. ii., figs. 1, 2; pl. iii., figs. 1–11.
1899. *Cribropontius Normani,* Giesb., Die Asterocheriden des Golfes von Neapel, p. 86, pl. 7, figs. 40–47.

This fine species was obtained in the same gathering with the one last recorded, and is the first time it has been noticed in the Firth of Forth. As will be observed from the synonymy, the genus-name has undergone several changes. Moreover, the colour of the living specimens, as shown by the drawings given in the 15th Annual Report of the Fishery Board for Scotland, is somewhat singular, and more ornate than is usually met with amongst the copepod-fauna of our seas; unfortunately, however, the bright colouration is very evanescent in specimens preserved in alcohol.

Bradypontius magniceps (G. S. Brady).

1880. *Artotrogus magniceps,* Brady, Mon. Brit. Copep., vol. iii., p. 61, pl. xciii., figs. 1–9.
1895. *Bradypontius magniceps,* Giesb., Sub-fam., gen., and sp. of the Copepod Fam. Ascomyzontidæ, Thorell; Ann. Mag. Nat. Hist., (6), vol. 16, p.

This, which is also a moderately large species, was obtained in a gathering of dredged material collected at the north-west end of Inchkeith on May 23rd, and in another gathering collected near North Craig on July 4th, 1901; one or two of the female specimens obtained in the last gathering were carrying ovisacs.

Bradypontius magniceps, though apparently widely distributed, is not very common, very few specimens being found in any single gathering.

Cancerilla tubulata, Dalyell. Pl. XXV., fig. 7.

1857. *Cancerilla tubulata,* Dalyell, The Powers of the Creator, vol. i., p. 233, pl. xxii., figs. 1–5.
1892. *Cancerilla tubulata,* Canu, Les Copépodes du Boulonnais, p. 255, pl. xxix., figs. 5–13.

A female specimen (fig. 7) of *Cancerilla tubulata* was obtained in a gathering of crustacea collected in the deep water (60 fathoms) off Aberdeen on August 2nd, 1901. The species, which appears to be rare in the British seas, has been recorded by Mr I. C. Thompson from the Irish Sea*, and Dr. Canu has described it in his work on the Copepods found near Boulogne.† This is the first time I have met with it notwithstanding that a careful look-out for it has been kept up for several years.

In 1893, T. and A. Scott recorded *Caligidium vagabundum,* Claus, from the Moray Firth‡. This copepod Canu in 1892 § and more

* Additions to the Copepoda of Liverpool Bay, *Trans.* L'pool Biol. Soc., vol. ix. (1893) p. 101.
† Les Copépodes du Boulonnais, p. 255, pl. xxix., figs. 5-13 (1892).
‡ Ann. and Mag. Nat. Hist., (6), vol. xii., p. 343 (October, 1893).
§ Les Copépodes du Boulonnais, p. 256.

recently Giesbrecht* have described as the male of *Cancerilla*. There is in some respects a similarity in the structure of *Caligidium* with that of *Cancerilla*, but I am not sure that the relationship between the two has been fully established. Dr. Edward Graeffe in his fauna of the Gulf of Trieste retains *Caligidium vagabundum*, Claus, under its distinctive name, without any reference to its sexual relationship with *Cancerilla*. †

Herpyllobiidæ.

Salenskya tuberosa, Giard and Bonnier. Pl. XXV., figs. 17–22.

1895. *Salenskya tuberosa*, Giard and Bonnier, Contrib. á l'étude des Epicarides; Bull. Scient., vol. xxv., p. 472, pl. xiii.

A few specimens of this remarkable form were found fixed between the thoracic legs of *Ampelisca spinipes*, Boeck, dredged near North Craig, Firth of Forth, on July 7th, 1901. They agree very closely with the figure of Giard and Bonnier, who obtained a single female and three "pygmy males" on a specimen of the same amphipod from Le Croisie.

The female (fig. 17) measures about ·84 mm. ($\frac{1}{31}$ of an inch) in length, and it is about as broad as long; one or two of the females carried two globular ovisacs, each one being nearly as large as the copepod itself. No appendages are present.

What seem at first sight to be the males, but, as Hansen has shown (Choniostomatidæ, p. 19), are really the larvæ—the adult males being degenerate like the females—(fig. 18) measure about ·15 mm. ($\frac{1}{166}$ of an inch). The anterior segment of the body is comparatively greatly dilated, the remaining segments are small. The antennules are very short, and three (or four) jointed, and furnished with two terminal setæ and a club-shaped appendage represented in the figure (fig. 19). Two pairs of limbs which represent the first and second maxillipeds are shown in figures 12 and 13.

My son, when dissecting the larvæ, was able to make out two pairs of thoracic feet; each foot appeared to be composed of a two-jointed basal part and a single one-jointed branch, which was armed with two small spines on the exterior margin, and four plumose on the inner margin and apex.

This description will be found to differ (possibly by reason of age) from the character shown by Giard and Bonnier, and my figures show a further difference in a greater segmentation of the hinder part of the abdomen.

It is very probable that the parasite is congeneric, and quite possible that it is identical with *Rhizorbina ampliscæ*, Hansen, described from *Ampelisca lævigata*, Lilljeborg, by Hansen, in 1892 (Entomol. Meddelelser, ii., pp. 207–234, pl. iii.), a memoir which I have not yet been able to consult. ‡

Order OSTRACODA.

A considerable number of Ostracoda have been observed in the dredged material examined during the year, but as they apparently all belong to described species which for the most part are more or less generally distributed, I will only refer to the two following which appear to be somewhat rare.

* Fauna u. Flora d. Golfes u. Neapel, vol. xxv., Astrocheriden, pp. 95 and 112, pl. x. figs. 1–11.

† Fauna d. Golfes v. Triest, *Arbeit. d Zoolog. Institute* zu Wien, t. xiii., haft 1, p. 43 (1900).

‡ I desire to express my indebtedness to Prof. D'Arcy W. Thompson for the identification of this interesting crustacean, as well as for other information concerning it.

Sarsiella (?) *capsula*, Norman. Pl. xxv., figs. 27–32.

Three specimens of an Ostracod—a *Sarsiella*—were obtained in some sand collected about twenty-two miles to the north of the Shetland Islands on May 17th, 1901. The sand had been for a time immersed in formaline, and this may probably be the reason why the shells of these specimens are comparatively soft and, when seen from the side (fig. 27), show a somewhat even surface instead of being solid, and with the surface more or less corrugated as seen in typical specimens (see Part II. of Monograph published by Professor G. S. Brady and the Rev. A. M. Norman*).

The specimen represented by the drawing (fig. 27) is that of a female, and the shell when seen from the side is somewhat obliquely rotundate, the length being rather greater than the height, and measuring about 1·2 mm. by ·9 mm. respectively; the produced posterior projection is finely ciliated, the ventral margin is also fringed with delicate hairs. The posterior end is slightly compressed and bounded by an indistinct ridge which extends obliquely across from the dorsal to the ventral margins. The surface of the shell is not rugose as in the typical *Sarsiella capsula*, but is ornamented with numerous minute pits.

In the dorsal view of the shell given in figure 28, the valves are open to some extent on the ventral aspect; this was due to the soft structure of the shell (the shell could not be mounted dry in the usual way, but had to be kept in water under a cover-glass while being figured).

The various appendages of the contained animal resemble the drawings given in the Monograph by Brady and Norman already referred to.

The secondary appendages of the antennæ are rudimentary. Each consists of a rounded tubercle bearing *two* small spiniferous setæ (fig. 30A). The caudal lamina is provided with six spines on the one side, but only five on the other; on this side there is no trace of a sixth spine, nor any indication that a sixth had been present but had been broken off.

In this specimen two ova were observed.

The shell of the male differed little, if at all, from that of the female, except that it was slightly smaller. The appendages also appeared to be similar, except that the secondary branches of the antennæ were, as in closely allied species, more developed and fitted for grasping, and that the caudal lamina was only provided with five spines on both sides.

The first joint of the antennules in the male is rather longer than the next, and the second, third, and fourth joints gradually decrease in length, the fifth joint is almost obsolete, so much so that it is difficult to make out whether there is really a fifth joint or not. There are no setæ on the first joint; the second joint is furnished with a small seta near the middle of the upper margin, and another on its lower and its upper distal angles; the third joint bears one seta on the upper and two on the lower distal angles, while the fourth and (?) fifth joints carry several terminal setæ as shown in the drawing (fig. 29); some of these hairs have an annulated structure, but this is not shown in the drawing.

The antennæ of the male are provided with a number of long plumose setæ, and the secondary branches, though somewhat rudimentary (fig. 30), are moderately elongated and are apparently four-jointed—the two middle joints being very small; there is also a minute terminal appendage.

The first maxillæ (fig. 31) are similar to those of the female in structure and armature.

* A Monograph of the Marine and Fresh-water Ostracoda of the North Atlantic and of North-western Europe, Part II., *Sci. Trans.* Roy. Dublin Soc., vol. v. ser. ii. (January, 1896), p. 677, pl. lx., figs. 1–4, 18.

The caudal lamina of the male appears to have only five spines on both sides (fig. 32), no trace of a sixth could be observed.

The male described and figured here does not agree with *Nematohamma obliqua*, Brady and Norman, the structure of the antennæ and of the secondary branches of the antennules differs considerably from that of the same appendages in *N. obliqua*.

No male of *Sarsiella capsula* appears to have been described hitherto.

Conchæcea elegans, G. O. Sars. Pl. xxv., fig. 33.

A specimen of this species was dredged 180 miles north-east from Buchan-ness (about sixty miles to the east of the Shetland Islands) on May 22nd, 1901. Another specimen was obtained in the stomach of a whiting captured in 65 fathoms about 10 miles off Aberdeen on the 19th of the same month.

Order BRANCHIOPODA.

POLYPHEMEDÆ.

Genus *Podon.*

Three species of *Podon* have been described from the North Sea viz. *Podon polyphemoides*, Leuckart, *Podon leuckartii*, G. O. Sars, and *Podon intermedius*, Lilljeborg, and two of these—the first and the third—have sometimes been included in lists of British Crustacea; there is a probability, however, that *Podon leuckartii* has sometimes been mistaken for *P. polyphemoides*, and as I have, with the assistance of Professor Lilljeborg's great work on Swedish Cladocera recently published, been enabled to recognise *Podon leuckartii* in some tow-net gatherings from the Firth of Forth and also from the Moray Firth, I will here indicate what seem to be the more obvious differences between this species and *Podon intermedius*, which is occasionally observed in the Firth of Clyde, and between both of these and *Podon polyphemoides*.

Podon leuckartii (G. O. Sars). Pl. XXV., figs. 23, 24.

The specimen represented by the drawing measures about a millimetre in length. The lower branches of the antennæ are composed of three, the upper of four joints as in the other two species referred to above; the joints of the lower branches are sub-equal in length, and the first two bear each one and the last four terminal setæ, the first joint of the upper branches is very small, but other three are larger and sub-equal in length, and are provided with the same number of setæ as the lower branches (fig. 24).

The caudal spines are strong and slightly curved, and are rather longer than the caudal spines of *Podon intermedius*.

Habitat.—Firth of Forth and the Moray Firth.

The species does not appear to be rare on the east of Scotland: it has probably been mistaken for *Podon polyphemoides*.

Podon intermedius, Lilljeborg. Pl. XXV., figs. 25, 26.

> 1853. *Podon intermedius*, Lilljeborg, De Crust. ex ordinibus tribus: Cladocera, Ostrocoda, Copepoda, in Scania occurr., sec. ii.; da Crust. Marina, Ord. Clad., p. 161.

The specimen represented by the drawing measures about 1·5 mm. The antennae (second antennæ) are somewhat similar in structure to those of *Podon leuckartii*, and the lower branches are provided with the same number of setæ; but the upper branches differ in being furnished with an additional seta on the penultimate joint—one of the setæ springs from the middle of the joint and the other from its distal end—this branch, therefore, carries seven instead of six setæ (fig. 26).

The caudal spines are moderately stout, and straight, but smaller than those of *Podon leuckartii* (fig. 25).

Habitat.—Firth of Clyde, not very rare. It may be readily distinguished from *Podon leuckartii* by having an additional seta on the upper branches of the antennæ and by the caudal spines being smaller and straight.

Podon polyphemoides, Leuckart—a species considerably smaller than the other two—is, like *Podon intermedius*, provided with seven setæ on the upper branches of the antennæ, but the end joints of both branches are distinctly shorter than the preceding joints; the supplementary seta on the penultimate joint of the upper branches springs from near the distal end instead of near the middle of the joint. The caudal spines are also smaller. Probably *Podon leuckartii* has sometimes been mistaken for this species.*

Order EDRIOPHTHALMA.

Sub-Order AMPHIPODA.

Many species belonging to the Amphipoda have been observed in townet gatherings, in dredged material, and in the stomachs of fishes examined during the past year, but only some of the rare forms are recorded here.

Pontoporeiidæ.

Bathyporeia norvegica, G. O. Sars, occurred in a tow-net gathering collected in Aberdeen Bay on September 4th, 1901. *Argissa hamatipes* (Norman) was also observed in some of the gatherings collected off Aberdeen during the past year.

Phoxocephalidæ.

The only species belonging to this family which may be noted is the *Phoxocephalus oculatus*, G. O. Sars; it was obtained in a tow-net gathering collected about 22 miles to the north of the Shetland Islands on May 17th, 1901.

Ampeliscidæ.

Several species of the Ampeliscidæ have been observed, not only in gatherings collected with the tow-nets and dredge, but also in the stomachs of fishes, with whom they appear to be a favourite kind of food. The following species were observed:—*Ampelisca macrocephala* has occurred in gatherings from the Firth of Forth, from off Aberdeen, and from the Shetland district. *Ampelisca assimilis* has been obtained in gatherings and in fishes' stomachs from the Firth of Forth and Collieston, Aberdeenshire. *Ampelisca spinipes* was obtained in dredgings from the Firth of Forth (with parasites attached) and in the

* All the three species of *Podon* mentioned above have recently been obtained in some tow-net gatherings from the Firth of Clyde collected for the most part in April and May and in July and August 1901; *P. leuckartii* was obtained in the spring gatherings, but not in those collected later; while the other two species were observed in these later gatherings only.

stomachs of fishes. *Ampelisca brevicornis* (A. Costa), occurred in fishes' stomachs from the Shetland district and the Firth of Forth ; and *Haploops tubicola* was also obtained in the Forth estuary and off Aberdeen.

Stegocephalidæ.

Stegocephaloides (?) *christianiensis* (Boeck). Pl. XXV., figs. 34–40.

Stegocephaloides christianiensis has again been observed in Loch Fyne, where it appears to be generally, though sparingly, distributed. Three specimens of what seems to be a variety of this species was dredged by the "Garland" in the Soundof Mull in 72 fathoms on March 31st, 1900. The fourth pair of coxal plates in these specimens are scarcely so broad in proportion to their length as in the typical forms (fig. 34). The basal joints of the last pereiopods do not terminate so acutely, but have the ends slightly rounded (fig. 38). The last epimeral plates of the metasome do not appear to be minutely notched on the low distal angles (fig. 39) ; and the telson seems to be slightly broader in proportion to its length (fig. 40). The other parts are similar to those of *Stegocephaloides christianiensis.*

Amphilochidæ.

The somewhat rare *Amphilochus tenuimanus*, Boeck, was obtained in the stomach of a small Whiting from Station III., Firth of Forth, in April. *Amphilochoides intermedius* was dredged at the same station on May 25th. *Gitana sarsii*, Boeck, was also obtained in this gathering, along with a few other species noticed in the sequel.

Metopidæ.

Metopa pusilla, G. O. Sars, was obtained in some dredged material from the west end of Station III. collected in May, and in similar material from Stations V. and VII. collected in April—all from the Firth of Forth. *Metopa pollexiana* was obtained in gatherings collected off Aberdeen and to the east of the Shetland Islands ; it was also dredged at the west end of Station III., Firth of Forth, on May 23rd, 1901, and *Sthenometopa* (*Metopa*) *robusta* (G. O. Sars) was also obtained in the same gathering, as well as off the North Craig—also in the Firth of Forth—in 8 fathoms, in July.

Dexaminidæ.

The somewhat rare *Guernia coalita* (Norman) has been dredged in the Firth of Forth, where it has been previously observed ; it was also dredged at Smith Bank in the Moray Firth, in 24 fathoms, on February 15th, and in Loch Linnhe in 48 fathoms on September 12th, 1901.

Gammaridæ.

Mæra loveni (Bruzel.) was obtained in the stomach of a Witch-sole, *Pleuronectes cynoglossus*, captured at Station V., Firth of Forth, by the "Garland" on June 28th, 1901 ; this is one of the rarer species in the Firth estuary. *Megaluropus agilis*, Norman, was obtained in gatherings of dredged material from Stations IV. and V., Firth of Forth, on the 22nd and 24th April ; while *Cheirocrates sundevalli* (Rathke) and *Cheirocrates assimilis* (Lilljeborg) were dredged at the north-west end of Inchkeith, Firth of Forth, on May 23rd, 1901.

Lilljeborgiidæ.

Lilljeborgia kinahani (Bate) occurred in some dredged material collected at Stations III. and VI., Firth of Forth, in May and June; the species appears to be somewhat rare in the Firth of Forth.

Photidæ.

The following species belonging to this family were observed during the year. *Leptocheirus pilosus*, Zaddach, was dredged at the north-west end of Inchkeith on May 23rd. (This is the form described by G. O. Sars, having a six-jointed accessory appendage to the antennules.) *Protomedeia fasciata*, Kröyer, was obtained on several occasions in the stomachs of fishes.

Megamphopus cornutus, Norman, was dredged at Smith Bank, Moray Firth, on February 15th, and also at Stations III. and V., Firth of Forth, in April and May, 1901; it was also observed in the stomachs of small Whiting captured off Aberdeen on September 3rd.

Corophiidæ.

I record two species belonging to this family. *Corophium affine*, Bruzelius, a male specimen, was obtained in the stomach of a small Whiting collected about ten miles off Aberdeen, in 55 to 60 fathoms, on September 3rd, 1901. *Unciola planipes*, Norman, was obtained in 78 fathoms about 110 miles north-east of Buchan-ness on May 15th, 1901.

Dulichiidæ.

Three species of *Dulichia* have during the past year been obtained in the Firth of Forth. *Dulichia porrecta*, Bate, was dredged at the west end of Station III. on May 23rd, and *Dulichia falcata*, Bate, at Station V. on April 24th. *Dulichia monacantha*, Metzger, which is new to the crustacean fauna of the Forth, was obtained in dredged material from Stations V. and VII. in April; all three species have also been observed in stomachs of fishes examined during the year.

Sub-Order ISOPODA.

Typhlotanais brevicornis (Lilljeborg). This minute isopod, which is only about 1·5 mm., was dredged in 50 to 55 fathoms, about 14 miles off Buckie, on November 3rd, 1900. So far as I know, this is the first representative of the genus *Typhlotanais* which has been recorded from the British seas.

Idothea granulosa, Rathke. Pl. XXV., fig. 41.

Two specimens of a small *Idothea* captured in the Bay of Nigg on March 23rd, 1901, agree with the *Idothea granulosa* of Rathke, as figured in Sars' Isopoda of Norway. The specimen represented by the drawing is a female with ova, and measures about 12·7 mm. ($\frac{1}{2}$ an inch) in length.

Sub-Order SYMPODA.

The following, amongst other species belonging to this sub-order, have been observed:—*Iphinoë serrata*, Norman, was obtained in a gathering collected to the east of Shetland on the 15th of May. *Diastylis rostrata* and *lucifera* were dredged at Station V., Firth of Forth, in April, the one on the 24th and the other on the 26th. *Diastylis tumida*, Lilljeborg, was obtained in a bottom tow-net gathering from 60 fathoms, about ten miles off Aberdeen, collected on August 21st, and *Pseudocuma similis*, G. O. Sars, was dredged at Smith Bank, Moray Firth, on February 15th, and at Station V., Firth of Forth, on April 24th; this is an addition to the crustacean fauna of the Forth. The two species belonging to the Cumellidæ, *Cumella pygmæa*, G. O. Sars, and *Nannastacus unguiculatus*, Bate, were obtained in some bottom mud brought up in a tow-net about 22 miles to the north of the Shetland Islands on May 17th. *Cumella* was also observed in a gathering collected in Uyea Sound between Unst and Uyea Island on the 18th, and also in some dredged material from the west end of Station VI., Firth of Forth, collected on the 22nd of the same month. In this last gathering the somewhat rare but widely distributed *Pseudocuma pulchella*, G. O. Sars, was also obtained.

Order PODOPHTHALMA.

Sub-Order SCHIZOPODA.

In the gatherings forwarded by the "Garland" from the Firth of Forth during the past year, the schizopod *Erythrops goesii* was, as usual, of frequent occurrence. Previous to the investigations instituted by the Fishery Board this species had not been recognised as a member of the British fauna. *Erythrops elegans*, G. O. Sars, has also been obtained in the Forth estuary during the past year, and the curious copepod-parasite *Aspidoecia normani*, Giard and Bounier, was found adhering to a specimen of both *Erythrops elegans* and *goesii*. *Siriella armata* (M. Edw.) was obtained in the Firth of Forth in a bottom tow-net gathering from Station IV. collected on April 22nd, and *Siriella crassipes* in a gathering from Station V. collected on April 24th. *Mysidopsis angusta*, G. O. Sars, was obtained in the same gathering with *Siriella crassipes*, and in a gathering from Smith Bank, Moray Firth. *Rhoda raschii* (M. Sars) was, as usual, frequent in many of the gatherings forwarded to the Laboratory. It will be observed that the Rev. Mr. Stebbing has restored Mr. Sim's generic name *Rhoda* for the group to which this species belongs.*

Sub-Order MACRURA.

Pasiphœa sivado (Risso) was obtained in 95 fathoms in Loch Linnhe on April 2nd, 1900, but the tow-net gathering in which it occurred was not examined till the following March. A specimen of *Pandalus montagui* (with *Phryxus* (?) *abdominalis* attached) was found in a gathering from Station III., Firth of Forth, collected on May 9th. A specimen of *Spirontocaris securifrons*, Norman, which also had a *Phryxus* (?) *abdominalis* attached to its abdomen, occurred in a bottom tow-net gathering collected in 78 fathoms, 110 miles north-east of Buchan-ness, on May 15th, while *Spirontocaris pusiola*, with what appeared to be the same species of parasite, was obtained in a gathering collected in the Forth to the west of Queensferry on April 26th. *Crangon* (*Cheraphilus*) *nanus* was obtained at Station V. on April 26th, and *Calocaris macandreæ* was obtained at the same station as well as at Station III.; this Macrurid

* Arctic Crustacea: Bruce Collection, by the Rev. T. R. R. Stebbing, *Ann. and Mag. Nat. Hist.* (7), vol. v. (Jany. 1900), p. 10.

was found in the stomachs of the Long-rough Dab and the Witch Sole as well as amongst the contents of the small-mesh trawl-net. The *Trachelifer* stage of *Jaxea nocturna*, Nardo, was collected in abundance in the surface tow-net in Tobermory Bay, Sound of Mull, after dark, on September 9th, 1901. The same organism has lately been recorded by my son from the Barrow Channel, near Barrow-in-Furness.† The occurrence of *Trachelifer* at three different places seems to indicate a somewhat extended distribution for this crustacean.

Additional Note.

Cancerina confusa, T. Scott, 19th Ann. Rept. of the Fishery Board for Scotland, pt. iii., p. 252, pl. xviii. figs. 12–20.

The copepod described under this name is identical with *Selioides bolbroei*, Levinsen (Vidensk Meddel. Naturh. Forening Kjöbenhaven. 1878, p. 373, *Crust. Copep.* parasit.); see also *Seloides, op. cit.* (1877). This copepod is said to be parasitic on *Harmothoe imbricata* (Lin.).

A marked peculiarity in this copepod is the position occupied by the ovisacs, as shown by the drawing in the Report of the Fishery Board for Scotland mentioned above. I have to thank the Rev. A. M. Norman for drawing my attention to the paper by Levinsen, and also for permitting me to examine the specimens he had received from that author.

Eurynotus insolens, T. and A. Scott, Ann. and Mag. Nat. Hist. (7), vol. i., p. 188 (1898); and *Eurynotopsyllus insolens*, T. Scott, 19th Ann. Rept. of the Fishery Board for Scotland, pt. iii., p. 256.

I am obliged to Dr. Steuer of Trieste for pointing out to me that this species is probably identical with *Eunicicola Clausii*, Kurz.—a parasite on a species of *Eunice*—one of the Annelida.

† Fifteenth Annual Report of the L.M.B.C., 1901, p. 13.

EXPLANATION OF THE PLATES.

PLATE XXII.

		Diam.
	Metridia longa (Lubbock).	
Fig. 1.	Female, dorsal view	× 18·6.
Fig. 2.	Male, dorsal view	× 23.
Fig. 3.	Foot of fifth pair, female	× 77.
Fig. 4.	Foot of fifth pair, male	× 77.
	Phænna, zetlandica, sp. n.	
Fig. 5.	Male, dorsal view	× 22.
Fig. 6.	Foot of fifth pair	× 77.
Fig. 7.	Terminal part of fifth pair of feet	× 525.
	Xanthocalanus (?) *borealis*, G. O. Sars.	
Fig. 8.	Female, dorsal view	× 18·6.
Fig. 9.	Foot of fifth pair	× 115.

Ectinosoma melaniceps, Boeck, var.

Fig. 10. Female, side view . . . . × 77.
Fig. 11. Antennule . . . . × 175.
Fig. 12. Mandible and palp . . . . × 210.
Fig. 13. First maxilliped . . . . × 262.
Fig. 14. Second maxilliped . . . . × 350.
Fig. 15. Foot of fifth pair . . . . × 210.
Fig. 16. Part of abdomen and caudal furca . . . . . × 102.

Stenhelia confusa, sp. n.

Fig. 17. Female, side view . . . . × 61.
Fig. 18. Antennule . . . . × 233.
Fig. 19. Antenna . . . . × 233.
Fig. 20. Mandible and palp . . . . × 162.
Fig. 21. Second maxilliped . . . . × 525.
Fig. 22. Foot of first pair . . . . × 233.
Fig. 23. Foot of fourth pair . . . . × 175.
Fig. 24. Foot of fifth pair . . . . × 350.
Fig. 25. Part of abdomen and caudal furca . . . . . × 87.

Leptopontia curvicauda, nov. gen. et sp.

Fig. 26. Female, side view . . . . . . × 154.
Fig. 27. Antennule . . . . × 350.
Fig. 28. Antenna . . . . × 525.
Fig. 29. Mandible and palp . . . . × 700.
Fig. 30. Second maxilliped . . . . × 630.
Fig. 31. Foot of first pair . . . . × 525.
Fig. 32. Foot of second pair . . . . × 525.
Fig. 33. Foot of fourth pair . . . . × 350.
Fig. 34. Foot of fifth pair . . . . × 700.
Fig. 35. Part of abdomen and caudal furca . . . . . × 350.

Ameira propinquca, sp. n.

Fig. 36. Male, side view . . . . × 38.
Fig. 37. Antennule, male . . . . × 117.
Fig. 38. Antenna . . . . × 175.
Fig. 39. Mandible and palp . . . . × 262.
Fig. 40. Foot of first pair . . . . × 175.
Fig. 41. Foot of third pair . . . . × 105.
Fig. 42. Part of abdomen and caudal furca . . . . . × 103.

PLATE XXIII.

Ameira propinquca, n. sp.

Fig. 1. Foot of third pair, male . . . . × 183.

Normanella attenuata, A. Scott.

Fig. 2. Female, side view . . . . × 77.
Fig. 3. Foot of first pair . . . . × 262.
Fig. 4. Foot of fifth pair . . . . × 262.

Fultonia hirsuta, nov. gen. et sp.

Fig. 5. Female, side view . . . . × 103.
Fig. 6. Antennule . . . . × 262.
Fig. 7. Antenna . . . . × 525.
Fig. 8. Second maxilliped . . . . × 525.
Fig. 9. Foot of first pair . . . . × 467.
Fig. 10. Foot of fourth pair . . . . × 350.
Fig. 11. Foot of fifth pair . . . . × 262.
Fig. 12. Part of abdomen and caudal furca . . . . . × 154.

Nannopus palastris, Brady.

Fig. 13.	Female, dorsal view	× 92.
Fig. 14.	Male, dorsal view	× 92.
Fig. 15.	Antennule, female	× 350.
Fig. 16.	Antenna ,,	× 350.
Fig. 17.	Mandible and palp, female	× 350.
Fig. 18.	Second maxilliped, ,,	× 700.
Fig. 19.	Foot of first pair, ,,	× 262.
Fig. 20.	Foot of second pair, ,,	× 262.
Fig. 21.	Foot of fourth pair, ,,	× 210.
Fig. 22.	Foot of fifth pair	× 262.
Fig. 23.	Antennule, male	× 262.
Fig. 24.	Foot of third pair, male	× 262.
Fig. 25.	Foot of fifth pair and appendage to first abdominal segment	× 262.

Cletodes longicaudata, Brady and Robertson.

Fig. 26.	Female, side view	× 102.
Fig. 27.	Antennule	× 350.
Fig. 28.	Antenna	× 350.
Fig. 29.	Foot of first pair	× 262.
Fig. 30.	Foot of second pair	× 262.
Fig. 31.	Foot of fourth pair	× 262.
Fig. 32.	Foot of fifth pair	× 131.
Fig. 33.	Part of abdomen and caudal furca	× 131.

Ameira reflexa, T. Scott, var.

Fig. 34.	Female, side view	× 77.
Fig. 35.	Antennule	× 350.
Fig. 36.	Antenna	× 525.
Fig. 37.	Mandible and palp	× 1050.
Fig. 38.	Second maxilliped	× 525.
Fig. 39.	Foot of first pair	× 350.
Fig. 40.	Foot of fourth pair	× 131.
Fig. 41.	Foot of fifth pair	× 131.
Fig. 42.	Part of abdomen and caudal furca	× 315.

PLATE XXIV.

Ameira tenuicornis, sp. n.

Fig. 1.	Female, side view	× 103.
Fig. 2.	Antennule	× 262.
Fig. 3.	Antenna	× 350.
Fig. 4.	Mandible and palp	× 630.
Fig. 5.	Second maxilliped, enlarged	× .
Fig. 6.	Foot of first pair	× 210.
Fig. 7.	Foot of fourth pair	× 175.
Fig. 8.	Foot of fifth pair	× 350.
Fig. 9.	Part of abdomen and caudal furca	× 210.

Ameira propinquca, sp. n.

Fig. 10.	Female, side view	× 103.
Fig. 11.	Antennule	× 350.
Fig. 12.	Antenna	× 350.
Fig. 13.	Mandible and palp	× 525.
Fig. 14.	Second maxilliped	× 700.
Fig. 15.	Foot of first pair	× 467.
Fig. 16.	Foot of fourth pair	× 262.
Fig. 17.	Foot of fifth pair	× 350.
Fig. 18.	Part of abdomen and caudal furca	× 275.

Stenhelia hispida, Brady.

Fig. 19.	Female, side view	× 51.
Fig. 20.	Antennule	× 175.
Fig. 21.	Antenna	× 262.
Fig. 22.	Mandible and palp	× 420.
Fig. 23.	Second maxilliped	× 350.
Fig. 24.	Foot of first pair	× 175.
Fig. 25.	Foot of fourth pair	× 175.
Fig. 26.	Foot of fifth pair and appendage to first abdominal segments	× 175.

Pseudomesochra longifurcata, nov. gen. et sp.

Fig. 27.	Female, side view	× 103.
Fig. 28.	Antennule	× 305.
Fig. 29.	Antenna	× 305.
Fig. 30.	Mandible and palp	× 305.
Fig. 31.	Second maxilliped	× 700.
Fig. 32.	Foot of first pair	× 315.
Fig. 33.	Foot of fourth pair	× 315.
Fig. 34.	Foot of fifth pair	× 525.
Fig. 35.	Part of abdomen and caudal furca	× 175.

Pseudopsyllus elongatus, nov. gen. et sp.

Fig. 36.	Female, dorsal view	× 46.
Fig. 37.	Antennule	× 262.
Fig. 38.	Antenna	× 262.
Fig. 39.	Second maxilliped	× 174.
Fig. 40.	Foot of first pair	× 174.
Fig. 41.	Foot of fourth pair	× 117.
Fig. 42.	Foot of fifth pair	× 262.

PLATE XXV.

Scolecithrix (?) *brevicornis*, G. O. Sars.

Fig. 1.	Male, dorsal view	× 38.
Fig. 2.	Fifth pair of thoracic feet (slightly damaged)	× 77.

Monstrilla longiremis, Giesbrecht.

Fig. 3.	Female, dorsal view	× 19.
Fig. 4.	Fifth pair of thoracic feet	× 51.

Thaumaleus thompsonii, Giesbrecht.

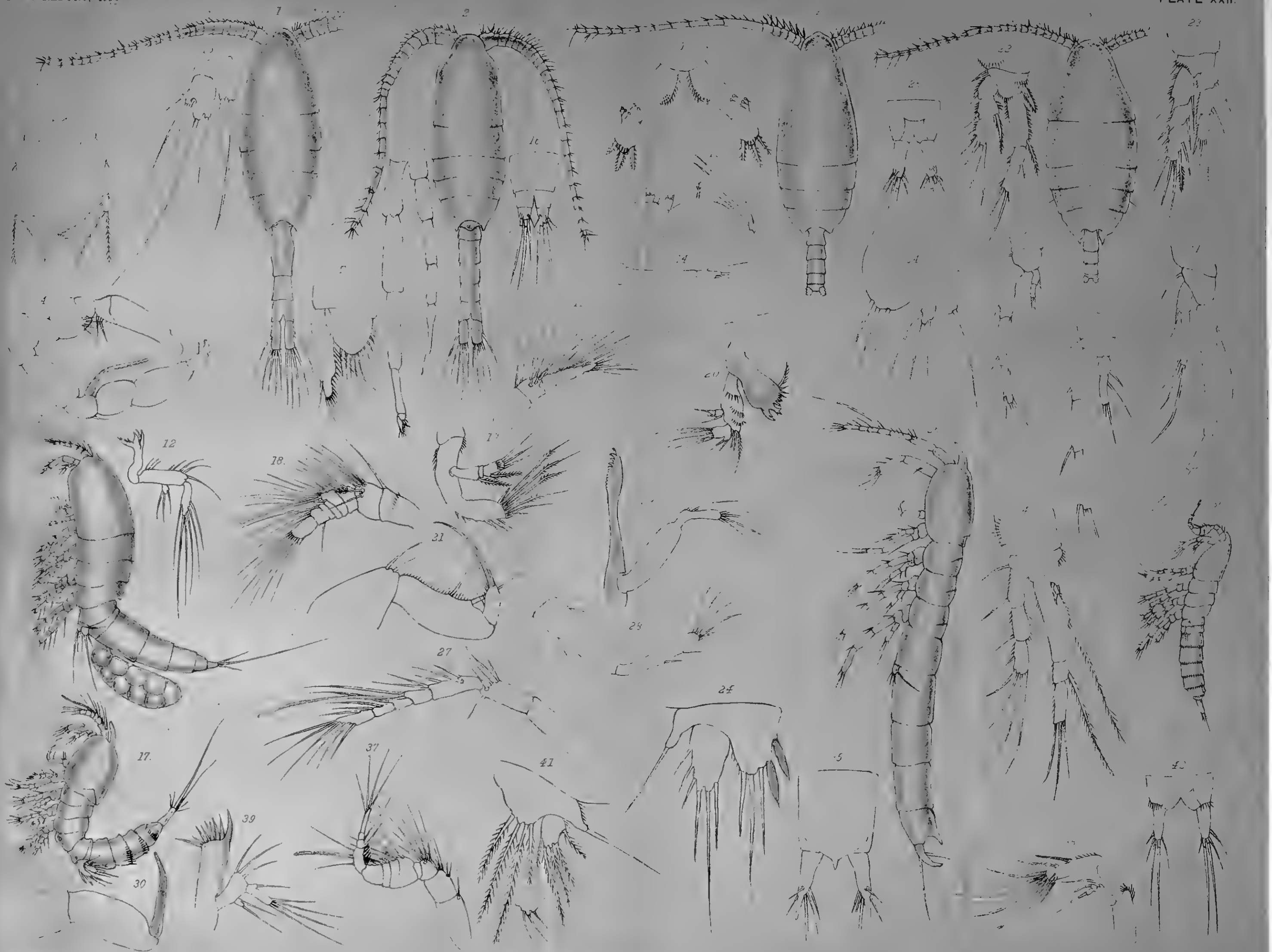
Fig. 5.	Male, dorsal view	× 19.
Fig. 6.	Fifth pair of thoracic feet	× 525.

Cancerilla tubulata, Dalyell.

Fig 7.	Male, dorsal view	× 51.

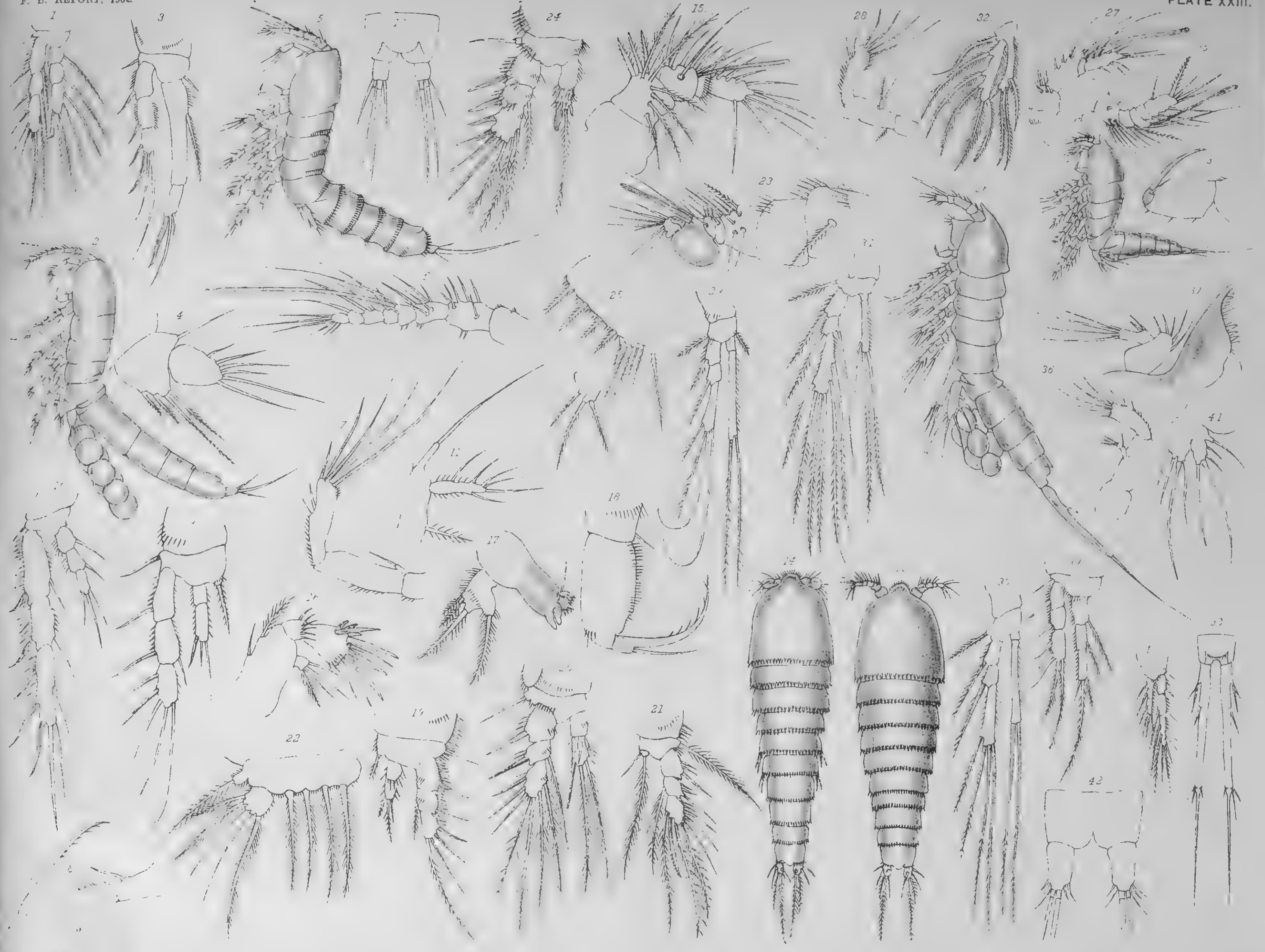
Nereicola concinna, T. Scott, sp. n.

Fig. 8.	Female, dorsal view	× 25.
Fig. 9.	Antennule	× 262.
Fig. 10.	Antenna	× 350.
Fig. 11.	Mandible	× 420.
Fig. 12.	First maxilliped	× 262.
Fig. 13.	Second maxilliped	× 350.
Fig. 14.	An immature (?) female	× 47.



A. SCOTT, del. ad nat.

Crustacea from Tow-net and other gatherings.



A. SCOTT, del. ad nat.

Crustacea from Tow-net and other gatherings.

T. Scott, del. ad nat.

Crustacea from Tow-net and other gatherings.

A. SCOTT, del. ad nat.

Crustacea from Tow-net and other gatherings.

Platypsyllus minor, T. Scott, gen. et. sp. n.

Fig. 15.	Female, dorsal view	× 34.
Fig. 16.	Siphon	(greatly enlarged).

Salenskya tuberosa, Giard and Bonnier.

Fig. 17.	Female, dorsal view	35.
Fig. 18.	Male, dorsal view	235.
Fig. 19.	Antennule	1050.
Fig. 20.	First maxilliped	788.
Fig. 21.	Second maxilliped	787.
Fig. 22.	Foot of second pair	× 1050.

Podon leuckartii, G. O. Sars.

Fig. 23.	Female, side view	× 38.
Fig. 24.	Antenna	× 62.

Podon intermedius, Lilljeborg.

Fig. 25.	Female, side view	× 38.
Fig. 26.	Antenna	× 62.

Sarsiella (?) *capsula*, Norman.

Fig. 27.	Female, side view	× 38.
Fig. 28.	Female, dorsal view	× 38.
Fig. 29.	Antennule, male	× 77.
Fig. 30.	Antenna ,,	× 77.
Fig. 30A.	Secondary appendage of antenna, female	(greatly enlarged).
Fig. 31.	First maxilla, male	× 154.
Fig. 32.	Post-abdomen, male	× 77.

Conchœcia elegans, G. O. Sars.

Fig. 33.	Side view	× 34.

Stegocephaloides christianiensis, Boeck.

Fig. 34.	Female, side view, slightly immature	× 15.
Fig. 35.	Antennule	× 77.
Fig. 36.	Antenna	× 31.
Fig. 37.	First gnathopod	× 31.
Fig. 38.	Seventh pereiopod	× 33.
Fig. 39.	Last epimeral plate of metasome	× 31.
Fig. 40.	Telson	× 115.

Idothea granulosa, Rathke.

Fig. 41.	Female, dorsal view	× 5

IX.—OBSERVATIONS ON THE FOOD OF FISHES.

By Thomas Scott, F.L.S., Mem. Soc. Zool. de France.

The observations contained in the present paper refer chiefly to the food of small or immature fishes, but reference to a few large gadoids, congers, and others are also included. It may be explained that during the past two or three years my attention has, to some extent, been devoted to the investigation of the ecto- and ento-parasites of fishes, and in connection with this it was generally found necessary that an examination should be made of the stomachs as well as of the other parts of the fishes which had been handed over to me for that purpose, and frequently while a search was being made for Entozoa separate notes of the food observed in the stomachs were also taken. In this way, as well as by the examination of fishes set apart for the special purposes of this paper, a considerable number of notes on the food of fishes have been collected.

The number of fishes dealt with in this paper reaches to considerably over two thousand, and includes representatives of fifty-six species and thirty-seven genera.* Their names are as follow.

The names of the fishes whose food is described in the following pages:—

Sebastes norvegicus (Ascan.).	The Norway Haddock.
Cottus scorpius, Lin.	The Sea Scorpion.
Trigla pini, Bloch.	The Red Gurnard.
,, *lucerna*, Lin.	The Sapphirine Gurnard.
,, *gurnardus*, Lin.	The Grey Gurnard.
Agonus cataphractus, Lin.	The Pogge.
Lophius piscatorius, Lin.	The Angler-fish.
Trachinus vipera, Cuv.	The Lesser Weaver.
Scomber scombrus, Lin.	The Mackerel.
Caranx trachurus, Lin.	The Horse-mackerel.
Gobius minutus, Gmel.	The Speckled Goby.
Callionymus lyra, Lin.	The Common Dragonet.
,, *maculatus* (Bonapart).	The Spotted Dragonet.
Cyclopterus lumpus, Lin.	The Lumpsucker.
Anarrhichas lupus, Lin.	The Cat-fish.
Pholis gunnellus, Lin.	The Butter-fish.
Macrurus lævis, Lowe.	
Enchelyopus (*Zoarces*) *viviparus*, L.	The Viviparous Blenny.
Lumpenus lampretiformis (Walb.).	The Sharp-tailed Lumpenus.
Atherina presbyter, Cuv.	The Sand Smelt.
Mugil chelo, Cuv.	The Grey Mullet.
Gasterosteus aculeatus, Lin.	The Three-spined Stickleback.
Gastræa spinachia (Lin.).	The Fifteen-spined Stickleback.
Gadus callarius, Lin.	The Cod-fish.
,, *æglefinus*, Lin.	The Haddock.
,, *luscus*, Lin.	The Whiting Pout or Brassie.
,, *esmarkii*, Nilsson.	The Norway Pout.
,, *merlangus*, Lin.	The Whiting.

* Besides the fishes dealt with here, a large number of others were examined, but have been excluded because their stomachs were either empty or contained matter that could not be identified.

Gadus virens, Lin.	The Saithe or Coal-fish.
,, *pollachius*, Lin.	The Pollack or Lythe.
Molua molva, Lin.	The Ling.
Onos mustela, Lin.	The Five-bearded Rockling.
Ammodytes lanceolatus, Le Sauvage.	The Greater Sand Eel.
Drepanopsetta plattessoides (Fabr.).	The Long Rough Dab.
Lepidorhombus whiff (Walb.).	The Sail-Fluke or Whiff.
Platophrys laterna (Walb.).	The Scald-fish.
Pleuronectes platessa, Lin.	The Plaice.
,, *microcephalus*, Donovan.	The Lemon Sole.
,, *limanda*, Lin.	The Common Dab.
,, *flesus*, Lin.	The Flounder.
Solea vulgaris, Quensel.	The Black Sole.
Argentina sphyræna, Lin.	The Hebridean Smelt.
Clupea harengus, Lin.	The Herring.
,, *sprattus*, Lin.	The Sprat.
,, *alosa*, Lin.	The Allis Shad.
,, *finta*, Cuv.	The Twait Shad.
Anguilla vulgaris, Cuv.	The Common Eel.
Conger niger (Risso).	The Conger.
Syngnathus acus (Lin.).	The Great Pipe-fish.
Nerophis æquoreus (Lin.).	The Straight-nosed Pipe-fish.
Raia batis, Lin.	The Grey Skate.
,, *fullonica*, Lin.	The Shagreen or Fuller's-ray.
,, *clavata*, Rond.	The Thornback-ray.
,, *radiata*, Donovan.	The Starry-ray.
,, *circularis*, Couch.	The Sandy-ray.
Lamna cornubica, Cuv.	The Porbeagle Shark.

When the food present in the stomachs of fishes has been subjected for a time to the strong solvent action of the gastric fluid it is often difficult, if not impossible, especially in the case of annelids and other soft-bodied animals, to determine with anything like precision the species or even the genus to which the organisms belong. Sometimes the food may consist partly or wholly of small fishes, and if the digestive processes have not been too long at work it may be possible, by an examination of what remains of the bony skeleton or of the ear-stones, if any be available, to ascertain with some degree of certainty whether the food observed consists of flat or round fishes, and in certain cases it may even be possible from an examination of the ear-stones to arrive at a more definite knowledge of the kind of fish which had been appropriated as an article of food. In the Whiting, for example, the ear-stones are of such a characteristic form that the observer may distinguish by these alone the kind of fish the remains belong to. The ear-stones of the Whiting are narrow and elongated, at one end they taper gradually to a sharp point, but the opposite end is somewhat obliquely rounded; they are also slightly curved laterally, so that when placed on any plane surface they do not lie flat. The young Pollack has ear-stones shaped somewhat like those of the Whiting, but they are not so elongated, nor do the narrow ends taper so much. The ear-stones of the Haddock do not taper so much at the narrow end as do those of the Whiting, and they are also proportionally shorter, stouter, and more crenulated; those of the Cod are of a massive structure, and are broadly sub-cylindrical in shape, and have the margins and concave surface usually more or less strongly rugose, while on the convex side the surface is smooth or nearly so. The ear-stones of large Pollack, Saithe, and Ling are also of a massive structure, and somewhat resemble those of the Cod in shape, except that they are rather more elongated; they do not show the same amount of crenulation on the edges nor is the concave surface corrugated—at least not so distinctly as in those of the Cod.

In the so-called flat-fishes, *i.e.*, Turbot, Plaice, Witch-soles, and others, the ear-stones are usually flat, moderately thin, and more or less rounded in shape. The ear-stones of the Witch-sole, *Pleuronectes cynoglossus*, are nearly circular in outline, and have the surfaces slightly rugose; those of the Plaice, *Pleuronectes platessa*, are broadly oblong, their inner surface is slightly irregular, and one edge is more evenly rounded than the other; the ear-stones of a Plaice 24 inches long were 12 millimetres long by 7 broad.

There is sometimes a considerable difference in the proportional size of the ear-stones of different fishes; those, for example, of a Lumpsucker $15\frac{1}{2}$ inches long measured about $1\frac{1}{2}$ by $1\frac{1}{4}$ mm., they were nearly round, but had a small tooth-like process at one end; those of a Lemon Sole 12 inches in length were sub-rhomboid in shape, and measured $3\frac{1}{2}$ by 2 mm., while those of a Long Rough Dab 10 inches in length, which were sub-rotundate, measured 6 by $4\frac{1}{2}$ mm. The ear-stones of the Hake appear to be comparatively large; those of a specimen of moderate size, but the exact length of which I am unable to give, measured 24 mm. in length by 9 mm. at the broadest part, in form they are broadly dagger-shaped, one edge is nearly even and gently curved, but the opposite margin is almost pectinate. A Cat-fish 27 inches in length had ear-stones broad at one end and pointed at the other, and measured 4 mm. by about $2\frac{1}{2}$ mm. at the broad end. The ear-stones of some of the smaller fishes, such as the Worm Pipe-fish, require the aid of a hand-lens to see them properly.

The shells of the smaller species of Mollusca are sometimes fairly perfect, and when that is the case it is not difficult to distinguish the more common forms, but molluscan shells, even if not smashed by the teeth of the fish, soon become corroded by the gastric fluid, and should the sculpture be, as it often is, a specific characteristic, their identification is made difficult and frequently uncertain.

The Crustacea are on the whole more easily determined than most of the other groups; the test of the smaller forms is usually moderately tough and flexible, so that they frequently occur in the stomachs of fishes more or less entire, and even when there are only fragments available the genus, if not the species, to which the animal they are part of belongs, may be made out. In many of the species of the Amphipoda, for example, there are certain appendages so characteristic that it is possible by an examination of these to indentify with a fair amount of certainty the species which they belong to; and in proof of this, reference may be made to the following from among other species. The first and second gnathopods of *Amphilochus manudens* are characteristic of that species; the second gnathopods of *Stenothoë marina* and *Metopa pollexiana* are also well-marked appendages. By the structure of the seventh pereiopods, together with the form of the third epimeral plates of the metasome, several species of *Ampelisca*, such as *A. brevicornis*, *A. macrocephala*, and *A. assimilis*, may be satisfactorily determined. The males of the three British species of *Cheirocrates*, of *Protomedeia fasciata*, and others may be distinguished by the form and armature of the second gnathopods, and I have frequently detected the presence of *Dulichia porrecta* and *falcata* by the second gnathopods alone.

The most of the Annelida appear to be readily acted upon by the gastric fluid, for if they are even for a comparatively short time in a fish's stomach the only evidence we have of their presence is a quantity of mucus mixed up with which are fascicles of bristles, and perhaps some of the internal muscular structure; *Aphrodita, Arenicola,* and a few others do not, however, appear to be so readily acted upon as some others.

The Starfish remains observed in the stomachs of fishes are usually very fragmentary; they consist of the disks and pieces of the arms, while sometimes plates and spines are the only evidence that Starfishes have been taken by the fish.

An interesting fact, brought out by the examination of the fishes mentioned in the sequel, is that Sagitta and the tadpole-like Ascidian, *Oikopleura*, sometimes form a considerable portion of the food of certain kinds of fishes; and it is also shown that the smaller Cœlenterata, *Pleurobrachia* and others, are at times moderately abundant in the stomachs of the common Lumpsucker.

Before passing on to describe the food observed in the stomachs of the fishes belonging to each of the particular species mentioned in the list, I would remark, although it is hardly necessary to do so, that to obtain a fairly accurate knowledge of the food of the smaller and immature fishes which feed largely on the minute Crustacea requires careful and patient research—it is work which cannot be done in a hurry. It frequently happens that minute organisms are so covered with mucus that they must be cleaned ere they can be identified, and sometimes they can only be identified by dissection.

The food of the various kinds of fishes will be described in the order in which their names are given in the list. The measurements are in centimetres (cm.) unless otherwise stated.

The Norway Haddock. *Sebastes norvegicus* (Ascan.).

Nine specimens were examined, their measurements being—one at 10 cm., one at 11 cm., one at $12\frac{1}{5}$ cm., one at $12\frac{1}{2}$ cm., one at 14 cm., three at 20 cm., and one at 34 cm. They were captured to the east of Fair Island, October 16th, 1900. The stomach of one was empty, or contained matter so much digested as to be almost indistinguishable, while the food contained in the others consisted entirely of Crustacea, chiefly *Pandalus montagui* and *Crangon* (?) *allmanni*. The *Crangon* remains were too disintegrated to be satisfactorily identified.

Sea Scorpion. *Cottus scorpius*, L.

In the stomachs of seven specimens, all from the Bay of Nigg, near Aberdeen, the food observed consisted altogether of Crustacea, and included larval Decapods, the fragments of a Hermit Crab (*Eupagurus*), *Porcellanea longicornis, Idothea baltica,* the Cypris stage of *Balanus* sp., and some fragments which could not be satisfactorily assigned to any particular genus or species. Van Beneden states that he has observed a young Gurnard, *Trigla gurnardus*, in the stomach of *Cottus scorpius*, but otherwise the food recorded by him consisted entirely of Crustaceans, and such as usually frequent shallow inshore water. The size of the fish ranged from about four to seven inches (10 to 18 cm.).

Red Gurnard. *Trigla pini*, Bloch, and
Sapphirine Gurnard. *Trigla lucerna*, L.

One specimen of the former measuring about $24\frac{1}{2}$ cm. in length, and two of the latter measuring $32\frac{1}{2}$ cm. and 34 cm. respectively, were examined. In the stomach of the first, two small *Portunus* sp. were observed, while the only food observed in the stomachs of the other two consisted of fragments of *Portunus* (?) *holsatus*. The Red Gurnard was captured in Sinclair Bay, Caithness-shire, and the Sapphirine Gurnards in the Moray Firth, June 29th, 1901.

GREY GURNARD. *Trigla gurnardus*, L.

Of the seventy-nine Grey Gurnards examined, five of them, which were from Annan (Solway), collected in May, 1900, and measuring about 14½ to 15½ cm., had their stomachs filled almost entirely with the fragments of Crustacea—*Crangon vulgaris* being the most common. Some specimens of Mysidæ and of *Calanus finmarchicus* were observed, and also a single specimen of *Monoculodes carinatus*.

In the stomachs of ten specimens from the Clyde, collected on October 4th, 1901, and which measured from 14½ to 19½ cm., *Crangon* was again the prevailing kind of food observed; the species observed was *Crangon allmanni*, and it occurred in eight out of the ten stomachs examined. *Pandalus montagui* was observed in two stomachs, *Schistomysis ornatus* in one, and *Halimedon parvimanus* (an Amphipod species) in two. A small round fish was observed in one of the stomachs, and was the only organism other than Crustacea obtained.

In twenty-four stomachs of Gurnards from the Moray Firth, seven of which were examined in June, 1900, and the others in June of the present year (1901), *Crangon* formed a smaller proportion of the food observed than in those just referred to, especially in the specimens examined this year. The stomachs examined last year were not in very good preservation, and only one contained food that could be identified, and which consisted of the remains of *Crangon* sp.; the examination of further specimens belonging to this sample was therefore discontinued. In the stomachs of those examined this year small Decapods were found in four (*Nika edulis* in one and *Crangon* sp. in three); *Erythrops elegans* occurred in one, *Schistomysis* sp. in one, and *Pseudocuma cercaria* in one; several Amphipods were also observed, but no Copepods or other minute forms. One stomach contained only the remains of Annelids, while similar remains, along with those of Crustaceans, were found in another. These Moray Firth Gurnards ranged from about 10½ to 30 cm. in length, and it was in the stomachs of the smaller specimens—from 10½ to 20 cm.—that the most of the Crustacean species were obtained; the food in the stomachs of the larger specimens was for the most part indistinguishable.

Seven specimens collected in Aberdeen Bay on June 10th, 1901, and fourteen captured off Collieston on July 5th, had all, without a single exception, been living to a greater or less extent on *Schistomysis spiritus* (Norm.); some other things, including a small *Crangon*, a few young *Pandalus*, a few Amphipods, the ear-stones of a small flat-fish, and the remains of other small fishes and fragments of Annelids, were also noticed, but the *Schistomysis spiritus* appeared to be the favourite food of these fishes at this time. These two samples of *Trigla gurnardus* ranged from 11 cm. to 20 cm. in length. It may also be stated that, besides the fourteen specimens from Collieston specially noticed here, a considerable number of others from the same locality were examined, though perhaps not so carefully, and all were found to have been feeding largely on the same kind of Schizopod. This Schizopod, which is sometimes abundant off the Aberdeenshire coast, is almost transparent; there is a faint tinge of red on parts of its body, and its eyes are intensely black, so that to one looking into the water from above the creature would be invisible were it not for its prominent and intensely black eyes.

Nineteen specimens of Gurnards from the Firth of Forth, captured in April and May, 1901, were also examined; those captured in April ranged in length from 19 cm. to 35 cm., and were not in very good preservation when examined, but it was found that, with the exception of two, the contents of whose stomachs were too imperfect for identification, they had been living entirely on *Crangon allmanni.* Those captured in May—seven in number—were smaller than the others, and though with these *Crangon* still formed a considerable part of their food, there were other things that appeared to be even more highly relished, especially by the smaller Gurnards; the species which, next to *Crangon*, appeared to be most in demand was the skeleton-like Amphipod *Dulichia falcata*; the food in two of the stomachs examined consisted very largely of this *Dulichia*, both males and females being obtained; several other species of Amphipods were observed, such as *Amphilochus*, *Amphilochoides*, *Paramphithoë*, *Ampelisca*, *Protomedeia*, but these were all more or less rare.

A common Gurnard, fully 5 cm. in length, from Smith Bank, collected in November, 1901, had in its stomach the heads and other parts of ten *Erythrops elegans*, besides a number of other fragments; probably in this case the beautiful eyes of the *Erythrops* had proved their destruction.

The following is a full list of the species of Crustacea, etc., observed in the stomachs of *Trigla gurnardus* referred to in the preceding notes:—

Crustacea.	Other Things.
Crangon allmanni, Kinahan.	Small round fish.
Crangon vulgaris (Linne).	Small flat fish (ear-stones).
Nika edulis, Risso.	Annelid remains.
Pandalus montagui, Leach.	
Schistomysis ornatus, G. O. Sars.	
Schistomysis spiritus, Norman.	
Schistomysis, sp.	
Erythrops elegans, G. O. Sars.	
Erythrops sp.	
Diastylis sp.	
Pseudocuma cercaria (v. Beneden).	
Bathyporeia sp.	
Harpinia crenulata, G. O. Sars.	
Ampelisca brevicornis (A. Costa).	
Ampelisca sp.	
Amphilochus tenuimanus. Boeck.	
Amphilochoides sp.	
Metopa sp.	
Leucothoë lilljeborgii, Boeck.	
Monoculodes carinatus, Spence Bate.	
Perioculodes longimanus (Spence Bate).	
Synchelidium brevicarpum (Spence Bate).	
Pontocrates altamarinus (Spence Bate).	
Halimedon parvimanus (Spence Bate).	
Apherusa borealis.	
Paramphithoë monocuspis, G. O. Sars.	
Megaluropus agilis, Norman.	
Protomedeia fasciata.	
Dulichia falcata.	
Dulichia sp.	
Calanus finmarchicus (Gunner).	

The Pogge. *Agonus cataphractus*, L.

Eighty Pogges have been examined for this paper, and with the exception of eleven they are all from Annan, Solway Firth. Fifty of those from Annan were collected at the end of April and the beginning of May, 1900, and fifteen in September; ten were from the Firth of Forth, and were collected on May 13th, 1901, while the others were part of a sample of fish sent from the Clyde in the beginning of October last. The food in the stomachs examined consisted almost entirely of Crustacea, and included representatives of the *Macrura (Crangon vulgaris*, jun.), the Schizopoda *(Praunus flexuosus)*, the Stomapoda *(Lamprops fasciata)*, the Isopoda *(Idothea linearis)*, the Amphipoda *(Gammarus locusta, Cheirocratus intermedius, Corophium grossipes, Dulichia*, etc.), the Copepoda *(Longipedia, Ectinosoma)*, the Ostracoda *(Paradoxostoma variabile)*, and the Cirripedia *(Balanus* sp., cypris stage). Starfish remains occurred in one or two of the stomachs, and Annelid remains in one. Nearly all the Pogges taken in April and May were infested with what looked like encysted worms; they occurred in the walls of the body cavity, sometimes on one side only, but more frequently on both sides, and in some cases they were present in large numbers. The specimens of *Agonus* examined ranged in length from $6\frac{3}{10}$ cm. to $12\frac{1}{2}$ cm., but it was only in the smaller specimens measuring from $6\frac{3}{10}$ cm. to $8\frac{3}{10}$ cm. that the Copepoda, Ostracoda, and larval Balani were observed, while *Crangon, Praunus*, and others of the "higher Crustacea" were only found in the stomachs of the larger specimens.

The following is a list of the species of Crustacea found in the stomach of the Pogges:—

Crustacea.	Other Things.
Crangon vulgaris (Lin.).	Annelid remains.
Praunus flexuosus (O. F. Müller).	Starfish remains.
Praunus sp.	The most of the fish caught on April 30th, 1900, were infested more or less with parasitic worms, which were encysted on the walls of the body cavity, sometimes on both sides.
Lamprops fasciata, G. O. Sars.	
Idothea linearis (Pennant).	
Bathyporeia sp.	
Metopa sp.	
Pontocrates altamarinus (Spence Bate).	
Paratylus swammerdami (M. Edwards).	
Gammarus locusta (Lin.).	
Cheirocrates intermedius, G. O. Sars.	
Corophium grossipes (Lin.).	
Dulichia porrecta, Spence Bate.	
Dulichia falcata.	
Proto pedata.	
Longipedia coronata, Claus.	
Ectinosoma melaniceps, Boeck.	
Paradoxostoma variabile (Baird).	
Balanus (cypris stage).	

Angler Fish. *Lophius piscatorius*, L.

Several small *Lophius* captured off Aberdeen in September, 1900, and measuring from 19 to about 30 cm., were examined, but the only food observed consisted of the remains of small fish—both flat fish and round fish. Professor M'Intosh has found a *Cottus bubalis* about a foot in length in the stomach of a *Lophius*, while the stomach of the *Cottus* itself was distended by two *Carcinus mænas*.*

LESSER WEAVER. *Trachinus vipera*, Cuv.

Of the forty-three specimens of *Trachinus vipera* examined, thirty-four were sent from Annan (Solway), and nine were taken off Collieston, Aberdeenshire. The specimens from Annan were for the most part collected in April, May, and June, 1900, but seven of them were captured early in January of the present year. In the stomachs of those collected in April, 1900, very little food was observed, and only four out of the fourteen examined contained matter that could be identified; this consisted chiefly of the remains of *Praunus inermis*, *Gammarus locusta*, some remains of Annelids and of two or three small fishes (Clupeoids). The specimens of *Trachinus* in this sample measured from 8 to $11\frac{1}{2}$ cm. In the stomachs of ten specimens examined in May the contents consisted chiefly of *Schistomysis* sp.; an Isopod—*Eurydice achata*—was also found in one, and in another the remains of a small Clupeoid. The specimens taken in September and January contained nothing that could be distinguished.

The nine specimens from Collieston collected on July 5th, 1900, had apparently been feeding largely on Schizopods, all of which appeared to belong to the one species, *Schistomysis spiritus;* the only other food observed consisted of the remains of a small fish, probably a young Clupeoid or Sand-eel. These Collieston specimens ranged from 11 cm. to $13\frac{1}{2}$ cm. in length. A considerable number of these specimens were examined besides the nine specially referred to here, but they all appeared to have been feeding on the same species of Schizopod.

The following is a tabulated list of the organisms observed:—

ORGANISMS FOUND IN THE STOMACHS OF LESSER WEAVERS.

CRUSTACEA.	OTHER THINGS.
Praunus inermis (Rathke). *Schistomysis* sp. *Schistomysis spiritus*, Norman. *Eurydice achata* (Slabber). *Gammarus locusta* (Lin.). Copepods (gen. et sp.?)	Small fishes? (Clupeoids or Sand-eels).

MACKEREL. *Scomber scombrus*, L.

The stomachs of over thirty Mackerel from the Clyde, examined in June, 1899, were found to be all more or less filled with Copepods, the prevailing form being *Calanus finmarchicus*; Euphausidæ (*Nyctiphanes* and *Rhoda*, or *Boreophausia*) were also observed in several, but the specimens were scarcely perfect enough for identification.

Another three dozen Mackerel, chiefly from Barra, Outer Hebrides, were also examined, and the food of these, as in the case of the Loch Fyne specimens, was found to consist largely of Copepods, but there was a greater variety of species; besides *Calanus finmarchicus*, which was well represented, the following other forms were also observed:—*Pseudocalanus*

* Micros. Journ., vol. v.

elongatus, *Temora longicornis*, *Centropages typicus*, and *Metridia* sp. Fragments of Schizopods were noticed in some of the stomachs, but were too much broken for certain identification. No remains of fish were observed in these stomachs from the West Coast, but in the stomachs of a few specimens captured off Aberdeen the remains of small fish, probably young Clupeoids or Sand-eels, were observed, in addition to the usual pelagic Copepods. A quantity of Mackerel stomachs were sent to me some years ago from Stornoway, and the food in these was found to consist almost exclusively of young fishes. They appeared to be for the most part the fry of herrings or sprats, but in some cases they consisted of the young of their own kind ; so extensively do they at times feed on small or young fish that Yarrel, referring to the food of the Mackerel, remarks : —" Their principal food is probably the fry of other fishes." * Professor P.-J. van Beneden, who devoted considerable attention to the subject of fish food, had evidently a somewhat different experience, for he states that the food of the Mackerel consisted of *Cetochilus septentrionalis* ((?) *Calanus finmarchicus*), and adds :—" Ce poisson est très-vorace, mais son estomac est généralement vide." †

The following is a tabulated list of the organisms observed in the stomachs examined :—

ORGANISMS OBSERVED IN THE STOMACHS OF MACKEREL.

CRUSTACEA.	OTHER THINGS.
Nyctiphanes sp. *Rhoda* sp. *Calanus finmarchicus* (Gunner). *Pseudocalanus elongatus*, Boeck. *Centropages typicus*, Kröyer. *Temora longicornis* (O. F. Müller). Copepods (gen. et sp. ?)	Fish remains (Herring or Sprats).

HORSE MACKEREL. *Caranx trachurus* (L.).

A specimen of *Caranx trachurus*, 18 cm, in length, captured in Aberdeen Bay, July 30th, 1901, had its stomach filled with Copepods, and, so far as could be made out, they all belonged to the one species—*Temora longicornis*. This fact is not without interest, as it seems to suggest that the *Caranx* had either fallen in with a shoal of *Temora* and had thus no choice but to feed upon them, or, being able to discriminate between one kind and another, it chose this particular form in preference to others.

SPECKLED GOBY. *Gobius minutus*, Gmelin.

A considerable number of Speckled Gobies have been examined, but those specially referred to here number fifty-one, and include samples from Annan (Solway), the Firth of Forth, and the Moray Firth. In the stomachs of a sample of fourteen Speckled Gobies sent from Annan in May, 1900, the food consisted largely of Copepods, all of which belonged to the genus *Eurytemora*, the species which was not satisfactorily made out appeared to be *Eurytemora velox*. These Copepods were fairly numerous in some of the stomachs examined. Mysidæ were

* *British Fishes*, vol. i., p. 140.

† *Les Poissons des Cotes de Belgique*, p. 136.

observed in four stomachs, *Lamprops fasciata* was found in one and *Bathyporeia* sp. in four, while *Gammarus* (?) *locusta*, the only other Amphipod identified, occurred in one. Only Crustaceans or Crustacean remains were observed. The fishes in this sample measured from $4\frac{1}{2}$ to $7\frac{1}{2}$ centimetres in length. In the stomachs of two specimens forming part of a sample sent from Annan in July, 1900, the food consisted entirely of Mysidæ and *Corophium grossipes*, while in a sample collected on November 28th, 1900, only two out of five contained matter that could be even doubtfully recognised, and it consisted of the remains of (?) Amphipods in the one and of *Crangon* sp. in the other; these Gobies ranged from $7\frac{1}{2}$ to $8\frac{3}{10}$ centimetres. Twelve specimens were sent from Annan in January, 1901, but the stomachs of seven of them were empty or contained matter that could not be identified; while the food observed in the other five consisted entirely of fragments of Amphipods, the genus and species of which could not be made out.

The stomachs of the Moray Firth specimens, collected in June, 1900, contained numerous Amphipods and the remains of Mysidæ. The two Amphipods identified were *Bathyporeia* sp. and *Corophium grossipes*.

The stomachs of fifteen specimens sent from the Firth of Forth were those of fishes collected at Station III. on July 13th, 1901. The constituents of the food in these stomachs exhibited rather more variety than that of those previously referred to. Copepods, consisting chiefly of *Longipedia coronata*, occurred in eight of these stomachs; Amphipods, comprising *Metopa*, *Harpinia*, and *Dulichia*, were present in four and Annelids in three; Crustaceans representing the cypris stage of *Balanus* were also observed in two of these stomachs, but Echinoderm or fish remains were not obtained in any of them.

The following Table contains a complete list of the various organisms observed in the stomachs examined:—

Specimens Found in Stomachs of *Gobius minutus*.

Crustacea.	Other Things.
Crangon sp. (jun.) Mysidæ. *Lamprops fasciata*, G. O. Sars. *Bathyporeia* sp. *Harpinia* sp. *Metopa* sp. *Gammarus* (?) *locusta* (Lin.). *Corophium grossipes* (Lin.). *Dulichia falcata*. Amphipod remains (gen. et sp. ?) *Eurytemora* (?) *velox* (Lilljeborg). *Longipedia coronata*, Claus. *Jonesiella spinulosa* (Brady and Robertson). *Balanus* (cypris stage).	Annelids.

Common Dragonet. *Callionymus lyra*, L.

Over fifty specimens of common Dragonets captured off Aberdeen in July, 1900, were examined, and fully sixty per cent. of these were males. Only the stomachs of eleven of these specimens contained matter that could be identified, which consisted almost entirely of Mysidæ; *Leucothoë* sp. was the only other organism observed.

The stomachs of five specimens from the Moray Firth contained a variety of organisms comprising Mollusca, Crustacea, Annelid and Star-fish remains. The stomach of one specimen $12\frac{3}{10}$ cm. in length contained the remains of two *Anapagurus hyndmanni* and an *Ampelisca* sp.; one $13\frac{2}{5}$ cm. in length contained fragments of lamellibranch shells (*Tellina* sp.), young *Crangon* sp., *Cheirocrates intermedius*, *Erichthonius* sp., *Longipedia coronata*, and the remains of Annelids and brittle Star-fishes; while the others contained the remains of lamellibranch shells and *Ampelisca* sp.

Seventeen specimens from the Clyde, collected on October 4th, 1901, had all without exception been feeding more or less on small Mollusca, chiefly lamellibranchs; Crustaceans were also well represented, their remains being found in fourteen of the stomachs examined; fragments of brittle Starfishes were not uncommon, and one stomach contained fragments of a young *Amphidotus* sp. The shell-fish included a *Natica alderi* and a fragment of a *Turritella* (each with a small Hermit Crab enclosed), a young *Pecten varius*, young *Solen*, *Montacuta bidentata*, and young *Saxicava rugosa*. The length of these Clyde Dragonets ranged from $13\frac{3}{10}$ to 19 centimetres. There was no appreciable difference in the food observed in the smaller specimens from that contained in the stomachs of the larger.

The names of the various organisms observed in the stomachs of these Dragonets are given in the Table annexed.

Crustacea.	Other Things.
Portunus sp. (small).	*Natica alderi*.
Anapagurus hyndmanni (Thomp.).	*Turritella* (fragments).
Small hermits (sp.?)	*Pecten varius* (small).
Crangon sp. (small).	*Montacuta bidentata*.
Decapod remains (small).	*Tellina* sp.
Mysidæ.	*Solen* sp. (small).
Harpinia sp.	*Saxicava rugosa*.
Ampelisca sp.	Annelids.
Ampelisca spinipes, Boeck.	Starfish remains.
Leucothoë sp.	*Amphidotus*, sp.
Cheirocrates intermedius, G. O. Sars.	(fragments of test).
Erichthonius sp.	*Lagena* sp.
Longipedia coronata, Claus.	

Spotted Dragonet. *Callionymus maculatus* (Bonap.).

The number of Spotted Dragonets examined was twenty-eight; they included two from Annan (Solway Firth), collected on April 30th, 1900; six collected about fifty miles to the eastward of Fair Island on October 19th, 1900; and twenty from the Clyde, collected on October 4th, 1901.

The two specimens from Annan measured $10\frac{9}{10}$ cm. and $12\frac{1}{2}$ cm. respectively; in one of these stomachs there was nothing that could be identified, and the only thing observed in the other was a single specimen of *Acartia* sp.

The stomachs of all the six specimens from the eastward of Fair Island contained matter that could be identified. *Diastylis* sp. was observed in one and *Astacilla* sp. in two stomachs; Amphipods comprising *Ascidostoma obesum*, *Harpinia* sp., *Metopella nasuta*, *Gammaropsis* sp., and *Dulichia* sp. were observed in five, Copepoda were observed in one, and Ostracoda in two. The remains of Annelids were observed in four stomachs, and the remains of Starfishes (*Amphiura* sp.) in one. One or two specimens of Foraminifera were also obtained in three of these stomachs. The length of the fish in this sample raned from 9 to 12 centimetres.

The lengths of the twenty specimens from the Clyde ranged from $9\frac{1}{5}$ to $11\frac{1}{2}$ cm., and it was evident from the contents of their stomachs that small Mollusca, Crustacea, and brittle Starfishes had been specially sought after for food. Small Mollusca, usually more or less fragmentary, were found in nineteen of these stomachs examined; *Montacuta bidentata* was of frequent occurrence, and was the only Molluscan species satisfactorily identified. The rare Isopod *Arcturella dilatata* was obtained in one of these stomachs—one specimen was fairly complete and there were fragments of other two. Amphipoda, which were not very common, were observed in five stomachs. No Copepods were observed, but Ostracoda—chiefly *Bythocythere turgida*—were found in eight. Fragments of Echinoderms (chiefly brittle Starfishes) were found in all the stomachs except two, and the remains of Annelids in sixteen—these Annelid remains were sometimes distinguishable only by the bristles which were left after the soft parts had been more or less dissolved by the gastric fluid. A few Foraminifera, such as *Miliolina siminulum* and *Rotalia beccari*, were noticed in one or two of the stomachs.

It may be remarked that most of the organisms which, judging from the samples of fish examined, constitute the chief part of the food of Spotted Dragonets, are such as have their habitat upon or near the bottom of the water, and this would indicate that the habitat of the fish is also usually near the bottom.

In the following Table will be found a list of the organisms observed in the various stomachs examined:—

List of Species Found in the Stomachs of Spotted Dragonets.

Crustacea.	Other Things.
Eupagurus sp. (remains).	*Natica* sp.
Diastylis sp.	Small Pecten.
Artacilla sp.	Small *Tellina* sp.
Arcturella dilatata, G. O. Sars (one nearly whole and fragments of other two).	*Montacuta bidentata*
Ascidostoma obesum (Spence Bate).	*Solen* sp. (jun.)
Harpinia neglecta, G. O. Sars.	Remains of *Terebella* sp.
Harpinia sp.	Remains of Annelids.
Ampelisca sp.	Remains of Starfishes
Metopa sp.	*Amphidotus* sp. (fragments).
Metopella nasuta (Boeck).	*Miliolina siminulum.*
Gammaropsis sp. (jun.)	*Rotalia beccari.*
Dulichia sp.	
Cythere antiquata, Baird.	
Cytheridea papillosa, Bosquet.	
Bythocythere turgida, G. O. Sars.	
Cytheropteron latissimum (Norman).	
Machaerina tenuissima (Norman).	
Asterope mariæ (Baird).	
Acartia sp.	
Longipedia coronata, Claus.	

Lumpsucker. *Cyclopterus lumpus*, L.

Considerably over three hundred specimens of Lumpsuckers were examined during the past two years, but the stomachs of a large proportion of them were either empty or filled with a watery fluid of about the same specific gravity as ordinary sea water. The fact that the stomachs of these fishes are found so frequently containing more or less of this watery fluid, and having sometimes mixed up with it a comminuted and whitish-coloured matter, has given rise to curious conjectures concerning the food supply of these fishes. P.-J. van Beneden in his work on *Animal Parasites* remarks that "Fishermen affirm, and the examination of the animal's stomach confirms their assertion, that the *Cyclopterus lumpus* feeds on nothing but the excreta of other fishes."* It is probably for this reason that he calls the Lumpsuckers "crotophagous fishes."† Occasionally I have found the stomachs of Lumpsuckers well filled with small Cœlenterates, such as *Pleurobrachia* or *Beroë*, and perhaps the occurrence of the comminuted bodies of such organisms may, partly at least, account for this opinion.

The Lumpsuckers referred to here were all, with the exception of two small specimens from Annan, captured in the Bay of Nigg, near Aberdeen, in the nets of the salmon fishers. It would appear that the Lumpsuckers come into the Bay to spawn, and the specimens captured in the salmon-nets, and which I examined, were therefore for the most part adult forms. The length of the two small specimens sent from Annan (Solway Firth), and which were collected on April 30th, 1900, measured 4·2 and 4·5 centimetres respectively; the only food found in the stomachs of these specimens consisted entirely of remains of *Gammarus locusta*. The Lumpsuckers from the Bay of Nigg, which numbered one hundred and forty-four, were all, with the exception of eleven, collected during the present year (1901). The eleven referred to were captured between the 16th and 18th of May, 1900, and are included here because the stomachs of a few of them contained a considerable number of Copepoda, chiefly *Temora longicornis*, whilst among other things observed were *Centropages hamatus*, *Gammarus locusta*, and *Idothea baltica*. In the stomachs of five specimens collected in the salmon-nets in February no solid food was found nor anything that could be identified; but in the stomachs and intestines of four of the specimens a considerable quantity of watery fluid was observed; young cestoid parasites were frequent, especially in their intestines, but the fish were apparently in a healthy condition. Forty Lumpsuckers were examined during March; the stomachs of seven, taken on the 9th of the month, were all more or less filled with watery fluid, nothing that could be identified being noticed. The stomachs of two captured on the 13th contained a quantity of matter closely resembling *Pleurobrachia* or some similar Cœlenterate, but was not sufficiently perfect for identification. Five captured between the 14th and 15th had their stomachs more or less full of fluid. On the 19th thirteen specimens, comprising ten males and three females, were captured; and in the stomachs of four of the males were found the remains of Amphipods and Isopods, the following species being distinguished, viz.:—*Hyperia galba*, *Calliopius læviusculus*, *Gammarus locusta*, and *Idothea emarginata*; the contents of the other stomachs consisted only of a little semi-fluid matter. Seven specimens were captured between the 21st and 22nd, but only in the stomachs of two was there anything that could be identified. One of these contained the remains of *Pandalus montagui*, and the other the remains of *Gammarus locusta*; the other stomachs contained the usual watery fluid. Of the five specimens captured on the 27th, two contained watery fluid, two were empty and greatly distended with air, while in one the remains of a chætopod Annelid and a specimen of *Hyperia galba* were observed.

* *Animal Parasites*, The International Scientific Series, vol. xx., p. 79 (1876).
† *Les Poissons des Cotês de Belgique.*

Forty-five Lumpsuckers were examined in April. In the stomach of one captured on the 11th a single Amphipod (*Amathilla* sp., jun.) was observed. In the stomach of one captured on the 13th one *Pandalus montagui*, a number of *Calanus finmarchicus*, and one or two Hyperids (gen. et sp. ?), were obtained as well as the remains of Annelides, and a considerable quantity of whitish semi-fluid matter, consisting partly at least of Cœlenterata. In the stomach of a male Lumpsucker captured on the 16th the following organisms were noticed—fragments of several *Pandalus montagui*, one young *Amathilla* (sp. ?), a few specimens of *Temora longicornis*, and the remains of several Annelids; in the stomach of another captured at the same time there was a quantity of matter consisting apparently of small Cœlenterates. In the stomach of a specimen captured on the 18th I obtained *Amathilla homari* and the remains of some Annelids, while fragments of *Pandalus montagui* were obtained in the stomachs of two collected on the 29th. Small Cœlenterates occurred in the stomachs of two of the five Lumpsuckers collected on the 30th of April; the Cœlenterates were numerous in one of the stomachs referred to along with the remains of Annelids, but only a few Cœlenterates were observed in the other.

Thirty-three Lumpsuckers were captured in May. Seven specimens were collected on May 1st, but only two of them contained food, which consisted of a considerable quantity of small Cœlenterates; and in the stomach of another collected on the 2nd, fragments of a moderately large *Idothea* (?) *baltica* were observed; *Temora longicornis*, the remains of at least four Annelids, and a few larval *Balani* (cypris stage) were also obtained. Five Lumpsuckers were captured on May 3rd, and the stomach of one of them was well filled with what looked like small Cœlenterates, and mixed up with them were a number of *Temora longicornis*, apparently only recently swallowed, one or two *Calanus finmarchicus*, larval *Balani* (cypris stage), and the remains of one or two Annelids. On the fins of this specimen several small tumours were observed, which, when opened, were found to contain numerous but extremely minute living Psorosphæræ; some were of a globular form and filled with granular matter, but the greater number were pear-shaped and furnished with two flagella at the narrow end. The gall-bladders of some of these fishes were also infested with larval Cestoids, and similar organisms were of frequent occurrence in the intestines. One *Idothea pelagica* and a number of *Temora longicornis* were mixed up amongst a quantity of whitish semi-fluid matter in the stomach of one of four Lumpsuckers collected on the 9th, and numerous specimens of *Temora*, mixed up with similar whitish matter, occurred in the stomach of another; both of these stomachs were those of male fishes. Ten Lumpsuckers were captured between the 13th and 16th of the month, and the stomachs of three or four of them contained small Cœlenterates and remains of Annelids. *Temora longicornis* and larval *Balani* were also frequent. Seven Lumpsuckers were captured in the month of June and three in July, but after the 18th of the latter month no more were obtained, and they appear to have left the Bay about that time. The stomachs of two of those obtained in June contained small Cœlenterates and *Temora longicornis*, and one of those captured in July was also filled with Cœlenterates consisting for the most part of *Pleurobrachia*. It may be of interest to note the fact that the stomachs containing food which could be most easily identified were usually those of male fishes; the great majority of the stomachs of female fishes examined were either empty or contained a thin fluid differing little, if at all, from sea water. The apparent absence of food in the majority of adult Lumpsuckers has been taken special notice of by Professor van Beneden, who remarks that "On trouve rarement des traces de pâture dans les poissons adults,"* while the only food observed by him that could be identified consisted of small Mysidæ and *Crangon*, and these occurred not in the stomachs of adults but of young specimens measuring from 1 to $3\frac{1}{2}$ centimetres in length.†

The following is a list of species obtained in the stomachs of the Lumpsuckers examined :—

LIST OF SPECIES FOUND IN STOMACHS OF LUMPSUCKERS.

CRUSTACEA.	OTHER THINGS.
Pandalus montagui, Leach (remains).	Annelid remains.
Idothea emarginata (Fabr.).	Small Cœlenterates.
,, *pelagica*, Leach.	*Beröe*, etc.
Hyperia galba (Mont.).	*Pleurobrachia*.
Calliopius læviusculus (Kröyer).	
Amathilla homari (Fabr.)	
Gammarus locusta (Linné).	
Calanus finmarchicus (Gunner).	
Temora longicornis (O. F. Müller).	
Balanus (cypris stage).	

CAT OR WOLF-FISH. *Anarrhichus lupus*, L.

Only one or two stomachs of Cat-fishes have been examined; they were collected in the Moray Firth, and the food observed consisted chiefly of lamellibranch shells (*Cardium echinatum*, etc.) in a very fragmentary condition and of Crustacea. The only Crustacean that could be identified was *Atelecyclus septemdentatus*, and only the claws of this were available for identification.

BUTTER-FISH. *Pholis gunnellus*, L.

The stomachs of fourteen specimens of *Pholis gunnellus*, sent from Annan (Solway Firth) in April and May, 1900, were examined, but the food they contained, besides being small in quantity, was not in very good preservation. Three of the stomachs contained Mussel fry; eleven contained small or young Crustacea, comprising young *Idothea*, *Gammarus locusta* (and perhaps one or two other Amphipods), and Ostracods belonging to the two species *Cythere viridis* and *Cytherura similis*. Four contained specimens of marine Acarides, while in another a few insect larvæ were observed. These Annan Butter-fishes ranged from $7\frac{2}{5}$ to 15 centimetres in length, but though there was a considerable difference in size between the smallest and largest, there was no appreciable difference in the nature of their food.

The stomachs of seven specimens from the Moray Firth, which were collected on May 18th, 1901, and measured from 10 to 16 centimetres in length, contained very little food, and so far as it could be identified it consisted almost entirely of small Crustaceans (Amphipods chiefly), In the stomach of one of the smaller fishes several insect larvæ were observed.

The food observed in the stomachs of nine Butter-fishes collected in the Firth of Forth on May 13th, 1901, comprised a much greater

* *Les Poissons des Cotes de Belgique*, p. 51.

† *Op. cit.*, p.

variety of organisms than was observed in the other two samples. The food of this sample of fishes, like that of the other two, consisted almost entirely of Crustaceans, and included such forms as *Pandalus montagui* (jun.), *Pandalina brevirostris*, Mysidæ, *Erichthonius deformis*, *Dulichia porrecta*, and the cypris stage of *Balanus* sp. The remains of a young fish were also observed in one of the stomachs from the Forth. One of the more interesting things observed was *Phryxus abdominalis*, female and male; probably this parasite had been adhering to the *Pandalus* or *Pandalina* when swallowed by the fish and had afterwards become detached.

The following is a tabulated list of the various species obtained in the stomachs of the Butter-fishes examined:—

SPECIES IN STOMACHS OF BUTTER-FISH.

CRUSTACEA.	OTHER THINGS.
Pandalus montagui, Leach.	Remains of young fish.
Pandalina brevirostris (Rathke).	
Mysidæ (gen. et sp.?)	Small Mussels.
Idothea sp.	
Phryxus abdominalis (Kröyer).	Insect larvæ.
Metopa sp.	
Paramphithoë monocuspis, G. O. Sars.	
Gammarus sp.	
Melita (?) *obtusata* (Mont.).	
Photis tenuicornis, G. O. Sars.	
Podoceropris excavata (Spence Bate).	
Erichthonius deformis, M. Edwards.	
,, *hunteri* (Spence Bate).	
Dulichia porrecta, Spence Bate.	
,, *falcata*, Spence Bate.	
Protella phasma (Mont.).	
Cytherura similis, G. O. Sars.	
Lichomolgus hirsutipes, T. Scott.	
Balanus (cypris stage).	

Macrurus lævis, Lowe.

Through the kindness of Dr. Fulton I am able to add a note on the food of this rather rare species of fish. The stomachs of five specimens which had been captured off St. Kilda by an Aberdeen trawler in September last, and which measured approximately 29, 31, 31, 33, and 42 centimetres respectively, were found to contain Crustacea and small fishes, but they were for the most part fragmentary. One contained a small *Galathea* sp. and a small stone; fragments of *Crangon allmanni* were observed in two; an Amphipod, the species of which could not be determined, was found in one, and the remains of small fishes (? Clupeoids) in three. It is apparent that, from the nature of the food, these specimens of *Macrurus* had been feeding near or at the bottom.

VIVIPAROUS BLENNY. *Enchelyopus (Zoarces) viviparus*, L.

Ten stomachs of *Zoarces* have been examined. One was from Annan (Solway Firth), but the food in the stomach of this one was so much decomposed as to be indistinguishable.

Nine were captured by Dr. Williamson in the Bay of Nigg in crab creels; the stomachs of six of these were empty, two contained small

Crustacea which could not be determined, and one contained small Molluscs and Amphipods (*Podocerus falcatus* chiefly), the Mollusca comprised young *Mytilis edulis* and Gastropods. The specimens of *Zoarces* examined ranged from about 23 to 28 centimetres in length.

SHARP-TAILED LUMPENUS. *Lumpenus lampretiformis* (Walb.).

Twenty-five specimens of Lumpenus have been examined; they comprised twenty-two from the Firth of Forth, collected in May and July of the present year (1901), and three from the Clyde, collected in 1897 but not examined till January 17th, 1901. The stomachs of all the specimens contained food, and in some cases in considerable quantity, but the organisms of which it was composed were generally small. A considerable proportion of the food consisted of Copepods and Ostracods, but several other groups of Crustaceans were also represented. Mollusca, Annelida, and brittle Starfishes also contributed to the Lumpenus' "bill of fare." The three Clyde specimens measured $15\frac{4}{5}$, $16\frac{3}{5}$, and $22\frac{2}{5}$ centimetres respectively; the stomach of one of these contained a few specimens of Ostracods (*Krithe bartonensis* and *Cytheridea* sp.) and Annelids. In the stomach of another *Cytheridea papillosa* and remains of Annelids were observed, while the stomach of the third contained the following among other organisms—young *Cardium* sp., *Nucula* sp. and *Cylichna* sp., *Eudorella truncatula*, and *Leptognathia breviremis; Cythere porcellanea, Krithe bartonensis, Cytheridea papillosa* and other Ostracods; *Longipedia coronata*, *Ectinosoma* sp., and other Copepods not determined.

The food observed in the stomachs of ten specimens captured at Station V., Firth of Forth, on May 13th, 1901, was composed of a great variety of organisms, and all the stomachs were well filled. Mollusca were found in two of the stomachs, and comprised small specimens of *Nucula tenuis, Corbula gibba, Tellina* sp., and *Montacuta substriata.* Crustacea formed the principal part of the food in the stomachs of almost all the fishes in this sample. Sympoda (Cumacea) occurred in five stomachs, but the only forms observed were *Leucon nasica* and *Diastylis* sp.; *Leptognathia breviremis*—one of the Isopoda chelifera—was found in one. Amphipods, comprising *Leucothoë lilljeborgii, Ampelisca* sp., *Protomedeia fasciata, Dulichia falcata* and other species were observed in four, Ostracoda were present in eight stomachs, and included the following amongst other species—*Cythere concinna* and *dunelmensis, Krithe bartonensis, Bythocythere simplex*, and *Philomedes interpuncta.* The Copepoda were represented by several species, but the following two were the most common, viz., *Longipedia coronata*, which was moderately abundant in several of the stomachs, and *Robertsonia tenuis*, which was also "frequent" or "common" in several, and usually in company with the *Longipedia.* Larval *Balani* (cypris stage) were present in a few, while marine Acarides and Foraminifera, the remains of Annelids, and the fragments of brittle Starfishes were also occasionally observed. The specimens of Lumpenus in this sample ranged from 28 to a little over 34 centimetres in length.

The second sample of Lumpenus from the Firth of Forth comprised twelve specimens, which were collected at Station III. on July 13th, 1901. The stomachs of all these specimens contained food which for the most part could be easily identified, and the organisms which appeared to be most in favour with the fish were *Longipedia*, these Copepods being present in eleven out of the twelve stomachs examined. There appeared to be less variety in the food of this sample than in that of the last, and a few organisms were observed which did not appear to be present in the last sample. The Sympoda were represented by *Leucon nasica, Eudorella* *truncatula*, and *Pseudocuma cercaria*. No Isopods were observed. The Amphipods comprised such forms as *Ampelisca* (?) *assimilis*, *Halimedon parvimanus*, and *Harpinia neglecta*. The only Ostracod noticed was *Cythere emaciata*. The Copepods, as already remarked, formed the principal part of the food of this sample. *Longipedia* (chiefly *L. coronata*) was abundant in three of the stomachs, frequent in other three, and few or moderately rare in five; *Robertsonia tenuis* was observed in four stomachs, and *Ectinosoma sarsi* in four; *Jonesiella spinulosa* was moderately rare in three, and *Ameira reflexa* in one. Young Mollusca were abundant in one of the stomachs examined, while in six the remains of Annelids were found. It may be noted in passing that *Pseudocalanus elongatus* and *Temora longicornis* were the only "pelagic" forms observed in all the stomachs examined, and these two forms were very rare; it would thus appear that the Lumpenus collects its food chiefly from amongst bottom fauna, and that the smaller Crustacea are the organisms that are most in favour with the fish.

The following tabulated list contains the names of all the species observed in the stomachs examined.

Species Found in the Stomachs of Lumpenus.

Crustacea.	Other Things.
Leucon nasica, Kröyer.	Annelids (small).
Eudorella truncatula (Spence Bate).	*Natica* sp. (jun.)
Diastylis sp.	*Tellina* sp.
Pseudocuma cercaria (v. Beneden).	*Montacuta substriata*.
Leptognathia breviremis (Lilljeborg).	*Beloculina* sp.
Harpinia neglecta, G. O. Sars.	*Nucula tenuis*.
Ampelisca sp. (? *assimilis*)	*Corbula gibba*.
Leucothoë lilljeborgii, Boeck.	*Rotalia beccari*.
Perioculodes longimanus (Spence Bate).	*Cylichna* sp.
Halimedon parvimanus (Spence Bate).	*Cardium* sp. (jun.).
Autonoë longipes (Lilljeborg).	
Protomedeia fasciata, Kröyer.	
Dulichia falcata, Spence Bate.	
,, sp.	
Cythere porcellanea, Brady.	
,, *concinna*, Jones.	
,, *emaciata*, T. R. Jones.	
,, *tuberculata* (G. O. Sars).	
,, (?) *finmarchica* (G. O. Sars).	
,, *dunelmensis* (Norman).	
Cytheridea papillosa, Bosquet.	
,, *punctillata*, Brady.	
Krithe bartonensis, T. R. Jones.	
Bythocythere simplex (Norman).	
Cytherideis subulata, Brady.	
Machaerina tenuissima (Norman).	
Philomedes interpuncta (Baird).	
Pseudocalanus elongatus, Boeck.	
Temora longicornis (O. F. Müller).	
Longipedia coronata, Claus.	
,, *minor*, T. and A. Scott.	
Bradya typica, Boeck.	
Ectinosoma sarsi, Boeck.	
Robertsonia tenuis (Brady and Robertson).	
Ameira reflexa, T. Scott.	
Jonesiella spinulosa, Brady.	
Cletodes (?) *longicaudata*, Brady and Robertson.	
Balanus (cypris stage).	

SAND SMELT. *Atherina presbyter*, Cuv.

Twelve Sand Smelts, part of a small lot captured in Inverneil Bay on October 31st, 1899, were recently examined. The length of the specimens ranged from $5\frac{1}{2}$ to $8\frac{2}{5}$ centimetres, and the stomachs of every one of the twelve examined contained Copepods in considerable abundance. One stomach was fairly well filled with *Oithona* sp.; one contained *Oithona* sp. and fragments of an insect; but in the other ten the food consisted of nearly equal numbers of *Oithona* and *Acartia*. In one of these ten there were also the remains of a few larval decapod Crustacea, and in another a young *Calanus finmarchicus*. The *Oithonas* contained in these stomachs appeared to be the one known as *O. spinifrons* (or *O. helgolandica*); the *Acartia* was *A. clausi*.

GREY MULLET. *Mugil chelo*, Cuv.

In the summer of 1900 three Grey Mullets were captured in the salmon fishers' nets in the Bay of Nigg, near Aberdeen; two were taken on June 20th and one on July 4th, but only one stomach (one of the two captured in June) contained food, and this consisted almost entirely of *Rhizoselenia*; there was a considerable quantity of these organisms in this stomach, and mixed up with them were a few common Copepods—*Calanoids*.

THREE-SPINED STICKLEBACK. *Gasterosteus aculeatus*, L.

Twenty-nine specimens of these Sticklebacks have been examined, one from the Bay of Nigg, two from the Moray Firth, and twenty-six from Loch of Loirston—within three or four miles from Aberdeen. The food observed in the stomach of the specimen from the Bay of Nigg consisted entirely of marine Copepods belonging to the Harpacticidæ, and they included *Ectinosoma* sp., *Stenhelia* sp., *Dactylopus tisboides*, and *Harpacticus* sp. (probably *H. fulvus*); this Stickleback measured $6\frac{7}{10}$ centimetres in length.

The stomachs of the two specimens from the Moray Firth contained small flat-fishes partly digested, and young Mysidæ. A number of Copepods, chiefly *Ectinosoma*, were also observed in one of them, as well as a few larval *Balani* (cypris stage). These two specimens of *Gasterosteus* measured $6\frac{3}{10}$ and $6\frac{1}{2}$ centimetres in length respectively.

The twenty-six specimens from Loch of Loirston ranged from about $3\frac{1}{2}$ to 5 centimetres in length, but the length of most of them did not exceed $4\frac{1}{2}$ centimetres. The stomachs of all the specimens, with only one or two exceptions, contained Entomostraca in fewer or larger numbers. *Cyclops serrulatus* and *Bosmina longirostris* were the two species most frequently noticed; the names of the others will be found in the tabulated list. Insect larvæ were observed in a number of the stomachs, and every one of these fishes was infested with cestoid parasites (*Schistocephalus*), the body cavity of the fish being in some instances crammed with them; eight comparatively large *Schistocephali* were taken from the body cavity of a Stickleback scarcely 5 centimetres in length.

[TABLE.

LIST OF SPECIES FROM THREE-SPINED STICKLEBACKS.

CRUSTACEA.	OTHER THINGS.
Mysidæ (gen. et sp. ?) *Cypria ophthalmica* (Jurine). *Cyclops viridis* (Jurine). ,, *albidus* (Jurine). ,, *serrulatus*, Fischer. ,, *fimbriatus*, Fischer. *Ectinosoma* sp. *Canthocamptus staphylinus* (Jurine). ,, *minutus*, Claus. ,, *crassus*, G. O. Sars. ,, *zschokkei*. *Stenhelia* sp. *Dactylopus* sp. *Harpacticus* (?) *chelifer* (O. F. Müller). *Bosmina longirostris* (O. F. Müller). *Alona quadrangularis* (O. F. Müller). *Harporhyncus falcatus*, G. O. Sars. *Chydorus sphaericus*, O. F. Müller. ,, (?) *cœlatus*, Schoedler. ,, *barbatus* (G. S. Brady). *Balanus* (cypris stage).	Small flat fish (remains). Insect larvæ.

FIFTEEN-SPINED STICKLEBACK. *Gastræa spinachia* (L.).

Five Fifteen-spined Sticklebacks were examined, but their stomachs contained very little food that could be identified. In the stomach of one from the Bay of Nigg, $12\frac{3}{10}$ centimetres in length, a few partially digested Amphipods, too imperfect to be determined, were found; and as for the other four, which were from Annan (Solway Firth), the stomach of one was empty, the stomach of another contained Crustacean remains which could not be distinguished; a partially digested Isopod (*Idothea baltica*) was obtained in the third, while the food contained in the fourth comprised *Idothea* sp. (probably *I. baltica*), *Gammarus locusta*, and *Jæra* sp. The lengths of the Annan specimens ranged from $10\frac{1}{2}$ to $14\frac{7}{10}$ centimetres.

COD-FISH. *Gadus callarius*, L.

The stomachs of the Cod-fishes referred to here have been examined at different times, and they have been obtained at different places, including the Firth of Forth, Aberdeen Bay, the Bay of Nigg near Aberdeen, the Moray Firth, and the estuary of the Annan (Solway Firth). One or two of the samples consisted of very small fishes, and these are considered separately.

A sample of eighteen collected at Annan on June 26th, 1900, ranged in length from 5 to 8 centimetres; the stomachs of all these contained food, the principal part of which consisted of Schizopods, and the specimens that were sufficiently perfect for identification belonged chiefly to *Neomysis vulgaris* (J. V. Thomp.), but a few of them appeared to be the common *Praunus* (*Mysis*) *flexuosus*. Small specimens of *Crangon vulgaris* were observed in two of the stomachs, and *Gammarus locusta* was obtained in four; one or two other Amphipods such as *Bathyporeia* sp. and *Corophium grossipes* were also noticed. *Eurytemora* (?) *velox* was frequently met with in these stomachs, and even spermatophores which had become detached from the females were obtained. The organisms obtained in the stomachs of these Annan specimens were all more or less estuarine and littoral forms.

A small sample of specimens, ranging from $8\frac{6}{10}$ to 11 centimetres in length, and collected in the vicinity of Aberdeen in October, 1900, had, like the Annan specimens, their stomachs moderately full of Schizopods, bnt in this case the species was *Schistomysis spiritus*; these organisms were absent from only one of the seven stomachs examined. Fragments of *Crangon* sp. and of a few Amphipods occurred in one or two stomachs, but no Copepods or other minute forms were observed. A small specimen about $47\frac{1}{2}$ millimetres in length, captured in the Moray Firth off Golspie, had its stomach filled with *Calanus finmarchicus*, *Thalestris* sp., and other Copepoda; larval *Balani* (cypris stage) were also present. The food in this example is more characteristic of the open sea than is the case with the other two, but its only significance is that the young Cod seem to have a special liking for small Crustaceans, though not for particular species.

Four specimens from the Firth of Forth, of a somewhat larger size than those already referred to, and collected on May 13th, 1901, had their stomachs partly filled with *Portunus holsatus*; but these Crustaceans having been subjected for a while to the action of the gastric fluid were not in very good preservation. The length of these small Cod ranged from $19\frac{3}{10}$ to 23 centimetres. The stomach of another specimen from the Firth of Forth, collected also in May, and measuring $20\frac{1}{2}$ centimetres, contained *Portunus pusillus* and *Eupagurus pubescens*.

A small Cod, $18\frac{1}{2}$ centimetres in length, taken off Collieston, Aberdeenshire, had also fragments of *Eupagurus* sp. in its stomach. Evidently Crustaceans were more in favour with these small Cod as food than any other kind of organism.

The following examples were all larger than those already mentioned, but their exact sizes could not always be obtained; they would probably, however, range between 50 and 75 centimetres in length, except in the case of some extra large specimens, the measurements of which are given.

The stomachs of nine Codlings captured in the salmon nets at the Bay of Nigg in April and May, 1900, contained *Portunus holsatus*, *Crangon vulgaris*, *Galathea rugosa*, *Idothea baltica*, and *Caprella septentrionalis*; Crustaceans only were observed in these stomachs. In the stomach of a large Cod from the same place, taken on July 27th, 1900, only partially digested fishes were found; the food in this example was too much decomposed for identification. The heads and viscera of two Codlings obtained from the salmon fishers at the Bay of Nigg on February 19th, 1901, were examined, but the only food observed in the stomachs consisted of fragments of *Galathea* (?) *rugosa* and the remains of some other Crustacea. The stomach of a moderately large Cod, captured in the salmon nets on May 18th, 1901, contained two female shore crabs, *Carcinus mænas* (with eggs nearly ripe), one common Dab about $12\frac{1}{2}$ centimetres long, one *Parajassa pelagica*, and a large number of *Caprella septentrionalis*. A small Cod, taken on July 20th, had in its stomach the remains of small flat fishes, two or three *Portunus holsatus*, and of an Amphipod—*Jassa falcata*; while another, about $77\frac{1}{2}$ centimetres in length, captured on the 19th of August, had in its stomach the remains of *Portunus* sp. and fishes. (Over one hundred specimens of the Copepod species *Bomolochus soleæ* were removed from the nostrils of this Cod.) In the stomach of a Cod from the Aberdeen Fish Market, examined at the Laboratory in October, and the length of which was 103 centimetres, a Long Rough Dab, *Drepanopsetta platessoides* (Fabr.), measuring 19 centimetres in length, was obtained; while in the stomach of the Dab portions of several young *Portunus* sp. were found. Several specimens of a cestoid parasite (*Abothrium*) were obtained in the intestines of this Cod, but each parasite had its head inserted into one of the cæcal tubes. The stomach of another cod from the Fish Market, measuring 89½ centimetres, and examined on November 6th, contained three adult Norway Lobsters *(Nephrops norvegicus)*, a small *Lucina* (?) *spinifera*, and a fragment of a *Cardium*, while the stomach of another specimen about 82½ centimetres, captured in Aberdeen Bay on November 29th, 1901, contained one Haddock about 16½ centimetres in length, the remains of some other fishes, and a considerable portion of the body of a large *Buccinum undatum* with the operculum attached.

The following is a tabulated list of species which the Cod, referred to in the preceding notes, had captured in the way of food.

SPECIES OBSERVED IN THE STOMACHS OF COD.

CRUSTACEA.	OTHER THINGS.
Carcinus mænas (Pennant).	Haddock.
Portunus holsatus, Fabricius.	Long Rough Dab (19 centimetres).
,, *pusillus*, Leach.	Common Dab.
Eupagurus pubescens (Kröyer).	Fish remains (sp. ?)
,, sp. (remains).	*Cardium* sp.
Galathea ? strigosa, Fabricius.	*Lucina spinifera.*
Nephrops norvegicus (Lin.).	*Buccinum undatum.*
Crangon vulgaris (Lin.).	Starfish remains (*Ophiura*).
,, sp.	
Small brachyura (gen. et sp. ?)	
Praunus ? flexuosus (O. F. Müller).	
Schistomysis spiritus, Norman.	
Apherusa sp.	
Gammarus locusta (Lin.).	
Parajassa pelagica (Leach).	
Corophium grossipes (Lin.).	
Caprella septentrionalis (Kr yer).	
Calanus finmarchicus (Gunner).	
Eurytemora velox (Lilljeborg).	
Ectinosoma sp.	
Thalestris sp.	
Copepods (gen. et sp. ?)	
Balanus (cypris stage).	

HADDOCK. *Gadus æglefinus, L.*

The stomachs of one hundred and twenty Haddocks have been examined for the purposes of this paper; fully 78 per cent. of these specimens were collected south-eastward of the Shetland and Fair Islands, about 17½ per cent. are from deep water—58 to 65 fathoms—about 10 miles off Aberdeen; of the other specimens, two are from the Clyde and two from the Moray Firth.

Fifty-five of the Haddocks from the Shetland district were collected 65 miles south-east of Sumburgh Head, on September 4th, 1900; thirty-one of them ranged from 8 to 11 centimetres (3⅕ to scarcely 4½ inches) in length, but the other twenty-four were of average size. The stomachs of the thirty-one small specimens contained food which consisted for the most part of small Crustacea; the remains of Annelids were observed in a number of the stomachs, while small Molluscan shells and fragments of Starfishes and Foraminifera were obtained in only one or two. The Crustacea included representatives of nearly all the important groups, except the Brachyura and the Schizopoda; young *Crangon* sp. (probably *C. allmanni)* occurred in a few of the stomachs, but the Sympoda *(Hemilamprops rosea* and others) were rarely noticed. On the other hand, Amphipods, Ostracods, and Copepods were of frequent occurrence. Amongst the Amphipods *Dulichia monacantha* and *porrecta* were the forms most frequently met with, but *Metopella nasuta* and *Gammaropsis nanus* were also occasionally observed as well as one or two of the more common species. *Bythocythere simplex* and *Krithe bartonensis* were the two Ostracod species most frequently obtained, while the Copepoda most commonly met with were *Ectinosoma sarsi* and *Idya furcata. Leptognathia breviremis*, one of the Isopoda-chelifera, was also found in one or two stomachs. No trace of fish remains was observed in the stomachs of any of this sample of small Haddocks. The stomachs of the larger Haddocks, captured at the same place and on the some date as the smaller specimens just referred to, contained food which was largely composed of Crustacea, though not so exclusively as in the previous sample, the grouping of the species was also somewhat different. The Sympoda were more frequently represented, and the species belonging to this group were more varied; small shell-fish were more frequent, and the remains of young fishes were also on one or two occasions obtained. Decapods *(Eupagurus* sp., and *Crangon allmanni)* were only observed in three of the twenty-four stomachs examined. Schizopods *(Erythrops serrata)* occurred in three. Sympoda, comprising *Hemilamprops rosea, Leucon nasica, Eudorella truncatula, Diastylis cornuta, Diastyloides biplicata, Campylaspis* sp., etc., were obtained in at least sixteen stomachs. Amphipoda, including amongst them the somewhat rare *Metopella nasuta* and *Aceros phyllonyx*, were even of more frequent occurrence. No Isopods were observed in the stomachs of this sample. The only Ostracod observed was *Philomedes interpuncta*, which occurred once. Copepods were also rarely met with, *Robertsonia tenuis* being the only species identified. Fully 75 per cent. of the stomachs contained partially digested Annelids (Chætopods), which in some cases were only identified by the presence of their bristles. The Mollusca comprised both Lamellibranchs and Gasteropods, but chiefly the former, and were represented by such forms as *Scrobicularia* sp., young *Solen* sp., and *Philine.* The fish remains observed were chiefly those of young flat-fishes—a small Long Rough Dab being one of those identified.

Two samples of Haddocks—one consisting of twenty-five small specimens ranging from 11 to $14\frac{2}{5}$ centimetres, and one of ten specimens of average size, and collected about fifty miles south-eastward of Fair Island—were also examined; but as the contents of the stomachs of these two samples resembled very closely those already described, both as to the quantity and the variety of the organisms observed, it is not necessary that a detailed description of them should be given; a full list of the organisms observed will be found in the annexed Table.

Two Haddocks which were captured in the Clyde at Station IV. (Kilbrennan Sound) in 18 to 20 fathoms on October 4th, 1899, gave the following results:—One which measured $26\frac{1}{2}$ centimetres in length had in its stomach eighty specimens of *Nyctiphanes norvegicus* of an average length of about 33 millimetres; the stomach of the other, which was a smaller fish and measured 22 centimetres long, contained one hundred and eighty *Nyctiphanes*, the length of the majority of which was about 20 millimetres.

In the stomach of a Haddock—one of a sample from Smith Bank, Moray Firth—captured on June 5th, 1901, a quantity of food was obtained consisting chiefly of *Oikopleura (Appendicularia)*, and young *Echinocardium*.

A sample of twelve Haddocks captured in 65 fathoms off Aberdeen on May 17th, 1901, and measuring from 17 to $21\frac{3}{10}$ centimetres in length, had all apparently been recently feeding, but they had evidently from choice or necessity limited their efforts to the selecting of small shell-fishes (young *Corbula gibba*, *Cylichina alba*, and *Philine scabra*), small Crustacea of various kinds, small Annelids, and brittle Starfishes. Foraminifera comprising *Biloculina* sp., *Miliolina* sp., *Rotalia beccari*, and others were also not infrequent, but whether these were introduced into their stomachs from adhering to or forming the food of the other organisms captured or intentionally selected by the fish, is a question which in some cases at least would be difficult to answer satisfactorily. Crustacea, as usual, formed a large part of the food found in the stomachs of these fishes, and the following are a few of the rarer forms observed:—*Hemilamprops rosea* was observed in seven stomachs, *Eudorellopsis deformis* in one, and *Campylaspis affinis* in one; *Metopa rubrovittata* was observed in one stomach, and *Metopella nasuta* in seven; *Phoxocephalus holbolii* occurred in at least one stomach, and *Amphilochoides intermedius* in one, while *Unciola planipes* was found in four. A few Ostracods, of which *Bythocythere turgida* was the more frequent, and the Copepod species *Longipedia coronata*, were also occasionally observed. In none of these stomachs were any fish remains found. Another sample of Haddocks from the deep water (about 58 fathoms) ten miles off Aberdeen, and collected on September 3rd, 1901, was also examined; the specimens in this sample, which were smaller than the last, ranged from $11\frac{3}{10}$ to $14\frac{3}{10}$ centimetres in length; all their stomachs contained food which as usual consisted largely of small Crustacea, chiefly Sympoda, Amphipoda, and Copepoda *(Longipedia coronata)*. Fragments of a small slender Starfish *(? Amphiura)* were occasionally noticed, and also very small *Echinocyamus* (or young *Echinocardium* sp.), but no remains of Annelids or fishes were observed. The following are some Crustacean species observed in the stomachs of this sample but which were not noticed in those of the previous one, viz.:—*Petalosarsia declivis*, *Bodotria scorpioides* (Montague), and *Diastylis rugosa* belonging to the Sympoda; *Megaluropus agilis*, *Paramphithoë monocuspis*, *Gammaropsis erythrophthalmus*, and *Phtysica marina* belonging to the Amphipoda; *Asterope mariæ*—one of the Ostraooda—and *Temora longicornis* belonging to the Copepoda. Twelve specimens—part of another sample of small Haddocks from the deep water off Aberdeen—collected on November 28th, and ranging in length from about 16 to $18\frac{1}{2}$ centimetres, had apparently been all feeding just before they were captured, as the contents of their stomachs were in a fairly fresh condition when examined. The food observed consisted for the most part of Crustacea (young *Portunus*, *Crangon*, *Spirontocaris securifrons*, *Ampelisca macrocephala*, *Pontocrates altamarinus* and other Amphipods) and Echinoderms (chiefly *Amphiura* sp., and *Echinocyamus pusillus*—*Echinocyamus* occurred more or less frequently in every stomach examined, and in one no fewer than eighty-three specimens of this small Echinoderm were obtained); some Annelid remains and one or two small Molluscs (*Philine scabra*, etc.) were also noticed.

It is evident from an examination of the food of these Haddocks that, for a short time before they were captured, they had been feeding almost solely on bottom organisms; it may be that a scarcity of pelagic forms had caused them to seek their food from amongst the bottom fauna, but it is probable that they prefer such organisms instead of those whose habitat is more pelagic.

The following tabulated list will show the very varied character of the food of Haddocks:—

Species Found in the Stomachs of Haddocks.

Crustacea.	Other Things.
Inachus (?) *leptochirus*, Leach.	*Gobius* sp. (jun.).
Eupagurus sp. (small).	*Scrobicularia prismatica.*
Anapagurus (?) *chiroacanthus* (Lilljeborg).	*Scrobicularia* sp.
Crangon allmanni, Kinahan.	*Cardium* sp.
Nyctiphanes norvegica (M. Sars).	*Modiolaria discors.*
Gastrosaccus spinifer (Goës).	*Nucula* sp.
Erythrops serratus, G. O. Sars.	*Tellina tenuis.*
,, sp.	*Corbula gibba.*
Bodotria scorpioides (Montague).	*Solen* sp. (jun.).
Iphinoë serrata, Norman.	Lamellibranchs (sp.?)
Lamprops fasciata, G. O. Sars.	*Philine scabra.*
Hemilamprops rosea (Norman).	*Cyclichna alba.*
Leucon nasica, Kröyer.	*Cylichna* sp.
Eudorella truncatula (Spence Bate).	*Eulima* sp.
Eudorella sp.	*Utriculus obtusus.*
Eudorellopsis deformis (Kröyer).	*Scalaria* sp.
Diastylis cornutus (Boeck).	*Amphidotus cordatus.*
,, *rugosa*, G. O. Sars.	*Echinocyamus pusillus.*
Diastyloides biplicata, G. O. Sars.	Starfish remains.
Pseudocuma cercaria (v. Beneden).	*Oikopleura.*
Petalosarsia declivis (G. O. Sars).	*Biloculina oblonga,*
Campylaspis rubicunda (Lilljeborg).	*Biloculina depressa.*
Leptognathia breviremis (Lilljeborg)	,, *subrotunda.*
Gnathia maxillaris (Montague).	*Spiroloculina* sp.
Paramunna bilobata (G. O. Sars).	*Globigerina* sp.
Acidostoma obesum (Spence Bate).	*Bulimina* sp.
Urothoë sp.	*Rotalia beccari.*
Phoxocephalus (?) *holbölli* (Kröyer).	*Nonionina* sp.
Harpinia neglecta, G. O. Sars.	*Polymorphina* sp.
Harpinia sp.	*Miliolina seminulum.*
Ampelisca macrocephala (Lilljeborg).	*Orbiculina universa.*
Ampelisca (?) *assimilis*, Boeck.	
Ampelisca tenuicornis, Lilljeborg.	
Ampelisca sp.	
Stegoplax brevirostris (T. and A. Scott.)	
Metopa bruzelii, Goës.	
Metopa rubrovittata, G. O. Sars.	
Metopella nasuta (Boeck).	
Amphilochus manudens, Spence Bate.	
Amphilochoides odontonyx (Boeck).	
Amphilochoides intermedius, T. Scott.	
Amphilochoides sp.	
Synchelidium brevicarpum (Spence Bate).	
Monoculodes sp.	
Halimedon parvimanus (Spence Bate).	
Pontocrates altamarinus (Spence Bate).	
Paramphithoë monocuspis, G. O. Sars.	
Paratylus swammerdami (M. Edwards).	
Aceros phyllonyx (M. Sars).	
Dexamine sp.	
Melita obtusata (Montague).	
Megaluropus agilis, Norman.	
Gammaropsis maculata, Johnstone.	
Gammaropsis nanus, G. O. Sars.	
Photis tenuicornis, G. O. Sars.	

SPECIES FOUND IN THE STOMACHS OF HADDOCKS—*continued.*

CRUSTACEA.	OTHER THINGS.
Photis longicaudatus (Spence Bate). *Unciola planipes*, Norman. *Siphonocœtus colletti*, Boeck. *Corophium affine*, Bruzelius. *Dulichia porrecta*, Spence Bate. *Dulichia falcata*, Spence Bate. *Dulichia monocantha*, Metzger. *Dulichia* sp. *Phytisica marina*, Slabber. *Cythere tuberculata* (G. O. Sars). *Cythere dunelmensis* (Norman). *Krithe Bartonensis* (T. R. Jones). *Cytheropteron latissimum* (Norman). *Bythocythere turgida*, G. O. Sars. *Bythocythere simplex* (Norman). *Paradoxostoma variabile* (Baird). *Asterope mariæ* (Baird). *Philomedes interpuncta* (Baird). *Calanus finmarchicus* (Gunner). *Pseudocalanus elongatus*, Boeck. (?) *Scolecithrix* sp. *Temora longicornis* (O. F. Müller). *Metridia* (?) *lucens*, Boeck. *Cyclopina* sp. *Longipedia coronata*, Claus. *Ectinosoma sarsi*, Boeck. *Idya* (?) *furcata* (Baird). *Balanus* (cypris stage).	

WHITING POUT OR BRASSIE. *Gadus luscus*, L.

The stomachs of two specimens of *Gadus luscus*, captured in the deep water off Aberdeen (58 fathoms) on September 3rd, 1901, and measuring 20½ and 24 centimetres respectively, contained food which consisted entirely of Crustacea, but the specimens in the stomach of the smaller fish could not be identified; the remains in the stomach of the other consisted of fragments of *Eupagurus* sp., *Epimeria cornigera*, and of some other forms which were doubtful. Professor P.-J. van Beneden gives the following species which he has found in the stomach of Whiting Pout:—*Portunus holsatus, Crangon vulgaris, Eupagurus bernhardus, Eolis coronata*, Forbes, and *Buccinum undatum*.*

NORWAY POUT. *Gadus esmarkii*, Nils.

Fifty-nine specimens of *Gadus esmarkii* were specially examined; they included six from the Firth of Clyde, collected in March, 1900; nineteen captured about sixty-five miles to the eastward of Sumburgh Head, Shetland, on September 4th, 1900; twenty from the Moray Firth, collected on October 11th and 12th, 1900; and ten collected in the deep water (58 fathoms) off Aberdeen, on September 3rd, 1901.

The stomachs of only three of those sent from the Clyde contained food that could in some measure be identified; Echinoderms (brittle Starfishes) were found in one, Schizopods (gen. et sp. ?) in another, while

* *Les Poissons des Cotes de Belgique*, p. 58.

in the third a few Copepods were found which could not be satisfactorily determined; the fishes in this sample ranged from $14\frac{3}{10}$ to $18\frac{1}{2}$ centimetres in length.

The stomachs of all the nineteen specimens from the Shetland district contained food which consisted almost entirely of the remains of Crustacea, but they were so much decomposed that it was with difficulty the following organisms could be recognised: *Hemilamprops rosea* and a few Mysidæ were found in two stomachs; *Crangon allmanni, Halimedon parvimanus,* and one or two other Amphipods—the genus and species of which were doubtful—were found in two. Copepods, including *Calanus finmarchicus, Temora longicornis,* and *Metridia lucens* occurred in at least nine of the stomachs, and the remains of small fishes in one. The viscera of these fishes was very oily, more so than those of any of the others examined.

The food observed in the Moray Firth specimens was largely composed of young Crustacea belonging to the Macrura; they occurred in the stomachs of every one of the twenty specimens examined; *Calanus finmarchicus* was also obtained in all these stomachs, but it was not so numerously represented as were the young forms I have mentioned. Other Copepods, such as *Temora longicornis, Metridia lucens,* and *Centropagus typicus,* were occasionally noticed, as also were *Eupagurus* sp., *Crangon* sp., *Hyperia galba,* and *Parathemisto oblivia.* It will be observed that the organisms which constituted the chief part of the food of these Norway Pouts from the Moray Firth were more truly pelagic in their habits than the organisms which constituted the food of the Haddock, but whether this difference is the result of necessity or choice it would at this stage be difficult to say.

The food observed in the stomachs of the sample collected in the deep water off Aberdeen consisted chiefly of *Sagitta* and *Calanus finmarchicus; Temora* occurred in eight of the ten stomachs examined, and *Pseudocalanus elongatus* in one; *Argissa hamatipes* was found in two, while *Gastrosaccus spinifer* and *Pseudocuma (?) cercaria* were each observed in one. One stomach contained matter too imperfect for identification. No young fishes, Mollusca, nor Starfishes were found in any of the stomachs of this sample; but the organisms of which the food was composed, though differing somewhat markedly from those composing the food of the Moray Firth sample, were forms which, like them, were more or less distinctly pelagic. It will be understood that in these remarks on the differences observed in the food of the different samples the reference is not so much to individuals, but rather to the group of species composing the food. Thus the food of the Moray Firth specimens consisted chiefly of young Macrura and *Calanus,* to which were added a few other forms, such as *Metridia lucens* and *Temora longicornis,* the former being the more frequent of the two. In the food of the Aberdeen sample, on the other hand, the young Macrura are replaced by *Sagitta,* and *Temora* is about equal to *Calanus* in frequency and quantity, but *Metridia* is altogther absent; moreover, in place of *Crangon* and the *Hyperoidæ* we have *Gasterosaccus, Pseudocuma,* and *Argissa,* yet the organisms composing the food in both samples are mainly pelagic forms.

The following list contains the names of all the species observed so far as they could be identified:—

[TABLE.

LIST OF SPECIES FOUND IN THE STOMACHS OF *Gadus esmarkii.*

CRUSTACEA.	OTHER THINGS.
Crangon allmanni, Kinahan.	Fish remains (rare).
Eupagurus sp.	*Oikopleura.*
Larval Decapods.	*Sagitta* (more or less abundant).
Young Macrura (Abundant).	Echinoderm remains.
Gastrosaccus spinifer (Goës).	
Erythrops sp.	
Hemilamprops rosea (Norman).	
Pseudocuma (?) *cercaria* (van Beneden).	
Hyperia galba (Montague).	
Parathemisto oblivia (Kröyer).	
Halimedon parvimanus (Spence Bate).	
Argissa hamatipes (Norman).	
Amphipod remains (sp. et gen. ?)	
Calanus finmarchicus (Gunner).	
Pseudocalanus elongatus, Boeck.	
Temora longicornis (O. F. Müller).	
Metridia lucens, Boeck.	
Centropages typicus, Kröyer.	

WHITING. *Gadus merlangus*, L.

About two hundred and thirty-five specimens of Whitings have been specially examined. A sample consisting of eight Whitings measuring from 9 to $11\frac{1}{2}$ centimetres, collected 65 miles south-east of Sumburgh Head, had in their stomachs nothing that could be distinguished except a small *Crangon allmanni*; a number of others from the same locality were also examined, but with no better result.

The stomachs of twenty-eight specimens ranging from $8\frac{2}{5}$ to $14\frac{1}{2}$ centimetres in length and captured in the vicinity of Aberdeen on September 20th, 1900, nearly all contained food which consisted to a large extent of small Crustacea; a considerable proportion of these belonged to the Amphipoda, and included such well-known forms as *Hippomedon denticulatus*, *Bathyporeia* sp., *Pontocrates arenarius*, *Paratylus swammerdami*, and others. Remains of small Schizopods (Mysidæ) occurred in several of the stomachs. *Pseudocuma cercaria* was also of frequent occurrence, but the only species observed belonging to the Copepoda was *Temora longicornis*, and it was only obtained in the stomachs of the smaller fishes. The remains of Annelids occurred in several stomachs, but Starfish remains were rare. Another sample of five specimens from near the same locality as the last, but collected five days later, had nearly the same kind of food in their stomachs.

A number of Whitings—about forty-one in all—collected off Aberdeen, between the 17th and 19th December, 1900, were also examined. The lengths of these specimens ranged from 12 to $17\frac{3}{5}$ centimetres, and nearly all of them had food in their stomachs; the food, so far as it could be identified, consisted mainly of Crustacea and Annelids. *Crangon allmanni* was moderately frequent, *Pandalina brevirostris* was observed once, *Gastrosaccus spinifer* and the remains of other Mysidæ were obtained in several stomachs, and specimens of *Parathemisto* were also not uncommon. A small *Sepiola* occurred in one stomach, a small Long Rough Dab about $3\frac{7}{10}$ centimetres long was found in another, and the remains of a small flat-fish (sp. ?) in a third.

A sample collected off Aberdeen in 65 fathoms on May 17th, 1900, is noticed here because in the stomach of one of them, about 26½ centimetres in length, I found a specimen of *Conchœcia elegans*, an Ostracod only hitherto observed in Loch Etive on the West Coast, and very rarely in the extreme North of Scotland.

Schistomysis spiritus was frequent in the stomachs of twelve specimens collected off Aberdeen on June 10th, 1901; *Crangon allmanni*, *Apherusa borealis*, and *Gammarus locusta* were very rarely observed, while the only species belonging to the Copepoda obtained was *Pseudocalanus elongatus*. *Oikopleura* was observed in four of the stomachs and was moderately common in three of them, while Annelid remains occurred in five.

A sample of Whitings, collected about ten miles off Aberdeen on September 3rd, 1901, measured from 10½ to 19 centimetres in length. One of these had nothing in its stomach that could be distinguished, but the stomachs of four contained the following among other Crustacea:—*Pandalus montagui*, *Pseudocuma cercaria*, *Callisoma crenata*, *Argissa hamatipes*, *Megamphopus cornutus*, *Calanus finmarchicus*, *Pseudocalanus elongatus*, *Temora longicornis*, and *Metridia lucens*; *Sagitta*, and some other Annelids were also observed.

Thirteen specimens from Aberdeen Bay, collected November 6th, 1901, and measuring from 15 to $24\frac{3}{10}$ centimetres, had very little food in their stomachs; *Crangon vulgaris*, jun., was observed in two; so also were *Schistomysis inermis*, *Hyperia galba*, and *Gammarus* sp. (jun.). Remains of Annelids were also observed in one or two of the stomachs, but any food that was present was not very easily identified. The stomach of one specimen, 7½ centimetres, had a young flat-fish in its stomach, while in the stomach of the flat-fish itself, *Calanus* and fragments of *Bathyporeia* sp. were obtained. The stomach of another specimen, 7 centimetres long, contained *Hyperia galba*, *Pseudocalanus elongatus*, and a few very young Decapoda.

Fourteen specimens ranging in length from 9 to 14 centimetres, besides two at 15½ c.m. and one at 17 c.m., were captured in 68 fathoms about 9 or 10 miles off Aberdeen, in November, 1901, and the examination of these gave the following results; the smaller specimens were found to have been feeding chiefly on *Parathemisto oblivia*—nearly every one of them having some of these Crustaceans in their stomach—the specimens were somewhat immature, but they all probably belonged to the species named; a few other species such as *Crangon allmanni*, *Paratylus* sp., *Temora longicornis*, and *Metridia lucens* were also noticed. The stomachs of two of the larger specimens were empty, but the other contained fragments of two *Spirontocaris securifrons*.

Other twelve Whitings ranging from about 14 to 20 c.m., collected in Aberdeen Bay on November 29th, had scarcely anything in their stomachs that could be identified; but so far as the contents could be made out, the fish appeared to have been feeding chiefly on Annelids; but a few fragments of species of Mysidæ were also observed.

Schistomysis spiritus was the most common species in the stomachs of some Whitings captured off Collieston on July 5th, 1901; *Pseudocuma cercaria* occurred in four of these stomachs and was abundant in one of them; *Bathyporeia norvegica* was present in one and *Oikopleura* in six. A few other common forms were also observed.

Six specimens from Smith Bank, Moray Firth, measuring 20½ to 27 centimetres, and collected June 5th, 1901, had very little in their stomachs that could be distinguished. A female of *Ampelisca assimilis* was about the only thing that could be satisfactorily determined; while the remains of small fishes, Annelids, and what seemed to be fragments of a *Crangon* appeared also to form part of the food contained in these stomachs—all being considerably decomposed.

Ninety-seven specimens of Whitings from the Firth of Forth collected during April and May of the present year (1901) included the following: —A sample of twenty of medium size, measuring on an average about 25 centimetres (or 10 inches) in length, and collected in April, had comparatively little food in their stomachs, and what was of it was much decomposed; but so far as it could be identified it was found to consist for the most part of *Crangon allmanni*, with occasionally the remains of *Pandalus montagui* and small fishes. Two small *Nephrops*, $4\frac{7}{10}$ centimetres in length (measuring to the end of the claws), were found in one of these stomachs. A sample of smaller Whitings—sixty-two in number—collected in April, and ranging from 12 to 15 centimetres in length, appear to have been feeding largely on small Crustacea at the time they were captured; every stomach was found to contain food, and some stomachs were well filled; *Crangon* was, as usual, one of the organisms most frequently observed, and specimens sufficiently perfect to be identified were found to belong to *Crangon allmanni; Paudalus montagui* was also occasionally noticed. The Schizopoda were represented by *Erythrops goesii*, which was the only species observed, and it was one which occurred very often amongst the contents of the various stomachs. The Sympoda was represented by several species, such as *Leucon nasica, Eudorella truncatula, Diastylis rostratus*, and others; the *Leucon* was, however, the most common form. The Isopoda were apparently rare, only one—*Astacilla* sp.—being obtained. The Amphipoda were represented by a number of forms, the following being the most frequent: —*Ampelisca assimilis, spinipes*, and *macrocephala, Protomedeia fasciata, Dulichia porrecta*, and others. The most common species of the Copepoda observed was *Temora longicornis*; but *Calanus finmarchicus, Pseudocalanus elongatus, Longipedia coronata*, and *Robertsonia tenuis* were also noticed. The parasitic Copepod—*Caligus rapax*—was found mixed up with the other things in one or two of the stomachs. I do not remember having previously observed *Caligus* amongst the food of fishes, but perhaps these specimens had been conveyed into the stomachs in which they occurred from adhering to some object which the fish had captured. Larval *Balani* (cypris stage) were not uncommon, and the Ascidian—*Oikopleura*—was also found in nearly all the stomachs; Annelids, on the other hand, were rarely obtained. I give the following as examples of the contents of some of the stomachs, in order to show the variety of organisms sometimes found in them:—

(1) *Crangon allmanni, Erythrops goesii, Leucon nasica, Diastylis* (?) *lucifera, Diastylis rostrata, Ampelisca* sp., *Perioculodes longimanus, Melita* sp., *Protomedeia fasciata* (male and female), *Temora longicornis, Longipedia coronata*, and *Robertsonia tenuis*.

(2) *Crangon allmanni, Leucon, Diastylis, Ampelisca* sp. (? *spinipes*), *Calanus, Temora* (male), *Oikopleura*.

(3) *Erythrops goesii, Leucon, Diastylis, Eudorella emarginata, Ampelisca, Dulichia falcata, Pseudocalanus*, and *Longipedia coronata*.

A considerable difference, when compared with the sample just referred to, was observed in the food of some Whitings from the Firth of Forth, collected on May 13th, 1901; the average length of these specimens was about seven inches ($17\frac{1}{2}$ centimetres). The food of this sample consisted largely of Schizopods (*Schistomysis spiritus* and *ornatus*), and *Oikopleura* was also abundant in several of the stomachs. A specimen of *Gobius minutus* was found in one stomach, and a young *Eupagurus* sp. and a specimen of *Metopa alderi* in another, but otherwise the food, so far as it could be identified, consisted almost entirely, if not altogether, of Schizopods and *Oikopleura*. From the occasional frequency and even abundance of these small tadpole-like Ascidians in the stomachs of fishes, it is evident that, though minute, they are by no means unimportant as fish food, and especially when it is found that even comparatively large fishes feed upon them. It is also interesting to note that the Sagittæ, which seem undoubtedly to prey on the smaller larval and post-larval fishes, are themselves devoured, sometimes in quantity, by fishes of larger size.

The annexed Table contains the names of the various organisms which have been found to constitute the food of Whitings :—

Crustacea.	Other Things.
Eupagurus bernhardus (Lin).	*Gobius minutus.*
Anapagurus lævis (Thompson).	Long Rough Dab (young).
Eupagurus sp.	Remains of flat-fishes.
Nephrops norvegicus (Lin.), (one 47½ mm. to end of claws).	Remains of other young fishes.
Crangon allmanni, Kinahan.	*Sepiola* sp.
Spirontocaris securifrons (Norman).	*Oikopleura* (common).
Pandalus montagui, Leach.	*Sagitta bipunctata.*
Pandalina brevirostris (Rathke).	Annelid remains.
Gastrosaccus spinifer (Goës).	Remains of Starfishes.
Erythrops goesii, G. O. Sars.	
Praunus (?) *inermis* (Rathke).	
Schistomysis spiritus, Norman.	
,, (?) *ornatus*, G. O. Sars.	
Leucon nasica, Kröyer.	
Eudorella emarginata (Kröyer).	
,, *truncatula* (Spence Bate).	
Diastylis rostrata (Goodsir).	
,, *lucifera* (Kröyer).	
Diastylis sp.	
Pseudocuma cercaria (v. Beneden).	
Gnathia maxillaris (Mont.), (jun.).	
Astacilla sp.	
Parathemisto oblivia (Kröyer).	
Callisoma hopei (A. Costa).	
Hippomedon denticulatus (Spence Bate).	
Orchominella nana (Kröyer).	
Bathporeia norvegica, G. O. Sars.	
Bathyporeia sp.	
Argissa hamatipes (Norman).	
Harpinia neglecta, G. O. Sars.	
Ampelisca assimilis, Boeck.	
,, *macrocephala*, Lilljeborg.	
,, *spinipes*, Boeck.	
Ampelisca sp. (fragments).	
Amphilochus tenuimanus, Boeck.	
Stenothoë marina, Spence Bate.	
Metopa alderi (Spence Bate).	
,, *pusilla*, G. O. Sars.	
Leucothoë lilljeborgii, Boeck.	
Perioculodes longimanus (Spence Bate).	
Pontocrates arenarius (Spence Bate).	
Synchelidium brevicarpum (Spence Bate).	
Epimeria cornigera (Fabricius).	
Apherusa bispinosa (Spence Bate).	
,, *borealis* (Boeck).	
Paratylus swammerdami (M. Edwards).	
Gammarus locusta (Lin.).	
Melita sp.	
Mæra loveni (Bruzelius).	

THE FOOD OF WHITINGS—*continued.*

CRUSTACEA.	OTHER THINGS.
Cheirocrates sp. *Megamphopus cornutus,* Norman. *Microprotopus maculatus,* Norman. *Protomedeia fasciata,* Kröyer. *Dulichia porrecta,* Spence Bate. ,, *falcata,* Spence Bate. ,, *monocantha,* Metzger. *Cythere porcellanea,* G. S. Brady. ,, *tuberculata,* G. O. Sars. *Cytheropteron humile,* G. S. Brady and Norman. *Asterope mariæ* (Baird). *Philomedes interpuncta* (Baird). *Conchœcia elegans,* G. O. Sars. *Calanus finmarchicus* (Gunner). *Pseudocalanus elongatus,* Boeck. *Temora longicornis* (O. F. Müller). *Metridia lucens,* Boeck. *Candacia pectinata,* G. S. Brady. *Longipedia coronata,* Claus. *Bradya typica,* Boeck. *Robertsonia tenuis* (Brady and Robertson). *Caligus* sp. *Balanus* (cypris stage). Megalops and other young forms of Crustacea.	

SAITHE OR GREEN COD. *Gadus virens,* L.

The stomachs of four moderately large specimens, kindly handed over to me by Dr. H. C. Williamson, were examined, and gave the following results:—

(1) The stomach of a Saithe, 90 centimetres (36 inches) in length, contained one Haddock $28\frac{1}{10}$ centimetres ($11\frac{1}{4}$ inches) long, one Whiting $24\frac{1}{2}$ centimetres ($9\frac{3}{4}$ inches) long, two other round fishes (? Whitings) which measured about 20 and $26\frac{9}{10}$ centimetres (8 inches and $10\frac{3}{4}$ inches) respectively, and the backbone of another round fish of moderate size.

(2) A Saithe, obtained in the Fish Market at Aberdeen, and which was slightly larger than the last, had in its stomach a Long Rough Dab $18\frac{3}{10}$ centimetres ($7\frac{1}{3}$ inches) in length.

(3) The stomach of another specimen from the Fish Market, and which measured 88 centimetres in length, contained the remains of fishes, but they were too much decomposed for identification.

(4) The fourth specimen, which was a male, and was also obtained at the Aberdeen Fish Market, appears to have been specially voracious; eight fishes were removed from its stomach, the dimensions of which were as follows:—One Common Dab 18 centimetres ($7\frac{1}{5}$ inches) in length, and seven Whitings; two of the Whitings measured each 25 c.m. (10in.) in length, one measured 27 c.m. ($10\frac{4}{5}$in.), one 19 c.m. ($7\frac{3}{5}$in.), one $14\frac{1}{2}$ c.m. ($5\frac{4}{5}$in.), one 12 c.m. ($4\frac{4}{5}$in.), and one 11 c.m. ($4\frac{2}{5}$in.) in length respectively.

LYTHE OR POLLACK. *Gadus pollachius,* L.

A considerable number of Pollacks have been examined—about ninety-two altogether—but the food contained in the stomachs of a number of them was too imperfect for satisfactory identification. In the stomach of a Pollack captured in the Bay of Nigg in the nets of the salmon fishers on February 19th, 1900, the remains of several small fishes and Schizopods (*Schistomysis spiritus*) were observed. The following Crustacea were obtained in the stomach of another Pollack received from the salmon fishers on April 2nd, 1900, viz.:—*Idothea emarginata*, *Idothea baltica*, *Idothea pelagica*, and *Idothea linearis; Amathilla homari*, *Parajassa pelagica*, *Caprella septentrionalis*, and fragments of some other species. There was also a post-larval Eel in this stomach. Two stomachs obtained from the salmon fishers—one on April 16th and one on the 17th—contained the following organisms:—*Idothea pelagica*, *Idothea emarginata*, and *Idothea linearis; Amathilla homari*, *Hyale nilssoni*, *Caprella septentrionalis*, and remains of other Amphipods. A young Pollack about $47\frac{1}{2}$ centimetres ($19\frac{3}{10}$ inches) in length was received from the salmon fishers on April 18th, and in its stomach the following Crustacea were obtained:—*Schistomysis spiritus*, *Idothea baltica*, *Idothea pelagica*, *Idothea emarginata*, and *Caprella septentrionalis*, as well as the remains of some Annelids. In the intestines of this fish over two hundred specimens of the cestoid parasite—*Echinorhynchus acus*—were obtained, as well as a few nematodes. Another stomach received on April 19th contained an immense number of *Caprella septentrionalis*, as well as the remains of other Crustaceans and of Sand-eels. In a stomach received from the salmon fishers on June 6th the remains of Amphipods, the genus and species of which were doubtful, was the only food observed.

In the stomach of a Pollack received from the salmon fishers in July of this year (1901) *Caprella septentrionalis* was again common. The frequent appearance of this *Caprella* in the stomachs of these fishes seems to indicate that it must be more or less abundant somewhere in the vicinity of the Bay, and that it is a favourite kind of food with the Pollack.

A Pollack about 27 centimetres in length, taken in 60 fathoms off Aberdeen on October 3rd, 1901, had the following organisms in its stomach:—A small round fish too imperfect for identification (its length would be about 9 centimetres), three or four *Pandalus montagui*, a few small Decapods (sp.?), *Hyperia galba*, and a few Schizopods belonging to Mysidæ.

The following organisms were obtained in the stomachs of four Pollack taken in St. Andrews Bay in the salmon fishers' nets during May, 1901. These specimens measured about 43, 50, 51, and 62 centimetres in length respectively. The stomach of the first contained the remains of fish, one or two small Cephalopods and Crustacean and Annelid remains, but not sufficiently perfect for satisfactory identification. The second contained a large Sand-eel, *Ammodytes* sp. The third contained a specimen of *Onos* sp. (*Motella*) about 12 centimetres long; but in the fourth there was nothing that could be identified.

A sample consisting of six specimens which were sent from Girvan, Firth of Clyde, in May, 1901, had scarcely any food in their stomachs that could be satisfactorily identified. The specimens measured from 27 to 28 centimetres in length, and the stomach of one of them contained a small *Labrus*, very imperfect; while the remains of Crustacea (probably of *Crangon* sp.) were observed in three. The contents of the other two stomachs were very much decomposed. Three specimens were sent from Girvan on October 15th, 1901, the length of which measured $23\frac{1}{2}$ c.m., 33 c.m. and 43 c.m. respectively. The food contained in the stomachs of this sample consisted entirely of the remains of small Herrings or Sprats about 3 inches (75 mm.) long.

The annexed Table contains the names of various organisms observed in the stomachs of the various Pollacks examined :—

ORGANISMS OBSERVED IN THE STOMACHS OF POLLACKS.

CRUSTACEA.	OTHER THINGS.
Crangon vulgaris (Lin.).	*Labrus* sp. (7 c.m.).
Crangon sp.	*Onos* sp. (12 c.m.).
Pandalus montagui, Leach.	Sand-eels (remains).
Decapod remains.	Herrings or Sprats, about 3 inches.
Schistomysis spiritus, Norman.	Young Eel.
Schistomysis sp.	Fish remains.
Idothea baltica (Pallas).	Small Cephalopods.
,, *pelagica*, Leach.	
,, *emarginata* (Fabricius).	
,, *linearis* (Pennant).	
Hyperia galba (Montague).	
Hyale nilssoni (Rathke).	
Ampelisca spinipes, Boeck.	
Paratylus swammerdami (M. Edwards).	
Amathilla homari (Fabricius).	
Parajassa pelagica (Leach).	
Dulichia sp.	
Caprella septentrionalis (Kröyer).	

LING. *Molua molva*, L.

Several specimens of small Ling were examined, but the only food observed in their stomachs consisted of the remains of Crustacea belonging to the Decapoda and Sympoda, but they were too imperfect for identification. A partly-digested Eel (*Anguilla vulgaris*) was found in the stomach of a small Ling captured in the Bay of Nigg on June 30th, 1900.

FIVE-BEARDED ROCKLING. *Onos mustela*, L.

The stomach of a specimen about 10 centimetres in length, sent from Annan on July 30th, 1900, contained a number of Amphipoda and other Crustacea, but they were too imperfect for identification. A Five-bearded Rockling taken in the Bay of Nigg, which measured about 12 cm. in length, had a number of Isopods and Amphipods (including *Hyale lubbockiana*) in its stomach, but the specimens were imperfect.

Ten Rocklings from the Firth of Forth, collected on May 13th, 1901, measured from 13 cm. to 23½ cm. in length ; the stomachs of all these specimens contained food which consisted chiefly of small Crustaceans. *Crangon allmanni* was observed in eight stomachs, *Pandalus montagui* in two, and *Erythrops goesii* in one; only one species (a *Diastylis*) belonging to the Sympoda (Cumacea) was observed in these stomachs, but no Isopods were obtained. The Amphipoda, on the other hand, were represented by a number of species, comprising *Ampelisca macrocephala*, *Mæra loveni*, *Protomedeia fasciata*, *Unciola planipes*, and *Dulichia falcata*. No Copepods were observed in any of the stomachs, but several Ostracods, such as *Bythocythere turgida*, *Bythocythere simplex*, *Loxoconcha impressa*, and *Machærina tenuissima*, were noticed. The remains of small Ascidians and Annelids occurred in one or two of these stomachs, and also some young *Balani* (cypris stage). It may be mentioned that sixty-five specimens of a *Bomolochus* taken from the gills and gill-covers of one of these Rocklings, appear to belong to a new species.*

The annexed list contains the names of all the organisms observed:—

LIST OF SPECIES IN THE STOMACHS OF FIVE-BEARDED ROCKLINGS.

CRUSTACEA.	OTHER THINGS.
Crangon allmanni, Kinahan.	Insect larva.
Crangon sp.	Small (?) Ascidians.
Pandalus montagui, Leach.	Annelids.
Erythrops goesii, G. O. Sars.	Starfish remains.
Diastylis sp.	
Small Isopods.	
Ampelisca macrocephala, Lilljeborg.	
Ampelisca sp.	
Gammarus locusta (Lin.).	
Mæra loveni (Bruzelius).	
Gammaropsis nana, G. O. Sars.	
Protomedeia fasciata, Kröyer.	
Unciola planipes (Norman).	
Dulichia falcata, Spence Bate	
Dulichia sp.	
Cythere lutea (O. F. Müller).	
Loxoconcha impressa, Baird.	
Bythocythere simplex (Norman).	
Bythocythere turgida, G. O. Sars.	
Machærina tenuissima (Norman).	
Thalestris sp.	
Balanus (cypris stage).	

GREATER SAND-EEL. *Ammodytes lanceolatus*, Le Sauvage.

Six Sand-eels from the Moray Firth, measuring $12\frac{1}{2}$ cm. to $16\frac{1}{2}$ cm. in length, and collected in June, 1900, were found to have been feeding largely on Copepods, and the following species were recognised :— *Pseudocalanus elongatus*, *Temora longicornis*, *Ectinosoma* sp. (? *sarsi*), *Stenhelia* sp., and *Lichomolgus* sp. Larval *Balani* (cypris stage) were also of frequent occurrence. A sample comprising four specimens which were sent from Annan in April, 1900, had nothing in their stomachs that could be identified.

In the stomach of a specimen from the Moray Firth (Smith Bank), collected on June 5th, 1901, many pelagic Copepods were observed, and they belonged for the most part to two species—*Calanus finmarchicus* and *Pseudocalanus elongatus*; in this stomach no organisms other than the Copepods were noticed. I have notes of a sample of ten specimens collected on December 26th, 1900, but the locality where they are from is uncertain. The length of these specimens ranged from $15\frac{1}{2}$ cm. to $17\frac{1}{2}$ cm., and the stomachs of all of them contained food. The food in three was not sufficiently perfect for identification, but the contents of the others consisted almost entirely of pelagic Copepods, the prevailing species being *Temora longicornis*. *Calanus finmarchicus* was observed in one, and a number of specimens of *Centropages typicus* were obtained in another stomach ; a young *Mytilis* (?) *edulis* occurred in one, and larval *Balani* (cypris stage) in one.†

* This *Bomolochus* is described at p. 289 of the present Report, under the name of *Bomolochus onosi*.

† Van Beneden states (*Les Poissons des Cotes de Belgique*, p. 64) that the food of the closely-allied species, *Ammodytes tobianus* consists also of microscopic Crustacea.

The annexed list contains the names of all the organisms observed :—

LIST OF ORGANISMS FROM THE STOMACHS OF GREATER SAND-EELS.

CRUSTACEA.	OTHER THINGS.
Calanus finmarchicus (Gunner).	Young *Mytilis.*
Pseudocalanus elongatus, Boeck.	
Temora longicornis (O. F. Müller).	
Centropages typicus, Kröyer.	
Ectinosoma sp.	
Stenhelia sp.	
Lichomolgus sp.	
Balanus (cypris stage).	

LONG ROUGH DAB. *Drepanopsetta platessoides* (Fabr.).

The stomachs of one hundred and five Long Rough Dabs, chiefly small specimens, have been specially examined; twenty-eight from the Shetland district were collected on September 4th, 1900, and other five on May 17th, 1901; sixty specimens from the Firth of Forth were collected in May, 1901, and other six on July 13th. Six specimens from deep water about ten miles off Aberdeen were collected on September 3rd, 1901.

The food observed in the stomachs of the specimens from Shetland, which were collected sixty-five miles south-east of Sumburgh Head on September 4th, 1900, was in some cases largely composed of the remains of Annelids, while in others it consisted chiefly of Starfish remains. The length of the specimens ranged from $4\frac{3}{10}$ cm. to 16 cm., but fully 57 per cent. were under 10 cm., and it was the food of the larger specimens that was composed chiefly of Annelids, while that of the smaller consisted for the most part of small Starfishes (Ophiurids). Small Crustacea were also moderately frequent in the stomachs of both the larger and smaller fishes, but Mollusca were rarely obtained. The Crustacea included examples of several groups. The Decapoda were represented by small Hermits, the species of which could not be clearly made out; *Erythrops serrata* represented the Schizopoda, and *Hemilamprops rosea* and *Diastylis* sp. the Sympoda. The Amphipoda comprised several species, such as *Hippomedon denticulatus*, *Halimedon parvimanus*, *Ampelisca macrocephala*, the rare *Dulichia monacantha*, and others. *Cythere dunelmensis* and *Bythocythere simplex* represented the Ostracoda, but the only Copepoda observed were *Calanus finmarchicus* and *Temora longicornis*. The second sample from Shetland was from 85 fathoms and collected on May 17th, 1901; the specimens of this sample measured $7\frac{1}{4}$, $10\frac{1}{4}$, $12\frac{1}{2}$, $14\frac{1}{4}$, and $18\frac{1}{4}$ centimetres respectively. In the stomach of the first two, specimens of *Leucon nasica* and some other Crustacean remains were observed; in the stomach of the second there were two small specimens of *Natica* and of two other small univalves (imperfect), all of them containing Hermit Crabs; the stomach of the third contained two *Naticas* and a few very young *Fusus* sp., all with Hermits; the fourth had in its stomach several small *Naticas*, one specimen of the somewhat rare *Adeorbis subcarinatus* and a *Trophon* (or *Difrancia*) sp., all of which had small Hermits located in them; in the stomach of the fifth, a specimen of *Anapagurus lævis* was found occupying the shell of a small *Natica*, and there were also one or two small *Fusus* containing hermits, even the shell of a *Ditrupa* was observed which had been utilised by a tiny Hermit; this last was the only stomach of the present sample in which the remains of Starfishes were observed.

Of the sixty specimens from the Firth of Forth collected during May, 1901, thirty-four measured from 7¼ to 9¼ centimetres and twenty-six from 10¼ to 19½ centimetres in length. Crustacea formed the principal part of the food of all the specimens, the only difference was that Ostracoda and Copepoda, which were frequent in the stomachs of the smaller fishes, were seldom observed in those of the larger. The remains of Annelids were not very common, and Starfish remains were rarely noticed. The shells of small univalve Molluscs containing Hermits were met with in one or two of the stomachs. The variety of the Crustacean species was considerable, but none of the larger Decapods were obtained, *Crangon* (?) *allmanni*, which was not observed very often and was usually in a more or less fragmentary condition, was the largest of the Crustacea noticed. *Erythrops goesii*, *Schistomysis ornata*, and *Leucon nasica* occurred very frequently; *Pseudocuma cercaria*, *Diastylis lucifera*, and one or two other species of Sympoda were also observed. No Isopod species was obtained in the stomachs of this sample. The Amphipoda were represented by a number of species, some of them being rare forms; their names are all entered in the tabulated list, but a few may be given here :—*Ampelisca macrocephala*, *Ampelisca brevicornis*, *Haploops tubicola*, *Amphilochus tenuimanus*, *Cheirocrates sundewalli*, *Protomedeia fasciata*, *Dulichia monacantha* (not previously noticed in the Firth of Forth), and others. *Bythocythere simplex* and *Cythere dunelmensis*. belonging to the Ostracoda, were occasionally noticed, so also were the two species of Copepoda—*Longipedia coronata* and *Robertsonia tenuis*. Other things observed included larval *Balani* (cypris stage) and several Anemones. The sample of Long Rough Dabs from the Firth of Forth collected at Station V. on July 13th, which were all under 10 centimetres in length, did not have very much food in their stomachs, and what was of it consisted chiefly of Crustacea. *Ampelisca assimilis* and *Erichthonius deformis* were observed in these stomachs and were the only species satisfactorily identified.

Six specimens from the deep water off Aberdeen collected on September 3rd, 1901, had an average length of about 13 centimetres. The food contained in their stomachs was very similar to that observed in the specimens from the Firth of Forth.

The following list contains the names of the various organisms referred to in the preceding notes :—

List of Species Found in the Stomachs of Long Rough Dabs.

Crustacea.	Other Things.
Eupagurus (?) *cuanensis* (Thomp.)	Young fish (Herring or Sand-eel, 37 mm. long).
Anapagurus lævis (Thomp.).	*Tellina* (?) *tenuis*.
Eupagurus sp. (small).	*Natica* sp. (small).
Crangon allmanni, Kinahan.	*Turritella terebra*.
,, *nanus* (Kröyer).	*Adeorbis subcarinatus*.
Young Carida (? *Pandalus*).	*Fusus* sp. (jun.).
Erythrops goesii, G. O. Sars.	*Pleurotoma septangularis*.
Schistomysis ornata (G. O. Sars).	*Pleurotoma trevelyana*.
Hemilamprops rosea (Norman).	,, *turricola*.
Leucon nasica, Kröyer.	
Eudorella sp.	
Diastylis rathkii (Kröyer).	

LIST OF SPECIES FOUND IN THE STOMACHS OF LONG ROUGH DABS—*continued.*

CRUSTACEA.	OTHER THINGS.
Diastylis lucifera (Kröyer). *Pseudocuma cercaria* (P.-J. v. Beneden). *Hippomedon denticulatus* (Spence Bate). *Tryphosella höringii* (Boeck). *Harpinia neglecta*, G. O. Sars. *Ampelisca typica* (Spence Bate). ,, *brevicornis* (A. Costa). ,, *macrocephala*, Lilljeborg. ,, *assimilis*, Boeck. *Haploops tubicola*, Lilljeborg. *Amphilochus tenuimanus*, Boeck. *Metopa* sp. *Leucothoë lilljeborgii*, Boeck. *Perioculodes longimanus* (Spence Bate). *Pontocrates arenarius* (Spence Bate). *Halimedon parvimanus* (Spence Bate). *Cheirocratus sundewalli* (Rathke). *Aora gracilis* (Spence Bate). *Protomedeia fasciata*, Kröyer. *Photis longicaudata* (Spence Bate). *Erichthonius deformis*, M. Edwards. *Dulichia porrecta*, Spence Bate. ,, *falcata*, Spence Bate. ,, *monacantha*, Metzger. *Phtisica marina*, Slabber. *Cythere concinna*, T. R. Jones. ,, *limicola*, Norman. ,, *dunelmensis* (Norman). *Loxoconcha tamarindus* (T. R. Jones). *Bythocythere simplex* (Norman). *Calanus finmarchicus* (Gunner). *Temora longicornis*, O. F. Müller. *Longipedia coronata*, Claus. *Ectinosoma* sp. *Robertsonia tenuis* (Brady and Robertson). *Balanus* (cypris stage).	*Trophon* (or *Defrancia*) sp. *Defrancia* sp. Annelids (Chaetopoda). *Ditrupa* sp. Starfish (Ophiura) remains.

WHIFF OR SAIL FLUKE. *Lepidorhombus whiff* (Walb).

The Sail Flukes examined were collected, for the most part, from deep water (85 fathoms) north of Shetland on May 17th, 1901. The number of specimens was thirty-one, and they measured $11\frac{1}{2}$ to 20 centimetres in length. The food observed in their stomachs consisted almost entirely of Crustacea, but it was in most cases very fragmentary. The Euphausiidæ were most in evidence as an article of food, but the genus or species could not be satisfactorily determined; these Schizopods occurred in the stomachs of fully half the number of the fishes examined. *Erythrops serratus* was also frequently observed. *Crangon* (?) *allmanni* was found in three stomachs and *Nika edulis* in one; *Ampelisca brevicornis* was obtained in three, and the remains of Annelids in one, but these organisms were comparatively few in number.

In the stomach of a moderate-sized Sail Fluke captured off Aberdeen on July 7th, 1900, a *Sepiola* sp. (?) and the remains of *Crangon* sp. were found.

The names of the various organisms are given in the tabulated list annexed :—

SPECIES FOUND IN STOMACHS OF SAIL FLUKES.

CRUSTACEA.	OTHER THINGS.
Remains of Decapods. *Eupagurus* sp. *Nika edulis*, Risso. *Crangon* (?) *allmanni*, Kinahan. Remains of Euphausiidæ sp. *Erythrops serratus*, G. O. Sars. *Ampelisca brevicornis* (A. Costa).	*Sepiola* sp. Remains of Annelids.

SCALD-FISH. *Platophrys laterna* (Walb.).

A single specimen from the Clyde was captured between Rhuad Point and Ailsa Craig in 22 to 25 fathoms on October 4th, 1901, and measured about $12\frac{1}{2}$ centimetres. A few fragments of *Crangon allmanni* was the only food observed in the stomach of this specimen.

PLAICE. *Pleuronectes platessa*, L.

Two hundred and twenty-six Plaice, most of them small, have been examined.

Eighteen specimens from the Moray Firth, collected on May 18th, 1900, and measuring from $7\frac{1}{2}$ to 20 centimetres, appeared to have been feeding for the most part on Lugworms, *Arenicola* sp., as the food contained in their stomachs, as far as it could be distinguished, consisted of the remains of these Annelids.

One hundred and thirty-five specimens were from Annan (Solway Firth), and were collected on April 30th, 1900; eighty-two of these specimens were under 10 centimetres in length, while the other fifty-three ranged from 10 to 19 centimetres. The stomachs of nearly all these fishes contained food, but it was in many instances too imperfect for satisfactory determination. The organism which composed the principal part of the food of the smaller specimens was *Eurytemora velox*, one of the Copepoda. *Corophium grossipes*, remains of Schizopods (Mysidæ), larval *Balani*, fragments of lamellibranch shells and of polychæte worms were also occasionally observed. The food of the larger Plaice, on the other hand, consisted for the most part of small lamellibranchs, such as *Tellina* (chiefly *T. baltica*), *Cardium* sp. (probably young *C. edule* and *C. fasciatum*). Copepods were rarely observed in the stomachs of the larger Plaice. Another sample from Annan consisting of twenty-four small specimens, ranging from $3\frac{3}{4}$ to $4\frac{1}{4}$ centimetres in length and collected on June 26th, exhibited, as regards their food, a somewhat remarkable contrast to those previously examined which were collected in April. The food in the stomachs of the present sample consisted entirely of the Copepod *Jonesiella spinulosa*, one of the Harpacticidæ; this species occurred in considerable numbers in almost all the stomachs in this sample. In the stomachs of another sample from the same place and collected at the same time, but ranging from 7 to $7\frac{1}{2}$ centimetres in length, *Jonesiella* was again of frequent occurrence, but a second Harpactid—*Canuella perplexa*—was also moderately common; specimens of *Cythere* (?) *pellucida* were occasionally noticed, as well as a few Foraminifera and fragments of *Crangon vulgaris.* A further sample of seven fishes, which measured from 10 to 15 centimetres, had Annelids in the stomachs of five of them; *Amphidotus* sp. was observed in one, but the contents of the others could not be distinguished. Eighteen specimens, also from Annan, and collected on July 30th, 1900, had very little in their stomachs, the only organisms identified being small lamellibranchs (*Cardium* sp.), Gasteropods (*Rissoa* sp.), *Canuella perplexa*, the remains of one or two Amphipoda and small Annelids.

In the stomach of a moderate-sized Plaice obtained from the fishermen at the Bay of Nigg on March 29th, 1900, the following species were obtained:—*Amathilla homari*, *Gammarus locusta*, *Idothea baltica* and *Idothea emarginata*; while in the stomachs of a few Plaice, also of moderate size, taken in the Bay of Nigg on April 11th, 1901, only the remains of Annelids were observed.

The names of the organisms from the stomachs of the Plaice referred to in the preceding notes will be found in the annexed Table:—

SPECIES FOUND IN THE STOMACHS OF PLAICE.

CRUSTACEA.	OTHER THINGS.
Crangon sp. (small).	*Mytilus* (?) *edulis.*
Praunus (?) *inermis* (Rathke).	*Cardium* sp. (small).
Pseudocuma cercaria (P.-J. van Beneden).	*Tellina* (?) *tenuis.*
Idothea baltica (Pallas).	*Tellina* (?) *baltica* (in nearly all the stomachs).
,, *emarginata* (Fabricius).	*Donax* sp.
Bathyporeia sp.	*Hydrobia ulvæ.*
Pontocrates arenarius (Spence Bate).	*Rissoa* sp.
Amathilla homari (Fabricius).	Annelids (Polychæta sp.)
Gammarus locusta (Lin.).	Annelids (Lugworms chiefly).
Corophium grossipes (Lin.).	*Amphidotus* sp.
Cythere (?) *pellucida*, Baird.	*Polystomella striato-punctata.*
Eurytemora velox (Lilljeborg).	
Canuella perplexa, T. and A. Scott.	
Jonesiella spinulosa (Brady and Robertson).	
Balanus (cypris stage).	

LEMON SOLE. *Pleuronectes microcephalus*, Donovan.

Several Lemon Soles were examined, but the remains of Annelids formed, as usual, nearly the whole of their food; the only other thing worth recording here is an example of *Acidicola rosea*, Thorell, found in the stomach of a specimen from the Moray Firth; this Copepod lives within the branchial sac of an Ascidian, and probably the Lemon Sole had swallowed one of these Ascidians, and the *Acidicola* had then somehow parted company with its host.

It has been pointed out in former reports on the food of Lemon Soles* that Annelids constitute by far the largest proportion of it, but it has also been shown that a considerable number of the stomachs that have been examined have been empty. With reference to the frequent appar-

* See papers by Dr. Ramsay Smith in Part III. of the *7th, 8th, 9th, and 10th Annual Reports of the Fishery Board for Scotland.* I will refer later and more particularly to some of the results given in these papers, but the following figures may be noted here. Out of 821 stomachs of Lemon Soles examined, 333 were empty or contained matter that was not distinguishable and 383 contained Annelids, so that only 105 (or scarcely 11½ per cent.) of those stomachs contained other than Annelid food.

ent absence of food in the stomachs of Lemon Soles, it is interesting to note in the work by Professor P. J. van Beneden on the Fishes of the Coasts of Belgium, already alluded to, that the author in speaking of these fishes remarks:—"Nous ne connaissons donc ne leur pâture ni les vers qui les hautent," and again—"Nous avons eu, au mois de juin, l'occasion d'en étudier deux examplaires provenant de la côte de Norwége, tous les deux très-frais; ils ne contenaient riens dans leur estomac, ni aucun parasite sur les branchies et dans les intestines." *

COMMON DAB. *Pleuronectes limanda*, L.

Sixty-eight specimens of Common Dabs have been examined, forty-one from Aberdeen Bay, seven from the Firth of Forth, and twenty from Annan.

Two from a sample collected in Aberdeen Bay in September, 1900, had some Amphipods and the remains of Starfishes in their stomachs, but they were not sufficiently perfect for identification. The stomachs of eighteen specimens captured in the vicinity of Aberdeen on September 20th and 25th, 1900, and ranging from 10 to 30 centimetres in length, were all found to contain food, and there was no appreciable difference in the food of the smaller from that of the larger specimens, which, in all of them, consisted principally of brittle Starfishes in a very fragmentary condition. In some cases the food consisted entirely of Starfish remains, but in a number of the stomachs of a few other things were also observed. In one a young hermit was obtained, and *Apherusa borealis* in another. *Pariambus typicus* was noticed in several, and the remains of other Crustacea not perfect enough for identification; young Molluscs—such as *Cardium echinatum*—and Annelid remains were also occasionally observed. *Paratylus falcatus*, a somewhat rare Amphipod, was obtained in the stomach of a specimen about 13 centimetres in length. The food contained in the stomachs of another sample from Aberdeen Bay, collected on June 10th, 1901, exhibited a greater variety in the organisms of which it was composed. The number of fishes in this sample was twenty-one, and they were mostly of small size; none of them reached six inches in length, while the smallest measured about three inches (or from $7\frac{3}{10}$ cm. to about $14\frac{1}{2}$ cm.). Annelids and brittle Starfishes formed the principal part of their food, but there were also a considerable number of other things observed, as shown by the following examples:—A Dab, $14\frac{1}{4}$ cm. in length, had in its stomach *Montacuta ferruginosa*, *Venus fasciata* (jun.), *Mya arenaria* (jun.), *Chiton* sp., *Philine scabra*, *Pariambus typicus* (and some other Amphipods—the fragments only remaining), several *Cythere* (?) *confusa*, *Ophiura albida* (there were fragments of this and probably also of another species), and a few specimens of *Miliolina seminulum*. In the stomach of another were found the remains of Starfishes (Ophiuroids) and Annelids; *Metopa rubrovittata*, *Apherusa borealis*, *Cythere confusa*, and other Crustaceans. *Apherusa borealis* occurred in several stomachs; *Leucothoë lilljeborgii*, *Argissa hamatipes*, *Microprotopus maculatus*, *Dulichia* sp., and a few other Amphipods were also obtained, but they were all more or less damaged. Young Mysidæ were observed in some of the stomachs, but no Isopods were met with. In view of the difference between the food observed in the stomachs of these Dabs and that obtained in the stomachs of previous samples, the question may be asked:—Was the difference due to a greater variety of suitable organisms on the ground where these Dabs were feeding, or was the difference the result of more or less deliberate choice—the fishes being more inclined to feed on certain

* *Les Poissons des Cotês de Belgique*, p. 77.

organisms at one time, while at another time they preferred different forms? Probably the food present on the ground determines, to some extent, the kind of organisms that are to be found in the stomachs of such fishes as are at least partly or wholly omnivorous.

A sample of twenty small Dabs—some of them being under two inches in length—were sent from Annan on April 30th, 1900. The food of this sample consisted of small lamellibranchs and other Molluscs; Amphipods such as *Bathyporeia* sp., *Corophium grossipes*, and *Gammarus*; and a few Copepods, chiefly *Eurytemora*, were also observed, besides fragments of Annelids, Zoophytes, etc., but nothing very particular was noticed.

The stomachs of seven specimens from the Firth of Forth, collected on May 13th, 1901, contained several small *Eupagurus* (? *cuanensis*), several *Ampelisca* sp., *Stenothoë marina*, *Paramphithoë monocuspis*, *Cheirocrates intermedius*, and *Dulichia falcata*, and also some remains of Annelids. The names of all the species will be found in the list annexed:—

LIST OF ORGANISMS FOUND IN THE STOMACHS OF COMMON DABS.

CRUSTACEA.	OTHER THINGS.
Eupagurus cuanensis (Thomp.).	Remains of small fish.
Eupagurus sp.	*Mya arenaria* (jun.).
Crangon sp. (jun.).	*Cyprina* (jun.).
Young Mysidæ.	*Cardium echinatum* (jun.).
Idothea baltica (Pallas).	*Mactra* sp.
Idothea sp. (jun.).	*Venus fasciata* (jun.).
Bathyporeia sp.	*Montacuta ferruginosa.*
Argissa hamatipes (Norman).	*Chiton* sp.
Ampelisca sp. (fragments).	*Philine scabra.*
Stenothoë marina, Spence Bate.	Annelid remains.
Metopa alderi (Spence Bate).	*Echinocyamus pusillus.*
Metopa (?) *rubrovittata*, G. O. Sars.	*Ophiura albida.*
Metopa sp.	Starfish remains.
Leucothoë lilljeborgii, Boeck.	*Hydrozoa.*
Paramphithoë monocuspis, G. O. Sars.	*Miliolina siminulum.*
Apherusa borealis (Boeck).	
Paratylus falcatus (Metzger).	
Gammarus locusta (Linn.).	
Cheirocrates intermedius, G. O. Sars.	
Photis sp.	
Microprotopus maculatus, Norman.	
Corophium grossipes (Lin.).	
Dulichia falcata, Spence Bate.	
Pariambus typicus (Kröyer).	
Cythere confusa, Brady and Norman.	
Eurytemora velox (Lilljeborg).	
Longipedia coronata, Claus.	
Ectinosoma sp.	

FLOUNDER. *Pleuronectes flessus*, L.

A considerable number of Flounders obtained from the salmon fishers at the Bay of Nigg have been examined, but the stomachs of most of them contained only the remains of Annelids, which were usually too much decomposed for identification, the only form recognised being the common Lugworm (*Arenicola*). Of seven specimens obtained on March 19th, 901, the stomachs of six did not contain anything that could be identified, but the following organisms were obtained in the other one, viz.:—*Idothea baltica*, *pelagica*, and *emarginata*, and also *Gammarus locusta*. The stomachs of eleven specimens were obtained on the 23rd, and five of these contained only a little digested matter; one was full of small Annelids, with the addition of a *Crangon vulgaris*, while the food contained in the other five was composed of Annelids and Amphipods (*Gammarus* (?) *locusta* chiefly).

A small Flounder from Annan, collected on April 30th, 1900, and measuring slightly over 13 centimetres, had its stomach and intestines filled with *Corophium grossipes*. Two other specimens, somewhat larger (about 17 to 19¼ cm.), from the same place, and collected at the same time as the last, had numerous fragments of *Tellina baltica* and a few small *Cardium* sp. in their stomachs.

In the stomachs of several of the Flounders obtained at various times from the salmon fishers at the Bay of Nigg, small *Portunus* (*P. holsatus*, jun.), *Idothea emarginata*, *Idothea pelagica*, *Paratylus swammerdami*, and *Amathilla homari* were observed. The names of the different species are given in the Table:—

Species Found in the Stomachs of Flounders.

Crustacea.	Other Things.
Portunus sp. (small). *Crangon vulgaris* (Lin.). *Idothea baltica* (Pallas). ,, *pelagica*, Leach. ,, *emarginata* (Fabricius). *Paratylus swammerdami* (M. Edwards). *Amathilla homari* (Fabricius). *Gammarus locusta* (Lin.). *Corophium grossipes* (Lin.).	*Cardium* sp. *Tellina baltica.* *Hydrobia ulvæ.* Annelids (*Arenicola* and others).

Black Sole. *Solea vulgaris*, Quen.

The following are notes of the contents of twenty-five stomachs of *Solea vulgaris* examined at different times; all the specimens, with the exception of four from the Clyde, were from Annan. The Annan specimens were of small size, ranging from 6½ to 18 centimetres in length; the four from the Clyde were larger, and measured 24½ to 32 centimetres. The food in the stomachs of the Clyde specimens, so far as it could be identified, consisted of Annelids and lammellibranch Mollusca. The food of the Annan specimens was similarly composed of Annelids, but there were also a few Crustaceans observed, such as *Corophium grossipes*, a specimen of *Hyperia* (?) *galba*, a few Copepoda (*gen. et sp.?*), and a few Ostracoda (*Cythere* sp.), but the specimens were not in very good preservation.

Hebridean Smelt. *Argentina sphyræna*, L.

Twenty-four specimens of the Hebridean Smelt (or Argentine), collected fifty miles to the eastward of Fair Island on October 19th, 1900, were examined on the 26th of the same month. The lengths of the specimens ranged from 15 to 21 centimetres. Annelids appeared to form the principal part of the food of these specimens, but the smaller Crustacea were also fairly well represented, and the following Molluscan species were observed:—*Tellina prismatica* (once), *Philine scabra* (in two stomachs), and *Dendronotus* sp. (once). *Tomopteris* (one of the Annelida) was obtained in three stomachs, and in one of them a considerable number of this curious species was found, the tube of a species of *Pectinaria* was also noticed. The Crustacea comprised the following amongst other species:—*Crangon allmanni*, which was obtained in six stomachs, and a young *Portunus* in one; *Ampelisca macrocephala* occurred in one, and *Stenothoë marina* in six. *Proto pedata* was observed in five stomachs, many specimens being found in one or two of them; *Dulichia* sp. and a few other Amphipods which could not be satisfactorily determined were also observed. The only Copepod noticed was *Longipedia coronata*, and it occurred in only one of the stomachs examined. In only one stomach were the remains of Starfishes observed. All the stomachs contained food, and the names of the organisms observed in them are given in the annexed Table:—

Species Observed in Stomachs of Hebridean Smelt.

Crustacea.	Other Things.
Portunus sp. (jun.). *Crangon allmanni*, Kinahan. *Ampelisca macrocephala*, Lilljeborg. *Stenothoë marina*, Spence Bate. *Pontocrates altamarinus* (Spence Bate). *Dulichia* sp. *Pariambus typicus* (Kröyer). Amphipod remains. *Longipedia coronata*, Claus.	*Tellina prismatica*. *Philine scabra*. *Dendronotus* sp. *Pectenaria*, *Tomopteris*, and other Annelids. Starfish remains.

Herring. *Clupea harengus*, L.

The stomachs of two hundred and fifty-seven Herrings have been examined; they are from the following places:—A sample from Annan, collected on July 30th, 1900, and one from Ballantrae, Firth of Clyde, collected on March 15th, 1901; a sample of twenty-three from the Firth of Forth, collected in May, 1901; another of fifteen from the Bay of Nigg, collected on June 19th, 1900, and of sixty from Aberdeen Bay (six being collected on August 14th, five on November 9th, and thirty-one on December 17th, 1900, and eighteen on June 6th, 1901). There was also a sample of Herrings collected off Collieston on July 5th, 1901, but with the exception of the specimens from the Clyde all those examined were of small size.

The sample from Annan, collected in July, measured from 6 to 9½ centimetres in length; all their stomachs contained Schizopods, which appeared to belong chiefly to one species, *Neomysis vulgaris*; the only other organisms noticed were one or two specimens of *Macropsis slabberi*, which occurred in the stomach of one of the smallest Herrings. Some Copepods were obtained in a few of the stomachs, but the only species identified was *Ectinosoma atlanticum*. A small *Mytilus* was also observed.

In the stomach of a Herring from Annan, collected in May, 1900, and measuring about 10¼ centimetres in length, numerous Copepods were observed, all belonging to *Eurytemora velox*; there were also fragments of *Mysidæ* and a small Amphipod.

The specimens from Ballantrae were collected by Mr. Dannevig, who kindly permitted me to examine them; they ranged from 21¼ to 30¼ centimetres in length. The only food observed in the stomachs of this sample consisted of larval Crustaceans.

The Herrings from the Firth of Forth measured from four to nearly five inches (10 to $14\frac{1}{2}$ cm.) in length; the stomachs of all the specimens contained food which for the most part consisted of pelagic Copepods and larval *Balani* (cypris stage). *Oikopleuræ* were moderately common in at least eight of these stomachs. The Copepods most frequently observed were *Pseudocalanus elongatus, Temora longicornis,* and *Centropages hamatus*; *Podon leuckartii* (G. O. Sars), one of the Cladocera, was also of frequent occurrence. A few other organisms were occasionally noticed; but those mentioned above formed the chief constituents of the food of this sample of Herrings.

In June, 1900, a shoal of young Herrings came into the Bay of Nigg; fifteen of them, collected on the 19th, and measuring from $5\frac{1}{2}$ to $6\frac{1}{2}$ centimetres, were examined, and the food contained in their stomachs was found to consist entirely of Copepods, some of which were pelagic, while others were demersal forms. The species identified were *Temora longicornis, Idya furcata,* and *Dactylopus tisboides.*

A small lot of average-sized Herrings, collected off Aberdeen on August 14th, had apparently, like those from the Bay of Nigg, been living entirely (or largely) on Copepods—no other organisms being observed in their stomachs—but the specimens were scarcely perfect enough for identification.

A sample of Herrings from Aberdeen Bay, collected on November 11th, 1900, and measuring from 13 to $14\frac{1}{2}$ centimetres in length, had nothing in their stomachs that could be identified. Another lot, also from Aberdeen Bay, and comprising thirty-one specimens, measuring from $12\frac{1}{4}$ to $15\frac{1}{4}$ centimetres, were collected on December 17th, 1900. The stomachs of all these specimens contained a considerable amount of food, which consisted very largely of *Parathemisto oblivia* and *Sagitta*; *Calanus finmarchicus* occurred also sparingly in nearly all the stomachs; but this species, except in a very few examples, formed but a small proportion of the food. *Temora longicornis, Metridia lucens, Candacia pectinata,* and fragments of a Schizopod ("Euphausida") were occasionally observed, but, as already stated, the principal constituents of the food of these Herrings were *Parathemisto* and *Sagitta.* It will be observed that the food of this sample of Herrings is in marked contrast to that found in the stomachs of those previously described. I do not remember having formerly observed *Sagitta* so plentiful in the stomachs of fishes as a constituent of their food. Many observations have been made on the food of fishes, but they were frequently made under conditions that did not admit of exact microscopical examination, and the presence of *Sagitta* may have thus at times been overlooked. It has also to be remembered that the *Sagitta,* like other creatures not protected by a chitinous or calcareous test, are readily acted upon by the gastric fluid and soon become unrecognisable, so that unless the fish had been feeding on these organisms shortly before or about the time it was captured they may become so much decomposed as to be indistinguishable.

In order to indicate more clearly the peculiar character of the food found in the stomachs of these Herrings I subjoin a short extract from the records made when the fish were examined:—

[Table.

SIZE OF FISH.	KIND OF FOOD.							
13·0 cm.	*Sagitta*,	few;	*Parathemisto*,	none;	*Calanus*,	frequent;	*Metridia*,	very rare.
12·7 ,,	,,	numerous;	,,	frequent;	,,	few.		
14·4 ,,	,,	numerous;	,,	frequent;	,,	rare;	*Temora*,	rare.
14·7 ,,	,,	frequent;	,,	few;	,,	few.		
14·7 ,,	,,	frequent;	,,	common;	,,	few.		
14·5 ,,	,,	numerous;	,,	frequent;	,,	few;	*Temora*,	rare.

The records for the whole thirty-one stomachs are very much a repetition of the part here given, and the peculiarity of the food contents will be more noticeable when compared with the food of the next sample of Herrings, which are also from Aberdeen Bay, but which were collected on June 10th of the present year (1901). In this sample there were eighteen Herrings, the lengths of which ranged from 13 to 16½ centimetres, and their food consisted very largely of pelagic Copepods, the most common form being *Temora longicornis*, a species which in the last sample held a very subordinate place as a constituent of their food. *Pseudocalanus elongatus* was moderately frequent, but larval *Balani* (cypris stage), though found in a considerable number of the stomachs, were not very numerous; on the other hand, *Schistomysis spiritus*, which only occurred in a few stomachs, was common or abundant in one or two of them. *Oikopleura*, which were common in the stomachs of some of the Herring from the Firth of Forth, were also moderately frequent in the stomachs of this lot. Subjoined is part of the notes made when this sample of Herrings was examined, as it will show more clearly the contrast between their food and the food of the previous sample:—

SIZE OF FISH.	KIND OF FOOD.		
15·8 cm.	Copepods, frequent (*Temora* and *Pseudocalanus*);	young *Balani*, few;	*Oikopleura*, many.
14·8 ,,	,, common (,, (chiefly), ,,);	,, ,, few;	,, many.
14·0 ,,	,, frequent (,, and ,,);	,, ,, none;	,, none.
15·2 ,,	,, abundant (,, (chiefly), ?);	*Schistomysis spiritus*, common.	
13·0 ,,	,, abundant (,, (chiefly), none);	,, ,, abundant.	
16·5 ,,	,, few (,, and *Pseudocalanus*);	young *Balani*, few.	

Four specimens captured off Collieston on July 5th, 1901, measured 14, 14, $14\frac{3}{10}$, and 15½ centimetres respectively, and the food observed in their stomachs was as follows:—

(1) Copepods, frequent (*Acartia* sp.); *Podon* sp., very rare; young *Balani*, very few.

(2) Copepods, frequent (they appear to be mostly *Acartia* sp. and *Pseudocalanus elongatus*); remains of a Schizopod; *Podon* sp., very rare; a minute Gasteropod; and a few young *Balani*.

(3) Schizopods, numerous (chiefly *Schistomysis spiritus*); *Pseudocuma cercaria*, rare; *Pseudocalanus elongatus*, few; *Acartia* sp., frequent; young *Balani*, rare.

(4) Copepods, frequent (they appear to belong mostly to *Acartia*); young *Balani*, very few.

The names of all the species observed in the stomachs of the Herrings examined are given in the annexed list:—

SPECIES FOUND IN THE STOMACHS OF HERRINGS.

CRUSTACEA.	OTHER THINGS.
Young Decapods.	*Mytilus edulis.*
Schistomysis spiritus, Norman.	Minute Gasteropods.
Neomysis vulgaris (J. van Thompson).	*Oikopleura.*
Macropsis slabberi (P.-J. van Beneden).	*Sagitta.*
Pseudocuma cercaria, P.-J. van Beneden.	
Parathemisto sp. (jun.).	
Calanus finmarchicus (Gunner).	
Pseudocalanus elongatus, Boeck.	
Temora longicornis (O. F. Müller.	
Eurytemora velox (Lilljeborg).	
Centropages hamatus (Lilljeborg).	
Centropages sp.	
Metridia sp. (*? lucens*, Boeck).	
Ætidius sp.	
Candacia pectinata, G. S. Brady.	
Acartia sp.	
Ectinosoma atlanticum (Brady and Robertson).	
Dactylopus (?) *tisboides*, Claus.	
Idya sp.	
Evadne nordmanni, Loven.	
Podon leuckartii.	
Balanus (cypris stage).	

SPRAT. *Clupea sprattus*, L.

Thirty-three specimens have been examined, twenty being from the Moray Firth and thirteen from the Firth of Forth. The Moray Firth specimens were collected on December 25th, 1900, and measured about 9 to $13\frac{1}{4}$ centimetres in length; only nine of them contained food that could be identified, and it consisted for the most part of Copepods. The following are the species which have been satisfactorily determined:—*Calanus finmarchicus*, observed in one stomach; *Pseudocalanus elongatus*, observed in one; *Temora longicornis*, in six; *Acartia* sp., in two; and *Oithona* (?) *helgolandica*, in two.

The specimens from the Firth of Forth were collected in May of the present year (1901), and with the exception of one specimen they were all under four inches in length (about 8 to 9 cm.); the largest one measured about $13\frac{1}{4}$ cm. The stomachs of all the thirteen specimens were fairly well filled, but their food consisted almost entirely of pelagic Copepoda. The most common species were *Pseudocalanus elongatus*, *Temora longicornis*, and *Centropages hamatus; Calanus finmarchicus* was also present in most of the stomachs, but was usually represented by only a few specimens; *Podon leuckartii*, *Evadne nordmanni*, larval Decapods, and larval *Balani* (both nauplius and cypris stages) were occasionally observed.

The names of the various organisms noticed are arranged in the annexed list:—

[TABLE.

SPECIES FOUND IN THE STOMACHS OF SPRATS.

CRUSTACEA.	OTHER THINGS.
Larval Decapods. *Cumacea* sp. (young). *Calanus finmarchicus.* *Pseudocalanus elongatus.* *Temora longicornis* (Gunner). *Centropages hamatus* (Lilljeborg). *Acartia* sp. *Oithona* sp. (? *helgolandica* or *similis*). *Podon leuckartii.* *Evadne nordmanni*, Lov. *Balani* (nauplius and cypris stages).	

ALLIS SHAD. *Clupea alosa*, Lin.

A specimen of *Clupea alosa* was obtained from the salmon fishers at the Bay of Nigg on August 18th, 1900 ; it had been captured in their nets during the preceding tide. The specimen measured twenty inches (about 50 cm.) in length, and weighed 2 lbs. 6¼ oz. The food contained in its stomach, which appeared to consist entirely of *Temora longicornis*, filled a 4-oz. bottle.

TWAIT SHAD. *Clupea finta*, Cuv.

A specimen of the Twait Shad measuring 20¾ inches, or nearly 51 centimetres, in length, which was captured about eight miles east-north-east of Aberdeen on January 6th of this year (1902), had in its stomach two Sprats about 7½ centimetres in length, and also several Amphipods belonging apparently to *Parathemisto oblivia* (Kröyer).

COMMON EEL. *Anguilla vulgaris*, Leach.

Nineteen specimens of the Common Eel have been examined, seven of which were captured at the mouth of the River Dee at Aberdeen, one in Loch Fyne, and eleven in Loch of Loirston—a few miles distant from the Laboratory—and for these I am indebted to Dr. Williamson. The specimen from Loch Fyne was captured near Inveraray in 1897, but it was only examined on January 27th, 1901. The stomach of this specimen contained three dozen examples of *Idothea pelagica*, Leach. Some of the female specimens carrying ova measured scarcely 5 millimetres in length. The fragments of a few *Gammarus locusta* were observed in the intestines of this fish.

Two specimens of average size captured near the mouth of the River Dee, the one in July and the other in August, 1900, had in their stomachs partly digested Crustacea and Annelids. Five which were captured near the mouth of the River Dee on July 8th, 1901, and measured from 37½ to 60 centimetres in length, were examined, and in the stomach of the largest one a small shore Crab, *Carcinus mænas*, and the partly digested remains of a Hermit Crab were obtained; the stomach of another, 39½ centimetres, contained a small Gunnel, *Pholis gunnellus*, the length of which was about 10 cm.; but the other three stomachs contained nothing that could be identified.

The specimens from Loch of Loirston were collected early in June, 1901, five being collected on the 4th and six on the 5th; nothing was observed in the stomachs of those collected last that could be identified, but the stomachs of the other five contained partly digested Sticklebacks, *Gasterosteus aculeatus*; several of these little fishes were observed in the stomach of the largest Eel, which was about 90½ centimetres in length.*

Conger Eel. *Conger niger* (Risso).

The following are records of the food observed in the stomachs of five specimens of *Conger niger*. Several others have been examined but as no food was observed in their stomachs they are not mentioned here. A specimen from Loch Fyne weighing 26 lbs., and captured in September, 1900, had in its stomach a partly digested *Cottus* sp. and several Gobies. The stomach of another, but smaller, specimen, captured at the same time as the last, contained three *Cottus* sp. and the remains of a shore Crab, *Carcinus mœnas*, and of a Hermit Crab, *Eupagurus* sp.

The stomach of a specimen obtained from the salmon fishers at the Bay of Nigg on July 23rd, 1900, and measuring 48½ inches (fully 112 cm.), contained an *Octopus vulgaris*, which was about 13½ inches (nearly 24 cm.) in length, measuring from the posterior end to the extremity of the tentacles.† A specimen was obtained from the salmon fishers on August 16th, 1900, which measured 57½ inches (about 144 cm.) in length and weighed 18 lbs., and in its stomach was found a partly digested Mackerel and the remains of Decapod Crustacea, too imperfect to be identified. In the stomach of another specimen which was also obtained from the salmon fishers, and which measured 61 inches long and weighed 32 lbs., the remains of fish and fragments of *Cancer pagurus* were obtained. On the outside surface of the stomach of this specimen were fascicles of minute globules resembling *Myxosporidium congri* (a Sporozoon).‡

Great Pipe-fish. *Syngnathus acus*, L.

Twenty-four specimens from Annan, collected in April and May, 1900, and measuring from 13 to 16½ centimetres, have been examined, and in the stomach of one of them a number of young Mysidæ were observed, but the food of all the others consisted entirely of Copepods, *Eurytemora velox* being the only species observed.

Straight-nosed Pipe-fish. *Nerophis æquoreus* (L.).

The stomach of a specimen 14 inches long, sent from Annan, collected April 30th, 1900, contained numerous specimens of young Mysidæ, but they were too young and too much decomposed for more particular identification.

* Van Beneden, referring to the presence of Eels in the reservoirs that had been prepared for Lobster culture, states that they are dangerous enemies of these Crustaceans, and, speaking generally of the food of Eels, he remarks:—"On peut dire que tout ce que a vie est dévoré par ce poisson. Il n'y en a pas de plus vorace. Les Crustacés mêmes, les Ecrevisses et les Homards deviennent leur proie."—(*Les Poissons des Cotês de Belgique*, p. 82.)

† Prof. P.-J. van Beneden also records *Octopus vulgaris* in the stomach of a Conger, and adds:—"Nous en avons trouvé, au mois de Janvier, un Poulpe complet, remplissant tout la cavité de l'estomac."—*Les Poissons des Cotes de Belgique*, p. 82.

‡ *Myxosporidium congri*, Perugia, Boll. Sci., Pavia, vol. xiii., pp. 24, 25, figs. 15-20; see also Dr. Gurley's Memoir on Psorosperms of Fishes in the *Report of the United States Commission of Fish and Fisheries*, 1892 (pub. 1894), p. 182, pl. 6, figs. 3-8.

§ Van Beneden, *op. cit.*, p. 89, states that the food of *Syngnathus acus* is *Crangon vulgaris*, and that the same Crustacean forms also the principal food of the next species (*Nerophis æquoreus*), but he adds that he had obtained, in addition to the *Crangon*, a dozen young fishes which he had not been able to determine.

Grey or Blue Skate. *Raia batis*, L.

The examination of the stomachs of nine specimens of *Raia batis* gave the following results—three stomachs of moderate-sized fish obtained at the Fish Market, Aberdeen, on March 21st, 1901, contained partly digested *Pandalus montagui* and the remains of other Crustaceans, but they were too imperfect for identification. The stomachs of two of average size were obtained at the Fish Market on April 9th, 1901; one of them contained the remains of flat-fishes, Whitings, *Crangon vulgaris*, and *Nika edulis*, the other contained one Common Gurnard, two flat-fishes, and the remains of two *Portunus holsatus*, but they were all very imperfect.

Three stomachs which were obtained at the Fish Market on April 11th, 1901, contained the remains of fishes (Whitings and others), but too imperfect for identification.

The stomach of a Grey Skate measuring 15 inches across the pectoral fins, collected in the deep water (65 fathoms) off Aberdeen, contained the remains of *Crangon allmanni* and *Pandalus montagui.*

Van Beneden, referring to the food of *Raia batis*, remarks that "Ce poisson dévore tout," and gives the following list of fishes that he had found in their stomachs:—*Callionymus lyra; Gadus morrhua*, jun., *Gadus æglefinus*, *Gadus merlangus*, and *Pleuronectes platessa*, L. *Portunus holsatus*, *Loligo vulgaris*, and *Solen ensis* were also among the organisms obtained by him.* Day also refers to the voracity of the Grey Skate, and states on the authority of Mr. Dunn of Mevagissey that a stone of nearly a pound weight was taken from the stomach of one of these fishes.†

Shagreen or Fuller's Ray. *Raia fullonica*, L.

The stomachs of three specimens of Fuller's Ray, obtained at the Fish Market, Aberdeen, contained a *Portunus holsatus* (with a sacculine parasite attached to its abdomen), *Spirontocaris securifrons*, *Nika edulis*, *Pandalus montagui* and a fragment of *Scalaria* sp., which had within it a partly decomposed Hermit Crab. The stomachs of other four specimens were obtained at the Fish Market on April 9th; and one of them contained a Sand-eel 14 centimetres in length and also the remains of another small fish; one contained three Sand-eels fairly perfect as well as the remains of a few others, and a *Crangon allmanni*; a third stomach contained fish remains (probably of small Haddocks) and a Schizopod, *Gastrosaccus spinifer*; while in the fourth a male *Callionymus lyra* 12 inches (30 cm.) in length was obtained. Another stomach, received on April 11th, contained the remains of fish, but they were too imperfect for identification.

Thornback Skate. *Raia clavata*, L.

Two young specimens of *Raia clavata* captured in Aberdeen Bay on July 3rd, 1900, had some food in their stomachs which consisted chiefly of Amphipoda, but the only species identified were *Hippomedon denticulatus* and *Bathyporeia norvegica.*

The stomachs of two Thornback Skates obtained at the Fish Market, Aberdeen, on April 11th contained *Eupagurus bernhardus* and the remains of some fishes not perfect enough for identification.

Three small Thornbacks captured in the Firth of Clyde on October 4th, 1901, and measuring respectively 18^1, 22, and 23 cm. across the

* *Op. cit.*, p. 16.

† *Brit. Fishes*, vol. II., p. 337.

pectoral fins, had each a small quantity of food in their stomachs which consisted entirely of Annelids and small Crustacea (apparently *Crangon*), but the food was too imperfect to be satisfactorily determined.

P.-J. van Beneden remarks (*op. cit.*, p. 18) that he has, in the month of April, found the stomachs of young *Raia clavata* about the size of the palm of the hand full of *Pseudocuma cercaria*, *Gammarus locusta* and *Calanus finmarchicus*. Mr. Dunn of Mevagissey states that he has known of quantities of Thornback Rays captured in the winter that were glutted with Horse-Mackerel, and he also states that this Skate "is very partial to Herrings and Sand-eels."

Starry Ray. *Raia radiata*, Donovan.

A considerable number of Starry Rays were captured about 180 miles north-east of Buchan Ness on May 22nd, 1901, but the stomachs of most of them were empty, and any food observed consisted entirely of Crustaceans, which appeared to consist for the most part of young Decapods and Macruræ, but they were not perfect enough to be identified.

Five Starry Rays captured 10 miles off Aberdeen on August 21st, 1901, had all of them more or less food in their stomachs, and this, like that of the Starry Rays previously noticed, consisted wholly of Crustacea; these fishes measured from 22 to $27\frac{1}{2}$ centimetres across the pectoral fins. The food contained in the stomach of the smallest of these specimens was not sufficiently perfect for identification; the food in another was also a good deal broken up, but the remains of a *Hyas* and *Astacilla* were observed; other two stomachs contained *Crangon allmanni* and what looked like the remains of *Hyas*, while the stomach of the other, which was the largest of this sample of Starry Rays, contained *Ebalia tuberosa*, *Portunus pusillus*, young *Hyas coarctatus*, and *Crangon allmanni*. A considerable number of specimens of what appears to be a new species of *Eudactylina* were obtained on the gills of these Starry Rays, and several specimens of *Callicotyle kroyerii*, a Trematode not previously recorded from Scottish waters, occurred on the ventral surface of several of these Rays.

Eight specimens of *Raia radiata* captured in Aberdeen Bay on November 29th and 30th were examined; their sizes ranged from $5\frac{3}{4}$ to $11\frac{3}{4}$ inches across the pectoral fins. The food found in their stomachs consisted of various organisms, amongst which the remains of small fishes were more or less frequent; they included a small *Cyclopterus lumpus* and some small Clupeoids, Whitings, and Common Dabs; a small *Rossia* was found in one stomach, *Crangon vulgaris* in six, and *Schistomysis ornatus* in two or three. There did not appear to be any material difference between the food observed in the stomach of the larger from that of the smaller specimens.

Sandy or Cuckoo Ray. *Raia circularis*, Couch.

In the stomachs of two specimens of *Raia circularis* obtained in the Fish Market, Aberdeen, on April 9th, 1901, the only food observed consisted of the remains of a few Sand-eels. Fish remains constituted the only food found in the stomachs of several other specimens received from the same place on April 11th.

Five specimens captured in the Clyde on October 4th, 1901, and measuring $12\frac{3}{4}$, 13, 18, 18, and 19 centimetres across the pectoral fins, were also examined. The stomach of one, 18 cm. in width, had nothing in it that could be identified, but the others contained food which consisted almost entirely of Crustacea and Annelids; a few Foraminifera were also observed.

The names of the various forms obtained are given in the annexed Table :—

Species Observed in Stomachs of *Raia circularis*.

Crustacea.	Other Things.
Portunus holsatus (with sacculina). *Eupagurus* sp. *Nika edulis*, Risso. *Spirontocaris securifrons* (Norman). *Crangon* sp. *Pandalus montagui*, Leach. *Erythrops* sp. Remains of Mysidæ (sp. ?) *Ampelisca* sp. *Cythere jonesi*, Baird. Remains of small Crustacea (gen. et sp. ?)	Sand-eels. Fish remains (sp. ?) *Scalaria* (fragments). Annelid remains. *Biloculina depressa*.

Porbeagle Shark. *Lamna cornubica*, Cuv.

A Porbeagle Shark sent from the Fish Market at Aberdeen on December 3rd, and measuring about 3 feet 9½ inches in length to the fork of the tail, was examined at the Laboratory, and in its stomach were found the remains of ten partly digested Whitings, the lengths of which was probably from eight to ten inches ; the only other organism observed was a *Crangon*, but it might have been derived from the stomach of one of the Whitings.

Another specimen of a Portbeagle Shark obtained at the Fish Market on December 5th, and measuring 3 feet 4 inches to the fork of the tail, contained in its stomach one Common Dab about six inches long, the earstones of four Whitings, probably 8 or 9 inches in length, a small *Loligo* (or *Ommatostrephes*) about 6 or 8 inches long, but not perfect enough to be identified, and also a small Crustacean, *Inachus dorsettensis*.

Concluding Remarks.

It may be pointed out by way of conclusion that the observations contained in the preceding pages concerning the food of fishes, especially of the larger and more adult forms, agree generally with the results given in Part III. of the Tenth Annual Report of the Fishery Board for Scotland,* of the examination of 10,461 specimens. These specimens comprised Common Gurnards, Cod, Haddock, Whitings, Long Rough Dabs, Plaice, Lemon Soles, Common Dabs, and Witch Soles. The total numbers of the respective kinds examined, including those from the Firth of Forth and St. Andrews Bay, were :—

Common Gurnards, - -	1,113	Plaice, - - - - - -	1,931
Cod, - - - - - -	727	Lemon Soles, - - - -	821
Haddocks, - - - - -	1,006	Witch Soles, - - - -	217
Whitings, - - - - -	1,187	Common Dabs, - - -	1,778
Long Rough Dabs, - -	1,606	Flounders, - - - - -	75

About one hundred other stomachs, comprising those of Skate, Cat-fish, and Angler-fish, were also examined.

The general results brought out by the examination of these fishes serve to show that Crustacea formed the principal part of the food of the

* *On the Food of Fishes*, by W. Ramsay Smith, M.B., C.M., B.Sc., pp. 211-231.

Common Gurnard, the Cod, and to some extent also of the Haddock they also formed a considerable proportion of the food of the Long Rough Dab and the Common Dab. On the other hand fishes were seen to form the most important part of the food of the Whiting, while Annelids entered largely into the food of the Plaice, the Lemon Soles, and the Witch Soles.

Although in the present paper the results stated above are generally corroborated as regards the larger and adult fishes, it is shown that in the food of young and immature fishes, and even of those which in the adult stage live to a large extent on Annelids, the smaller Crustacea—Schizopods, Amphipods, and Copepods—form a very important part. If, for example, we compare the food of the Plaice, as given in the Tenth Annual Report already referred to, with the observations on the food of immature and small specimens contained in this paper, we find that, as recorded in the Tenth Annual Report, 1931 Plaice were examined, 1392 of the stomachs contained food which could be identified, and of this number only about 9 per cent. contained Crustacea, while fully 54 per cent. contained Annelids, and 45 per cent. Mollusca. In the present paper it is shown that, in marked contrast to the above, the food of the two hundred and twenty-six small specimens examined consisted almost entirely of minute Crustacea, and that it was in the stomachs of only a few of the larger of the specimens where Annelids were observed.

In a number of cases only a few stomachs have been examined, but it is likely that further observations will be made on the species noticed here as well as on others I have not yet had an opportunity to examine.

In former papers on the food of fishes it has usually been the larger organisms observed that have been recorded; the conditions under which these records were made were frequently unfavourable for the identification of minute forms; but in the preparation of the present paper these smaller forms have been specially studied, and this has permitted me to give a more detailed account of the food of the various fishes referred to.

X.—ICHTHYOLOGICAL NOTES.

By Dr. T. Wemyss Fulton, Scientific Superintendent.

The Anchovy (*Engraulis encrasicholus*, L.).

On 18th October two anchovies were taken in the small-meshed net around the otter-trawl in Aberdeen Bay in 16 fathoms; they measured 130 and 144 mm. On the 28th November other three were taken in the small-meshed net in 68 fathoms, nine miles south-east by east of Aberdeen; their length was 122, 127, and 130 mm. No specimens were procured in any of the other hauls during the year, or in the previous year. On 28th January 1902 a specimen was caught in a herring-net, in fourteen fathoms of water, off Buckhaven in the Firth of Forth, and forwarded to me by Mr. James Robertson, fisherman, who recognised it from the sketch of the outline of an anchovy which accompanied a circular sent to the Fishery Officers around the coast after the specimens at Aberdeen were taken. It was the only specimen received.

The anchovy appears to be a rare visitor to Scottish waters. In the winter of 1889-90, however, a number of specimens were captured at various parts of the coast, both the East Coast and the West Coast; the largest sent to me at that time measured $5\frac{1}{2}$ inches (140 mm.).*

It is of interest to note in this connection that the anchovy fishing on the Dutch coast (Zuiderzee) in 1889 was one of the smallest on record (1600 *ankers*), while in 1890 it was the largest recorded (190,000 *ankers*).† Last year, I believe, the fishery was also exceptionally productive. It is carried on in the spring.

Couch's Whiting (*Gadus poutassou*, Risso),

In last year's Report I recorded specimens of this species from the deep water off the Shetlands. In January 1902, I received a specimen from Mr. C. L. Barrett, which was caught in a net in the Firth of Forth, off Kincardine, on the 8th of that month. It was 214 mm. ($8\frac{1}{2}$ inches) in length. It does not appear to have been previously recorded from the Forth.‡

The Norway Pout (*Gadus esmarkii*, Nilsson).

Numerous specimens of this species were recorded in last year's Report from the deep water off the Shetlands, off Aberdeen Bay, the Moray Firth, and the Firth of Forth. Additional localities are the deep water (85 fathoms) off Kinnaird Head where a number of specimens were taken on 4th July, and Lunan Bay, near Montrose, where three specimens, 143, 144, and 148 mm., were taken in $12\frac{1}{2}$ fathoms on 28th June.

The Silvery Pout (*Gadus* (*Gadiculus*) *argenteus* (Guich.)).

Specimens of this species were recorded in last year's Report from the deep water off the Shetlands. On 21st August a single specimen was taken in the small-meshed net in 58 fathoms, about ten miles off Aber-

* *Eighth Annual Report, Part iii.*, p. 351.
† *Verslag van den Staat der Nederl. Zeevisscherijen, over 1900*, p. 192.
‡ Cf. Parnell, Fishes of the Firth of Forth; W. Eagle Clarke, *Ann. Scot. Nat. Hist.* January, October, 1900.

deen. Day records a specimen found by Sim in 1885 on the beach at Aberdeen after a storm. It doubtless had been carried from the deep water a little off the shore; but it must be rare, since numerous hauls of the fine net have been made there and no other specimen procured.

The Twaite Shad (*Clupea finta, L.*).

Three specimens of this species were obtained, one on 6th January, 1902, eight miles E.N.E. of Aberdeen, which measured 416 mm.; one on 18th January in the Firth of Forth, which measured 372 mm.; and the third on 8th January, three or four miles off Montrose, which measured 230 mm.

The Red Mullet (*Mullus surmuletus*, L.).

On 16th December a specimen of this species was taken in the small-meshed net in 57 fathoms, nine miles south-east from Aberdeen; it measured 112 mm. Another was caught by a trawler eight miles south-east from Girdleness—and therefore in the same locality—on 12th December, and landed. A third specimen was caught by a trawler on 27th January, 50 miles E.S.E. from Noss Head, it measured 309 mm., and weighed 12½ ounces.

The Red Gurnard (*Trigla cuculus*, L.).

In the course of the trawling work specimens of this species were occasionally caught. A female, measuring 336 mm., and with ovaries nearly ripe, was taken on 29th June, in eight fathoms, in Aberdeen Bay; another, 268 mm. in length, on 16th December, in 57 fathoms, nine miles south-east from Aberdeen; one was caught in Burghead Bay in 7–15 fathoms on 1st July, and other six in the same place on 2nd and 3rd August; seven were taken on 8th November, in 23–24 fathoms, off Lybster, Caithness, and one in 26 fathoms in the same locality on 18th January.

The Black Sea Bream (*Cantharus lineatus* (Montagu)).

Two specimens were caught by trawlers, one on the 5th January, six miles south-east from Tod Head, and the other on 8th January, seven miles east from Girdleness. The latter specimen measured 414 mm. in extreme length, 133 mm. in extreme height, and weighed 2 lbs. 4½ ozs.

The Great Silver Smelt (*Argentina silus*, Nilsson).

Specimens of this species from the deep water off the Shetlands were described in last year's Report. Since then a number of specimens have come into my possession from the same region, which were landed at the market at Aberdeen. They are occasionally brought ashore by trawlers, but fetch a poor price, a cwt. realising, for example, two shillings and ninepence. Trawling skippers say they can be got at any time in 100 fathoms, about 190 to 200 miles E.N.E. from Buchan Ness, but that, commercially, they are not worth bringing ashore. They may be got, I am informed, as far south as about 90 miles N.-E. ½ E. from Buchan Ness. In referring to this species last year the fact was overlooked that it was first described as British by Mr. E. W. L. Holt from a specimen obtained in 74 fathoms about 75 miles true south of the Old

Head of Kinsale.* Mr. W. L. Byrne, who drew my attention to this circumstance, informs me that the fish sometimes finds it way to the English markets.

The Opah or King Fish (*Lampris luna*, Gmel.).

A record of the specimens of this species landed at Aberdeen market has been kept for me by Mr. James Robb, with a note of the place where they were stated to have been caught. In June three specimens were caught as follows:—80 miles N.N.W. from Hoy, Orkney, in 125 fathoms; 40 miles N.N.W. from Foula; 67 miles N. from Noup Head. In July ten were recorded from the following localities:—90 miles N. by W. from Hoy; 65 miles N. from Noup Head (three specimens); 60 miles N. from Noup Head (two); 90 miles N.W. by W. from Hoy; 45 miles N. by E. from Foula (three specimens). In August one specimen was recorded from 45 miles N. by E. from Foula; and in September two from 90 miles N.W. by N. from Hoy. They were all taken by line.

The Angel-Fish (*Rhina squatina*).

A male specimen of this species was taken by a trawler between eight and nine miles south-east of Buchan Ness, in January 1902. It measured 79·5 cm. and weighed 8 lbs. 1 oz.

Macrurus lævis, Lowe.

Six specimens of this species were captured by the steam-trawler *Aberdeenshire* at St. Kilda, and landed some days later (3rd September). They measured from 296 to 420 mm., and were not in a very good state of preservation. During the survey of the fishing grounds on the West Coast of Ireland 25 specimens were taken, mostly about 26 to 40 miles off Achill Head, Co. Mayo.†

The White-beaked Dolphin (*Delphinus* (*Lagenorhynchus*) *albirostris*).

It may be mentioned here that a young specimen of this species was captured in an otter-trawl at the mouth of Loch Inchard, on the West Coast of Sutherlandshire, in about 40 fathoms, and landed at Aberdeen. It was alive when brought to deck. It was kindly identified by Professor Sir William Turner, K.C.B., to whom it was sent, and who described the species as Scottish some years ago.‡ Other Scottish specimens are referred to by Mr. Hugh Boyd Watt in a recent paper.§

* *Journ M.B.A.*, *V.*, 341.
† Holt and Calderwood, *Sci. Trans. Roy. Dublin Soc. V.* (Ser. II.), 473, 1895.
‡ *Proc. Roy. Phys. Soc., Edin.*, *X.* p. 14, 1891.
§ *Ann. Scot. Nat. Hist.*, *IX.*, 244, 1900.

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