



Serial No.1825  
(D.a.66)

ICNAF Res.Doc.67/18

ANNUAL MEETING - JUNE 1967

Portuguese Research Report, 1966

by Manuel Lima Dias  
Instituto de Biologia Maritima  
Lisbon

During 1966 the Portuguese otter trawl and dory vessel fleets caught a total of 199,395 tons of cod in the ICNAF Area as shown below:

Subareas	1	2	3	4	Total
Otter Trawl	2,053	44,446	60,616	10,830	117,945
Line Trawl (Dory vessel)	73,357	-	8,093	-	81,450
Total	75,410	44,446	68,709	10,830	199,395

The otter trawl fishery was carried out in all four subareas and amounted to almost twice that of the line fishery which was carried out mainly in Subarea 1. The total catch in 1966 shows a slight increase of 2,238 tons over that in 1965.

This report presents the status of the fisheries in the four subareas where the Portuguese fleet fished and includes observations made in commercial trawlers in Subareas 2, 3 and 4. Data on lengths, ages, stage of maturity and probable age at first maturity are presented. All samples were taken at random before discarding the undersized fish; for the age/length keys the same procedure is followed as in our previous report (ICNAF Annual Meeting Res.Doc.66/37). Detailed information on the samples will be included in the Sampling Yearbook for 1966.

Subarea 1

A. Status of the Fisheries

I. Cod

In this subarea the dory vessel fleet took 73,357 tons of a total of 75,410 tons of cod caught. The best trawler catches in Subarea 1 were made in Div. 1B (1,438 tons between June and September), while the lowest catches were in Div. 1C (345 tons in June), 1E (214 tons from March to May), 1D (40 tons in May and June) and 1F (16 tons in May). For the dory vessels, the largest catches were made in Div. 1B (39,082 tons from June to September), 1D (22,194 tons between May and August) and 1C (12,081 tons from May to September).

Subarea 2

A. Status of the Fisheries

I. Cod

As in previous years, only the otter trawlers fished in this subarea. The total catch (44,446 tons) is lower by 28,390 tons than in 1965. Catches in Div. 2G, 2H and 2J were 611 tons, 7,380 tons and 36,455 tons respectively from March to November.

Samples for biological study were obtained in Div. 2G, 2H and 2J from 14 March to 5 June as follows:

<u>Sample Group</u>	<u>Sample numbers</u>	<u>Date</u>	<u>Depth (m)</u>	<u>No Lengths</u>	<u>No Aged</u>
Div.2G					
A.	8-9-10-11-12-13	13-18 April	295-320	983	364
Div.2H					
B	4-5	17-18 March	270-340	150	83
C	14-15-16-18-19-20	19-27 April	395-460	861	342
D	22	2 May	310-350	125	70
Div.2J					
E	1-2-3	14-16 March	270-350	375	62
F	6-21	10-30 April	230-380	225	175
G	23-24-25-26-27-28-29-30	3-30 May	200-470	1,559	486
H	32-33-34-35-36	1-5 June	180-220	900	350

a. Lengths (Fig.1). Lengths ranged from 22 to 106 cm classes. Mean lengths were A - 58.7, B - 53.3, C - 55.0, D - 57.4 and E - 54.6.

b. Ages (Fig.1). In March the most important age-groups were VI, VII and VIII (1960, 1959 and 1958 year-classes), in Div.2H and 2J.

In April, May and June, in Div.2G and 2H, the VIII, IX and X age-groups (1958, 1957 and 1956 year-classes) were the most representative, while in Div.2J in May and June, age-group V (1961 year-class) was the most important. Age-group II (1964 year-class) appeared for the first time in May and June in Div.2J. The oldest age-group, XXII (1944 year-class) appeared twice in April Div.2G, and June Div.2J.

Mean ages are as follows: A - 10.3; B - 7.4; C - 8.6; D - 9.2; E - 6.9; F - 7.6; G - 6.6; H - 6.3.

c. Growth is shown in the following table of average lengths (figures in brackets are numbers of fishes for each quarter of the year):

<u>Year-Class</u>	<u>Div.2G Age-Group</u>	<u>2nd Quarter</u>
		<u>April</u>
1961	V	45.2 (4)
1960	VI	47.3 (13)
1959	VII	50.5 (44)
1958	VIII	56.0 (35)
1957	IX	57.8 (75)
1956	X	59.7 (50)
1955	XI	62.8 (26)
1954	XII	62.3 (39)
1953	XIII	67.1 (27)
1952	XIV	62.5 (14)
1951	XV	67.7 (18)
1950	XVI	66.2 (13)
1949	XVII	70.0 (4)
1948	XVIII	-
1947	XIX	82.0 (1)
1946	XX	-
1945	XXI	-
1944	XXII	106.0 (1)

Year-class	Age-group	Div. 2H		
		1st Quarter	2nd Quarter	
		March	April	May
1963	III	-	31.8	34.4 (7)
1962	IV	-	37.8	34.7 (7)
1961	V	44.4 (6)	43.4	41.0 (19)
1960	VI	48.5 (12)	48.9	50.7 (21)
1959	VII	51.6 (29)	51.5	52.9 (70)
1958	VIII	56.8 (16)	55.6	58.1 (77)
1957	IX	58.0 (12)	56.8	58.3 (102)
1956	X	59.6 (4)	59.4	61.6 (43)
1955	XI	70.5 (4)	61.9	63.7 (19)
1954	XII	-	64.2	68.4 (13)
1953	XIII	-	62.7	61.6 (16)
1952	XIV	-	59.0	59.1 (6)
1951	XV	-	64.6	66.1 (7)
1950	XVI	-	66.9	68.8 (5)
1949	XVII	-	67.0	67.0 (1)
1948	XVIII	-	70.0	70.0 (1)
1947	XIX	-	76.0	76.0 (1)
1946	XX	-	-	-
1945	XXI	-	65.5	76.6 (1)

Year-class	Age-group	Div. 2J			
		1st Quarter	2nd Quarter		
		March	April	May	June
1964	II	-	-	25.0	25.0 (1)
1963	III	-	31.3	29.8	29.1 (36)
1962	IV	43.0 (1)	40.4	38.8	38.3 (117)
1961	V	45.5 (4)	45.4	45.1	44.2 (204)
1960	VI	51.5 (19)	50.3	49.6	49.2 (120)
1959	VII	55.6 (23)	54.0	53.2	53.1 (180)
1958	VIII	54.5 (10)	58.2	56.7	56.7 (92)
1957	IX	64.5 (4)	59.7	58.3	58.0 (146)
1956	X	70.0 (1)	62.7	59.7	61.4 (45)
1955	XI	-	67.7	64.5	64.6 (19)
1954	XII	-	72.1	60.4	59.2 (11)
1953	XIII	-	63.8	62.3	62.6 (14)
1952	XIV	-	69.3	64.1	64.7 (9)
1951	XV	-	67.1	66.3	65.4 (7)
1950	XVI	-	69.4	63.2	63.8 (7)
1949	XVII	-	-	-	-
1948	XVIII	-	73.0	73.0	1 (1)
1947	XIX	-	-	-	-
1946	XX	-	67.0	67.0	67.0 (1)
1945	XXI	-	-	-	-
1944	XXII	-	-	82.0	82.0 (1)

d. Stage of maturity (Fig. 2). In Div. 2G in April, about 30% of the males and 20% of females were in the spawning stage. About 20% of the males and 50% of the females were in the post-spawning stage. Yet about 30% of the males and 20% of the females were in the developing stage.

In Div. 2H in March, 60% of the males and 24% of the females were in the spawning stage, and 40% of the males and 76% of the females in the developing stage. But in April only about 2% of the females were in the spawning stage and almost all the females were in the post-spawning (75%) and in the recovering (23%) stages. Of the males, almost 70% belong to the developing stage and about 20% and 10% to the recovering and post-spawning stages respectively. In May, about 10% of the males were now in the spawning stage.

In Div. 2J in March, about 50% of the males and 10% of the females were in the spawning stage and 50% of the males and 90% of the females in the developing stage. In April about 40% males and 10% females were in the spawning stage. In May and June, the majority of fish were in the recovering and developing stages with some in the post-spawning stage in June.

e. Age at first maturity

Div.2G

Age-group	1 <sup>st</sup> spawn.						Total	♀ ♀						Total
	VI	VII	VIII	IX	♂ ♂	♀		VI	VII	VIII	♀	♀	♀	
III														
IV														
V	-	-	-	-	4	-	4	-	-	-	-	-	-	
VI	-	-	-	-	13	-	13	-	-	-	-	-	-	
VII	-	1	-	-	35	-	36	-	-	-	8	-	8	
VIII	-	-	-	-	26	-	26	-	-	-	9	-	9	
IX	-	7	1	-	48	1	57	-	-	-	18	-	18	
X	-	4	2	1	28	-	35	-	-	2	12	1	15	
XI	1	2	1	-	12	2	18	-	-	-	7	1	8	
XII	2	3	3	1	19	2	30	1	-	1	7	-	9	
XIII	-	2	4	-	14	1	21	1	1	-	4	-	6	
XIV	-	1	1	-	6	2	10	-	-	1	2	1	4	
XV	1	1	1	-	8	-	11	-	2	2	2	1	7	
XVI	1	2	3	-	3	-	9	-	2	-	1	1	4	
XVII	-	-	2	-	-	-	2	-	-	1	1	-	2	
XVIII	-	-	-	-	-	-	-	-	-	-	-	-	-	
XIX	-	-	-	-	-	-	-	-	-	-	1	-	1	
XX	-	-	-	-	-	-	-	-	-	-	-	-	-	
XXI	-	-	-	-	-	-	-	-	-	-	-	-	-	
XXII	-	-	-	-	-	-	-	-	1	-	-	-	1	
<b>No. observed</b>							<b>272</b>							<b>92</b>

Div. 2H

Age-group	1 <sup>st</sup> spawn.							2 <sup>nd</sup> spawn.						
	VI	VII	VIII	IX	0	?	Total	VI	VII	VIII	IX	0	?	Total
III	-	-	-	-	1	-	1	-	-	-	-	1	-	1
IV	-	-	-	-	5	-	5	-	-	-	-	2	-	2
V	-	-	-	-	21	-	21	-	-	-	-	4	-	4
VI	-	-	-	-	28	-	28	-	-	-	-	5	-	5
VII	-	1	-	-	67	-	68	-	3	-	-	28	-	31
VIII	-	3	-	-	56	-	59	-	2	1	-	30	1	34
IX	1	5	3	1	59	3	72	1	2	2	-	36	1	42
X	2	2	2	-	20	2	28	2	1	1	-	13	2	19
XI	-	3	1	-	8	-	12	-	1	-	1	8	1	11
XII	-	-	-	-	6	1	7	-	-	1	1	3	1	6
XIII	-	3	1	-	1	-	5	1	3	4	1	2	-	11
XIV	-	1	-	1	2	1	5	-	-	-	-	-	1	1
XV	-	3	-	-	-	1	4	-	1	-	-	1	1	3
XVI	-	-	-	1	1	-	2	-	-	3	-	-	-	3
XVII	-	-	1	-	-	-	1	-	-	-	-	-	-	-
XVIII	-	-	-	-	-	-	-	-	-	-	1	-	-	1
XIX	-	-	-	-	-	-	-	-	-	-	1	-	-	1
XX	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XXI	-	-	-	-	-	-	-	-	-	-	1	1	-	2
No. observed							318	177						

Div. 2J

Age-group	1 <sup>st</sup> spawn. ♂♂							♀♀							
	VI	VII	VIII	IX	0	?	Total	VI	VII	VIII	IX	0	?	Total	
II	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
III	-	-	-	-	16	-	16	-	-	-	-	20	-	20	
IV	-	-	-	-	69	-	69	-	-	-	-	49	-	49	
V	-	-	-	-	115	-	115	-	-	-	-	93	-	93	
VI	-	-	-	-	67	-	67	-	-	-	-	72	-	72	
VII	3	5	-	-	99	3	110	2	7	-	-	83	1	93	
VIII	1	1	2	-	41	5	50	1	5	3	-	42	1	52	
IX	3	22	2	-	32	10	69	6	15	11	-	39	10	81	
X	-	7	1	-	12	4	24	1	2	6	1	7	4	21	
XI	-	2	2	-	3	1	8	1	4	3	-	2	1	11	
XII	1	-	2	-	3	1	7	-	2	-	-	-	2	4	
XIII	-	1	4	1	-	1	7	-	3	3	-	-	1	7	
XIV	-	3	1	-	-	-	4	-	2	3	-	-	-	5	
XV	-	-	1	-	-	-	1	-	2	3	1	-	-	6	
XVI	-	2	2	-	-	1	5	-	1	1	-	-	-	2	
XVII	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XVIII	-	-	-	-	-	-	-	-	-	1	-	-	-	1	
XIX	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XX	-	-	-	-	-	1	1	-	-	-	-	-	-	-	
XXI	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
XXII	-	-	-	-	-	-	-	-	-	-	1	-	-	1	
No. observed							553								519

Subarea 3

A. Status of the Fisheries

I. Cod

Catches in this subarea totalled 68,709 tons, a considerable increase over 1965 catches. The principal reason for this increase was the otter trawler fishery with 60,616 tons (34,649 tons in 1965), while the dory vessels caught only 8,093 tons (14,324 tons in 1965).

The trawlers operated mainly in Div.3K, 3L, 3M, 3N, 3O, 3Pn and 3Ps. Best results were obtained in Div.3L (37,419 tons from March to November) and 3K (12,196 tons from March to October). The dory vessels fished in Div.3L, 3N, 3O and 3P with best results in 3L (5,620 tons from April to September).

Samples for biological study were obtained in Div.3K, 3L and 3M from 20 March to 28 November as follows:

<u>Sample Group</u>	<u>Sample numbers</u>	<u>Date</u>	<u>Depth (m)</u>	<u>No lengths</u>	<u>No aged</u>
<b>Div. 3K</b>					
A	13-14-15	22-26 May	215-350	340	252
B	16-17-18-19	22-31 August	195-230	350	70
C	20-28-37	1-29 Sept.	195-330	255	48
D	41-42-43-44-46-47-49	10-28 Octob.	200-350	790	123
<b>Div. 3L</b>					
E	1-2-3-4	20-23 March	180-210	491	135
F	22-23-24-25-26-29-30 31-32-33-34-35-38	5-30 Sept.	210-320	1,410	152
G	39-40-48-50-51	7-31 Octob.	230-320	400	47
H	52-54-55-56-57-58-59 61-62-63-64-65-66	1-28 Nov.	220-300	1 430	125
<b>Div. 3M</b>					
I	6-7-8-9	25-31 March	420-460	825	275
J	10-12	2-4 April	446-460	225	177

a. Lengths (Fig.3). Lengths ranged from 19 to 121 cm classes. Mean lengths were A - 50.0, B - 51.1, C - 52.3, D - 56.3, E - 52.2, F - 50.7, G - 51.9, H - 55.8, I - 61.7, J - 60.7.

b. Ages (Fig.3). In Div.3K and 3L ages ranged from about 2 to 20 years with a marked predominance of the IV, V, VI and VII age-groups (1962, 1961, 1960 and 1959 year-classes). Ages 4, 5 and 6 (1962, 1961 and 1960 year-classes) were abundant in both divisions from March to November.

In Div.3M two samples caught in March and April had ages ranging from 3 to 13 years with a marked predominance of the VI, VII and VIII age-groups (1960, 1959 and 1958 year-classes). Mean ages were as follows: Div.3K: A - 6.0; B - 5.2; C - 5.5; D - 6.0; Div.3L: E 5.7; F - 5.1; G - 4.8; H - 5.2 and Div.3M: I - 7.5; J - 7.4.

c. Growth is shown in the following tables of average lengths (figures in brackets are number of fish for each quarter of the year).

Div. 3K

Year-class	Age-group	2 <sup>nd</sup> Quarter May	3 <sup>rd</sup> Quarter August Sept.		4 <sup>st</sup> Quarter October
1963	III	27.8 (14)	34.4	33.7 (8)	38.1 (3)
1962	IV	39.2 (47)	42.6	43.1 (38)	45.1 (18)
1961	V	45.4 (71)	51.4	52.6 (19)	51.4 (33)
1960	VI	53.3 (43)	57.0	57.5 (24)	58.6 (19)
1959	VII	57.1 (23)	62.5	61.6 (14)	62.1 (17)
1958	VIII	63.5 (17)	67.2	68.1 (9)	65.3 (13)
1957	IX	64.1 (17)	64.9	61.7 (5)	64.8 (10)
1956	X	73.3 (7)	-	-	70.1 (5)
1955	XI	76.5 (4)	-	-	71.3 (3)
1954	XII	83.7 (2)	79.0	79.0 (1)	82.0 (1)
1953	XIII	79.0 (1)	-	-	-
1952	XIV	80.2 (2)	-	-	-
1951	XV	79.0 (1)	-	-	115.0 (1)
1950	XVI	98.5 (2)	-	-	-
1949	XVII	-	-	-	-
1948	XVIII	-	-	-	-
1947	XIX	-	-	-	-
1946	XX	100.0 (1)	-	-	-

Div. 3L

Year-class	Age-group	1 <sup>st</sup> Quarter	3 <sup>rd</sup> Quarter	4 <sup>st</sup> Quarter	
		March	September	Octob.	Novemb.
1964	II	-	29.2 (4)	-	-
1963	III	30.6 (5)	39.6 (14)	39.6	39.2 (12)
1962	IV	38.7 (23)	45.1 (39)	47.5	48.8 (46)
1961	V	46.5 (36)	53.1 (35)	52.9	54.2 (31)
1960	VI	53.7 (25)	60.2 (20)	61.6	62.7 (14)
1959	VII	61.9 (22)	66.3 (20)	67.6	68.9 (21)
1958	VIII	69.1 (16)	73.2 (13)	71.1	72.2 (27)
1957	IX	80.8 (2)	72.5 (3)	79.9	78.4 (8)
1956	X	80.7 (3)	79.0 (1)	72.3	75.9 (3)
1955	XI	85.0 (1)	82.0 (1)	79.1	82.7 (4)
1954	XII	91.0 (1)	-	-	109.0 (1)
1953	XIII	91.0 (1)	-	115.0	- (1)
1952	XIV	-	-	112.0	- (1)
1951	XV	-	-	-	88.0 (1)
1950	XVI	-	-	-	-
1949	XVII	-	-	121.0	- (1)
1948	XVIII	-	-	-	-
1947	XIX	-	98.6 (2)	-	-
1946	XX	-	-	136.0	- (1)
1945	XXI	-	-	-	-

Div. 3M

Year-class	Age-group	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter
		March	April
1963	III	-	37.0 (1)
1962	IV	47.2 (16)	45.6 (11)
1961	V	50.5 (15)	49.0 (5)
1960	VI	56.9 (40)	56.7 (36)
1959	VII	58.6 (64)	57.4 (41)
1958	VIII	63.6 (90)	63.6 (48)
1957	IX	68.7 (23)	64.8 (15)
1956	X	74.7 (9)	-
1955	XI	72.8 (5)	73.0 (11)
1954	XII	79.8 (11)	75.2 (7)
1953	XIII	-	88.0 (1)
1952	XIV	74.3 (2)	115.0 (1)

d. Stage of maturity (Fig.4). In Div.3K in May about 55% of the males and 80% of the females were in the recovering or resting stage. About 40% of the males were in the developing stage. By August about 70% of the males and 88% of the females were in the recovering stage. Yet in August about 30% of the males and 9% of the females were in the developing stage. In September and October the recovering and developing stages were the most abundant.

In Div.3L in March about 4% of the males only were spawning. During the month as in September, October and November, a large percentage of males and females were in the resting or recovering and developing stages.

In Div.3M in March about 50% of the males and 40% of the females were in the spawning stage and about 30% of the males and 40% of the females in the developing one. By April about 60% of the males and 30% of the females were in the spawning stage and a very low percentage of the males and about 30% of the females were in the recovering and post-spawning stages.

e. Age at first maturity

Div.3K

Age-group	♂♂						♀♀						
	VI	VII	VIII	θ	?	Total	VI	VII	VIII	IX	θ	?	Total
III	-	-	-	13	-	13	-	-	-	-	12	-	12
IV	-	-	-	54	-	54	-	-	-	-	49	-	49
V	-	-	-	67	-	67	-	-	-	-	56	-	56
VI	-	-	-	40	-	40	-	-	-	-	46	-	46
VII	1	1	-	18	1	21	1	2	-	-	30	-	33
VIII	1	2	-	15	1	19	1	3	-	-	15	1	20
IX	-	2	2	8	2	14	-	5	-	-	10	2	17
X	-	3	-	4	-	7	-	1	1	-	3	-	5
XI	-	-	-	2	-	2	1	1	1	1	1	-	5
XII	-	-	-	1	-	1	-	1	1	-	1	-	3
XIII	-	-	-	-	-	-	-	-	-	-	1	-	1
XIV	-	-	1	-	-	1	-	-	1	-	-	-	1
XV	-	-	-	-	-	-	-	1	-	-	1	-	2
XVI	-	-	-	2	-	2	-	-	-	-	-	-	-
XVII	-	-	-	-	-	-	-	-	-	-	-	-	-
XVIII	-	-	-	-	-	-	-	-	-	-	-	-	-
XIX	-	-	-	-	-	-	-	-	-	-	-	-	-
XX	-	-	-	-	-	-	-	-	1	-	-	-	1
<b>No. observed</b>						<b>241</b>							<b>251</b>

Div. 3L

1 <sup>st</sup> spawn. Age-group	♂♂						♀♀						
	VI	VII	VIII	θ	?	Total	VI	VII	VIII	IX	θ	?	Total
II	-	-	-	4	-	4	-	-	-	-	-	-	-
III	-	-	-	17	-	17	-	-	-	-	14	-	14
IV	-	-	-	59	-	59	-	-	-	-	49	-	49
V	-	-	-	40	-	40	-	-	-	-	62	-	62
VI	-	-	-	24	1	25	1	-	-	-	33	-	34
VII	-	-	-	25	-	25	2	6	-	-	28	2	38
VIII	1	11	1	13	-	26	2	2	1	-	23	2	30
IX	-	1	-	1	-	2	-	1	-	-	9	1	11
X	-	1	-	1	-	2	-	-	-	-	4	1	5
XI	-	1	1	2	-	4	1	-	-	-	1	-	2
XII	-	-	1	-	-	1	-	-	-	-	1	-	1
XIII	-	-	1	-	-	1	-	-	-	-	1	-	1
XIV	-	-	-	1	-	1	-	-	-	-	-	-	-
XV	-	-	-	-	-	-	-	1	-	-	-	-	1
XVII	-	-	-	-	-	-	-	-	-	1	-	-	1
XIX	-	-	-	-	-	-	-	-	1	-	-	1	2
XX	-	-	-	-	-	-	-	-	-	-	-	1	1
No. observed	207						252						

Div. 3M

1 <sup>st</sup> spawn. Age-group	♂♂						♀♀						
	VI	VII	VIII	θ	?	Total	VI	VII	VIII	θ	?	Total	
III	-	-	-	1	-	1	-	-	-	-	-	-	-
IV	-	-	-	24	-	24	-	-	-	3	-	-	3
V	-	-	-	15	-	15	-	-	-	5	-	-	5
VI	2	-	-	58	-	60	-	-	-	16	-	-	16
VII	3	5	-	67	-	75	1	2	-	26	1	-	30
VIII	5	8	-	77	-	90	6	3	1	38	-	-	48
IX	1	3	-	21	1	26	-	3	-	9	-	-	12
X	-	1	-	2	-	3	-	2	-	3	1	-	6
XI	-	-	-	10	-	10	-	3	-	3	-	-	6
XII	2	5	2	2	3	14	2	1	1	-	-	-	4
XIII	-	-	-	-	-	-	-	-	-	1	-	-	1
XIV	-	1	-	-	1	2	-	-	-	1	-	-	1
No. observed	320						132						

Subarea 4

A. Status of the Fisheries

I. Cod

In 1966 as in 1965, only otter trawlers operated in Subarea 4. They caught 10,830 tons, a small decrease from the fishery in 1965 which took 14,665 tons. Catches were taken from January to August in Div.4R (10,361 tons), 4S (331 tons) and 4Vn (138 tons).

Samples for biological study were obtained in Div.4R in August as follows:

<u>Sample Group</u>	<u>Sample numbers</u>	<u>Date</u>	<u>Depth (m)</u>	<u>No Lengths</u>	<u>No Aged</u>
A	1-2-3-4	26-29 Aug.	50-100	255	105

a. Lengths (Fig.5). Lengths ranged from 28 to 127 cm classes. Mean length was A - 57.0.

b. Ages (Fig.5). Ages ranged from 3 to 21 years with a marked dominance of the IV, V, VI, VII, VIII and IX age-groups (1962, 1961, 1960, 1959, 1958 and 1957 year-classes). Mean age was A - 6.8.

c. Growth is shown in the following table of average lengths (figures in brackets are numbers of fish).

<u>Year-class</u>	<u>Div.4R Age-group</u>	<u>3<sup>rd</sup> Quarter August</u>
1963	III	32.0 (3)
1962	IV	40.0 (17)
1961	V	47.4 (10)
1960	VI	53.8 (15)
1959	VII	59.8 (14)
1958	VIII	64.2 (11)
1957	IX	73.7 (16)
1956	X	76.8 (4)
1955	XI	81.2 (2)
1954	XII	96.6 (3)
1953	XIII	77.6 (5)
1952	XIV	112.0 (1)
1951	XV	-
1950	XVI	-
1949	XVII	91.0 (1)
1948	XVIII	118.0 (1)
1947	XIX	115.0 (1)
1946	XX	-
1945	XXI	127.0 (1)

d. Stage of maturity (Fig.6). About 50% of the males and 75% of the females were in the resting or recovering stages. Almost 40% of the males and 5% of the females were also in the developing stage while very few (about 4%) of both were in the spawning stage.

e. Age at first maturity

Div.4R

1 <sup>st</sup> spawn. Age-group	♂♂			♀♀				
	VII	θ	Total	VII	VIII	X	θ	Total
III	-	1	1	-	-	-	2	2
IV	-	13	13	-	-	-	4	4
V	-	7	7	-	-	-	3	3
VI	-	8	8	-	-	-	7	7
VII	-	7	7	-	-	-	7	7
VIII	-	3	3	1	-	-	7	8
IX	1	6	7	-	-	-	9	9
X	-	1	1	-	1	-	2	3
XI	-	1	1	-	-	-	1	1
XII	-	1	1	-	-	-	2	2
XIII	-	2	2	-	-	1	2	3
XIV	-	1	1	-	-	-	-	-
XV	-	-	-	-	-	-	-	-
XVI	-	-	-	-	-	-	-	-
XVII	-	1	1	-	-	-	-	-
XVIII	-	-	-	-	-	-	1	1
XIX	-	-	-	-	-	1	-	1
XX	-	-	-	-	-	-	-	-
XXI	-	1	1	-	-	-	-	-
No. observed			54					51

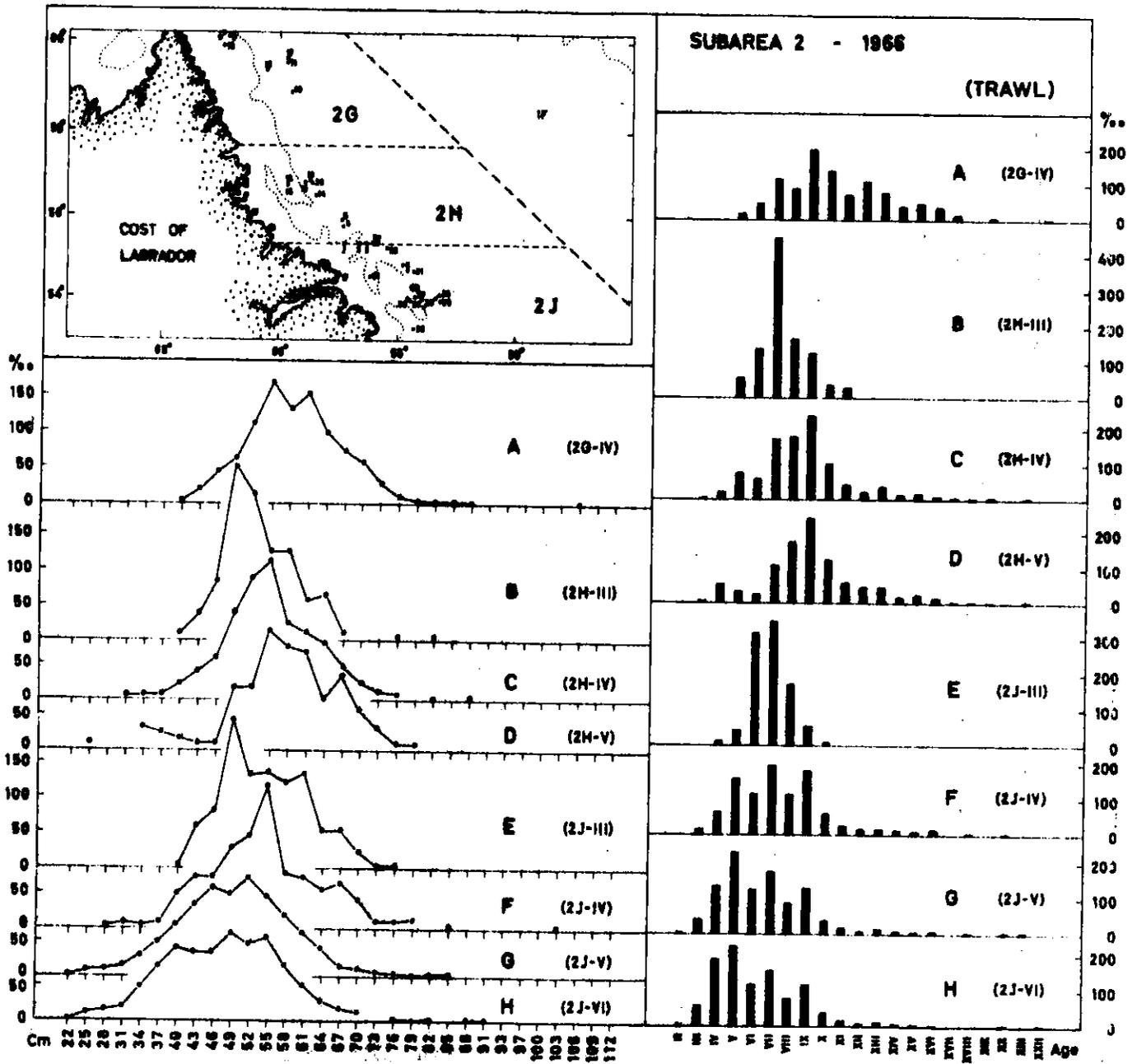


Fig. 1. Cod. Subarea 2. Length and age composition, March-June 1966.

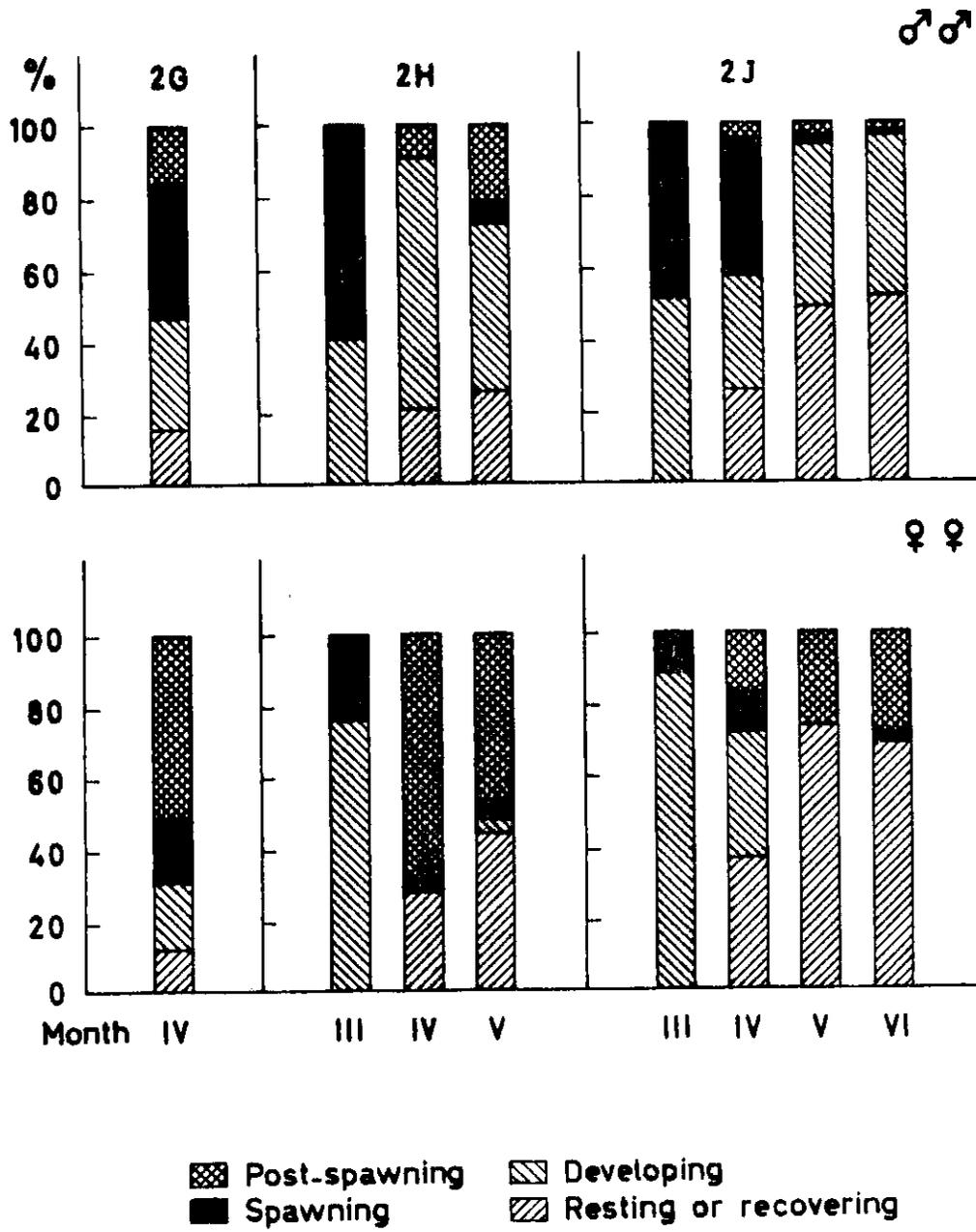


Fig. 2. Cod. Subarea 2. Stages of maturity, 1966.

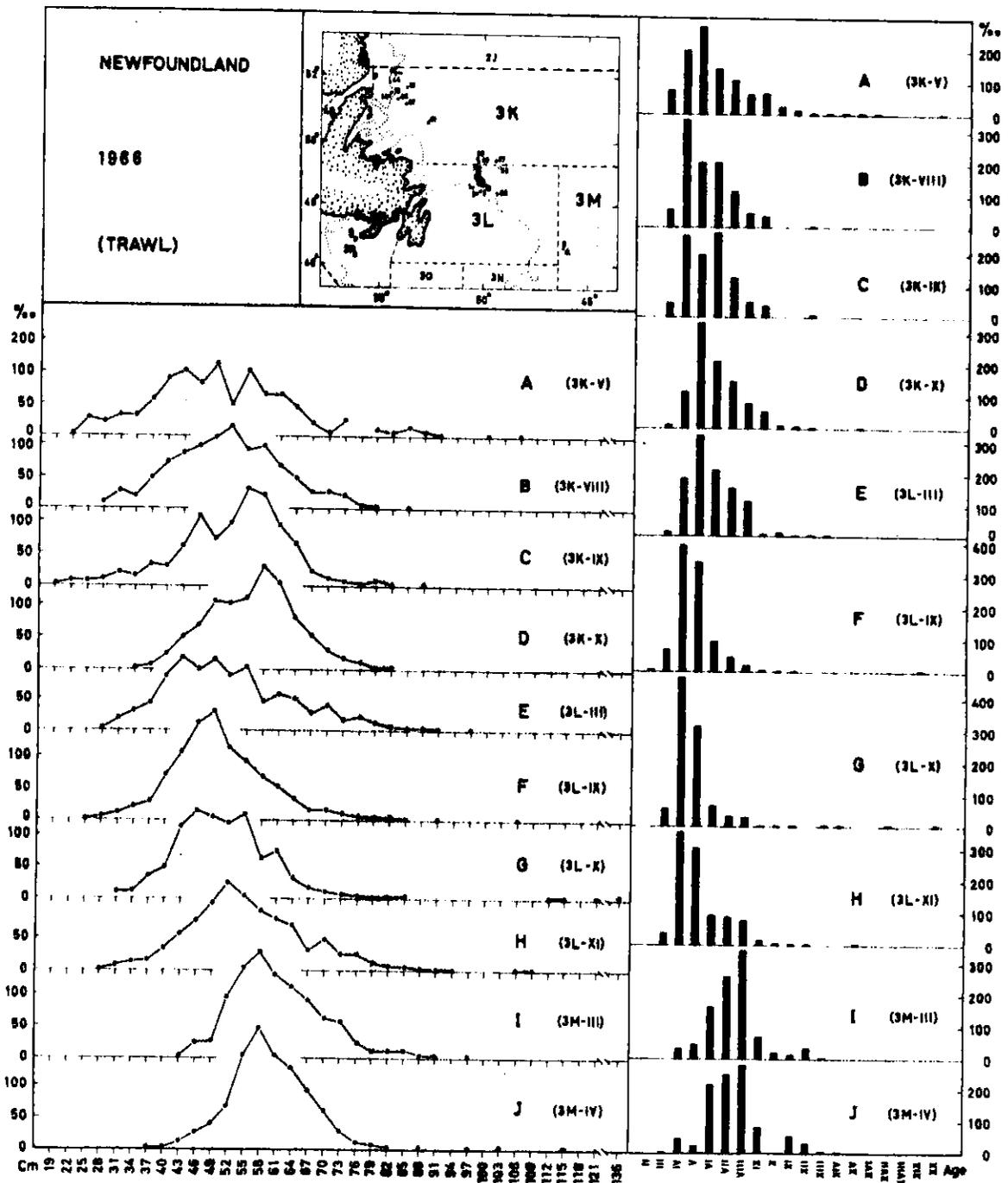


Fig. 3. Cod. Subarea 3. Length and age composition, March–November 1966.

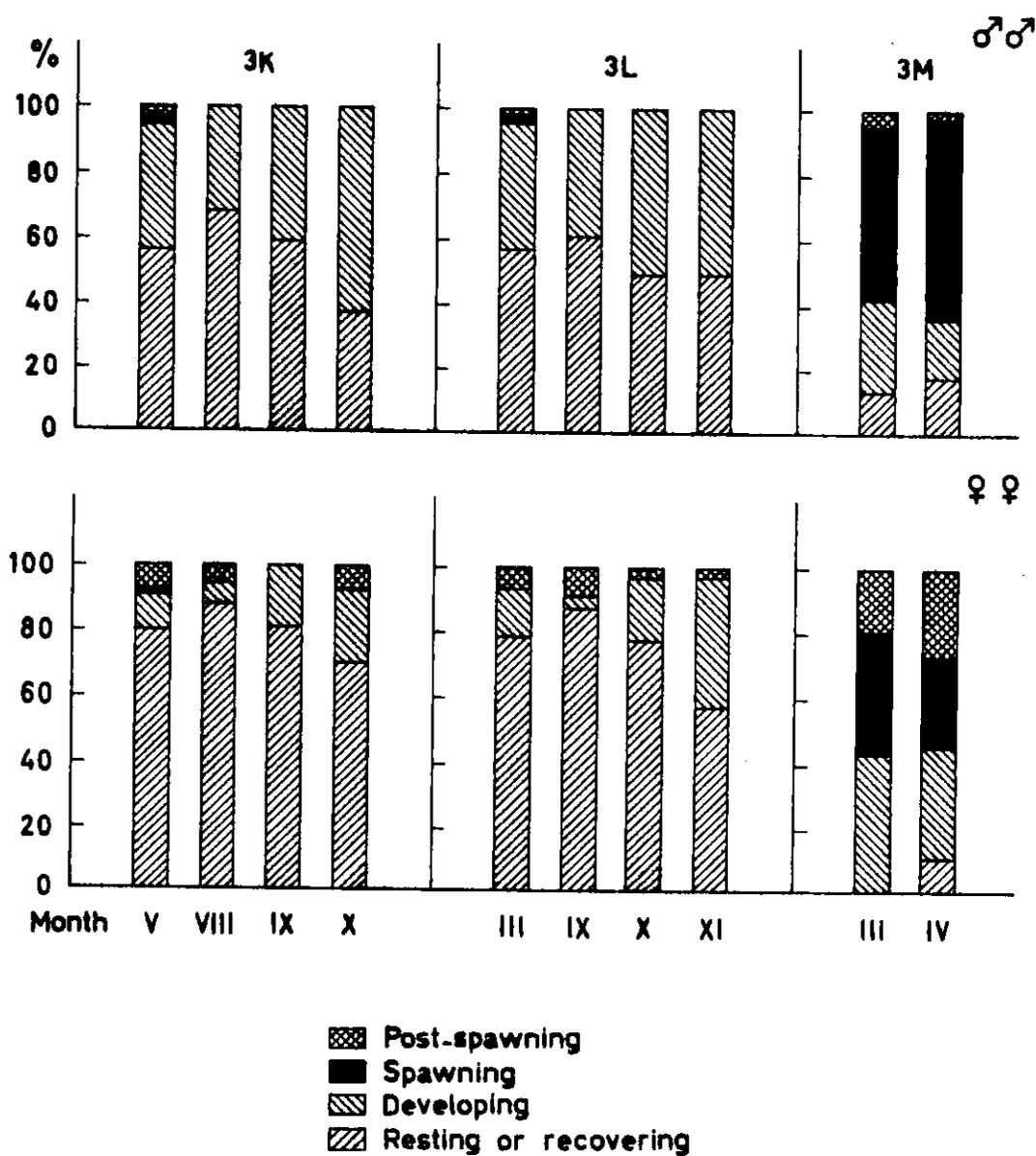


Fig. 4. Cod. Subarea 3. Stages of maturity, 1966.

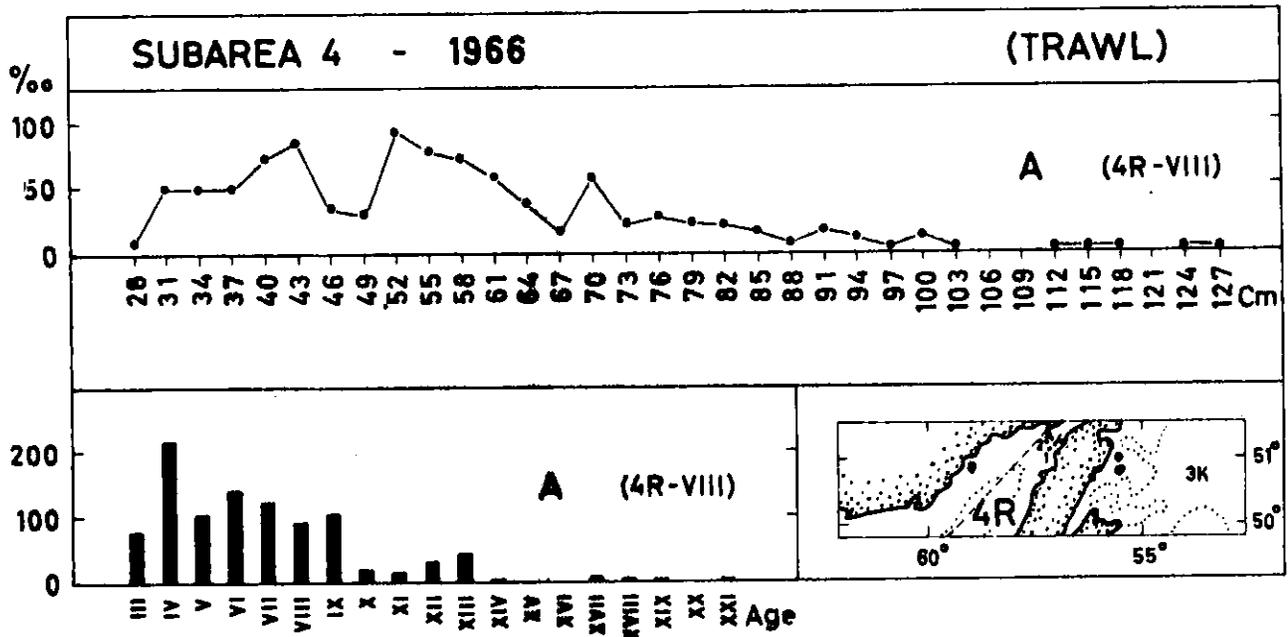


Fig. 5. Cod. Subarea 4. Length and age composition, August 1966.

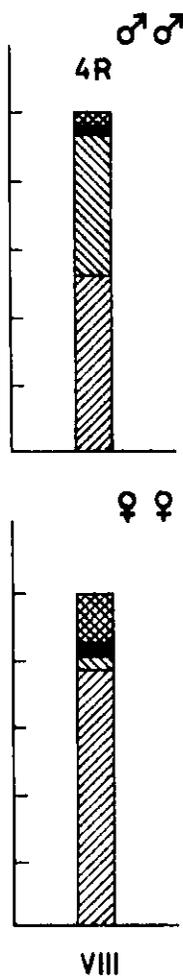


Fig. 6. Cod. Subarea 4. Stages of maturity, 1966.