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REPORT ON NORWEGIAN FISHERY AND MARINE INVESTIGATIONS VOL. III NO. 2

THE YOUNG HERRING OF THE NORTH SEA

A CONTRIBUTION TO THE KNOWLEDGE
ABOUT
THE YOUNGER AGE-GROUPS

BY
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BERGEN
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1918

As shown by several authors, Hjort, Delsman, Bjerkan¹⁾ a. o. the drift-nets used by the herring fishers in the North Sea are adapted to the capture of grown herring of the size frequenting the different fishing-grounds. Special implements must thus be used to obtain information as to the distribution of the younger, immature age-groups of the herring.

Investigations on the younger age-groups have previously been made at many places on the coasts bordering the North Sea; as, for instance Scotland (Firth of Forth, Murray Firth), England (Plymouth), Holland, Germany and Denmark. No closer investigation has, however, been made about their distribution in the open waters of the North Sea and of their subsequent growth and habitat. It is also of great difficulty to study these conditions on the open coasts of the North Sea, the service of a steamer and implements of many kinds being required.

In 1912 Dr. Johan Hjort therefore made several cruises in the North Sea with the Norwegian research steamer „Michael Sars“ especially for the purpose of studying the distribution of the younger stages of the herring, accompanied by his assistants, E. Koefoed and E. Lea. The cruises were carried out in June—July, and October—November in order to compare the conditions prevailing in the summer with those of the autumn.

¹⁾ Johan Hjort: Fluctuations in the great Fisheries of Northern Europe, Rap. & Procés-Verbaux, Vol. XX Cons. perm. intern. p. expl. de la mer. Copenhagen, 1914.

H. C. Delsman: Über das Wachstum von Nordseehering und Zuiderseehering nach Untersuchungen an den Schuppen, Rapporten en Verhand. Rijksinstituut voor Visscherijonderzoek. Deel I. Afl. 2. S. Gravenhage, 1914.

Paul Bjerkan: Age, Maturity and Quality of North Sea Herrings, Rep. on Norw. Fishery and Marine Investigation. Vol. III, No. 1. Bergen, 1917.

The material thus secured has been given to me by Dr. Hjort for examination. The preliminary results of this investigation have been published with a map by Hjort in 1914 (l. c.). As, however, the aim of his work was by far too wide to allow of a thorough consideration of the special features displayed by the material, I find it to be of interest for the further study of the question to publish the results in details, in each case with reference to the available material.

As might be understood by those who have worked with similar questions, it is a difficult task in the open sea to secure a suitable material in order to solve such a problem. As it is, the material is not very extensive and further investigations will perhaps give a better material and more definite results, but as a first attempt, the investigations might be of some use by indicating the best course for further study.

A few of the samples were not available for my examination, but in most cases I could then find accounts of the material in the journal of the cruises and, in some instances, measurements of a number of individuals. In this paper I will confine myself to the treatment of the first three age-groups, — herrings which live in their first, second or third summer, and are therefore said to belong to the 0-, I- and II-group. The scales of these herrings have then either none or one or two winterings respectively. In the supplementary table I I have shown the results of the measurements of the herrings belonging to these three age groups. The separation of the age groups as shown in table I is largely made on the principles shown by C. G. Joh. Petersen, who found that the frequencies of the length-groups displayed the different age-groups. As shown by later investigations this holds good for the younger year-classes. In some cases I have made use of the scales to make sure about the age of the herrings. The determination of the age by the scales could not be universally applied, owing to the fact that many of the herring in the samples had lost their scales. This is often found in young herrings, which have been somewhat roughly handled, as is the case in most of the trawl catches. In table I are found records of date of capture, locality, depth of the station and gear used in taking the sample. From the map can be seen if other imple-

ments than those recorded in table I have been used at the same station. The maps also show all the stations where implements adapted to catch the younger age-groups have been in use, while the supplementary table only shows the stations with positive results. (See also the inserted tables a and b, p. 10 and 11).

The gear.

The implements used during the cruises were a fine-meshed trawl of the same construction as used by the German and Swedish fishermen, and a fleet of drift-net composed of a series of nets of greatly varying width of mesh.

The width of mesh in the different parts of the German herring-trawl is compared with that of the English herring-trawl as follows:

	German herring trawl.	English herring trawl.
Wings (from knot to knot)	4.5 cm.	7.0 cm.
Square — „ —	4.5 „	7.0 „
Baiting — „ —	4.1 „	3.0 „
Belly — „ —	3.7 „	3.2 „
Cod-end — „ —	2.3 „	3.0 „

The drift-nets were as follows:

	Width of mesh (from knot to knot)....	
Sprat net.	1.0 cm.	
— „ —	1.2 „	
„Loddegarn“ ¹⁾	1.3 „	
Nordland fat herring net	2.1 „	
— „ — „ — „ —	2.2 „	
— „ — „ — „ —	2.5 „	
Norwegian large — „ —	3.1 „	

The herring trawl is, compared with the nets, of a very coarse fabric and the meshes are double-threaded and are thus actually much smaller, compared with those of the nets, than is shown by the figures.

The implements were found to be well suited to the purpose of the investigations. The trawl took all size of the herring down to 10 cm.

¹⁾ Norwegian nets used for *Malotus*.

in length, smaller sizes occasionally and in quite small numbers. The drift-nets took all sizes down to 7—8 cm. It is evident, however, that the hauls made with these implements cannot, at any rate in the case of the drift-net, claim to be representative of the stock on the fishing-grounds. The result seems to be most satisfactory as regards the I-group. Of the 0-group the herring of 6 cm. in length and smaller went through the meshes of the drift-nets and very possibly some herrings of the length of 7—8 cm. had the same narrow escape. In the trawl the 0-group was only taken occasionally and then the length-frequencies of the samples show plainly that a lot of the smaller sizes had escaped through the meshes. Regarding the II-group it could now and then be observed, according to the journal, that herrings fell off the small meshed nets, and from the herrings caught we can judge that these were mostly belonging to the II-group. The I-group was taken as well by the net as by the trawl, but in the trawl catches this group is much better represented; it thus seems that the herring at this stage lives nearer the bottom. The contrary is the fact in the II-group, — the best catches are made by the drift-nets and the few taken by the trawl are mostly small-sized ones. The material taken is not large enough to make safe deductions, but the catches seem to indicate a segregation of the larger individuals from the shoals of smaller ones of the same age groups. This is especially the case as regards the II-group. The smaller individuals seem to keep more to the bottom while the habitat of the larger ones is more pelagic. If this be the case it might be still more difficult to attain a material sufficiently representativ, especially of the II-group. This segregation I will discuss more closely later on.

The maps.

The three maps (fig. 1—3) are constructed in order to give a view of the stations of the cruises and the principal results as regards the three above-named age-groups.

Fig. 1 shows the position of the stations of the summer and autumn cruises, where implements to catch small herrings, viz: herring-trawl and small-meshed nets, were used. As might be seen the sum-

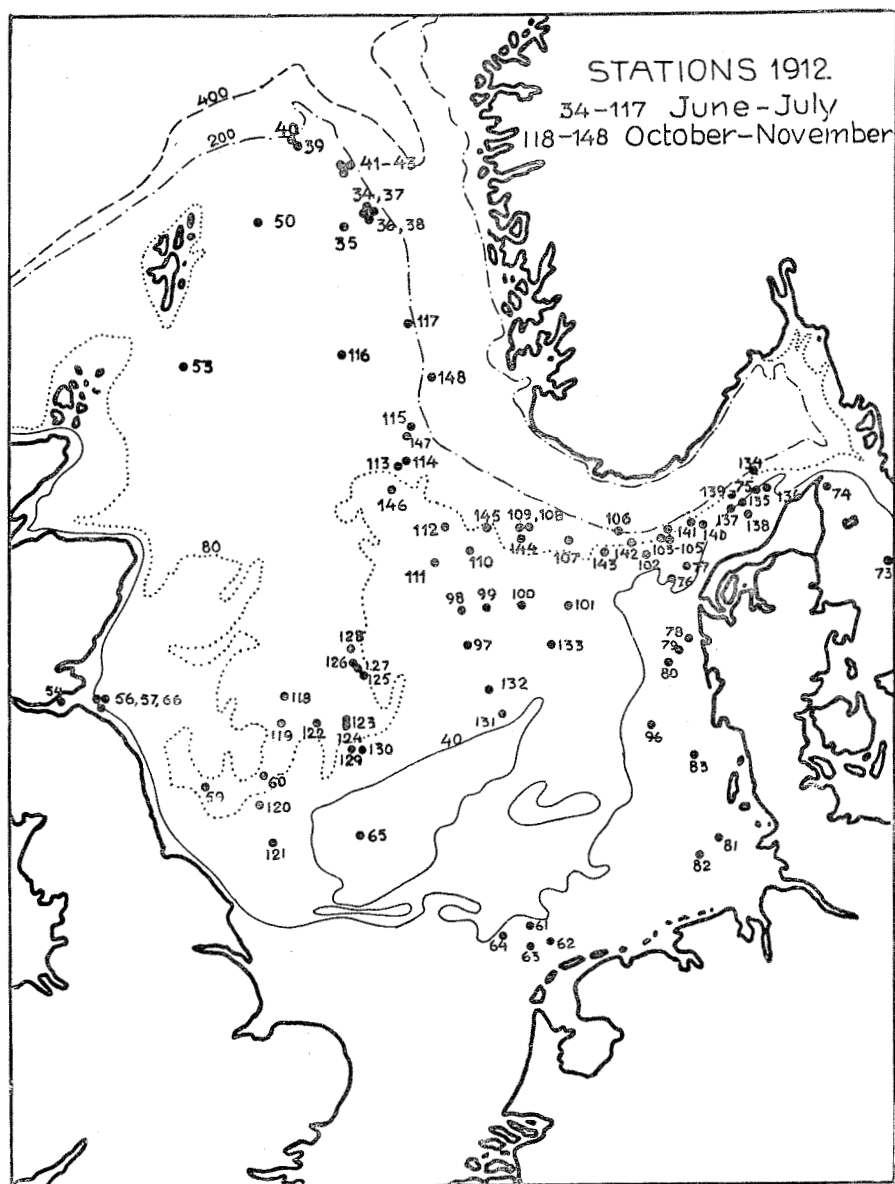


Fig. 1. Map showing the stations.

mer cruises (Stats. 34—117) were extended to the „Revkant“ (the western slopes towards the Norwegian Channel) and the plateau between this and the Shetland Island, to the British coast (Firth of Forth, off Northumberland), Dutch coast (off Texel) German coast (Heligoland Bay), coast of Denmark (Blaavands Huk to Limfiord),

Skager Rack to Ling Bank (at the slopes towards the Norwegian Channel and on the plateau to the south). Two stations lie in Cattegat (Stats. 73 and 74). During the autumn cruises the stations are mostly situated north and west of Dogger Bank and at the slopes towards the Norwegian Channel, from off Skagen to off Ling Bank.

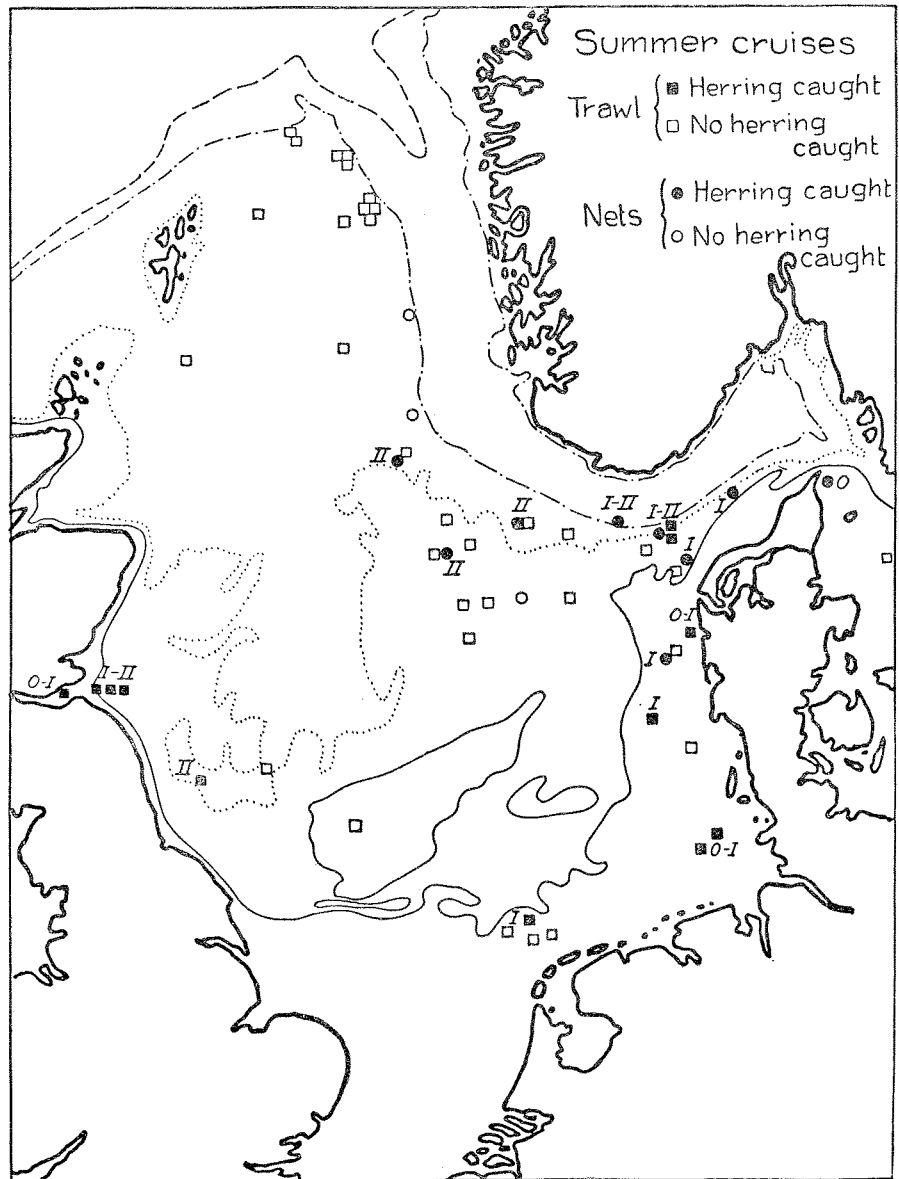


Fig. 2. Map showing the results of the summer cruises.

The two following maps (fig. 2 and 3) show the distribution of the three younger age-groups as found respectively during the summer and autumn cruises. As in the foregoing map all stations, where implements to catch small herrings have been used, are recorded and special signs show the trawl- and net-stations and the catch at each

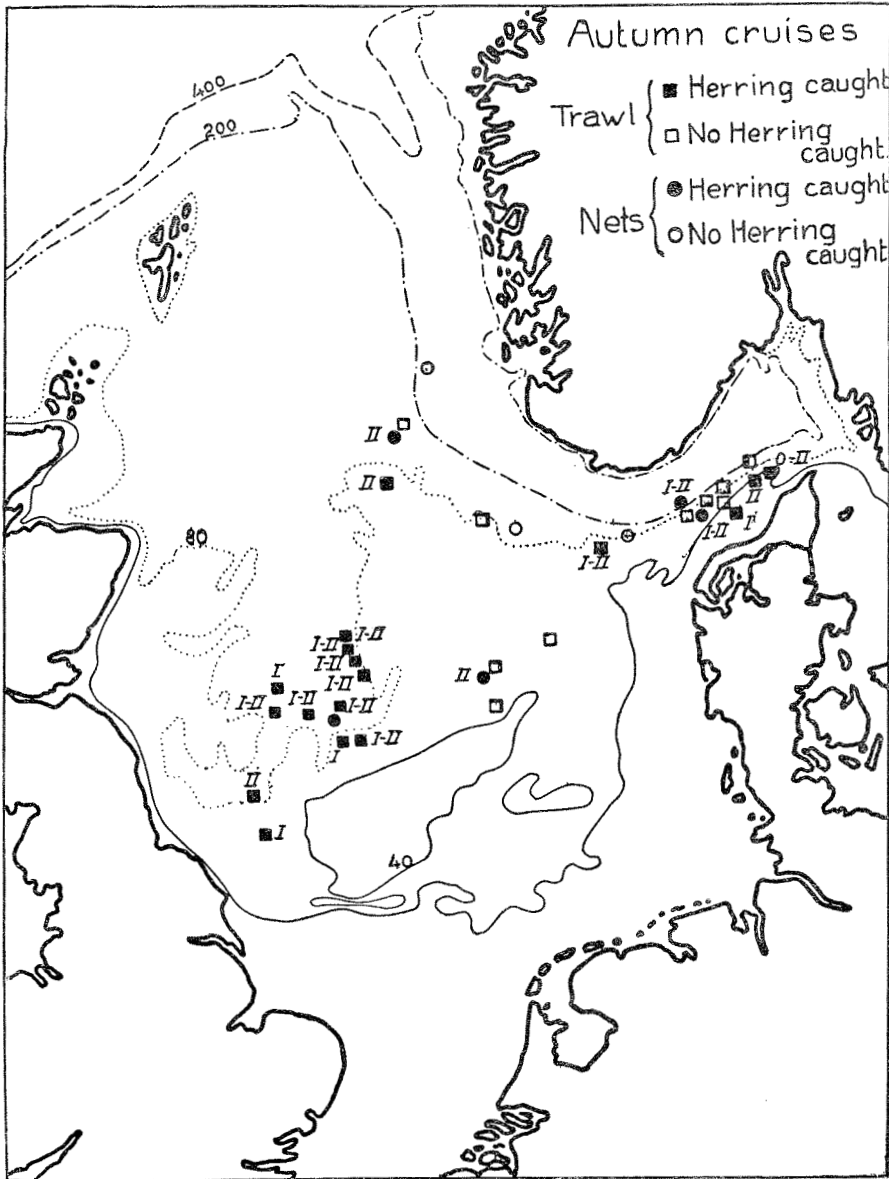


Fig. 3. Map showing the results of the autumn cruises.

Table a. Summer Cruises.

Stations	Trawl				Nets				Stations	Trawl				Nets			
	used	0-group	I-group	II-group	used	0-group	I-group	II-group		used	0-group	I-group	II-group	used	0-group	I-group	II-group
34	.	-	-	-					78	.	×	×	×				
35	.	-	-	-					79	.	-	-	-				
36	.	-	-	-					80	.				.	-	×	-
37	.	-	-	-					81	.	×	×	-				
38	.	-	-	-					82	.	×	×	-				
39	.	-	-	-					83	.	-	-	-				
40	.	-	-	-					96	.	-	×	-				
41	.	-	-	-					97	.	-	-	-				
42	.	-	-	-					98	.	-	-	-				
43	.	-	-	-					99	.	-	-	-				
50	.	-	-	-					100	.				.	-	-	-
53	.	-	-	-					101	.	-	-	-				
54	.	×	×	-					102	.	-	-	-				
56	.	-	×	-					103	.	-	×	×				
57	.	-	×	×					104	.	-	×	×				
59	.	-	-	×					105	.				.	-	×	×
60	.	-	-	-					106	.				.	-	×	×
61	.	-	×	-					107	.	-	-	-				
62	.	-	-	-					108	.	-	-	-				
63	.	-	-	-					109	.				.	-	-	×
64	.	-	-	-					110	.	-	-	-				
65	.	-	-	-					111	.	-	-	-	.	-	-	×
66	.	-	×	-					112	.	-	-	-				
73	.	-	-	-					113	.				.	-	-	×
74	.				.	×	-		114	.	-	-					
75	.				.	-	×	-		115	.						
76	.				.					116	.						
77	.				.	-	×	-		117	.						

station. When trawl and net have been used at the same place the two signs are placed close to each other as near up to the position of the station as possible. Below, the results shown in the maps are found in the two accompanying (tables a and b). In these the stations, which lie close to each other, are connected by brackets. Further details about the number of individuals of each age-group and the length of those belonging to each age group are found in table I (suppl.)

¹⁾ Taken by catcher.

Table b. Autumn Cruises.

Stations	Trawl				Nets				Stations	Trawl				Nets			
	used	0-group	I-group	II-group	used	0-group	I-group	II-group		used	0-group	I-group	II-group	used	0-group	I-group	II-group
118	•	—	×	—					134	•	—	—	—				
119	•	—	×	×					135	•	—	—	×				
120	•	—	—	×					136	•	×	×	×				
121	•	—	×	—					137	•	—	—	—				
122	•	—	×	×					138	•	—	×	—				
123	•	—	×	×					139	•	—	—	—				
124					•	—	—	×	140					•	—	×	×
125	•	—	×	×					141					•	—	×	×
126					•	—	—	×	142					•	—	—	—
127	•	—	×	—					143	•	—	×	×				
128	•	—	×	×					144					•	—	—	—
129	•	—	×	—					145	•	—	—	—				
130	•	—	×	—					146	•	—	—	×				
131	•	—	—	—					147	•	—	—	—			×	
132	•	—	—	—	•	—	—	×	148					•	—	—	—
133	•	—	—	—													

The o-group.

This group is only caught accidentally and in some few localities and then always by the trawl, though, as stated before, the trawl only took with certainty such as were down to a length of 10 cm. The number of individuals caught is also very small; only the two samples from Heligoland Bay (Stats. 81 and 82) display a considerable amount of individuals, viz: 168 and 95.

The material from the different localities is as follows:

Locality	Sample	Date	Size cm.	Aver. size cm.	Number caught	Depth m.	Gear	Remarks
Firth of Forth	1	17/6	6—8	7.0	4	21	t.	
Off Nissum Fiord....	8	13/7	8—11	9.7	39	25	t.	
Heligoland Bay	9 and 10	13/7	8—11	9.3	263	18—27	t.	
Skager Rack.....	30	29/10	11	11.0		54	t.	

Of the summer samples, that from the Firth of Forth is too small to give an approximate value for the average length of the age group, only 4 individuals, and by the other samples we must bear in mind that the trawl with certainty only fished herrings of down to a length of about 10 cm. The average length, as found above, is thus most likely too high. From the actual lengths, as recorded for the samples from Nissum Fiord and Heligoland Bay, we see that no individual smaller than 8 cm. has been taken and, judging from the presence of smaller individuals in the Firth of Forth sample, it is most likely that they have been present in the other samples too, but have escaped through the meshes of the trawl together with some percentage of the nearest length-groups (8 and 9 cm.)

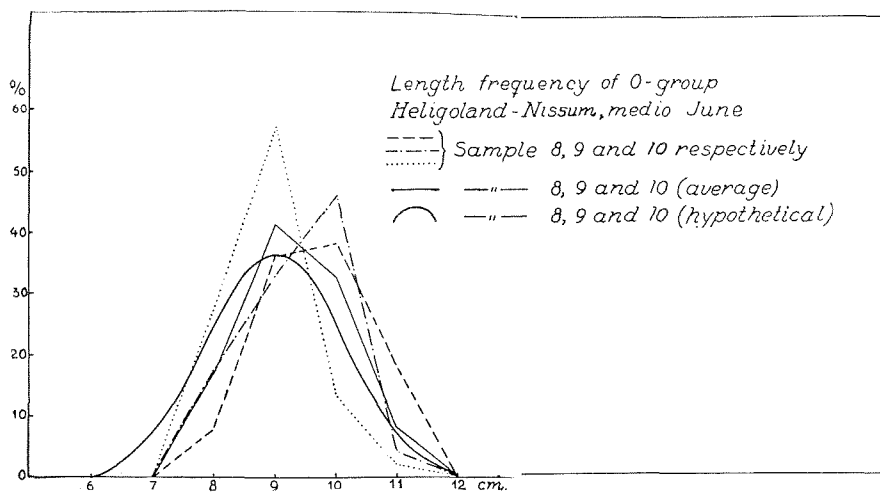


Fig. 4. Length of the 0-group, summer.

Fig. 4 shows the length-frequency curves of the 0-group of the three samples from Heligoland—Nissum (Samples 8, 9 and 10). The dotted lines represent each of the samples, while the continuously-drawn broken line shows the average-frequency curve of the three samples. In the smooth continuously-drawn line an attempt is made to show approximately how the frequency might fall if the trawl had taken all lengths of the age group alike. As seen, the average length is then supposed to fall close upon 9 cm. All these summer samples have been taken medio June.

The stations of the autumn cruises lie farther out at sea and this is most likely the reason why only one individual of the 0-group was taken during the cruises.

The I-group.

The material of the I-group is more abundant than that of any other of the age-groups treated in this paper. Especially some summer samples display a lot of individuals, up to 206 and 156 in two samples from the Firth of Forth and more than 50 in two samples from the west coast of Denmark.

As this group has a length of more than 10 cm., the lower limit of the capacity of the trawl, it would thus seem as if the material might give good observations as to the length-frequency of the age-group at the time of the cruises. As shown below the conditions do not, however, fall quite as simply.

In fig. 5 I have made a comparison of the length-frequency of the I-group of the principal samples taken during the summer cruises. As seen I have grouped them according to locality and depth, where the samples are taken. By far the larger part of these samples are taken by trawl, which as stated above of this age-group is supposed to take samples representative of the composition of the shoals.

The first frequency-curve shows the length of the individuals of of the I-group of a sample taken by trawl in the Firth of Forth at a depth of about 21 m. The number of individuals is 206. The average length is 12,1 and the mode of the curve lies by 12 cm., but some few individuals are up to 15 cm. long.

In the next part of the figure the length-composition of the I-group of the samples 2, 3 and 6, also from the Firth of Forth, are found represented. These samples are taken at a depth of about 50—53 m. The samples 3 and 6 show very marked modes at 14 cm. and the average length is 14,1 and 14,7 cm. respectively. The sample 2 display an intermediate length-composition, with the mode by 13 cm., but the 14 cm. group is also well represented. The continuously-drawn line represents the average length composition of the 3 samples from deeper water. As seen at once there is a difference in the mean length of the two groups of about 2 cm., and remembering what is stated above of the capacity of the trawl as regards the catch of this special age-group, we come to conclusion that a pronounced difference in length-composition is actually to be found between the shoals in the deeper and those in the shallower parts of the Firth of Forth.

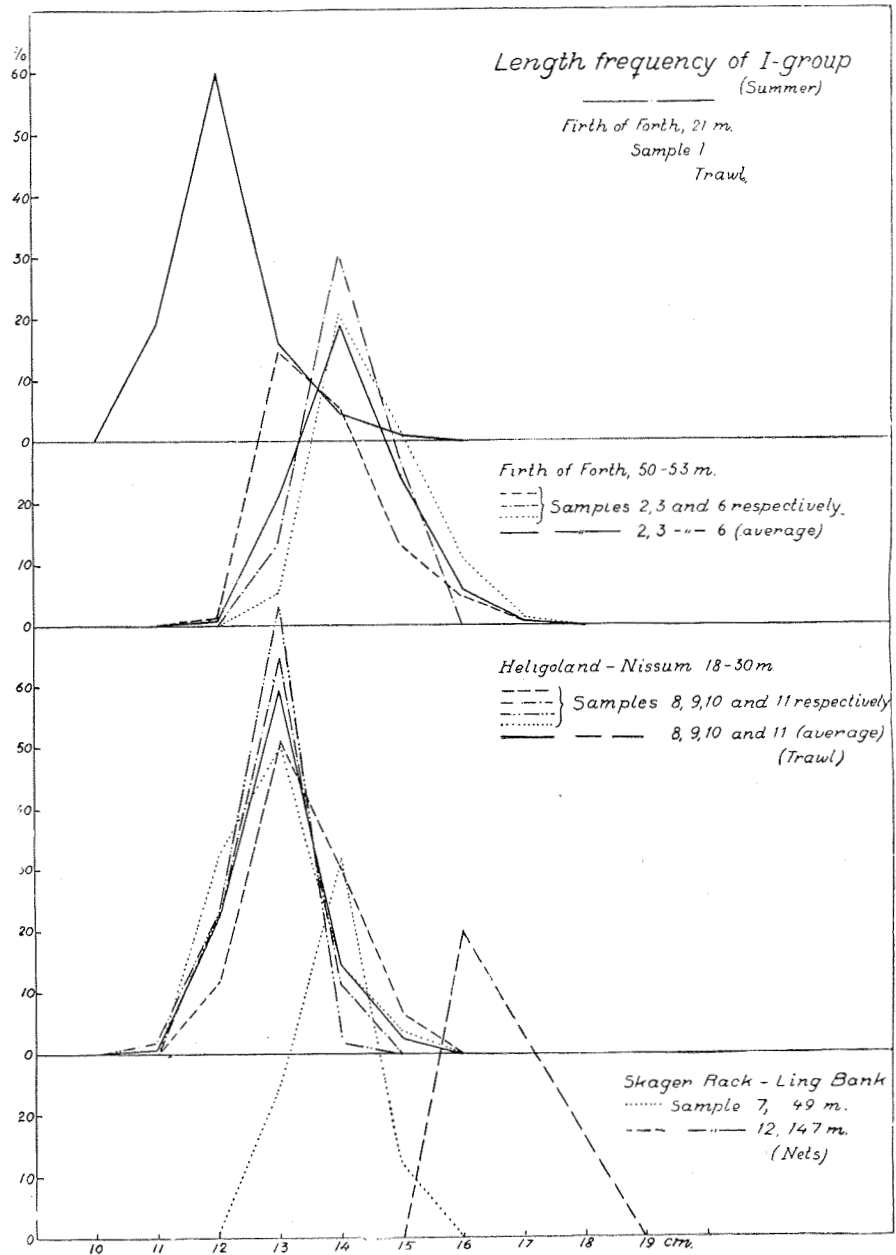


Fig. 5. Length of the I-group, summer.

The reason of this phenomenon must be a segregation of the larger individuals from the shoals of smaller ones living in the shallower parts of the area. This segregation must be supposed to take

place gradually and the intervening length-groups, between 12 and 14 cm. might be supposed to inhabit the area of the Firth of Forth, having a depth between 25 and 50 m. A suggestion in this direction we find in sample 2, which has a length composition lying somewhat intermediate between the two groups but tending very decidedly towards the latter. The cause of the segregation is very difficult to locate, it might be the hydrographical conditions, the search for suitable food, the swimming capacity or, most probably, a combination of all these factors. The question might arise whether it is a segregation of the larger individuals. The same result might have been found if a lot of the individuals had by chance emigrated to the deeper water and under the different conditions grown more rapidly. The first-named explanation is, however, more in conformity with features displayed by segregation among the larger herrings, viz: the segregation of the larger individuals of the fat herring and their subsequent congregation with the spawning herring.

The third part of the figure shows the curves representing the length frequency of the samples from Heligoland Bay to off Nisum Fiord (Samples 8—11). As seen they are fairly uniform and display marked modes by 13 cm. The average length composition of the four samples is shown by the continuously-drawn line. By comparing these samples with those from the Firth of Forth we find that the length composition is intermediate between the two groups found at the latter place. As these samples have been taken at depths from 18—30 m. they confirm the idea of a segregation of the larger individuals of the group and a migration of these individuals to deeper water, in such a manner that the average length found from the samples becomes higher the farther out the samples are taken.

All the above-mentioned samples are taken by trawl: the fourth part of the figure, however, represents two samples taken by nets. The number of individuals in these samples is very small, only 8 and 6 respectively and they would have been of little interest had not, especially sample 12, displayed remarkably larger individuals of the I-group than any sample taken by trawl. As seen from table I the average length is found to be 16.7 cm., about 2 cm. higher than found in any trawl sample. The 6 individuals of the I-group are taken

together with 12 individuals of the II-group and a lot of larger herrings. All of these have been investigated as to age by means of the scales and an error in age is thus not to be feared. As this sample was taken some days only after the Heligoland—Nissum samples it seems as if the largest individuals of the group have migrated still further out and congregated with the shoals of young-herrings of the older age groups, and live in a more pelagic manner. A strict comparison between the trawl-samples from the more southern areas and the net-samples from Skager Rack—Ling Bank is, however, not possible as a growth-difference affecting the I-group might very well exist between the stocks of herrings in question. The fact is only mentioned here as a point to be paid attention to in the further studies of the subject.

The number of the individuals of the I-group taken during the autumn cruises is mostly very small. With the exception of the samples 22 and 30, with 36 and 47 indivs. respectively, the largest amount is 6 indivs. The average length of the individuals of the group, which mostly falls between 15 and 17 cm., is thus of little importance and only gives the impression that the group on the average has grown some 2 cm. between the summer and autumn cruises. No difference in length is observable between the individuals of the group taken by nets compared with those taken by trawl. Mostly the I-group is caught together with older herrings especially those belonging to the II-group.

The II-group.

The number of individuals of this group is very small. Especially in the trawl-catches from the summer cruises the group is very scarce, in the net-catches from the same time they are, however, found more frequently. These catches have been made in the area Skager Rack—Ling Bank and in comparatively deep water. The largest number taken in a net-haul is 12 (sample 12) and in a trawl-catch 6 (sample 27). As a rule the group is scarcer in the trawl- than in the net-samples, quite contrary to the case of the younger age-groups, which is found more abundant in the trawl catches. This gives the impression that the herrings, having attained a certain length (and age), habitually

live more pelagically, a point which, however, owing to the small material at hand, ought to be submitted to further investigation.

The average length found from the material is very variable as might be expected considering the small number of individuals. The only interesting feature regarding the mean length, which might be of some interest in further studies, is the comparison between the size of the net-caught and the trawl-caught individuals of the group.

By a comparison of the samples from the autumn we find for the II-group:

Locality	Sample no.	Trawl			Nets		
		Number	Length	Aver. length	Number	Length	Aver. length
Near Dogger Bank	16—22, 24—27	16	19—21	19.5	—	—	—
	23, 28	—	—	—	11	21—26	23.1
Near Skager Rack	29—31, 34	8	20—23	21.4	—	—	—
	32—33	—	—	—	10	21—25	22.5
Near Ling Bank	35	1	19	19.0	—	—	—
	36	—	—	—	2	20—24	22.0

As both the trawl-caught and net-caught samples from about the same locality were taken within a very short interval of time, the above tabulated figures give the impression that the larger individuals of the group habitually live more pelagically, while the smaller ones keep to the bottom. It is of interest to note, that the latter as shown, mostly have a length of about the length-limit usually accepted between the „small herrings“ and the „fat herrings“. The difference in length between the three groups of trawl-caught and net-caught herring, is certainly due to the different locality.

Resumé.

As stated at the beginning of this report Dr. Hjort by these cruises in the „Michael Sars“ only intended to make some preliminary investigations about the habitat of the younger age-groups of the herrings in the North Sea so as to get some starting-points for further researches into the question.

In this report it has been shown that the material collected is insufficient to fix the average size of the herring of the different age-groups at the time of the cruises, because:

1) The 0-group was not caught in sufficient number, as a lot of the smaller individuals escaped through the meshes of the gear, and the catches could thus not be representative of the shoals.

2) The I-group, which had a suitable size to be taken regularly by the implements, has been shown to be distributed in such a manner that the smaller individuals live in the shallower water. The catches are thus only representative of the shoals at the depths, where they are caught, but not of the whole age-group.

3) The II-group was only caught in small numbers and mostly by nets; very possibly a lot of individuals of this group fell off the small-meshed nets and could not be taken in those of larger mesh.

These investigations have shown:

1) That the 0-group mostly keeps to shallow water, below 20 m., which area seems to be the principal nursery-ground of the herring.

2) That the I-group is mostly found from the 20 m. line out to a depth of 50—60 m. The individuals of the group seem to be distributed in such a way that the average size of the herrings caught is higher, the deeper the water is where they are caught. A continuous segregation and a subsequent migration of the larger herrings towards deeper water thus seems to take place. The largest individuals of the group are found pelagically among individuals of older herrings, especially of the II-group.

3) That the II-group is mostly taken by nets and thus seems to live more pelagically than the younger age groups. The individuals of the group taken in nets (pelagically) are larger than those taken in the trawl (near the bottom).

As a whole there seems to be a constant segregation and congregation in new shoals according to size and development. This segregation of the faster-growing individuals and their subsequent migration to deeper water is most conspicuous in the I-group, but is also marked in the II-group. It then follows, that if the investigations are to give complete results, catches must be made in all depths from the shore and out to the slopes by nets of different meshes and by fine-meshed trawl.

Supplement:

Table I.

No. of sample	Stations	Date	Position	Depth m.	Gear	0-group			I-group			II-group			Locality
						Number	Length cm.	Aver. length cm.	Number	Length cm.	Aver. length cm.	Number	Length cm.	Aver. length cm.	
1	54	17/6	56° 16' N., 3° 6' W.	21	t	4	6—8	7.0	206	11—15	12.1	—	—	—	Firth of Forth
2	56	18/6	56° 7' N., 2° 36' W.	50	t	—	—	—	92	12—16	13.8	—	—	—	—
3	57	18/6	56° 7' N., 2° 24' W.	53	t	—	—	—	15	13—15	14.1	1	21	—	—
4	59	19/6	55° 16' N., 0° 30' W.	70	t	—	—	—	—	—	—	1	18	—	Off Blyth
5	61	20/6	53° 42' N., 4° 54' E.	33	t	—	—	—	13	13—15	14.0	—	—	—	„ Terschelling
6	66	22/6	56° 7' N., 2° 24' W.	51	t	—	—	—	156	13—17	14.7	—	—	—	Firth of Forth
7	77	13/7	57° 8' N., 7° 56' E.	49	n	—	—	—	8	13—15	13.9	—	—	—	Skager Rack
8	78	13/7	56° 23' N., 7° 53' E.	25	t	39	8—11	9.7	59	12—15	13.6	1	18	—	Off Nissum Fiord
9	81	15/7	54° 25' N., 7° 59' E.	18	t	168	8—11	9.7	17	12—14	12.9	—	—	—	Heligoland Bay
10	82	15/7	54° 21' N., 7° 42' E.	27	t	95	8—11	8.9	28	12—15	12.9	—	—	—	—
11	96	17/7	55° 37' N., 7° 7' E.	30	t	—	—	—	52	11—14	12.8	—	—	—	Off Blaavands Huk
12	106	21/7	57° 31' N., 6° 54' E.	147	n	—	—	—	6	16—18	16.7	12	21—24	22.4	S. of Lindesnes
13	109	22/7	57° 43' N., 5° 28' E.	77	n	—	—	—	—	—	—	10	21—24	22.7	N. of G. Fisher Bank
14	111	23/7	57° 26' N., 3° 43' E.	70	n	—	—	—	—	—	—	5	21—23	22.0	N. of —
15	113	24/7	58° 21' N., 3° 4' E.	102	n	—	—	—	—	—	—	4	23—25	24.0	N.E. of Ling Bank
16	118	15/10	56° 6' N., 0° 51' E.	83	t	—	—	—	4	16—18	17.0	—	—	—	N.W. of Dogger Bank
17	119	15/10	55° 55' N., 0° 49' E.	83	t	—	—	—	1	16	—	2	19	—	N.W. „ —
18	120	16/10	55° 5' N., 0° 26' E.	83	t	—	—	—	—	—	—	1	21	—	W. „ —
19	121	16/10	54° 46' N., 0° 41' E.	82	t	—	—	—	2	17	—	—	—	—	W. „ —
20	122	17/10	55° 53' N., 1° 35' E.	84	t	—	—	—	2	16	—	1	18	—	N. „ —
21	123	17/10	55° 52' N., 1° 58' E.	85	t	—	—	—	1	16	—	3	19—20	19.7	N. „ —
22	125	18/10	56° 19' N., 2° 15' E.	81	t	—	—	—	36	15—18	16.6	1	19	—	N. „ —
23	126	18/10	56° 25' N., 2° 10' E.	84	n	—	—	—	—	—	—	1	22	—	N. „ —
24	127	19/10	56° 26' N., 2° 2' E.	87	t	—	—	—	1	18	—	—	—	—	N. „ —
25	128	19/10	56° 31' N., 2° 3' E.	87	t	—	—	—	3	17—18	17.7	1	20	—	N. „ —
26	129	20/10	55° 37' N., 1° 54' E.	78	t	—	—	—	2	15—16	15.5	—	—	—	N. „ —
27	130	20/10	55° 34' N., 2° 13' E.	70	t	—	—	—	5	16—18	17.0	6	19—20	19.8	N. „ —
28	132	22/10	56° 9' N., 4° 40' E.	52	n	—	—	—	—	—	—	10	21—26	23.2	N. „ —
29	135	29/10	57° 43' N., 9° 30' E.	32	t	—	—	—	—	—	—	3	23	—	Skager Rack
30	136	29/10	57° 40' N., 9° 41' E.	54	t	1	11	—	47	13—18	14.6	1	20	—	—
31	138	30/10	57° 38' N., 9° 10' E.	38	t	—	—	—	1	18	—	—	—	—	—
32	140	31/10	57° 32' N., 8° 37' E.	104	n	—	—	—	1	14	—	1	21	—	—
33	141	31/10	57° 35' N., 8° 10' E.	161	n	—	—	—	4	14—16	15.0	9	21—25	22.8	—
34	143	5/11	57° 20' N., 6° 40' E.	82	t	—	—	—	6	17—19	18.2	4	20—21	20.5	—
35	146	7/11	58° 8' N., 2° 56' E.	85	t	—	—	—	—	—	—	1	19	—	Ling Bank
36	147	7/11	58° 25' N., 3° 10' E.	115	n	—	—	—	—	—	—	2	20—24	22.0	N.E. of Ling Bank

Length frequencies of the individuals of the samples, length in cm.

Length frequencies of the individuals of the samples, length in cm.																				Total	
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
1	2	1	—	—	39	123	33	9	2	—	—	—	—	—	—	—	—	—	—	—	210
—	—	—	—	—	—	1	41	33	12	5	—	—	—	—	—	—	—	—	—	—	92
—	—	—	—	—	—	—	2	9	4	—	—	—	—	—	1	—	—	—	—	—	16
—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	1	11	1	—	—	—	—	—	—	—	—	—	—	—	13
—	—	—	—	—	—	—	9	79	49	17	2	—	—	—	—	—	—	—	—	—	156
—	—	—	—	—	—	—	2	5	1	—	—	—	—	—	—	—	—	—	—	—	8
—	—	3	14	15	7	7	30	18	4	—	—	1	—	—	—	—	—	—	—	—	99
—	—	29	55	77	7	4	11	2	—	—	—	—	—	—	—	—	—	—	—	—	185
—	—	26	54	13	2	9	14	4	1	—	—	—	—	—	—	—	—	—	—	—	121
—	—	—	—	—	1	12	38	1	—	—	—	—	—	—	—	—	—	—	—	—	52
—	—	—	—	—	—	—	—	—	—	3	2	1	—	—	1	6	4	1	—	—	18
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	6	1	—	—	10
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	1	—	—	—	5
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	1	—	4
—	—	—	—	—	—	—	—	—	—	1	2	1	—	—	—	—	—	—	—	—	4
—	—	—	—	—	—	—	—	—	—	1	—	—	2	—	—	—	—	—	—	—	3
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
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—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	2
—	—	—	—	—	—	—	—	—	—	1	—	—	1	2	—	—	—	—	—	—	4
—	—	—	—	—	—	—	—	—	3	10	19	4	1	—	—	—	—	—	—	—	37
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	—	1	2	—	1	—	—	—	—	—	—	4
—	—	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	2
—	—	—	—	—	—	—	—	—	—	2	1	2	1	5	—	—	—	—	—	—	11
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	2	2	1	1	10
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	3
—	—	—	—	—	1	—	7	18	13	7	1	1	—	1	—	—	—	—	—	—	49
—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—	—	—	2
—	—	—	—	—	—	—	—	1	2	1	—	—	—	—	1	3	3	1	1	—	13
—	—	—	—	—	—	—	—	—	—	—	1	3	2	2	2	—	—	—	—	—	10
—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	2