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NORTHUMBERLAND SEA FISHERIES COMMITTEE.

REPORT on the Scientific Investigations

For the Year 1909, and to June 15th, 1910.

EDITED BY PROFESSOR ALEXANDER MEEK, M.Sc.,

ARMSTRONG COLLEGE (IN THE UNIVERSITY OF DURHAM), NEWCASTLE-UPON-TYNE,
DIRECTOR OF THE DOVE MARINE LABORATORY, CULLERCOATS, NORTHUMBERLAND.

Printed by order of the Committee.

NORTHUMBERLAND

SEA FISHERIES COMMITEE.

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1910.

CONTENTS.

SUMMARY AND GENERAL REPORT.

Circumstances did not permit of making trawling experiments later than August 27th. The four trials which were made up to this time proved interesting, however, since they furnished the necessary evidence of the return of the flat fish to the inshore waters in the summer. In addition the "Evadne," by means of a small net in December and March, on the sandy ground to the north of the mouth of the Tyne, disclosed the presence of young gadoids, gobies, and small herrings, and sprats — practically "white-bait."

Mr. Sisson adds notes to this account on the salinity of the water obtained at the trawling experiments, and off Cullercoats, and on the question of the effect of freezing on the salinity of sea water.

Further particulars are given with reference to the migrations of turbot and plaice. A turbot liberated in August, 1907, at Skate Roads was captured in July, 1909, 48 miles E.$\frac{1}{2}$S. of Aberdeen. A plaice marked in Skate Roads in July, 1909, was caught in December, 1909, near the Bell Rock. In addition to the further evidence of the growth of plaice furnished by the results of this experiment, an account is given of the growth of the plaice in one of the tanks of the aquarium.

The experimental legislation of the east coast of England is subjected to further analysis, and the figures for the Eastern District are added. It is shown in particular that the protection of the berried lobster in Northumberland has proved to be beneficial. The attempt to rear lobsters was a failure, due, it is believed to the berried lobsters being obtained from Shields market, and probably also to copper being present in the water. Mr. Douglas marked 74 berried lobsters, and 19 of these have been accounted for. One migrated ten miles north of Beadnell where it was liberated.

An experiment in transplanting mussels at Holy Island has evidently been attended with success. Moreover, the area being free from sewage contamination, the mussels have given exceptionally pure results when subjected to bacteriological analysis.

Miss Lebour describes more fully a new Trematode parasite of the Catfish, and advances good reasons for supposing that the larval stages occur in *Buccinum undatum*, and that there is no intermediate host.

Mr. Storrow draws attention to the presence of a sesamoid articular in the lower jaws of a number of fishes, and gives an account of a case of spinal curvature in a codling caught on the hook at St. Mary's Island.

St. Mary's Island furnished a new parasitic alga to Dr. Darbishire at Easter, and he describes it under the name *Chantransia sanctæ-mariæ*. He found it growing on a reproductive frond of *Himanthalia lorea*.

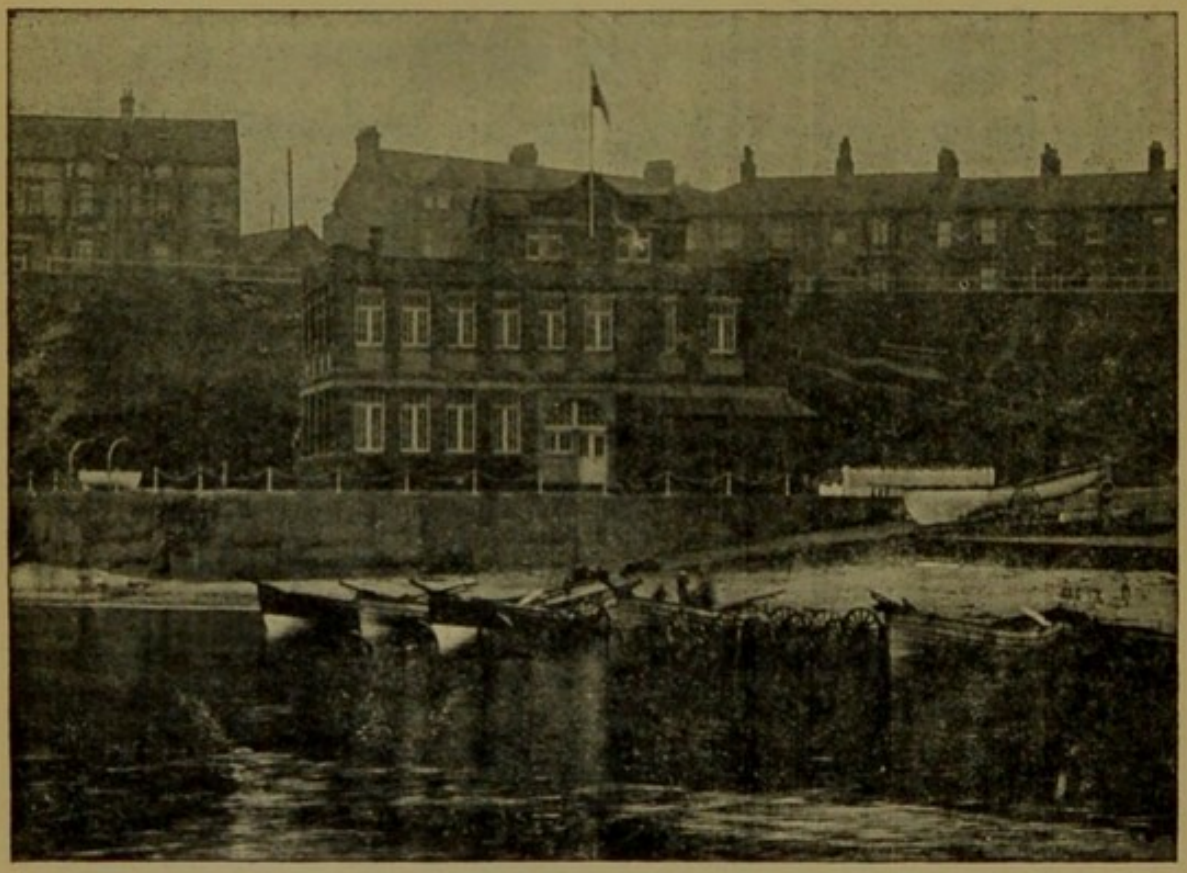
A three-eyed dab was sent to the Laboratory in January, 1909, and was found to be an extremely fine example of misapplied ingenuity.

Notes are given relating to the occurrence of rare and new fish and Mollusca in the district.

The new motor boat, the "Evadne," has already proved of great use for dredging purposes, and for experimental work, such as that involved in the transplantation of mussels at Holy Island. A short account is given of her construction and measurements.

Although nothing has been done to carry out the recommendations of the Treasury Committee with reference to Fishery Investigations in England, one change of importance has occurred. The English portion of the work of International Investigation, previously carried on by the Marine Biological Association, has been taken over by the Board of Agriculture and Fisheries. Thus the Board for the first time has become responsible for a definite scheme of research. It is to be hoped that this will lead to the development of national and of local investigations.

ALEXANDER MEEK.



DOVE MARINE LABORATORY, CULLERCOATS.

TRAWLING EXPERIMENTS.

It was only possible to conduct trawling experiments in the Committee's district on four occasions, and at the last experiment the trawl was caught by an anchor, thus rendering the results incomplete. The conditions and the detailed statement of the fish caught at each haul are given in tables I and II, and the results are summarised in terms of catch per one hour's trawling in table III.

The experiments of 1909, although few in number, are interesting, however, because they link the important facts given in the last report with reference to the experiments made in the winter of 1908-9 with the experiments of the following summer. It was found that there was the greatest possible contrast in the bays where the experiments are made between the summer and the winter. In the summer relatively large numbers of plaice and dabs with other species occupy the sandy grounds of the bays and in the winter very few plaice and practically no dabs and other species liable to be caught by the trawl net are to be met with.

The plaice gradually increase in numbers during the early months of the year, reaching a maximum from about June to October, and they rapidly decrease in numbers again in November and December. There is thus, as I put it, an annual flow and ebb of the plaice population. During the outward and inward migration median plaice are caught within the district by the inshore fishermen and just beyond the district by trawlers. It is about March that the median plaice are replaced outside the district by large plaice arriving from deeper water.

It is gradually becoming clear therefore that during the year there is a wholesale migration with reference to depth affecting all sizes of plaice. The small plaice, so to speak, move into the region previously occupied by the median, the latter into the region where the large plaice were congregated and the large spread into the deeper and wider areas beyond. The migration experiments tend to show that the large and median plaice about to become mature do not always come back again. Their place is taken by others to some extent at least derived from areas further south. But the immature plaice do not leave the immediate region of the coast. They move inshore in the spring and summer following the small plaice. Even the large mature plaice, as I have previously

shown, may to a certain extent in the latter part of the summer penetrate within a mile of the shore, into, that is to say, the region of the small and immature plaice.

The dabs, as was pointed out in the last report, leave the district almost completely during the winter, vide table V and chart I of the preceding report. The figures now submitted show still more convincingly the results of the summer inshore migration of this species. During the previous winter we sometimes did not get a single example, and in other cases only one or two were caught even as late as May 20th. If these results be compared with those for the summer of 1909 for the corresponding bays, it will be at once clear that the dab is essentially a summer visitor to the inshore waters. In this case there is no distinct segregation according to size. The whole population, mature and immature, except the very small ones migrate together outwards and inwards. Some of them at the same time exhibit a tendency to migrate southwards. During the winter the inshore fishermen and the trawlers catch the dabs within and without the district.

The flounder in the mature condition migrates, as has already been shown, to the north, and in the winter even the immature stages are poorly represented at our trawling stations.

The gurnard in similar manner is rarely caught in the winter, but in the summer, as is apparent from the figures given in this report it is often got in immense numbers inshore,—small, immature and mature. I think it will be found that the gurnard also migrates to the north and to the east. It is obtained by the trawlers outside our district during the inward and outward migration.

I cannot speak with the same confidence with regard to the rare sole and turbot. A few are caught in the summer. Not one was obtained in January and February. Our marking experiments have shown that the turbot with approaching maturity migrates beyond the district and often to a great distance. I have no information to report as to the few soles which have been marked.

In short, it may be said that most species are affected by the annual change in climate, and the tables now given may therefore be said to complete the general evidence of the annual flow and ebb of the fish population of the Committee's district.

It will be interesting to add here the results of short hauls with a small net on the ground locally known as the "Frolics," to the north of the mouth of the Tyne, and off Sharpness Point. The

first dredging trip of the "Evadne" was made to this ground on December 3rd, 1909, and in some ten minutes the catch was found to be:—

Six small Whitings.
Atherine or Sand Smelt, *Atherina presbyter*, 11.3 cm.
Sprat, 6.5 cm.
Shrimps.
Pleurobrachia, in immense numbers.

This Atherine is the first one which has been reported from the N.E. coast.

On March 3rd, 1910, with the same net on the same ground, the catch was:—

Herrings, average 10.5 cm.
Sprats, average 7.5 cm.
Gobies, *Gobius minutus*, 5+ cm.
Small Whitings.
„ Cod.
„ Dab.
Father Lasher, *Cottus scorpius*.
Pipe Fish, *Syngnathus acus*.
Post larval herring.
Shrimps, Amphipods and Molluscs, including *Doris depressa*.

These are the kind of fish which constitute whitebait, and it is interesting to know that in the early part of the year there is this congregation of the young stages of so many important species so close to the shore.

These preliminary trials are of importance since they serve to show that at the time when the dominant summer fish of the inshore regions have left the district, the waters still retain the very small flat fish, round fish, and pelagic fish. It is at this period also that the important gadoids approach the shore waters in still relatively large numbers.

PELAGIC LIFE.—It is not necessary to give full particulars at present of the plankton observed during the season. The most interesting feature was the presence in even larger numbers in the surface water than in the previous season of *Euthemisto compressa*. Large examples of this Amphipod, including many berried females, were also cast on shore at various times during March to May. They were scattered over the beach in countless numbers.

TABLE I.

Place.	Date.	Wind.	Sea.	Weather.	Temperature.		Condition of Ground.
					Air.	Sea.	
	1909.						
Alnmouth Bay ...	July 16th	N.W., strong	Smooth	Fine	67	55	Clean.
Druridge Bay ...	,,						
Blyth Bay ...	,,						
Skate Roads ...	July 28th ...	N.N.E.	Slight Swell	Dull, improving	58	55	Some *Laminaria* present.
Alnmouth Bay ...	Aug. 13th	N.W.	Smooth	Fine	.....	53	Clean.
Druridge Bay ...	,,						
Blyth Bay ...	,,						
Alnmouth Bay ...	Aug. 27th	S.E.	Slight swell following a heavy sea on 25th Aug.	Fine	.....	56	Clean.
Druridge Bay ...	,,						

NOTE.—See also page 28.

TABLE II.

1909.

First Haul. ALNMOUTH BAY, July 16th. Began 11·25 a.m., ended 1·25 p.m. Time, 2 hours. [Second half of flow.]

CENTIMETRES.

Name of Fish	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	Total.
Plaice	...	...	...	...	...	...	3	2	6	10	10	11	6	2	3	4	7	4	6	8	2	2	...	...	1	2	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	91
Dab	...	...	...	...	...	1	1	5	14	8	11	5	5	9	5	6	4	5	4	5	...	...	1	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	92
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	2
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Flounder	...	...	...	...	...	...	2	...	...	1	4	1	3	1	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	14
Gurnard	...	1	...	...	...	1	4	15	22	15	13	19	13	9	1	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	117
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1
																																									318

First Haul. DRURIDGE BAY, July 16th. Began 2·10 p.m., ended 3·40 p.m. Time, 1 hour 30 minutes.

[High tide and beginning of ebb.]

Plaice	...	...	...	...	1	...	3	8	4	14	7	4	4	2	1	2	6	9	3	7	4	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	83
Dab	...	...	...	...	...	...	...	2	3	7	5	2	3	5	2	...	1	3	...	1	...	3	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	38
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1
Flounder	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
Gurnard	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	1	...	...	...	1	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
																																									134

First Haul. BLYTH BAY, July 16th. Began 4·55 p.m., ended 6·10 p.m. Time, 1 hour 15 minutes. [Mid ebb.]

Plaice	...	...	...	...	...	1	2	5	7	5	6	3	...	1	1	...	2	1	3	2	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	42
Dab	...	...	...	...	...	...	...	...	3	2	2	1	3	3	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15
Flounder	...	...	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	4
																																										61

TABLE II.—Continued.

1909.

First Haul. SKATE ROADS, July 28th. Began 9·30 a.m., ended 10·30 a.m. Time, 1 hour. [End of flow.]

CENTIMETRES.

Name of Fish	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	Total.
Plaice	...	...	1	...	1	5	3	4	4	1	7	...	3	2	2	1	4	7	15	4	9	2	1	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	80
Dab	...	...	...	...	...	...	1	4	...	2	...	...	...	...	...	...	1	1	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	12
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
Flounder	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4
																																									97

Second Haul. SKATE ROADS, July 28th. Began 11 a.m., ended 1·30 p.m. Time, 2 hour 30 minutes. [First half of ebb.]

Plaice	...	...	...	...	2	3	12	16	15	4	7	7	3	6	7	2	5	12	7	10	9	8	5	2	8	...	4	...	2	...	...	...	...	...	...	...	...	...	...	...	156
Dab	...	...	...	...	...	...	...	1	...	3	2	1	...	2	3	...	2	2	1	1	...	...	2	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	22
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	2
Flounder	...	...	...	...	...	...	...	...	...	1	...	...	1	1	1	2	1	2	1	...	1	...	...	2	2	4	...	1	...	...	2	...	...	...	1	1	...	...	...	...	24
Gurnard	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
																																									205

Third Haul. SKATE ROADS, July 28th. Began 1·50 p.m., ended 2·50 p.m. Time, 1 hour. [Mid-ebb.]

Plaice	...	...	...	...	...	1	8	11	2	...	...	4	...	...	...	1	...	4	3	2	...	3	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	41
Dab	...	...	...	...	...	...	...	...	1	...	1	1	1	...	...	...	...	1	1	...	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
Thornback	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1
																																										51

TABLE II.—CONTINUED.

1909.

First Haul. ALNMOUTH BAY, August 13th. Began 11·20 a.m., ended 1 p m. Time, 1 hour 40 minutes.

[Second half of flow.]

CENTIMETRES.

Name of Fish	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	Total.
Plaice	...	...	...	...	1	4	4	...	2	1	2	8	4	5	1	6	7	4	7	5	6	8	4	6	6	2	1	...	...	2	1	...	...	1	...	1	...	...	..	...	...	99
Dab	...	...	...	...	...	...	1	6	8	17	30	28	22	13	11	4	3	1	3	1	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	148
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	3
Flounder	...	...	...	...	...	...	...	...	...	...	1	2	...	...	2	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	6
Gurnard	...	.	...	...	...	1	2	18	24	69	63	86	69	80	39	18	4	6	2	1	...	3	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	487
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1
																																									744

First Haul. DRURIDGE BAY, August 13th. Began 1 55 p.m., ended 3·25 p.m. Time, 1 hour 30 minutes.

[First half of ebb.]

Plaice	...	...	...	...	1	...	...	...	1	...	2	12	9	18	7	11	7	15	11	11	7	19	6	11	4	4	3	2	1	...	2	1	...	...	...	...	...	..	...	...	165
Dab	...	...	...	...	...	...	...	1	4	10	21	26	13	25	22	17	9	6	6	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	161
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	1	..	...	...	...	...	3
Turbot	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	.	1
Flounder	...	...	...	...	...	...	...	1	1	...	...	...	1	...	...	...	1	...	...	1	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	7
Gurnard	...	...	...	...	...	...	...	...	...	4	3	10	9	12	22	11	7	9	4	11	2	2	5	7	2	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	121
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2
																																									460

First Haul. BLYTH BAY, August 13th. Began 4·45 p.m., ended 6·15 p.m. Time, 1 hour 30 minutes.

[Second half of ebb.]

Plaice	...	...	...	...	...	1	1	2	...	2	5	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14
Dab	...	...	...	...	...	...	...	...	1	7	16	9	2	2	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	39
Sole	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	1
Gurnard	...	...	...	2	5	2	2	1	1	3	6	2	3	3	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	32
Angler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1
																																									87

TABLE II.—Continued.

1909.

First Haul. ALNMOUTH BAY, August 27th. Began 11·30 a.m., ended 1 p.m. Time, 1 hours 30 minutes.

[High tide and first of ebb.]

CENTIMETRES.

Name of Fish	— 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	Total
Plaice					1		1		1	2		2	2		1		1		1			1																		13
Dab					1			1		1	1	1	2		1	1		1																						10
Sole																																					1				1
Flounder											1	1	1	1	2		2																								8
Gurnard										1		2		2	1	1																									7
																																								39

First Haul. DRURIDGE BAY, August 27th. Began 2 p.m., ended 2·45 p.m. Time, 45 minutes.* [Mid ebb.]

Plaice												1				1																									2
Dab									1	3	4	5	3	1	2	1																										20
Gurnard											1			1													1														3
																																								25

* Trawl caught by an anchor, and was only cleared at 5 p.m.

TABLE III.—1909. **Catch per one hour's Trawling.**

Date.	Place.	Plaice.	Dab.	Sole.	Turbot.	Flounder.	Gurnard.	Angler.	Thornback	Total.
1909.										
July 16th ...	Alnmouth Bay ...	45·5	46	1	·5	7	58·5	·5	...	159
	Druridge Bay ...	55·3	25·4	·7	·7	2·7	4	·6	...	89·4
	Blyth Bay	33·6	12	...	...	3·2	...	...	...	48·8
July 28th ...	Skate Roads ...	80	12	...	1	4	...	...	...	97
		62·4	8·8	...	·8	9·6	·4	...	...	83
		41	9	...	...	...	...	...	1	51
August 13th ...	Alnmouth Bay ...	59·4	88·8	1·8	...	3·6	292·2	·6	...	446·4
	Druridge Bay ...	110	107·3	2	·7	4·7	80·7	1·3	...	306·7
	Blyth Bay	9·3	26	·7	...	...	21·3	·7	...	58
August 27th ...	Alnmouth Bay ...	8·7	6·7	·7	...	5·3	4·6	...	...	26
	Druridge Bay ...	3	26	...	...	...	4	...	...	33

MIGRATIONS OF INSHORE FLAT FISH.

A turbot which was marked in August, 1907, at Skate Roads, was recaptured in July, 1909, 48 miles E.$\frac{1}{2}$S. from Aberdeen. It measured 29 cm. (11$\frac{1}{2}$ in.) when liberated, and 43·8 (17$\frac{1}{4}$ in.) when recovered. During the two years, therefore, this example, a female, has grown 14·8 cm. (5$\frac{3}{4}$ in.) It would have weighed about 1 lb. in 1907, and it weighed 3 lbs. 9 oz. when recaptured. From what has already been said in previous reports with regard to the growth of the turbot, it is evident that this one was over three years old in 1907, and over five years old in 1909 when it was recaptured.

On July 28th, 1909, 2 turbot (Nos. 304, 350) and 54 plaice (Nos. 305—349, 351—359) were marked and liberated at Skate Roads. The turbot have not been recovered, but particulars are given in the accompanying table of the plaice which have been recaptured.

The last one was evidently one which had been marked, for the wound made by the fastener was still visible.

It is interesting to note the northerly migration of the female, which from its size was evidently becoming mature. All the others were immature when recaptured.

I wish to take this opportunity of thanking Professor D'Arcy W. Thompson, and also the fishermen for returning the marked fish.

TABLE IV.—MIGRATIONS OF FLAT FISH.—TURBOT.

NOTE.—T. = Trawl Net. L. = Line.

Number	Date.	Length.	Where Liberated.	Where Recaptured.	Date.	Length.	Increase.	Sex.	Migration.
N 40	1907. Aug. 29	Cm. 29	Skate Roads ..	48 miles E. ½ S. from Aberdeen, 36 fths. T.	1909. July 16	Cm. 43·8	Cm. 14·8 in 687 days	f	107 miles N.E. by N.

PLAICE.

Number	Date.	Length.	Where Liberated.	Where Recaptured.	Date.	Length.	Increase.	Sex.	Migration.
N 309	1909. July 28	Cm. 33	Skate Roads ..	Off the Bell Rock T.	1909. Dec. 7	Cm. 33·2	Cm. ·2 in 132 days	f	51 miles N.
330	,,	26	Skate Roads ..	North end of Skate Roads L.	1910. Mar. 8	26·6	·6 in 223 ,,	f	1 mile N.
333	,,	22	Skate Roads ...	Skate Roads L.	May 7	23·5	1·5 in 283 ,,	f	o
336	,,	21	Skate Roads ...	Skate Roads L.	April 19	22	1·0 in 265 ,,	f	o
340	,,	25	Skate Roads ...	Holy Island Harbour L.	1909. Sept. 22	25·5	·5 in 56 ,,	m	1 mile N.
?	,,	?	Skate Roads ...	Skate Roads L.	1910. April 22	27·7	? in 268 ,,	m	o

GROWTH OF PLAICE IN A TANK.

On October 8th, 1908, just after the opening of the Laboratory, and only two days after the sea water was introduced, 81 plaice got at the trawling experiment of that date in Blyth Bay were put into one of the aquarium tanks. It will be seen by reference to the report for 1908 that 119 plaice were caught, and as all the small ones were kept alive for this purpose they were approximately of the size given in the first column of the accompanying table. Some of the fish were a little the worse for the voyage round to Cullercoats, but they all recovered.

They were measured thereafter at intervals as shown in the succeeding columns of the table. Losses occurred due to various causes, but the majority have been preserved and are still living. One measuring 24 cm. was lost on July 26th, 1909. Three were missing on October 23rd. On April 25th, thirteen were found to have died at a time when some alterations led to the supply of water being stopped for several days. In the table these have been specially noted so that the plaice now living may be exactly specified. The large females at this period proved to be mature, and the ova were shed in the tank, and in the case of the dead fish, the females were just on the eve of spawning. These mature fish measured 28 to 31 cm.

On August 4th, 1909, I added four small one-year old plaice obtained in a sandy pool at Cullercoats, measuring $1\frac{1}{2}$, $1\frac{3}{4}$, $1\frac{3}{4}$ and $1\frac{11}{16}$ in. These have all disappeared except one, which measured on April 25th, 1910, 9 cm. This plaice, then, in a period of some nine months has about doubled its size, that is to say, in its second year.

The youngest of those originally introduced into the tank were for the most part $2\frac{1}{2}$ years old, and in a year they have grown about 9 - 10 cm. This is almost exactly the rate of increase previously deduced from the trawling and marking experiments, v. Report for 1905, page 61. The plaice now alive in the tanks are therefore in their fourth and fifth years, and the large five-year old females have become mature. None has grown beyond 31 cm., and at first sight it would appear that this was connected with the confinement in the tank, and while there is doubtless some truth in this, the fact is that at approaching maturity there is apparently a temporary lull in the rate of growth.

A consideration of the results of the migration experiments in this Report illustrates this, and it will be interesting to compare the above measurements with those of the plaice which were marked and liberated on July 28th, 1909, at Skate Roads. A 25 cm. male was 25.5 cm. when recaptured in September. In March to May this year a 21 cm. female was found to have become 22 cm., a 22 cm. female was found to have become 23.5 cm., and a 26 cm. female 26.6 cm.

Both in confinement and in the free condition there is thus a good deal of variation, but the above results show that the plaice in the tank have grown at least as well as those living in the sea.

On July 20th, 1909, there were three dabs in the tank also got at the same time as the plaice at Blyth Bay, two 23 cm., and one 25 cm. On October 23rd there were two, one 23 cm., and one 25 cm. On April 25th, 1910, the two measured 24 and 25 cm. The dabs therefore do not appear to have found the conditions in the tank to be favourable.

Cm.	1908. Oct. 8th.	1909. July 20th.	1909. Oct. 23rd.	1910. April 25th. dead.
31	—	1	2	5 + 2 = 7
30	—	—	2	3 + 2 = 5
29	—	3	7	8 + 1 = 9
28	—	5	10	14 + 2 = 16
27	—	11	10	11 = 11
26	—	8	10	6 + 1 = 7
25	—	8	10	7 + 1 = 8
24	—	7	6	5 + 4 = 9
23	—	8	7	3 = 3
22	—	6	6	2 = 2
21	1	8	7	
20	13	7		
19	20	7		
18	11	2		
17	13			
16	3			
15	14			
14	3			
13	2			
12	1			
	81	81	77	64 13 77

CRABS AND LOBSTERS.

In continuation of the accounts which have been given from time to time with regard to crabs and lobsters, and for the purpose of bringing the information up to date, I wish to submit the following figures.

Crabs.—The tables and chart given in the last year's Report brought into contrast the Eyemouth, Northumberland and North Eastern districts up to 1908. The returns for 1909 are as follows:—

Eyemouth	...	...	335,501
Northumberland		...	828,377
North Eastern ...		...	1,789,705

I desire again to thank Mr. Procter, Clerk to the North Eastern Committee, and the Fishery Officer of the Eyemouth district for these and the figures relating to lobsters.

It will be remembered that in the North Eastern district up to 1906 there was a close time for crabs. In that year the by-law was repealed, and the fishermen, instead of fishing for seven months each year, now fish for the whole year. Nevertheless, the total catches since 1906 have steadily decreased. The average catch for the three years 1904—06 was 2,267,353, and for the three years 1907—09, 2,018,464. During the five years 1891—95 just before the by-law was passed, the average catch was 1,845,670. During the eleven years the by-law was in force 1896—1906, the average catch was 1,853,323. The fishermen of the North Eastern district were catching more crabs in seven months per year when the by-law was in operation, than they did in twelve months before and after the period of the by-law. There can be no question that the district was much richer in crabs in 1906 when the by-law ceased than it was before and has been since.

I wish to add here for comparision the figures relating to the Eastern District for which I have to thank Mr. Donnison, the Fishery Inspector of the Eastern Committee. The Eastern Committee has attempted to give a further protection to soft crabs by prohibiting the landing of the white-footed crab, and also by not allowing under-sized crabs to be used for bait. In both these cases, however, the other districts may be said to be as efficiently protected as the Eastern. Until the last two years when an improvement has been shown, its history will be found to be very similar to that of the Northumberland and the Eyemouth districts.

EASTERN DISTRICT.

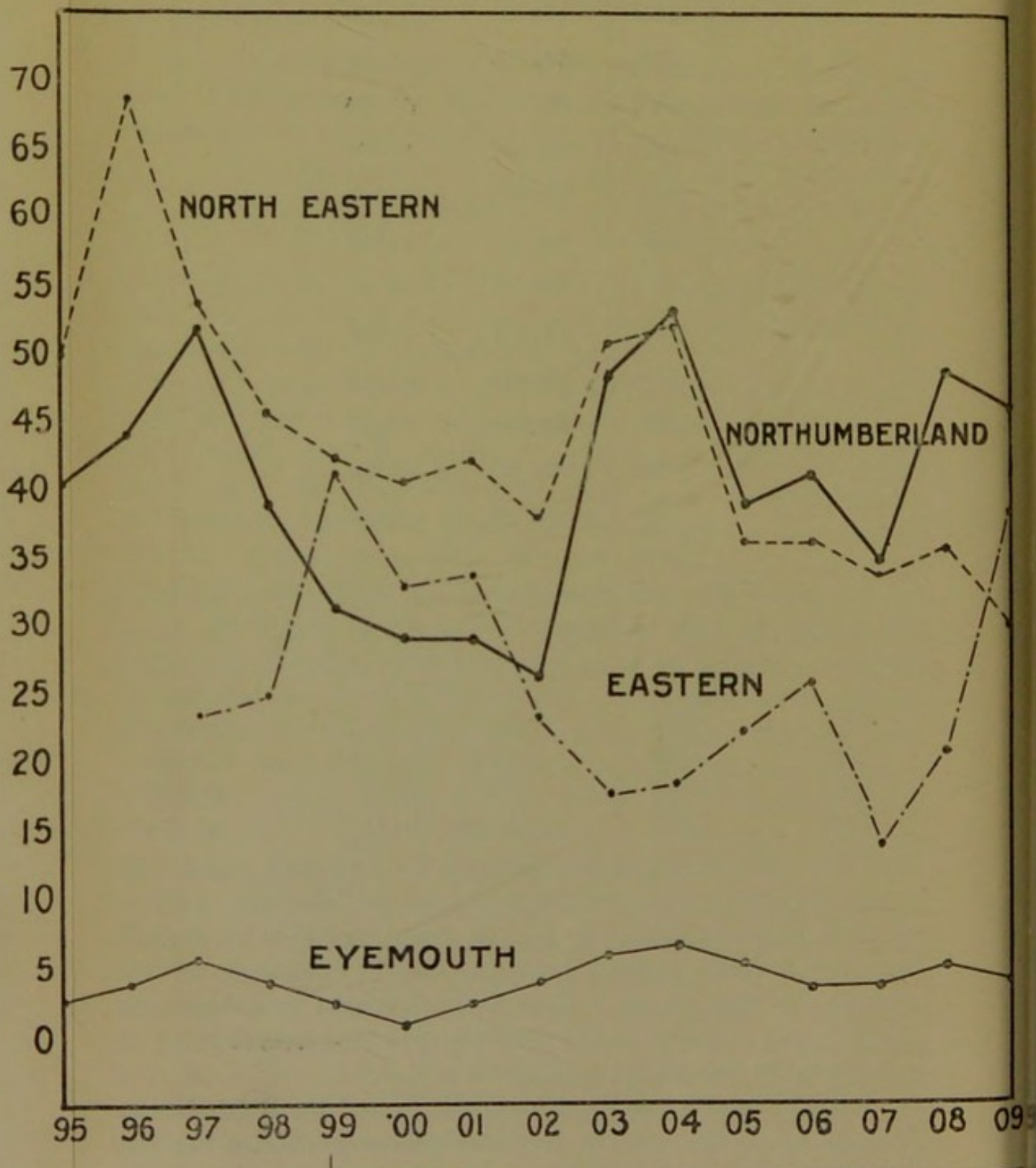
Year.	Crabs.	Lobstes.
	Number.	Number.
1897	688,000	23,200
1898	841,000	25,000
1899	784,000	42,000
1900	1,087,000	33,000
1901	1,320,000	34,000
1902	940,000	24,000
1903	824,000	17,500
1904	880,700	19,000
1905	877,000	23,000
1906	758,000	25,900
1907	655,000	14,500
1908	838,000	21,200
1909	1,253,000	39,400

Lobsters.—The statistics with regard to lobsters are given in the reports for 1904 and 1905, up to the year 1905. The figures for the remaining years to 1909 are now furnished. It will be seen that two sets of numbers are given for Northumberland. The reason for this is that during these years statistics were gathered at three stations as stated in the last report, and as these statistics were not included in the years before, and the collection at these stations has now ceased, I have thought it best to deduct them. They are not included in the chart which I give here showing the catches in the four adjoining districts named.

Year.	Eyemouth.	Northumberland.	North Eastern.
1906	3974	42,618 (45,890)	35,576
1907	4310	34,756 (39,151)	34,610
1908	5241	48,547 (53,112)	35,360
1909	3660	46,634 (48,445)	29,915

I think it can be said that as in the case of the North Eastern District so in the case of Northumberland protection has been beneficial. This chart may be interestingly compared with that given for the crab in the Report for last year.

Unquestionably the protection afforded to the berried lobster during the months April to July each year is a hardship to the fishermen, but I can see no other reason for the fact that since 1904—five years after the protection began—more lobsters have been landed in the Northumberland district than in any of the others.



By-law in Northumberland district, protecting berried lobsters each year from April 1st to July 31st, passed in 1899.

The figures on the left of the diagram represent thousands of lobsters.

MIGRATIONS OF LOBSTERS.

Mr. J. Douglas, Beadnell, marked 74 berried lobsters between June 1st and June 15th, 1909, and the recaptures have been as follows:—

LIBERATED.		CAPTURED.		
Date.	Place.	No. of Label.	Date.	Place and Migration.
1909. June 1...	North Sunderland Point	402	1909. Aug. 21...	Beadnell.
,, 1...	North Sunderland Point	403	1910. May 27...	North Sunderland Point.
,, 3.	Beadnell	413	1909. Oct. 12.	Beadnell, inshore.
,, 3...	Beadnell	415	,, 20..	Beadnell, inshore.
,, 4.	Beadnell	420	Dec. 14.	Beadnell, inshore.
,, 5...	Beadnell	428	1910. June 2..	½ mile N.W. of Emmanuel Head.
,, 9..	Beadnell	446	Jan. 10.	½ mile off Beadnell.
,, 10...	Beadnell	455	,, 15...	Beadnell, inshore.
		458	,, 17...	Beadnell, inshore.
,, 11..	Beadnell	460	,, 20..	Beadnell, inshore.
,, 12...	Beadnell	463	May 10...	1 mile off Beadnell.
,, 14...	Beadnell	469	Apr. 12...	Beadnell, inshore.
,, 15...	Beadnell	473	1909. Apr. 25..	Beadnell, inshore.
,, 15...	Beadnell	475	1910. Jan. 17...	Beadnell, inshore.

Mr. Douglas states that in addition to the above 14, five labels have been lost by fishermen at Beadnell from lobsters caught inshore there, making 19 altogether—a percentage recapture of 25·7.

As before there is no evidence yet of a distinct migration, but No. 428 was found ten miles north of the place of liberation.

LOBSTER CULTURE.

Through a grant obtained from the Board of Agriculture and Fisheries, certain additions were made to the tanks in the experimental aquarium, and an apparatus was installed for keeping the water in the tanks in movement by paddles, for the purpose of making an experiment on lobster culture. No special arrangements, however, were made for obtaining lobsters, and we obtained our supply from the market at North Shields. The first batch of berried lobsters yielded about one larva each, and the larvae did not live more than about a week. Another berried lobster was obtained by Fishery Officer Taylor from the same source, about the end of the hatching season, and this one yielded some 1,300 larvae. These were reared with scarcely a death from a fortnight to three weeks, when they suddenly, in a few days, became reduced in numbers in the most mysterious manner, without leaving any trace. Yet again as late as September 17th, another berried lobster was got from Shields. She commenced to hatch on October 7th, and in about a week about 20 larvae were found to be swimming about the aquarium tank in which the berried lobster was placed. These finally (just before the end of the month) all left the surface. They were seen from time to time thereafter at the bottom of the tank. But these in turn have also gradually disappeared.

The preliminary trials have therefore been far from satisfactory. It is evident that the exposure to the air of the berried lobsters is rapidly fatal to the larvae. In no case did we obtain more than a small proportion of the available number of larvae. The drying of the egg-capsules makes it difficult for the embryo to hatch. It is possible that the effects persist even in the case of those which have hatched, accounting to some extent for the subsequent deaths. The successive castings did not take place so quickly as was expected from the experiences of other places. But it is possible that the copper of the taps and of the standards of the paddling apparatus may have had something to do with the failures as well.

TRANSPLANTATION OF MUSSELS AT HOLY ISLAND.

Fenham Flats, the wide expanse between Holy Island and the mainland has on several occasions been surveyed with the view to increasing the mussel resources of the district, *v.* Report for 1898, and the paper by Miss Lebour in the Report for 1906. It was suggested that a portion of the grant received last year from the Board of Agriculture and Fisheries might be usefully employed in determining how far the area would respond to some method of cultivation. The flats were in consequence again inspected on December 30th, 1909, and more thoroughly explored on March 29th and 30th, when the general nature of the experiment was determined upon. Arrangements were entered into with the agent of the Earl of Tankerville and with Mr. Leyland, of Haggerston, and permission was obtained to make the experiments. A local committee of representative fishermen, viz., John Beadnell, John Wilson, Thomas Walker, Thomas Kyle, Thomas Cromarty, William Wilson, George Cromarty, with Mr. H. G. Winship and the Rev. Irvine Crawshaw was formed. An assurance was given to the members and to the fishermen generally that the rights they at present enjoyed would not be interfered with, and in consequence the committee and the whole of the fishing community are joining in the attempt to make the experiment a success.

The region of the flats communicates with the sea to the north at high tide, and to the south-east there is the wide and deep harbour which opens by a narrow channel into Skate Roads. A great portion of the ground is exposed for a long time when the tide ebbs, and it is at these periods that the flats are visited by many men and women from the island for the purpose of gathering periwinkles. These exposed regions through which two or three streams and drainage systems from the slake have excavated channels, naturally at various parts support large patches of mussels. The mussels, however, which obtain a footing in these places are too long exposed to grow satisfactorily. On the other hand the "mussel scaup" which is at least a square mile in area is practically bare, although it gives every appearance of being in every way favourable for the growth of mussels, and it is almost

altogether under water, except at spring tides. The scaup with the adjoining "Madges Bats" offered therefore ample ground for choosing an area for transplanting the mussels from the regions where they were growing so badly, and also for further expansion if the experiment were attended with the success which was anticipated.

An arrangement was made, thanks to Mr. Luke, for the ground chosen being stirred with a grubber, and on April 11th 12 plots of 1/10th acre each were staked out, and arrangements were made with the local fishermen to get the mussels removed and spread on the plots. By April 24th when the experimental bed was again visited a good deal of the work of removal had been accomplished, and at this visit a small quantity of young mussels from Blyth was added.

As Fenham Flats is not exposed to sewage contamination, and as the question of obtaining a pure mussel is viewed with importance by the Local Government Board and by the Fishmongers' Company, I brought a sample on this day from the beds for bacteriological analysis by my colleague Professor Hutchens. The result was: "3rd May, 1910, mussels. I cannot say that these were absolutely free from B. coli, but the numbers were very, very small." This examination referred as will be seen from what has been said above to the newly removed mussels. On May 4th, the work of transplantation was finished, 17 boat loads being required, and these with a small quantity from the Hen Pool near the mouth of the harbour, were spread over the plots. A further sample was obtained by Mr. William Wilson on May 11th, and this was sent to Professor Hutchens who wrote: "I examined four of the six mussels. In none of the four was there any trace of the Colon bacillus." At the request of the Secretary of the Fishmongers' Company, Mr. J. Wrench Towse, a further sample was gathered by Mr. Wilson, and sent to me. I divided this sample into two, sending twelve mussels each to the Fishmongers' Company and to Professor Hutchens. The following is Professor Klein's report on the former. "May 30th, 1910, *re* sample of mussels, No. 476. Of eight mussels none contain *B. coli communis.* Of four specially examined two contain some Streptococci, but not those commonly found in sewage. Of two specially examined neither contains enteritidis spores. Result—mussels exceptionally clean." Professor Hutchens wrote: "Among the last twelve mussels sent for examination, I find the Colon bacillus in one."

The mussels which have been transplanted are thus in a highly satisfactory condition from a bacteriological point of view, and I have no doubt by this time are altogether in a pure state. So far as can be seen, moreover, in the short time since the experiment was commenced, the mussels have obtained a good hold, and are already showing a marked increment of growth.

The Fishery Officers and the Laboratory Attendant have helped materially in the making of the experimental mussel bed.

NOTES ON THE SALINITY AND TEMPERATURE OF THE SEA ON THE NORTHUMBERLAND COAST AND ON THE FREEZING OF SEA WATER.

By G. SISSON.

The salinity of all samples of sea water is stated in conformity with the tables of Dr. Knudsen, and compared with the "Normal Wasser" obtained from the Copenhagen Laboratory of the International Committee for the Exploration of the Sea.

The temperatures are taken in centigrade degrees from a standard thermometer with National Physical Laboratory certificate.

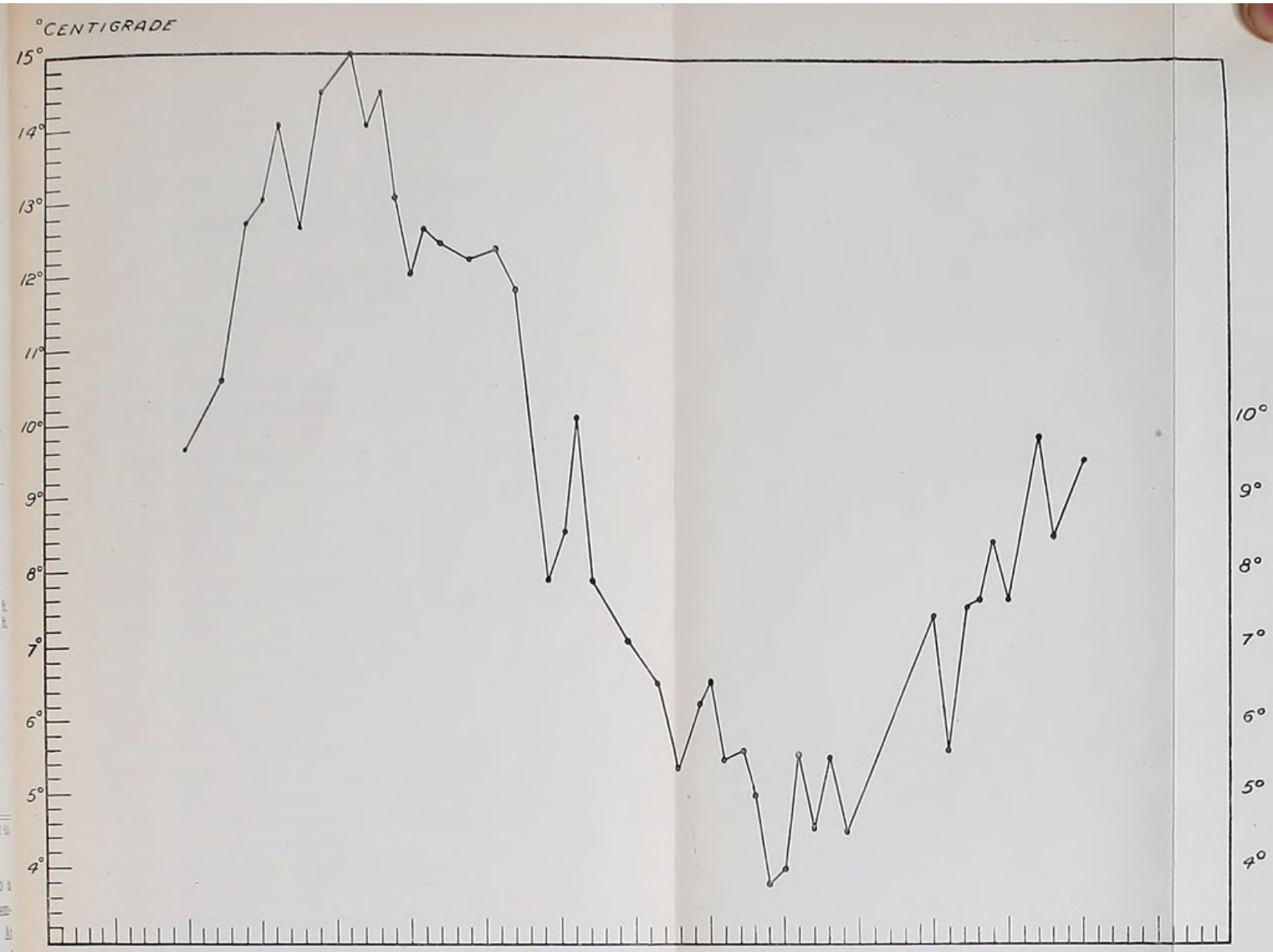
Some of the results are given in the adjoining table and chart.

Date.	Time.	Locality.	Temperature.	Salinity.	Remarks.
1909.			Degrees C.		
July 16th...	11·30 a.m.	Alnmouth Bay ...	12·2	34·50	
,, ...	2·15 p.m.	Druridge Bay ...	12·5	34·45	
,, ...	5·0 p.m.	Blyth Bay... ...	12·4	34·45	
July 28th...	7·50 a.m.	Off Farne Islands..	12·7	34·50	
,, ...	12·15 p.m.	Skate Roads ...	13·0	34·20	Heavy rain.
July 31st ...	...	Cullercoats Bay ...	13·5	34·35	Depth of 23 ft.
,, ...	...	,, ,, ...	13·5	34·35	Depth of 28 ft.
Aug. 13th..	1·0 p.m.	Alnmouth Bay ..	14·0	34·40	
,, ...	3·30 p.m.	Druridge Bay ...	13·5	34·45	
,, ...	5·40 p.m.	Blyth Bay ...	13·0	34·45	
Sept. 28th.	...	Marine Laboratory	...	34·35	
Oct. 8th ...	...	,, ,,	...	34·35	
Oct. 18th...	...	,, ,,	...	34·30	
1910.					
March ...	...	Fenham Flats ...	...	31·50	
,, ...	...	Holy Island Harbour (ebb tide)	5·0	32·30	

Notes on above.—The maximum salinity found was 34·50, the minimum 34·35; difference of ·15. The average salinity of the coast being 34·45.

300 gms. of sea water of 34·3 ‰ salinity submitted to a freezing mixture began to form ice at −1·5° centigrade, the temperature of the sea water gradually falling to −2·5° centigrade. At this stage 100 gms. of ice had formed leaving 200 gms. of water of 39·5 salinity, and 100 gms., of which the first 50 gms. melted tested 17·0 salinity, the second 50 gms. 30·5 salinity.

An important source of dense sea water in Arctic regions is no doubt the winter freezing and consequent partial separation of normal sea water into water of high and ice of low salinity.



TEMPERATURE OF SEA WATER AS PUMPED INTO MARINE LABORATORY, CULLERCOATS.
JUNE, 1909, TO JUNE, 1910.

MAX.—AUG. 10TH, 1909, 15·0°. MIN.—JAN. 28TH, 1910, 3·7°.

ACANTHOPSOLUS LAGENIFORMIS, N. Sp., A TREMATODE IN THE CATFISH.

By MARIE V. LEBOUR, M.Sc.,
Assistant Lecturer and Demonstrator in Zoology, Leeds University.

The following work was done entirely at the Dove Marine Laboratory, Cullercoats, from material brought in by the fishing boats.

Distomum, sp., Lebour, "Fish Trematodes of the Northumberland Coast," Northumberland Sea Fisheries Report for 1907, p. 31, Plate III., figs. 6—8.

A brief and incomplete description of this Trematode was given by myself in the above-mentioned paper. Nicoll (1) is of the opinion that it is closely allied to *Acanthopsolus* Odhner (2) and the differences are so slight that it seems hardly justifiable to found a new genus for it.

The worm occurs frequently, and in great numbers in the upper part of the intestine of the Catfish *Anarrhichas lupus*. It is by no means always present, but occurs in about 40 per cent. of the local Catfish in Spring, Summer, and early Autumn, *i.e.*, from April till October, being rarer in Spring than in Summer, and disappearing in the Winter altogether, repeated search for it in the Winter months being unsuccessful. Two Catfish from Shetland brought in by the North Shields boats (April, 1909) both also contained the worm. The usual habitat is the creamy, opaque, and very thick intestinal slime just beyond the stomach. The worm gets entangled in this, and it is very difficult to get it completely away from the slime which must act as an effective obstacle to its being swept away with the intestinal contents of its host, the suckers being apparently too weak to make any hold on the walls of the intestine. The stomach is sometimes also infected as well as the mouth and pharynx, but usually the younger stages occur in these latter regions, and the anterior portion of the intestines seems to be the true habitat. There may be hundreds present in one fish, and there is always a great number if the worm occurs at all.

This Trematode is very small and inconspicuous, and with the exception of the eggs is quite colourless. The adult (Plate I., figs. 1—2) measures 0·54 mm. to 1·30 mm. in length, and is flask-shaped, the broadest part which is about half the length occurring behind the ventral sucker. The anterior end narrows considerably, and after a short neck the body gradually broadens out, and is rounded posteriorly. In section it is nearly round, but slightly flattened dorso-ventrally, especially in front of the ventral sucker. The exceptionally large eggs have thick yellow shells which shine conspicuously through the colourless body. The whole worm is covered with sharp spines arranged in rows, somewhat flat and scale like in front, and becoming very sharp from the neck to about the posterior third of the body where they dwindle in size, although they never entirely disappear even at the extreme end.

On the dorsal surface are two conspicuous eye-spots, one on each side of the pharynx, each composed of a dark brown central mass of pigment with smaller flecks radiating irregularly from it. These appear to be nearer or further from the oral sucker according to the amount of extension or retraction of the extremely mobile neck.

The suckers are weakly developed and very nearly equal in size, the oral sucker in the adult being slightly the larger. In preserved material a specimen 0·35 mm. in length has the oral sucker globular and 0·06 mm. across, or it may be oval or oblong measuring 0·07 mm. by 0·05 mm. in a specimen of the same size, and 0·09 mm. by 0·08 mm. in a specimen 0·54 mm. long. It grows with the worm. The aperture is almost terminal with a slight ventral inclination. The ventral sucker occurs just in front of the centre of the body, and is inconspicuous, and not so muscular as the oral sucker. It measures 0·06 mm. across in all the specimens examined, and does not appear to increase in size from the full-grown cercaria stage to the adult.

The oral sucker leads to a narrow prepharynx so extremely contractile that it sometimes appears not to exist at all, its walls being flatly spread over the anterior part of the pharynx which telescopes into it, or it may reach a length of more than 0·08 mm., and then is seen to be narrow and thin-walled. Following this is a strongly muscular pharynx 0·07 mm. long and about two-thirds as broad. This leads to a very short and broad œsophagus which branches immediately in front of the ventral sucker into two broad intestinal cœca reaching nearly to the posterior end of the body.

(In the previous description the cœca were described as not reaching so far). Between the termination of the cœca is a pear-shaped excretory vesicle reaching nearly to the level of the hind end of the testes and opening posteriorly and slightly dorsally.

The genital opening is a transverse slit situated in the middle line immediately in front of the ventral sucker. At times it is very difficult to see, but usually in the living worm it can easily be made out as it is constantly opening and shutting. This leads to a small genital sinus, into which open the male and female ducts, male on the right and female on the left. The testes are longitudinally oval bodies, 0·08 mm. in length and 0·05 mm. broad, occurring ventrally to the intestinal lobes and a little nearer the posterior end of the body than the ventral sucker. They are symmetrically placed one on each side of the body. From each testis runs a narrow vas deferens, and these join the vesicula seminalis behind the ventral sucker. The vesicula seminalis is divided into two nearly equal parts by a constriction, and lies completely within the club-shaped cirrus sac. The latter is dorsal to the ventral sucker, in pressure preparations it may be seen either to the right or left side. It contains in front of the vesicula seminalis, a long ductus ejaculatorius, the first part of which is a weakly developed pars prostatica surrounded by gland cells, and the next part is armed for about a quarter of its length with sharp spines with round bases; the terminal part is unarmed and very much curled up. This duct appears to be a protrusible cirrus, although I have not seen it exserted. The ovary is a circular body generally situated immediately in front of the right testis and is slightly smaller than that organ. Dorsally it gives off a long oviduct which makes a twist before giving off a receptaculum seminis and a Laurer's canal. The vitelline duct opens into it just after it gives off the receptaculum seminis. The latter organ when full of sperms is quite conspicuous and of a roundish form. In some specimens it is hardly visible, and the sperms are to be seen moving about in the oviduct and in Laurer's canal. The vitellaria take up almost the whole of the rest of the body, extending dorsally from the extreme posterior end to the level of the centre of the pharynx, only leaving a small median part uncovered. They partly cover the intestinal cœca ventrally. They consist of large lobules indistinctly connected by lateral longitudinal vessels from which a thick transverse branch runs across each side in the region of the ovary to unite in a large receptacle from which a duct enters the oviduct. After receiving

the vitelline duct, the uterus winds in a few loops greatly distended here and there by the enormous eggs and not extending behind the testes. It then runs up straight as a strongly muscular vagina, armed with spines similar to those in the cirrus but rather thinner and not so closely set, to open into the genital sinus.

The eggs, seldom more than four, although eight have been observed, are relatively very large, measuring 0·08 mm. to 0·10 mm. in length, the breadth being about two-thirds of the length. In the smaller specimens the eggs give the worm a most curious appearance, as they are as large as the testes. The smallest specimens (preserved) containing ova measured 0·54 mm. in length. Younger stages from the mouth and stomach of the Catfish measured 0·34 mm. to 0·50 mm. in length, and can be traced from the young stages without vitellaria onwards.

The life history appears to be fairly clear, as a cercaria corresponding in every way to these young stages from the Catfish occurs in the liver of *Buccinum undatum*. This cercaria was first described by myself from Holy Island (3), but further infected specimens of Buccinum have been met with about two miles north of Cullercoats Bay, and from these I am able to give an amended description, and can correct certain errors in the first.

80 specimens of *Buccinum undatum* were collected in March, 1910, and in six of these the liver was of an unhealthy brownish colour all over, the reproductive organs in addition being imperfectly developed. The worm occurred throughout the liver which was literally packed with rediæ. I formerly described these rediæ as sporocysts since the small mouth and pharynx with the sac-like intestine, which are undoubtedly present, were not then noticed.

The youngest redia (fig. 3) seen measured 0·30 mm. in length when alive, and was quite colourless. The mouth led to a muscular pharynx and intestine reaching more than half way down the body. The hind end was pointed, and there were no locomotory processes posteriorly which are often so conspicuous in the young redia, and there was no collar anteriorly. It is possible that the absence of these appendages shows that the redia is developed in the same organ as the sporocysts, and that it does not migrate, as is often the case, from one organ to another. This small redia contained no cercariæ. The larger rediæ (figs. 4-5), which measure 0·50 to 3·20 mm. in length, were either very short and sausage-shaped and contained two or more cercariæ, or they were elongated and contained from 16 to 32 cercariæ. These older forms were of a dull

yellowish colour, the enclosed cercariæ being colourless. The intestine of the redia gradually diminishes, and is pushed out of position by the foremost cercaria.

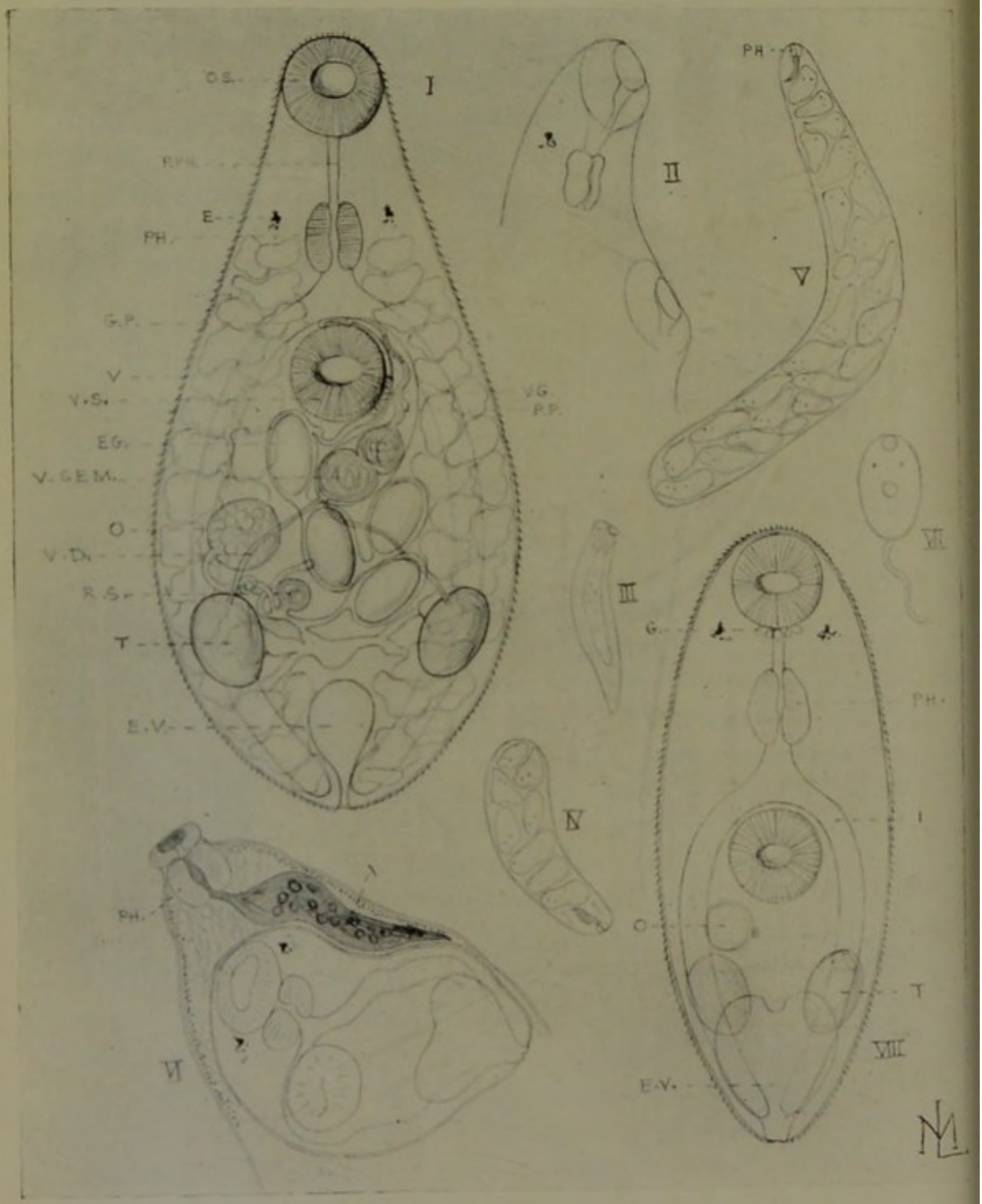
The cercaria (figs. 7-8) may be tailed or tail-less. In the first infected specimens of *Buccinum undatum* examined, all had tails and moved about actively by aid of these, but in the later specimens very few had tails, and these when present seemed to be of little use. Tailed and tail-less forms occur in the same redia. By far the greater number have no tails, and all move by creeping in a leech-like manner by aid of their suckers. It remains to be seen whether a tailed stage precedes the tail-less one in the redia. The tail when present is thin and longer than the body. It is very easily detached. The interesting fact that the tail may be either present or absent shows that it is not a necessary organ, and this is borne out by the supposition that the Catfish eats the Buccinum, and the cercaria becomes a mature worm without entering an intermediate host and without a resting stage. We, therefore, see this apparently useless organ disappearing, in some cases entirely.

The absence of large glands which are often present in other cercariæ, and serve to secrete the cyst, bears out the theory that the present worm omits the encysted stage. From the number of specimens present in the Catfish, it is extremely likely that the worm enters directly from the Buccinum.

The usual length of the cercaria in live pressure preparations is 0·50 mm., in preserved specimens they contract considerably, and measure only about 0·35 mm. The greatest breadth is less than half the length. It is difficult to say what is the shape of the cercaria as it is so contractile that its shape is continually changing. It is certainly never so flask-shaped as the adult worm, and there is not much difference in the shape of the head and tail ends. The body is covered with spines which dwindle posteriorly, but are never absent. The eye-spots are conspicuous. The suckers almost the same size (0·06 mm. across), but the oral may be slightly larger. The prepharynx, pharynx, and intestine agree with those of the adult worm. The excretory vesicle is large, and sometimes appears bilobed. The testes are symmetrically placed, one on each side about midway between the ventral sucker and the posterior end of the body. The ovary may in some specimens be seen in front of the right testis, and there are sometimes traces of the male and female duct. Just behind the oral sucker is a little row of gland cells of a pale yellowish colour.

Buccinum undatum is one of the commonest articles of food of the catfish. Remains of it are constantly to be found in the stomach. The specimens examined came from rocky ground where the catfish is to be found living almost entirely on mollusca and where *Buccinum undatum* is one of the commonest forms to be met with. It is, therefore, extremely probable that this cercaria and the adult worm from the catfish are identical.

I have named this Trematode *Acanthopsolus lageniformis* from its flask-like form. The most important differences from *Acanthopsolus oculatus* (Levins), the only hitherto-known member of the genus, consist in the position of the testes which are symmetrically placed one on each side of the body instead of obliquely as in *A. oculatus*, and in the presence of a receptaculum seminis which is said to be absent in *A. oculatus*. The eggs are enormous for the size of the worm, far larger in proportion than those of *A. oculatus*. These differences do not seem to justify the founding of a new genus for this worm, especially as the receptaculm seminis often appears to be absent when not full of sperms. I would, therefore, alter slightly the present diagnosis of the genus so as to make it include *A. lageniformis*:—Small distomes with delicate body rounded before and behind, which is divided into a very moveable flattened fore part and a plump hind part more circular in section. Skin very thin, armed with scales. Intestine with long prepharynx, pharynx of medium size, extremely short œsophagus. Fork of the intestine a little in front of the ventral sucker. Intestinal cœca similar, reaching to the hind end of the body. Excretory vesicle a simple sac. Genital pore median immmediately in front of the ventral sucker. Male and female copulatory organs strongly developed, armed with thorn-like spines. Cirrus sac club-shaped, rather long, containing a bilobed seminal vesicle, an apparently weakly developed pars prostatica and a long cirrus covered with spines. Testes in the hind body, lying obliquely behind one another or symmetrically placed on each side of the body. Ovary on the right, in front of the testes or nearly at the side of the foremost testis. Laurer's canal present, receptaculum seminis present or absent. Vitellaria with big follicles, especially under the dorsal surface and at the sides of the body. Shell gland dorsal, at the side of the ovary. Uterus loops between the ventral sucker and genital glands. Eggs few in number, very big (about 0·125 mm. long) thin-walled. Inhabits intestines of marine fish.


O.S.
I
R.P.H.
E.
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V.
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E.G.
V.GEM.
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R.S.
T.
E.V.
II
PH.
V
V.G.
P.P.
III
VII
G.
PH.
IV
I
O.
T.
VIII
E.V.
PH.
VI

Plate I.

The life history of *Acanthopsolus lageniformis* may be thus summed up :—

First Host.	Intermediate Host.	Final Host.
Buccinum undatum. Inhabiting liver. (Rediæ containing cercariæ).	Omitted.	*Anarrhichas lupus.* Inhabiting intestine.

Plate I.

Fig. 1.—*Acanthopsolus lageniformis* from intestine of Catfish—ventral view (natural size 0·80 mm.)

O.S.	...	Oral sucker.
P.PH.	...	Prepharynx.
E.	...	Eye.
PH.	...	Pharynx.
G.P.	...	Genital pore.
V.	...	Vitellaria.
V.SEM.	...	Vesicula seminalis.
P.P.	...	Pars prostatica.
V.S.	...	Ventral sucker.
O.	...	Ovary.
EG.	...	Egg.
V.D.	...	Vas deferens.
V.G.	...	Vagina.
R.S.	...	Receptaculum seminis.
T.	...	Testis.
E.V.	...	Excretory vesicle.

Fig. 2.—Side view of same.

„ 3.—Young redia (natural size 0·30 mm.) from liver of *Buccinum undatum.*

„ 4.—Small redia containing cercaria (natural size 0·50 mm.)

„ 5.—Large redia containing cercaria (natural size 3·20 mm.)

„ 6.—Anterior end of redia showing pharynx and intestine, and one contained cercaria (greatly enlarged).

„ 7.—Cercaria with tail (natural size of body 0·50 mm.)

„ 8.—Cercaria without tail (natural size 0·50 mm.); glands near oral sucker.

LIST OF REFERENCES.

1.—Nicoll—"A Contribution towards a Knowledge of the Entozoa of British Marine Fishes," Part II. Ann. and Mag. Nat. Hist. (8) IV. (1909), p. 15.

2.—Odhner—"Die Trematoden des Arktischen Gebietes," p. 328 (1904).

3.—Lebour M. V.—"Notes on Northumbrian Trematodes," Northumberland Sea Fisheries Report for 1905, p. 6 (1906).

THE PRESENCE OF A SESAMOID ARTICULAR IN SOME OF THE COMMON FISHES.

By B. STORROW.

Whilst making a preparation of the skull of a ling in March, 1909, a small flat irregularly shaped bone, a sesamoid articular, was found internal to the articular and in close relation to Meckel's cartilage. Previous to this date, skulls of the cod, haddock and whiting had been prepared, but this bone was not noticed. This was because hot water was used for cleaning purposes, and the bone in these heads, being small and loosely attached to the articular, comes away easily with Meckel's cartilage.

Dr. Ridewood, whom I have to thank for the identification of this bone, describes the sesamoid articular on pages 71 and 72 of the Proceedings of the Zoological Society for 1904, and in his paper on the Cranial Osteology of the Clupeoid Fishes, December, 1904, notes its presence in some of the skulls he examined.

In 1909, during August, September and October, I examined and prepared skulls, or parts of skulls, of the cod, haddock, whiting, hake, ling, torsk, cat-fish, opah and plaice, and in every case the sesamoid articular was present. In the opah it is placed above and behind the proximal end of Meckel's cartilage; in the other fishes named it is developed above and around Meckel's cartilage. The bone, in the heads examined, varies in size according to its devlopment above Meckel's cartilage. In the ling, cat-fish and opah, it is fairly large, yet less than the angular, except in the cat-fish where it is slightly larger; in the others, especially the plaice, it is very small, and is most easily found by dissecting out the levator muscle of the mandible, in the tendon of which it is developed. A rough examination has also been made of the lower jaw of the horse mackerel, and a small pointed bone was found internal to the articular, but a further examination is necessary before stating a sesamoid articular for this fish.

The preparations made are now in the laboratory, and had it not been for the kindly help and advice given by Professor Meek I should not have been able to deal with them as I have done.

To Mr. Wood, a member of the Coast Club, I am indebted for the photograph illustrating this short paper.

In June of this year, a sesamoid articular was found whilst preparing the skull of a northern cat-fish (*Anarrhichas latifrons*)

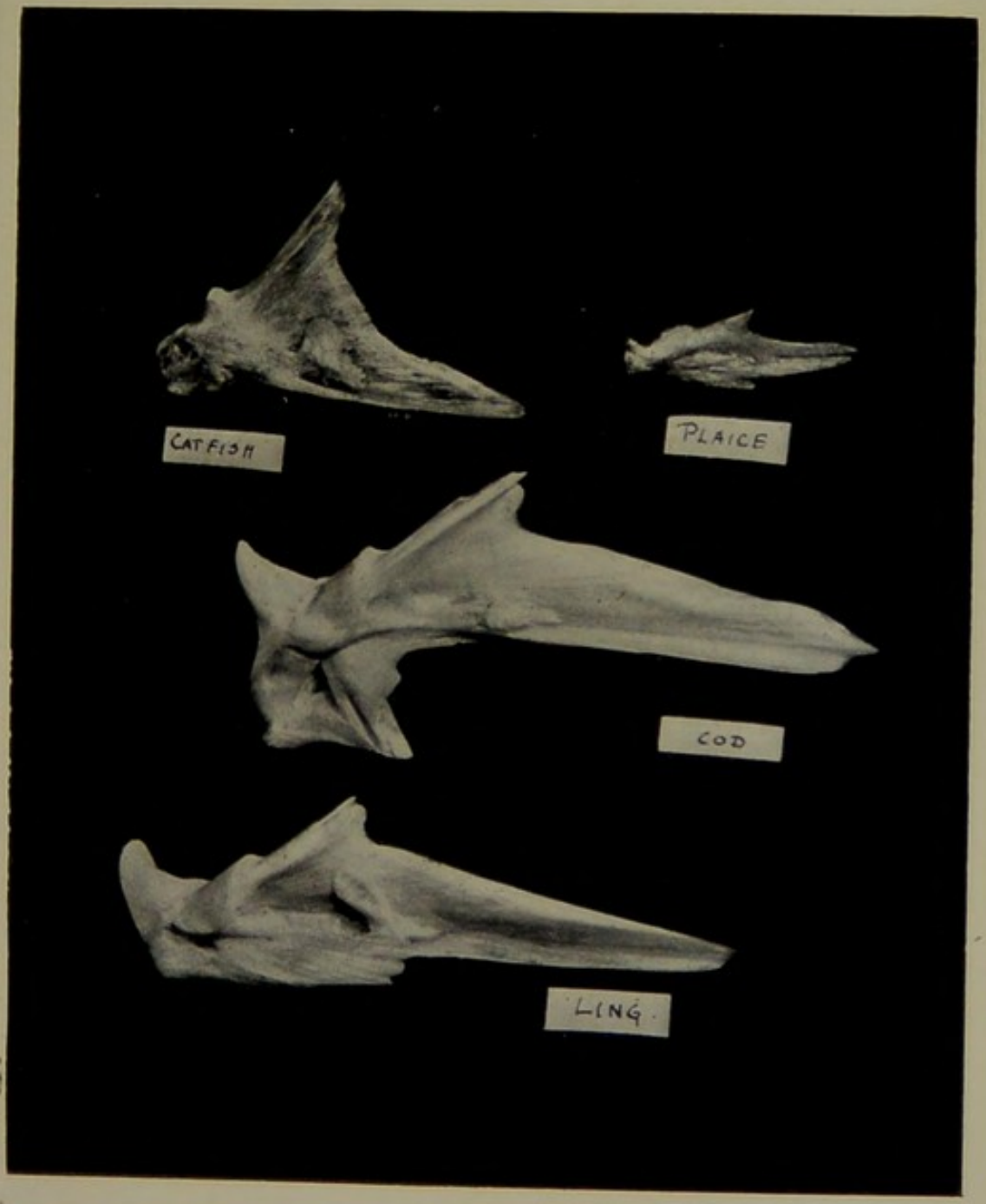


FIGURE I.– Internal view of articular showing sesamoid articular in position.

A CASE OF SPINAL CURVATURE IN A CODLING.

By B. STORROW.

On November 6th, 1909, Professor Meek gave me a codling which had been caught by Mr. H. Arthur, Whitley Bay, the previous day at St. Mary's Island, and suggested that a preparation of the backbone might prove interesting. The body of the fish, which was curved vertically and horizontally, measured from snout to tip of tail 9⅞ inches, and its greatest depth was 2⅝ inches. After preparing the skull and vertebral column with tail attached, the length from the vomer to tip of tail was 8⅞ inches, but if the curvature of the spine was followed it was 10⅝ inches. It was assumed that had the fish been normal it would have been about 12 inches long, and a codling of 13 inches was obtained for purposes of comparison. The greatest depth of this fish was 2½ inches, which was less than the depth of the deformed fish by ⅛ of an inch, although the length was greater. The length, after making the skeleton, from vomer to tip of tail was 12 inches, an inch being lost as in the deformed specimen. The length of the skull from vomer to basi-occipital was the same in both cases, but in the normal fish the vertebral column and tail have a length of 9 7/16 inches, whilst the length in the deformed fish was 6 5/16 inches, or 8 1/16 inches if the curvature was followed.

On looking along the back of the fish towards the head which was inclined to the right, the body from just behind the head to the anterior portion of the second dorsal fin was curved to the right, from here to the beginning of the third dorsal it was curved to the left, to the end of the third dorsal it was curved to the right, and the remaining portion was slightly curved to the left. In the region of the second dorsal fin there was a downward curve to be seen on the back only, and under the third dorsal, which was somewhat modified, was a very marked upward curve. The amount of muscle at the sides of the backbone varied, there being very little on the left side in the region of the posterior two-thirds of the second dorsal.

The backbone is in a series of horizontal and vertical curves, the latter being more pronounced in the posterior region. Owing to the horizontal curvature the whole of the vertebrae, with the

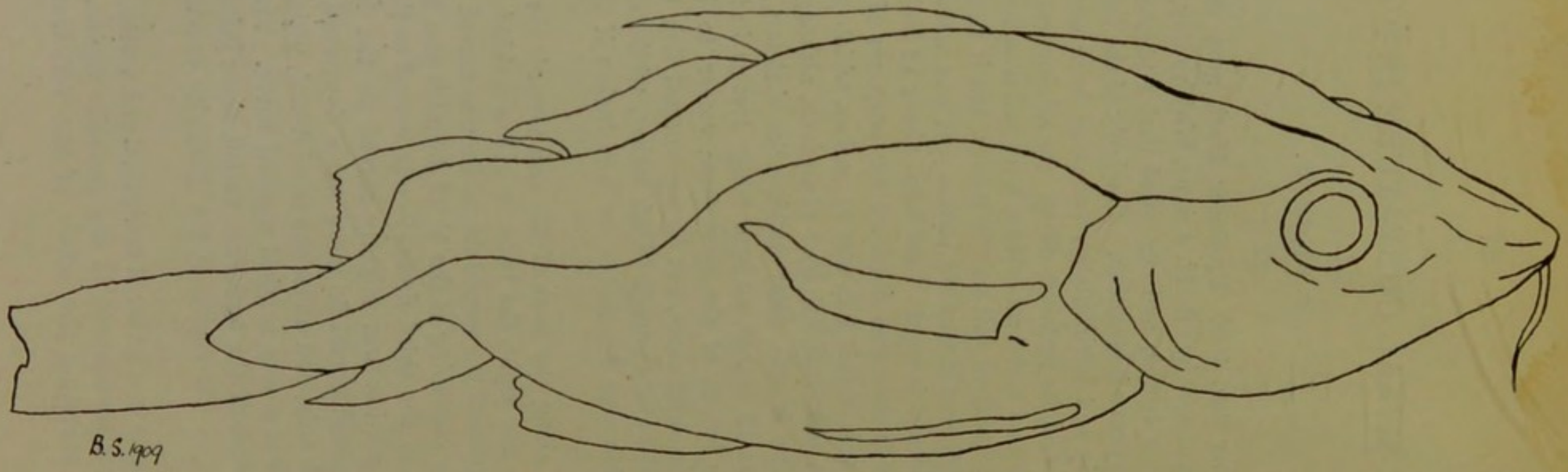


Fig. 1.—Lateral view of Deformed Codling.

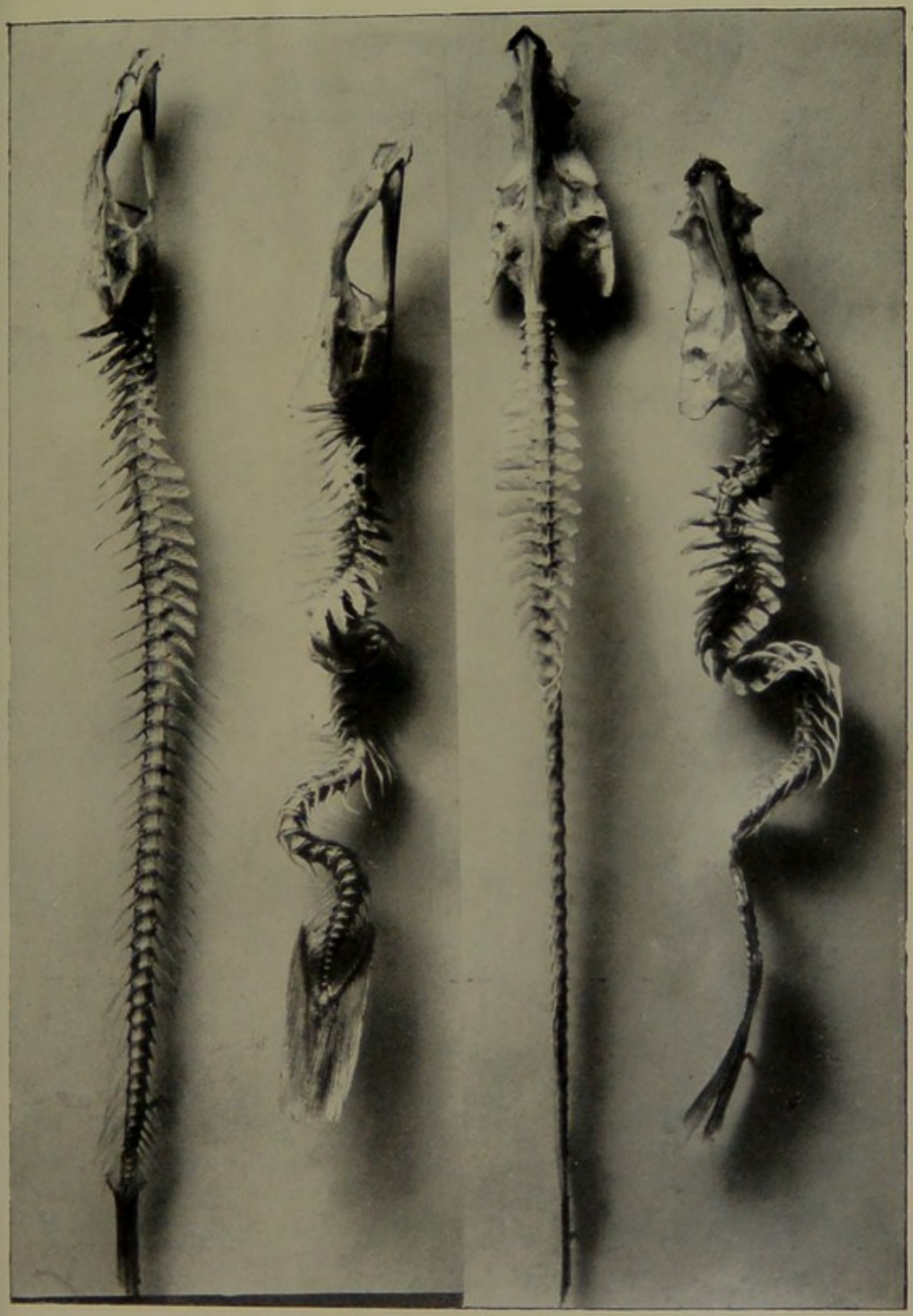


Fig. 2. Fig. 3. Fig. 4. Fig. 5.

Figs. 2 and 3.—Lateral views of skeletons of normal and deformed codling.

Figs 4 and 5.—Ventral views of same.

(Note contour of free ends of neural and haemal spines, width of skull, and anterior haemal arches).

exception of the first, are displaced, and the only vertebrae not affected by the vertical curvature are the anterior six and vertebrae 20 - 26, further what should be the vertical plane of the individual vertebra is not always truly vertical, but is in many cases an inclined plane. The vertical displacement may in some degree have been caused by drying. Vertebrae 2, 3, 4, 21, and 22 are somewhat compressed on the right side, and vertebrae 16 and 17 on the left side. The neural and haemal arches on the outer edge of the vertical curves are adpressed, and some of the haemal spines of the inner edge of one of these curves are slightly recurved. Accompanying the horizontal curvature in the anterior region is a difference in the development of some of the transverse processes, those of the outer edge of the curve being stouter than the corresponding processes on the inner edge. In the same region the neural spines have not the normal backward inclination but are more erect. On comparing the skulls of the two preparations, the length from vomer to basi-occipital is the same; in the deformed specimen, the length from mesethmoid to supra-occipital is less, the parasphenoid is stouter, the width across the parethmoids and otic bones is greater, the parotic processes are larger and are unequal in size, the right one being the greater of the two.

There are no signs of previous fracture, and from the shape of the vertebral bodies the deformity has probably been congenital (Professer Howse, Proc. Zoo. Soc., 1894, page 95). It may have been due to unequal development, as regards bulk and elasticity of various muscles (op. cit. pages 99 and 100) or the curvature of the spine may have caused the unequal development of the muscles. Dr. Williamson in the Twenty-seventh Annual Report of the Fishery Board for Scotland, Part III, page 119, mentions Meyer's experiments, in which some herring fry, the development of which had been retarded by the influence of cold, had curved backs. It is also possible that at a very early age the fish was imprisoned in some small space, and although not being able to grow normally, it was possible for it to obtain sufficient food, which would give growth in strength and size, until the fish was able to free itself. That it was able to swim with a fair amount of freedom is shown by the fact that it was caught on a hook by Mr. Arthur who was fishing from the rocks. I take this opportunity of thanking Professor Meek for his help and the loan of the books mentioned above, and Mr. Wood, who has taken the photographs for the illustrations.

CHANTRANSIA SANCTÆ-MARIÆ.

A New British Species.

By O. V. DARBISHIRE.

During the examination of some marine algae collected near St. Mary's Island about four miles to the north of Tynemouth on the coast of Northumberland, a small and not previously described species of Chantransia was found. It has been given the specific name of *Chantransia sanctæ-mariæ*, after the Island of the same name. It was growing endophytically but intercellularly on the lower portion of a reproductive frond of *Himanthalia lorea*. Only one specimen of the latter was found to be infested with the new species, and unfortunately it was not possible to examine any material quite fresh. Thus the form of the chromatophore could not be properly determined but it appears to be plate-like and flat, and not split up. *Chantransia sanctæ-mariæ* most nearly resembles *Ch. immersa* recently described by Kolderup Rosenvinge,* but the latter has at least occasionally short hairs on the projecting cells. Only one long hair was found in the new species. The new species is also not unlike *Ch. polyides* of the same author. † It differs from this species however by its shorter cells. In *Ch. polyides* they may be four times as long as broad. This species also occasionally has hairs, though not so often as *Ch. immersa*.

It may be mentioned here that the generic name Chantransia is used here, and not Acrochaetium Naeg., by which Batters has replaced the older generic name of Chantransia (D.C.) ‡ I quite agree with Rosenvinge that the latter should stand, and that Acrochaetium should not take its place. §

Chantransia sanctæ-mariæ lives entirely inside its host plant, *Himanthalia lorea*, except for the outer walls of the sporangia. The filaments extend in a radial direction to a depth of over ·4 mm. The cells remain coloured even at this distance from the surface of the brown alga. The filaments push their way through

* Rosenvinge, L. Kolderup, The Marine Algæ of Denmark, Part 1, p. 130.—Memoires d. l'Acad. Roy. d. Sciences et d. Lettres d. Danemark. Copenhagen 7me Ser. Sect. d. Sci., t. 7, no. 1, 1909.

† Loc. cit. p. 132.

‡ Batters, E.A.L., A Catalogue of British Marine algæ, page 58, Journal of Botany, 1902.

§ Loc. cit. p. 80.

the outer layers of the assimilating cells till they reach the larger and more isodiametrical elements of the collecting and storage tissue which do not, of course, contain any coloured plastids. The filaments of the endophyte are little branched except at the two ends. They branch near to the surface of the host for the formation of the sporangia, and again among the deeper cells deep in the tissue of the host, presumably for the absorption of food. I did not observe any intracellular connection between the cells of the two organisms. But that is, of course, not necessary for an exchange of dissolved material. The separate cells are short and squat. Their diameter measures about ·009 to ·011 mm. As a rule the cells are broader than long. I have been unable to make out clearly the shape of the plastid. Monosporangia are formed near the surface of the host plant. As is generally the case, new spores are formed in the old sporangia as soon as one spore has been shed. The sporangia are about ·015 mm. long.

The following is a brief diagnosis of the new species: Thallus endophyticus, filis instructus totaliter immersis, intercellularibus, apicibus utrisque solis ramosis; cellulæ latæ ·009-·011 mm. rotundatæ aut medio inflatæ, rarius elongatæ, pilis longis rarissime instructæ; chromatophorum non bene visum; sporangia quasi emersa, ·011 mm. lata et ad ·015 mm. longa, monospora. Habitat in fronde fertili Himanthaliæ loreæ, St. Mary's Island, Northumberland.

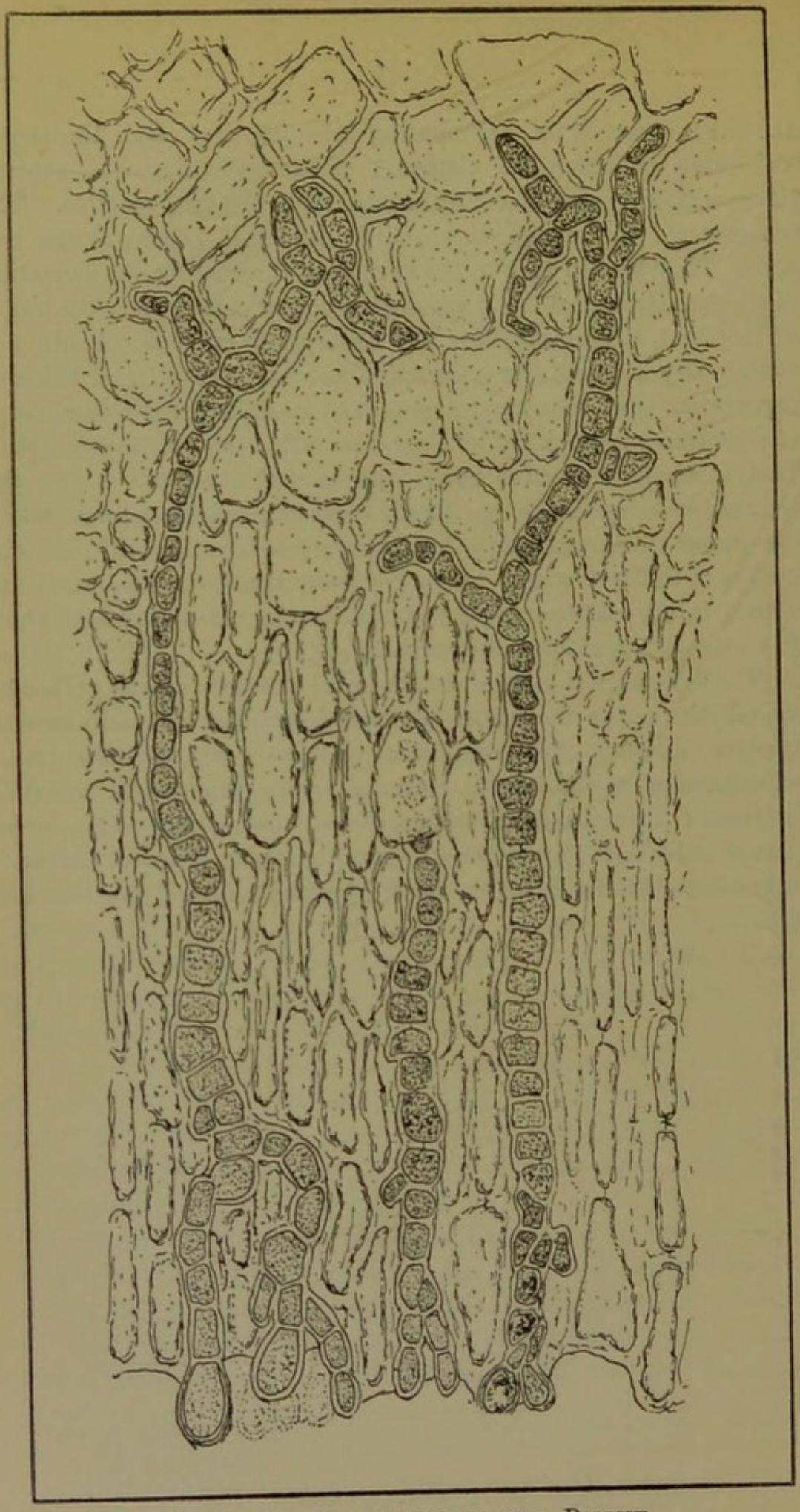


FIG. 1.—CHANTRANSIA SANCTÆ-MARIÆ, DARBISH.
Section of thallus of *Himanthalia lorea* showing the filaments of the endophyte bearing monosporangia. Magn. 600.

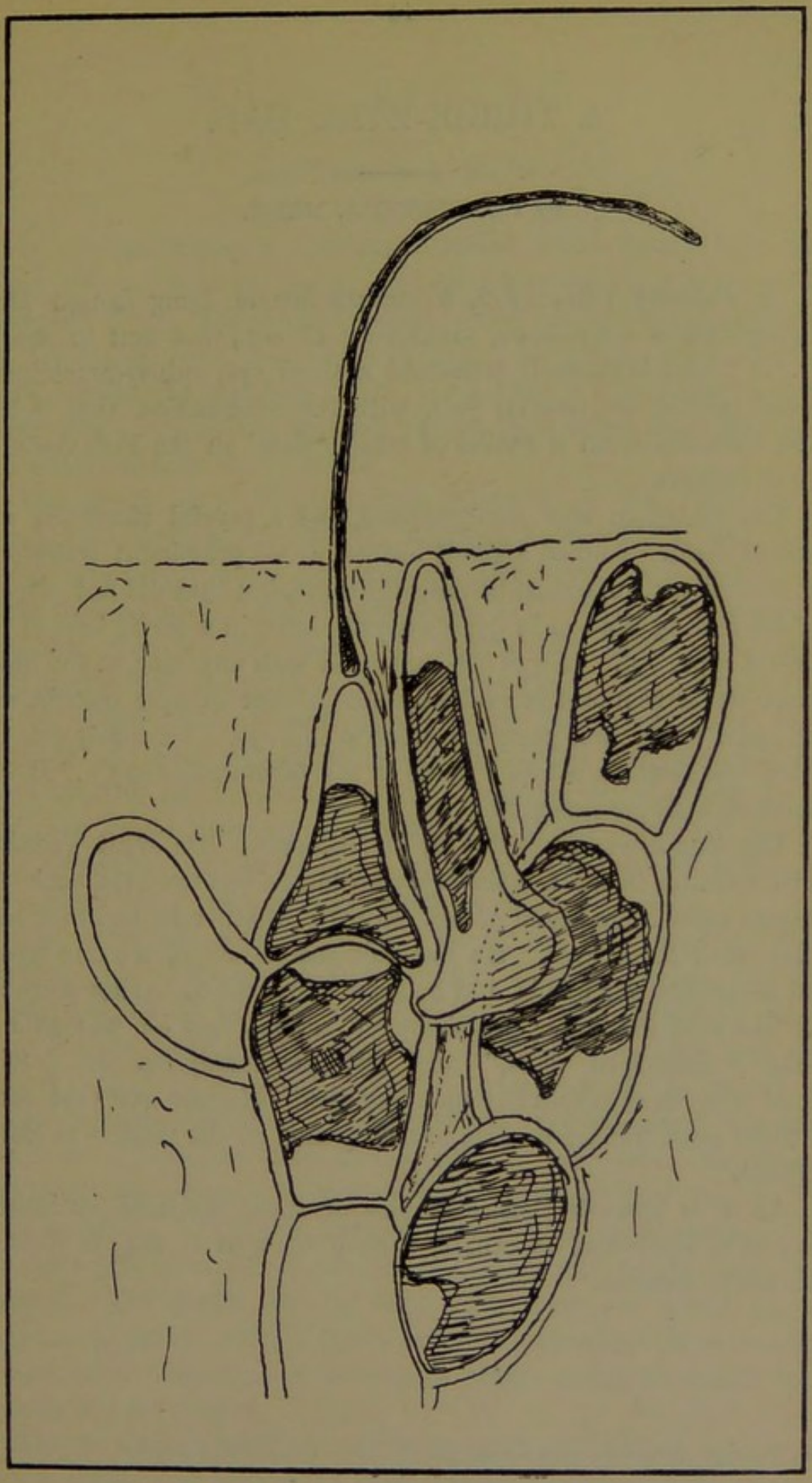


FIG. 2.—CHANTRANSIA SANCTÆ-MARIÆ, DARBISH.
Branching of filament near the margin of a section through *Himanthalia lorea*. The plate-like plastids and the one hair are shown. Magn. 1200.

A THREE-EYED DAB.

By PROFESSOR A. MEEK.

On January 10th, 1909, a mature female Long Rough Dab, *Hippoglossoides limandoides*, measuring 19 cm., was sent to me by Mr. T. Dunn because it possessed a third eye, sub-symmetrically placed behind the normal pair, with the information that it had been obtained from a basket of small 'flats' on the Fish Quay at North Shields.

The specimen was photographed, and a careful dissection was entered upon. I noted a small but not at all prominent transverse cut behind the important looking third eye, but that did not prepare me for finding the eye in question quite loose in a cavity behind the normal right eye. It was not connected with anything in the head. There was a remnant of evidently the inferior oblique muscle, and the optic nerve had been cut close to the eye. I actually cut the latter into sections before I wrote in my laboratory diary: "It was therefore a clever deception."

The sequel was furnished by Mr. Storrow. On Whit Tuesday, 1910, a visitor to the Laboratory, who turned out to be the cook of a Shields trawler, enquired of Mr. Storrow whether he had ever seen a dab with three eyes. He was told the nature of the one which had come into our hands, and he then confessed to having prepared it. He said that after practising on several fish he was able to make "three-eyed dabs," and so successfully as to deceive those who were constantly handling fish. He also saw that some of these were put on baskets of fish placed on the market at North Shields.

As it is possible that examples of these prepared curiosities may have been sent to others, I have thought it well to publish this short account.

THE "EVADNE."

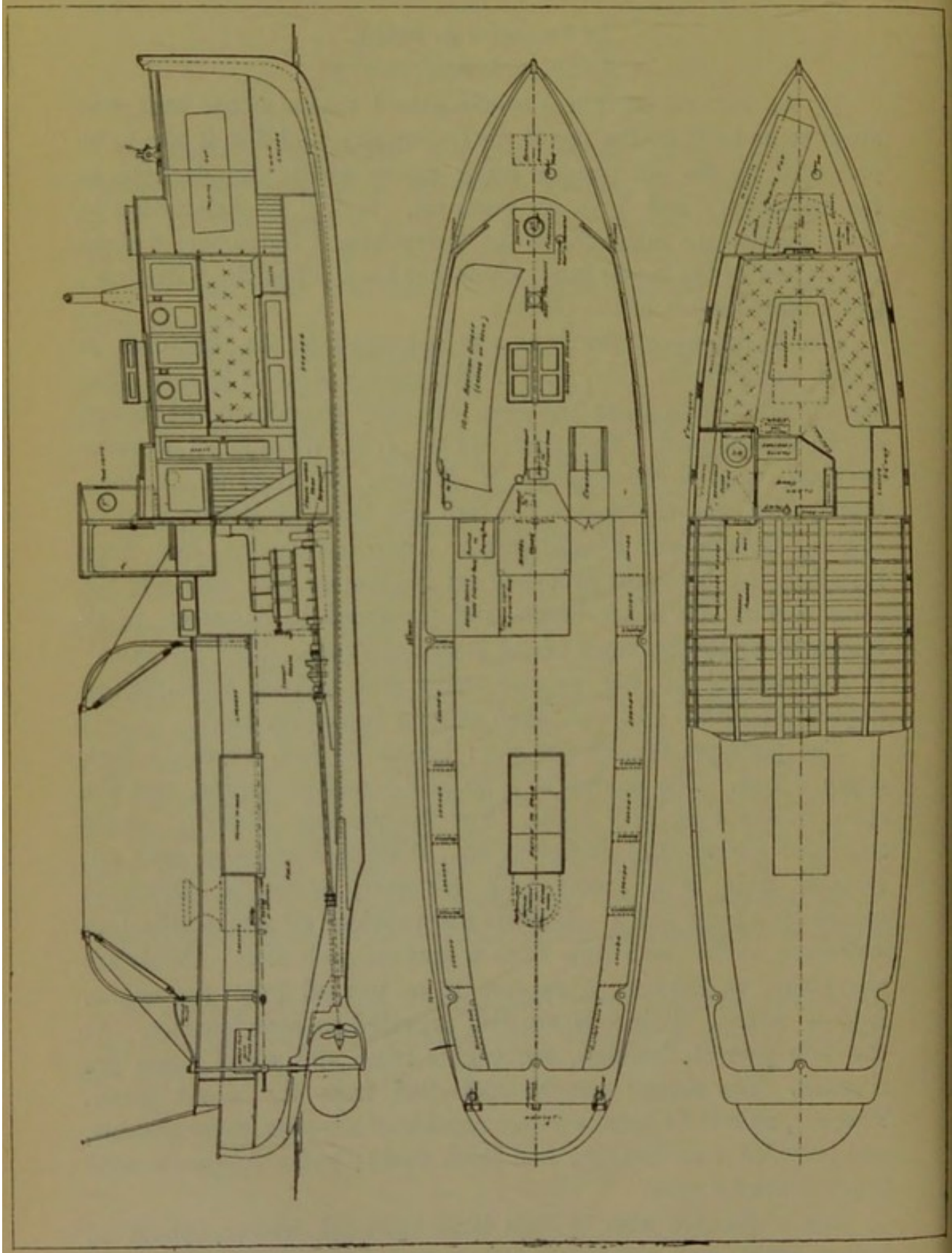
By Professor A. MEEK.

In the last report it was briefly stated that a motor boat was about to be built for the use of the Laboratory, and that it was to be presented by the anonymous donor whose earlier benefactions to the Laboratory had been so generous. It will be interesting to many besides the members of the Committee if I give here a short description of the motor boat, which has been called the "Evadne," and a reproduction of the plans.

The designing of the boat was entrusted to the Lecturer in Naval Architecture (Mr. F. H. Alexander, M.I.N.A.), and after certain alternative plans had been carefully considered the design shown was adopted. The tender of Mr. J. E. Weyman, Newcastle-on-Tyne, who is the agent of Messrs. L. Gardner & Sons, Manchester, was accepted. The hull was built by Messrs. J. & G. Forbes, Sandhaven, Fraserburgh. After the engine had been installed, the boat was launched on September 9th, and left the same evening for Fraserburgh, and proceeded to Aberdeen to be inspected by the Surveyor of the Board of Trade. The "Evadne" then proceeded on her voyage south and arrived at Blyth on September 14th. She was taken over on November 15th.

The principal dimensions are: length 50 feet, beam 11 feet, depth 6 feet. The engine is a 30 H.P. Gardner engine, and the speed is about 8½ to 9 knots. For the purpose of giving ample room for the work of dredging, etc., there is a spacious deck aft. Beneath this is a roomy hold for gear, access to which is gained by a large hatch. Lockers are provided all round this deck and these at the same time form a seat on each side. Davits are also placed as shown. A capstan to be worked from the engine is to be added. Fairleads are also provided on each quarter. At the fore part of the deck, the engine room and wheel house are situated. The engine can be controlled from the wheel house. There is, as will be seen, a cabin capable of sleeping three persons, and provided with lavatory and cloak room; and a forecastle with sleeping cot for crew.

She is planked with 1¼ inch larch upon oak frames, spaced 40 inches apart, and with bent elm frames between these about 8 inches apart. The deck is of 1½ inch red pine on larch and oak beams. Deck fittings are in mahogany, pitch pine and oak.



SECTIONAL ELEVATION AND PLANS OF "EVADNE."

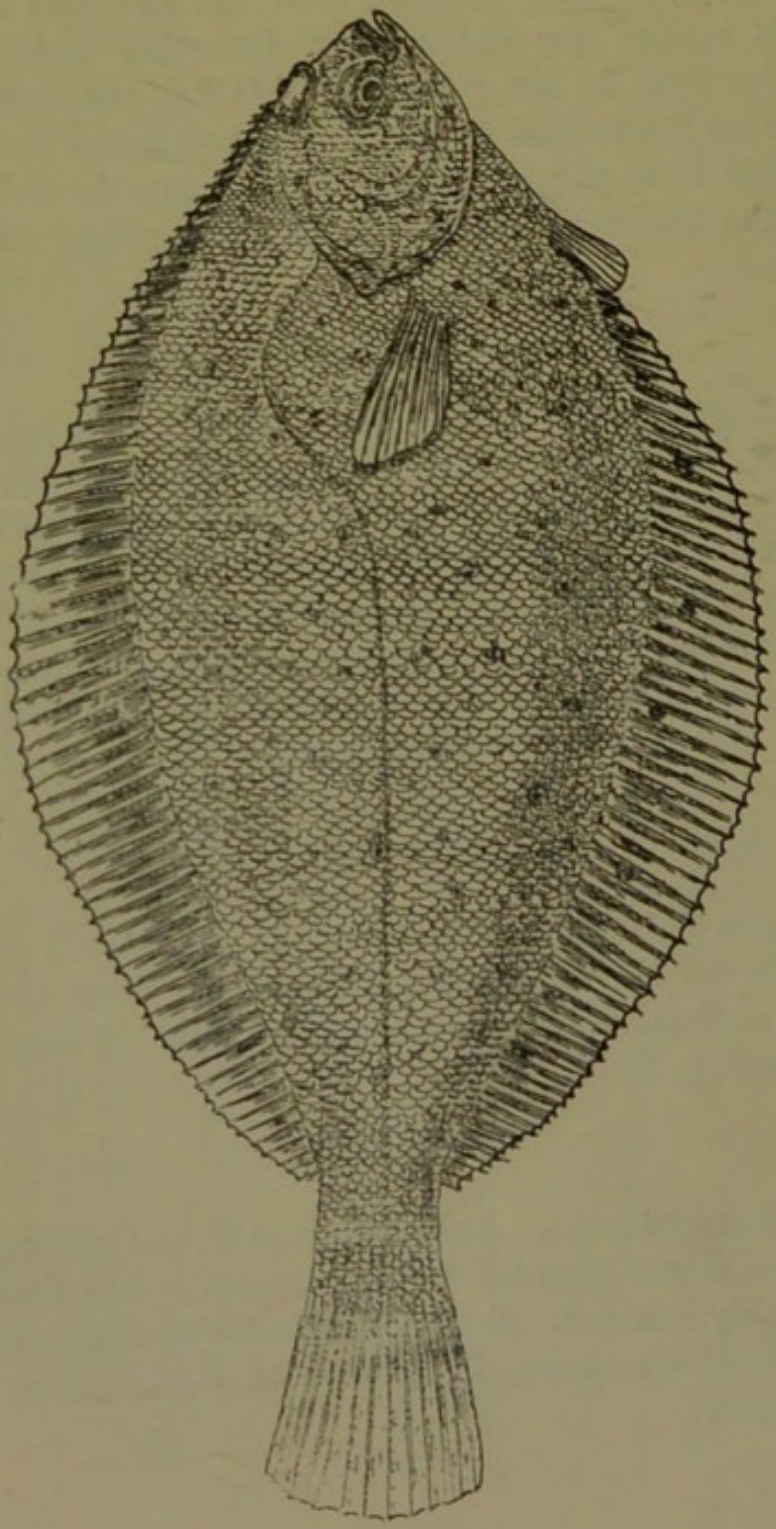
FAUNISTIC NOTES.

The Atherine, *Atherina presbyter*, Cuv. As has been stated on page 9 this species was obtained on December 2nd near the mouth of the Tyne by the "Evadne." It has not before been recorded for the North-East Coast. It has been found in the Firth of Forth; and I am obliged to Mr. W. H. Young for bringing to my notice the Yorkshire records in the "Naturalist" of March, 1910. A.M.

The Northern Catfish, *Anarrhichas latifrons*. This species was recorded by E. L. Gill in the Report for 1906. It was obtained in July of that year, 15 miles E.N.E of the Tyne. A second example was captured this year by the trawler "Craigellachie," 15 miles N.E. by E. of the Tyne, and was sent to the Laboratory by Mr. T. Dunn (whom we have to thank for many interesting specimens) on June 13th. It was a female measuring 4 feet 2½ ins. The skeleton of the head has been prepared by Mr. Storrow. A.M.

Ommastrephes todarus. A fine specimen was found dead on Whitley sands in May, 1909. This squid has been previously found in the district, and is given as "fairly rare" by Alder, Moll. Northumberland, p. 15. B.S.

Lumpenus lampetriformis. As was suggested by Professor Meek when this species was recorded for the district, it has since been found to be fairly common. It is not infrequently found, together with the 5-bearded rockling, in baskets of Nephrops on North Shields Fish Quay. B.S.



The Common Dab.