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by

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The present paper summarises the biological studies carried out from cod (Gadus morhua) samples obtained in subarea 3, and subarea 2 during 1978.

I SUBAREA 3

Special Research Studies

1. Environmental Studies

No research studies were carried out on these subjects.

2. Biological Studies on Cod

Biological studies on cod were carried out on board of a commercial other trawl in Divisions 3M, 3L and 3K in order to obtain informations about lengths composition, growth and maturity.

Samples were obtained in the 1<sup>st</sup> and 4<sup>th</sup> quarters as follows:

Div.	Months	Depth	Samples	fish measured	fish aged
3M	April	295-310	5	500	129
	May	300-470	6	600	172
	Oct.	125-420	22	2200	266
	Nov.	260-350	17	1647	219
	Dec.	265-300	3	300	132
3L	April	298-400	3	300	129
	May	330-417	3	300	116
	Dec.	250-300	1	100	100
3K	March	307-395	8	800	208
	April	265-428	2	200	148

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## 2.1 Length and age composition

### Division 3M

In these Division a total of 5247 fish were measured and 918 pairs of otoliths taken for age determination. As it wasn't possible to read all the otoliths a random subsample of 10 pairs for each 3 cm length-group was taken and only 354 pairs were observed.

Length and age composition of the cod sampled in this Division are given in Tables 1 and 2, Fig. 1 where we can see that length range from 33 cm to 96 cm in the 2<sup>nd</sup> quarter and from 15 cm to 129 cm in the 4<sup>th</sup> quarter.

Age ranged from IV to X (Fig. 1) in the 2<sup>nd</sup> quarter with a mean age of 5.9 while in the 4<sup>th</sup> quarter it ranges from II to XV with a mean age of 5.7. In the two quarters age group VI (corresponding to the 1972 year class) is the most frequent.

### Division 3L

A total of 700 fish were measured and 214 pairs of otoliths taken for age determination. Lengths and age compositions of the cod sampled are given in Table 1 and 2 Fig. 2. Lengths range from 24 to 66 cm in the 2<sup>nd</sup> quarter, with the predominant age group V (1973 year class) and a mean age 4, 8, and from 33 to 111cm in the 4<sup>th</sup> quarter, with a predominant age group VI (1972 year class) and a mean age 5.9.

### Division 3K

A total of 1000 fish were observed and 356 pairs of otoliths taken for age determination. Only the lengths composition is presented in Fig. 3 (the otoliths are not yet observed). Lengths range from 33 to 96 cm in the 1<sup>st</sup> quarter with a mode situated at 51-53 cm and from 33 to 78 cm in the 2<sup>nd</sup> quarter with a mode at 48-50 cm.

## 2.2 Average Length and Weight

Average length and weight, by year class, of cod sampled in Division 3M and 3L are presented in Table 3.

## 2.3 Stages of maturity

Fig. 5 represents, in percentage, the stages of maturity for males and females identified monthly in Divisions 3L and 3M. Both the stages

"resting or recovering" and "developing" appears in a high percentage in the two Divisions with predominance of the "resting or recovering" to Division 3L and "developing" to Division 3M.

#### 2.4 Age of first maturity

A very small number of otoliths presented spawning marks as can be seen in Tables 4 and 5, respectively for Division 3L and 3M.

To notice, from those tables, that from a total of 214 otoliths observed in Division 3L spawning marks were identified in only 2 (0.9%) of them. The same to Division 3M where, from 354 pairs observed only 15 (4.8%) showed that marks.

Such small percentage doesn't allow any conclusions.

## II SUBAREA 2

### Division 2J

#### Special Research Studies

##### 1. Environmental Studies

No research studies were carried out on these subjects.

##### 2. Biological studies on cod

Biological studies on cod were carried out on board of a commercial other trawl in Division 2J. Samples were obtained during the 1<sup>st</sup> and 2<sup>nd</sup> quarters as follows:

Div.	Months	Depth	Samples	fish measured	fish aged
2J	March	275-400	3	300	161
	April	330-395	4	401	127

##### 2.1 Length and age composition

In Fig.4 are only represented the length composition of cod sampled in Division 2J. Lengths range from 36 to 96 cm in the 1<sup>st</sup> quarter, with a principal mode at 51-53 cm and from 33 to 90 cm in the 2<sup>nd</sup> quarter with a mode at 45-47 cm (see Table 6).

The otoliths in this Division are not yet all observed. A subsample of 10 pairs for each 3 cm length group from all the otoliths collec

ted in March + April, without considering quarters, was taken in a total of 155 (97 to March and 58 to April) which results are presented in Table 7.

The results of the observation of all the otoliths will be sent as soon as they will be ready. The ones which are now presented are considered provisional, which takes us to no further comments.

However, although the subsample is very small we would only like to point out that in the 1<sup>st</sup> quarter age group VI is the predominant, while in the 2<sup>nd</sup> quarter is age group V (frequencies).

TABLE 1. Length composition(°/oo)  
of cod in Divisions 3M  
and 3L.

Length Group	2 <sup>nd</sup> Quarter		4 <sup>th</sup> Quarter	
	Div. 3M	Div. 3L	Div. 3M	Div. 3L
cm	°/oo	°/oo	°/oo	°/oo
15			.2	
18			2.9	
21			14.2	
24		1.6	3.8	
27		13.3	1.0	
30		23.3	6.0	
33	3.3	30.0	24.6	20
36	5.4	65.0	44.1	50
39	15.4	95.0	55.5	100
42	70.0	155.0	60.0	140
45	207.3	176.7	94.8	130
48	199.1	170.0	176.3	120
51	174.5	125.0	177.7	70
54	122.7	71.7	144.7	120
57	77.3	46.6	91.9	70
60	67.3	16.6	47.0	20
63	28.2	6.6	23.9	40
66	11.8	3.3	11.6	20
69	3.6		4.1	20
72	5.4		5.5	30
75	.9		2.1	10
78	-		1.0	10
81	2.7		1.7	-
84	2.7		.5	-
87	-		.7	10
90	.9		.2	-
93	.9		1.0	-
96	.9		.5	10
99			.5	-
102			1.0	-
105			-	-
108			.5	-
111			-	10
114			.2	-
117			-	-
120			-	-
123			-	-
126			-	-
129			.2	-
Measured fish	1100	600	4147	100

TABLE 2. Age composition of cod sam-  
pled in Divisions 3M and 3L

Age Group	Year class	2 <sup>nd</sup> Quarter		4 <sup>th</sup> Quarter	
		Div. 3M	Div. 3L	Div. 3M	Div. 3L
		°/oo	°/oo	°/oo	°/oo
I	1978				
II	1977				
III	1976			128.9	
IV	1975		92.4	40.0	
V	1974	69.8	294.1	80.0	153.1
VI	1973	201.6	420.2	182.2	287.2
VII	1972	519.4	159.7	280.0	326.6
VIII	1971	186.0	25.2	155.6	142.9
IX	1970	7.8	8.4	53.3	40.0
X	1969	-		17.8	30.0
XI	1968	15.5		17.8	10.0
XII	1967			8.9	-
XIII	1966			17.8	-
XIV	1965			4.4	-
XV	1964			4.4	-
XVI	1963			8.9	-
	1962				10.0
Aged fish		129	119	225	95
Mean age		5.9	4.8	5.7	5.9

TABLE 3. Mean Length  $\bar{L}_t$  (mm) and mean Weight  $\bar{W}$  (gr) by age group, in Division 3M and 3L

Age Group	Year class	2 <sup>nd</sup> Quarter				4 <sup>th</sup> Quarter			
		Division 3M		Division 3L		Division 3M		Division 3L	
		$\bar{L}_t$ (mm)	$\bar{W}$ (gr)	$\bar{L}_t$ (mm)	$\bar{W}$ (gr)	$\bar{L}_t$ (mm)	$\bar{W}$ (gr)	$\bar{L}_t$ (mm)	$\bar{W}$ (gr)
I	1977								
II	1976					220			
III	1975			350	386	280			
IV	1974	370	433	380	528	340		380	
V	1973	430	753	510	1184	450		450	
VI	1972	580	1827	590	1771	600		500	
VII	1971	670	2991	570***	1633	670		610	
VIII	1970	750*	4200	660*	2400	830		720	
IX	1969		8000			880		780	
X	1968	910**				830		1050**	
XI	1967					1090***			
XII	1966					1000			
XIII	1965					1290*			
XIV	1964					1020*			
XV	1963					1060**			
XVI	1962								

\* Value based on 1 fish only

\*\*\* " " " 2 " "

\*\*\* " " " 3 " "

TABLE 4. Spawning marks, by age group, for males and females, in Division 3L

Age Group	Spawning marks ♂						0	T	Spawning marks ♀						0	T
	V	VI	VII	VIII	IX	X			V	VI	VII	VIII	IX	X		
III							5	5							6	6
IV							26	26							24	24
V							35	35							42	42
VI							23	23							26	26
VII							8	8							9	9
VIII							3	3							2	2
IX							2	2							1	1
X		1						1								
XI																
XII																
XIII																
XIV																
XV																
XVI											1					1
	1						102	103	1						110	111

0 Unknown including imature fish

TABLE 5. Spawning marks, by age group, for males and females, in Division 3M

Age Group	Spawning marks ♂						0	T	Spawning marks ♀						0	T
	V	VI	VII	VIII	IX	X			V	VI	VII	VIII	IX	X		
II							11	11							19	19
III							5	5							4	4
IV							15	15							12	12
V							33	33							34	34
VI	2	1					58	61	1						67	68
VII		2					31	33		1					25	26
VIII		2	1				6	8							5	5
IX							2	3							1	1
X		1						1		1		1			3	5
XI															2	2
XII							1	1							3	3
XIII																
XIV													1		1	1
XV											1				1	1
XVI															1	2
	2	6	1				162	171	1	2	1	1	1		176	183

0 Unknown including imature fish

TABLE 6. Length composition  
of cod in Division 2J  
( $^{\circ}/_{\infty}$ )

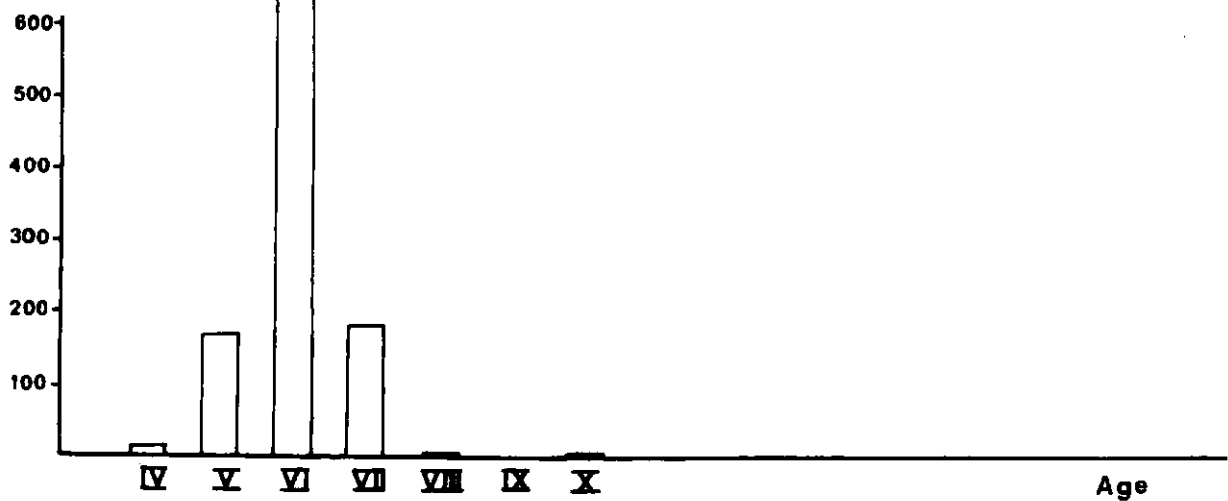
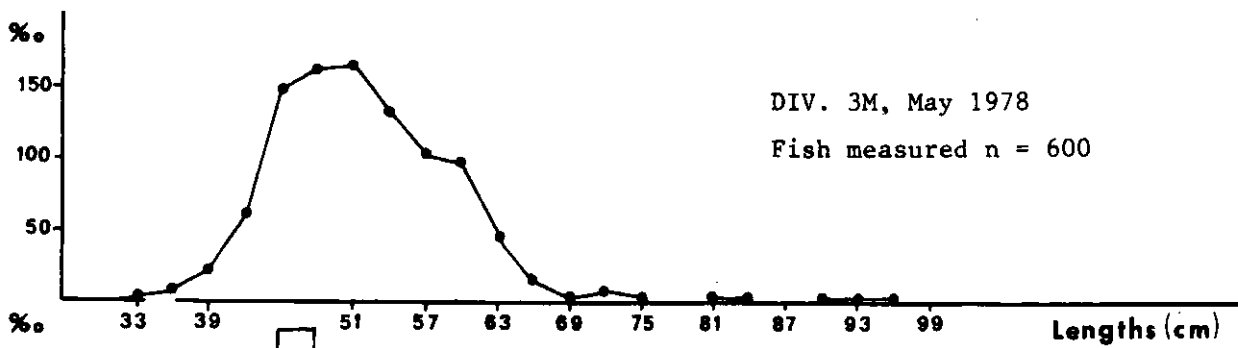
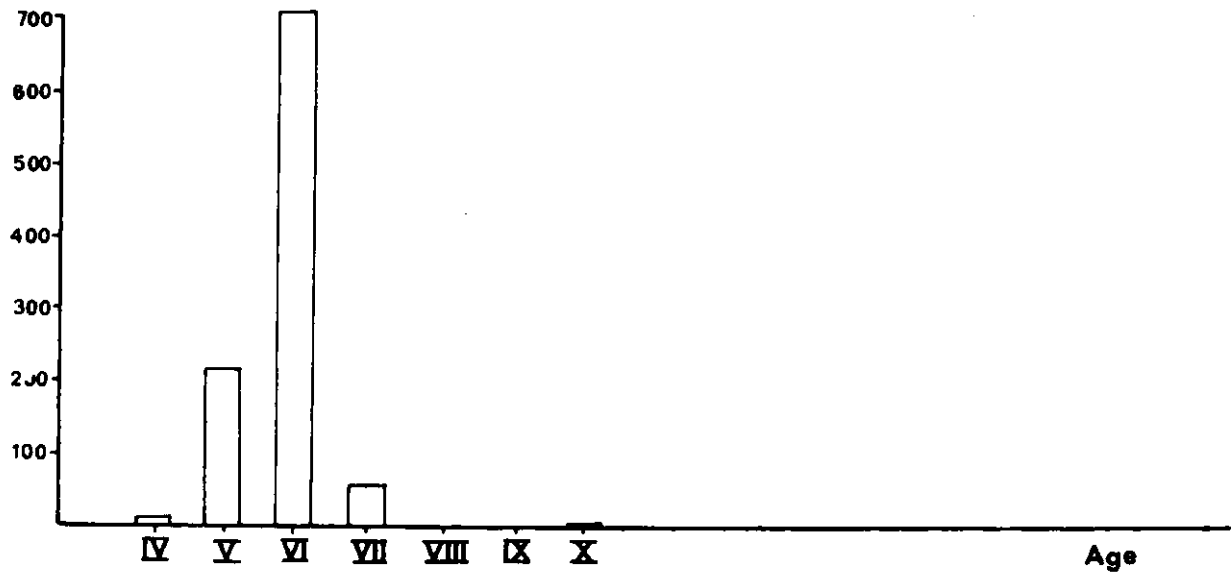
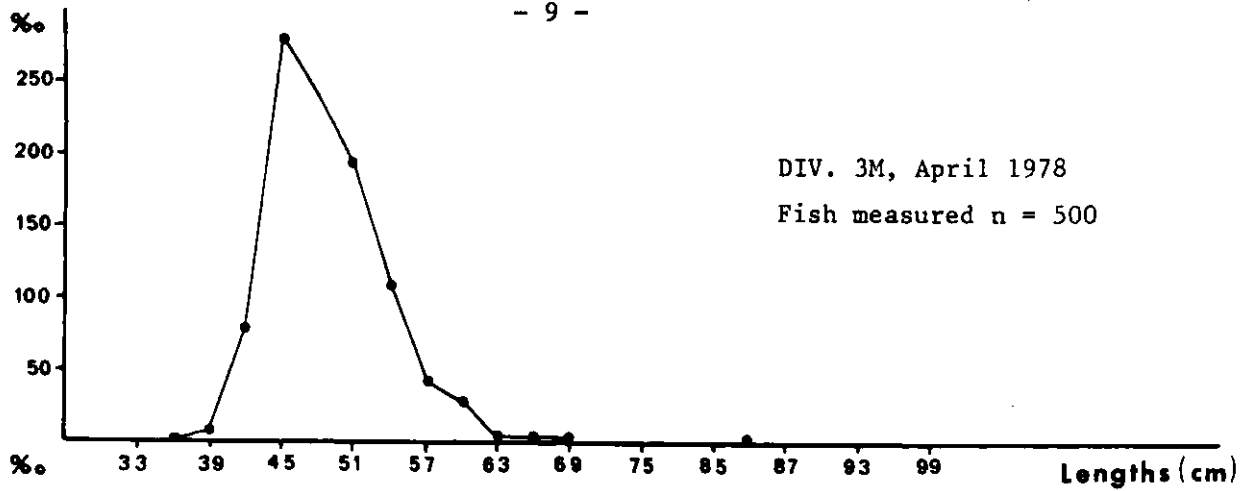
Length Group	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter
cm	$^{\circ}/_{\infty}$	$^{\circ}/_{\infty}$
30		
33		2
36	10	10
39	37	85
42	57	120
45	113	209
48	160	200
51	173	160
54	147	115
57	83	50
60	60	25
63	40	8
66	20	2
69	13	5
72	10	
75	23	2
78	13	5
81	3	
84	13	
87	10	
90	7	2
93		
96	7	
99		
Measured fish	300	401

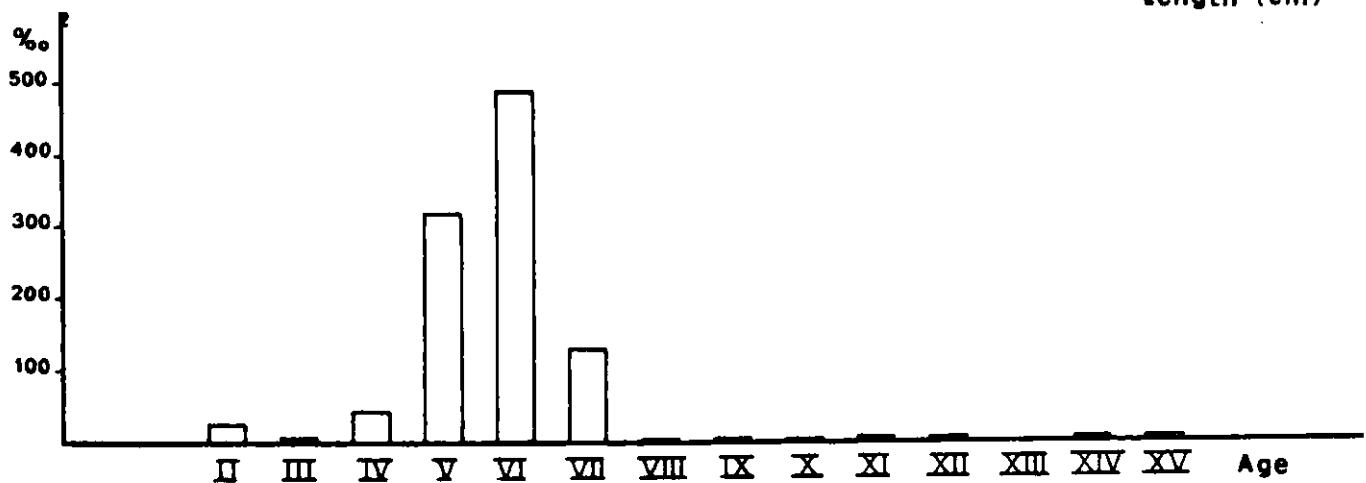
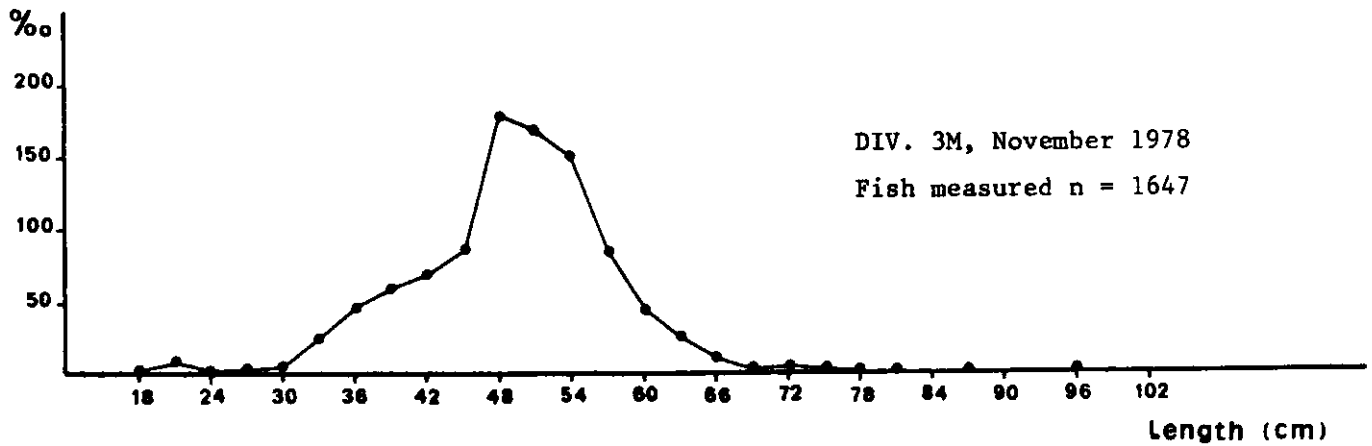
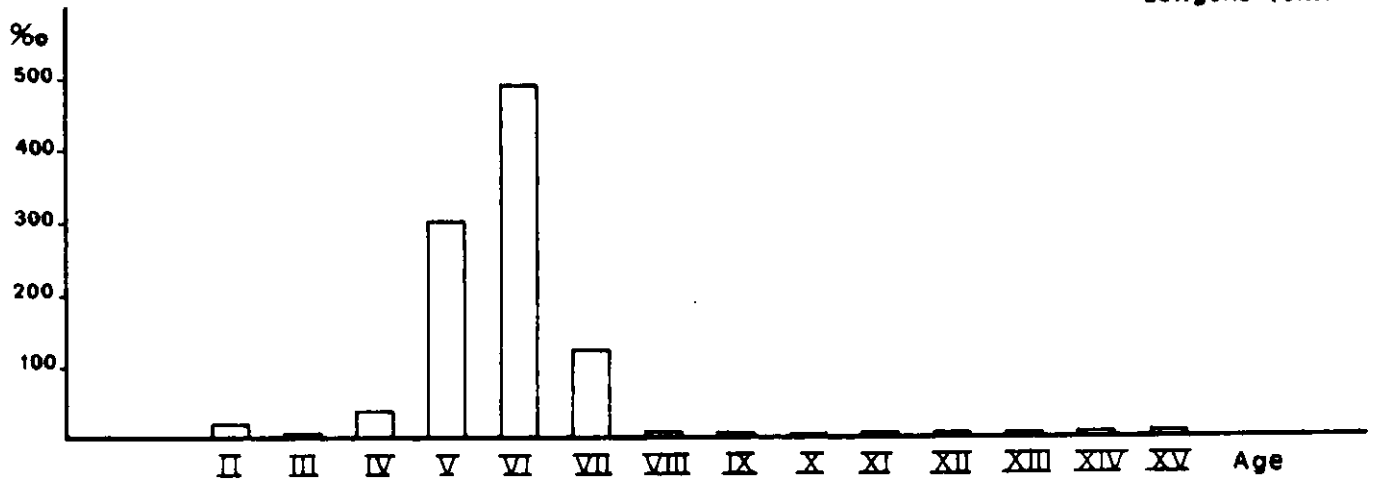
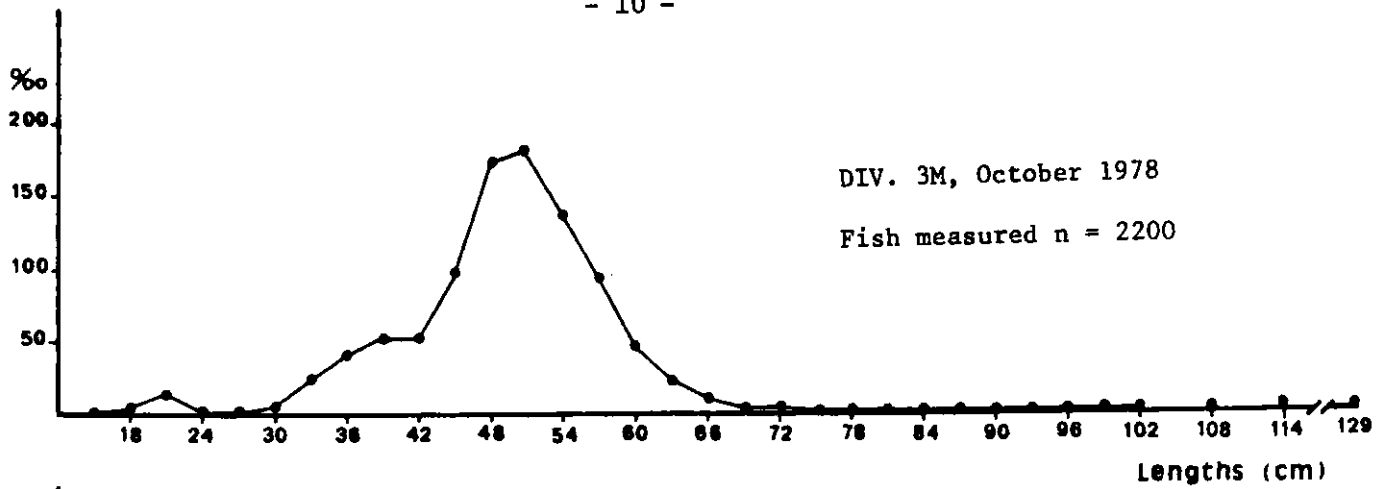
TABLE 7.\* Age composition of cod  
sampled in Division 2J  
(frequencies)

Age Group	Year Class	1 <sup>st</sup> Quarter	2 <sup>nd</sup> Quarter
		F	F
	1978		
I	1977		
II	1976		
III	1975		
IV	1974	6	11
V	1973	19	25
VI	1972	27	11
VII	1971	6	5
VIII	1970	16	2
IX	1969	6	3
X	1968	7	
XI	1967	4	1
XII	1966	3	
XIII	1965	1	
XIV	1964	1	
XV	1963	-	
XVI	1962	1	
Aged fish		87	58

\* (based in a subsample taken from all  
the otoliths collected in March and  
April)







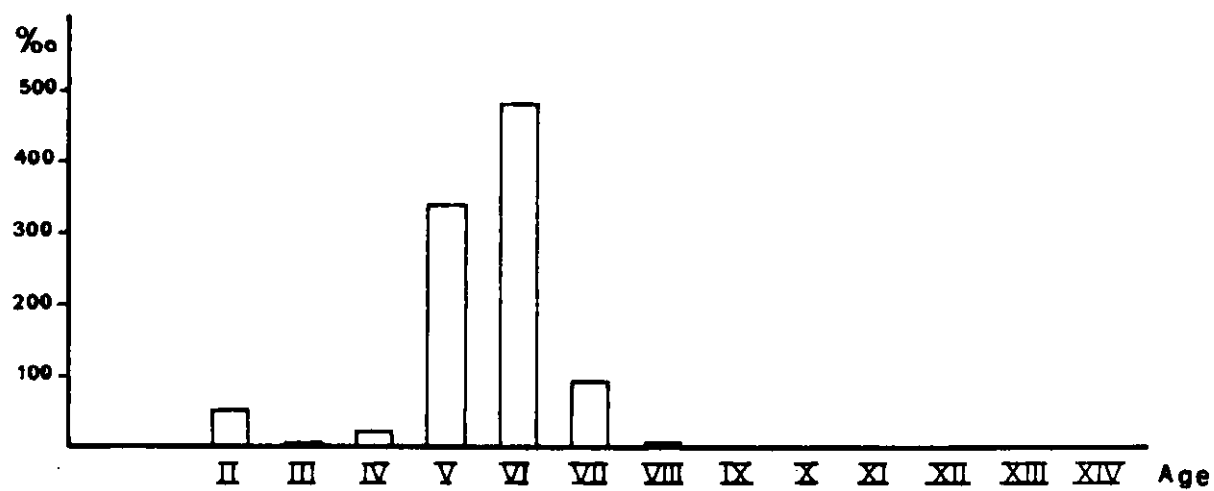
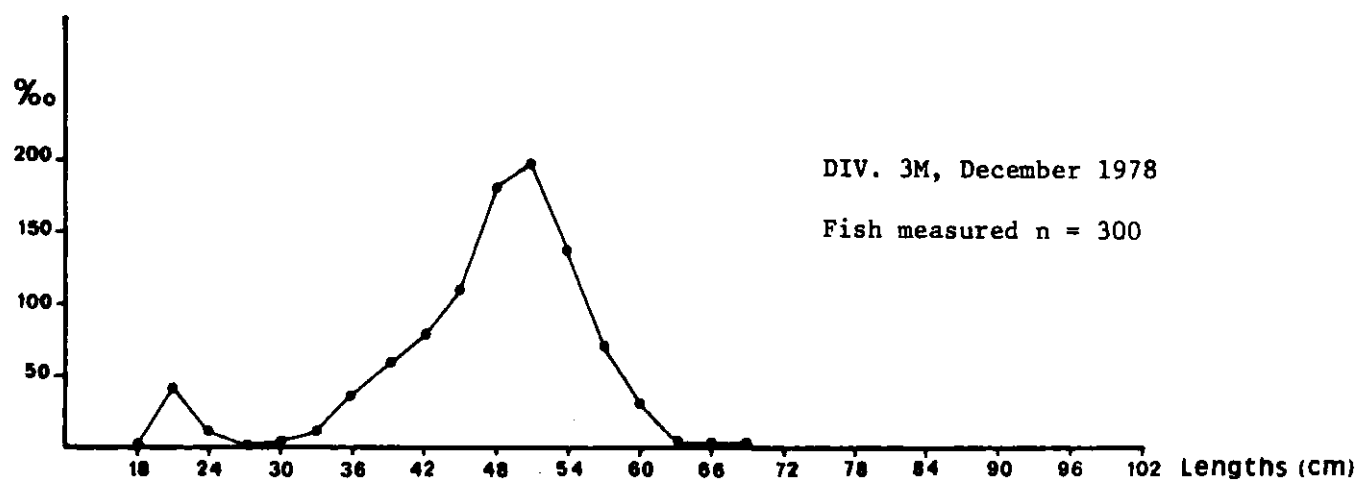


FIG. 1 Cont'd.

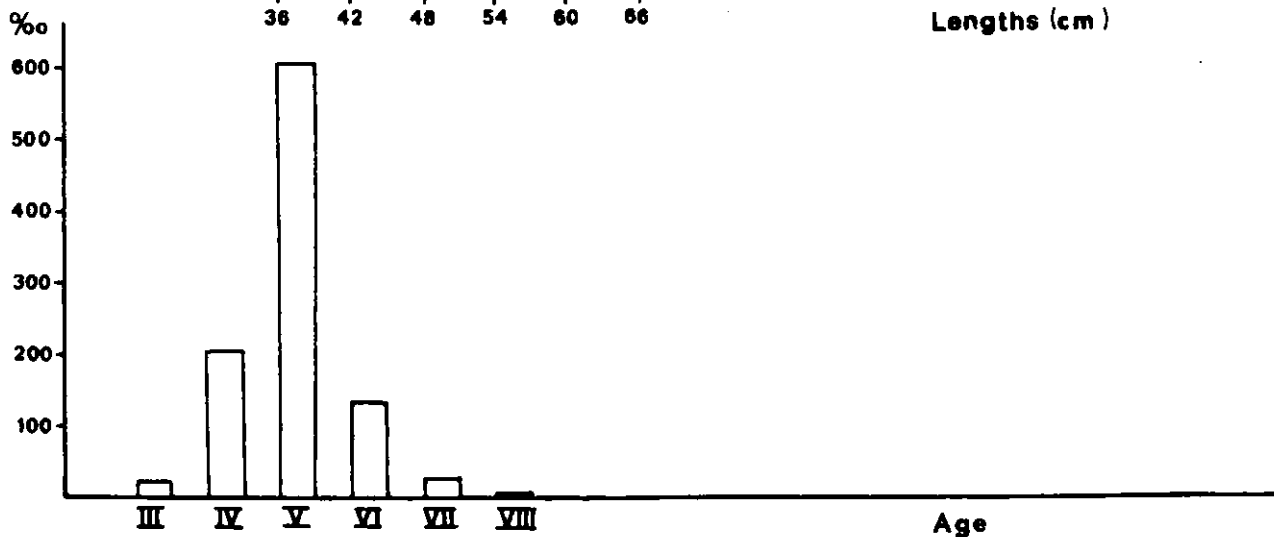
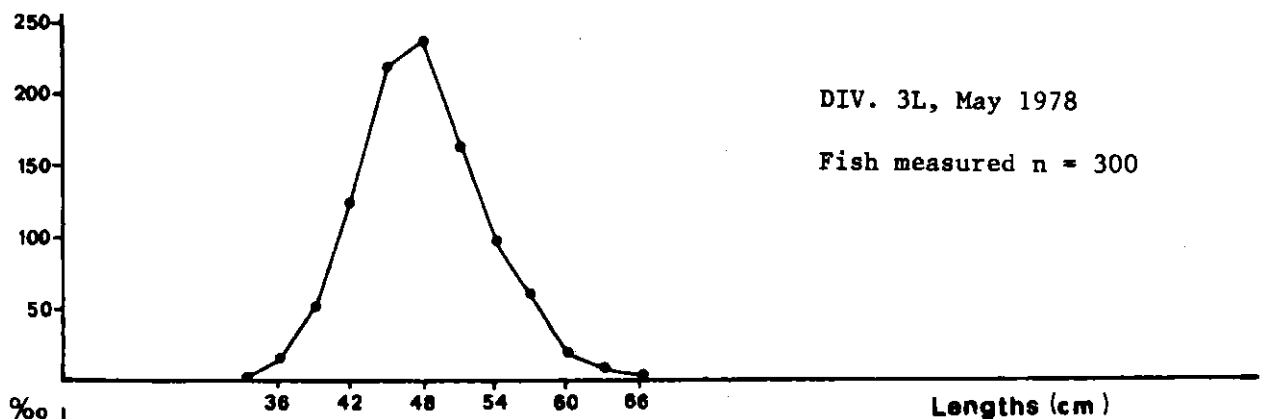
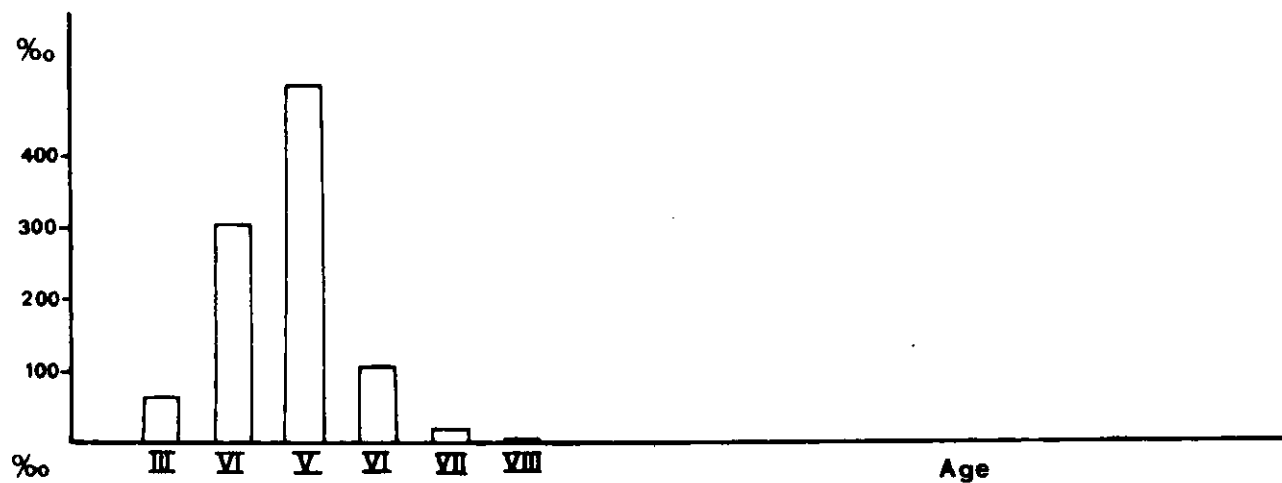
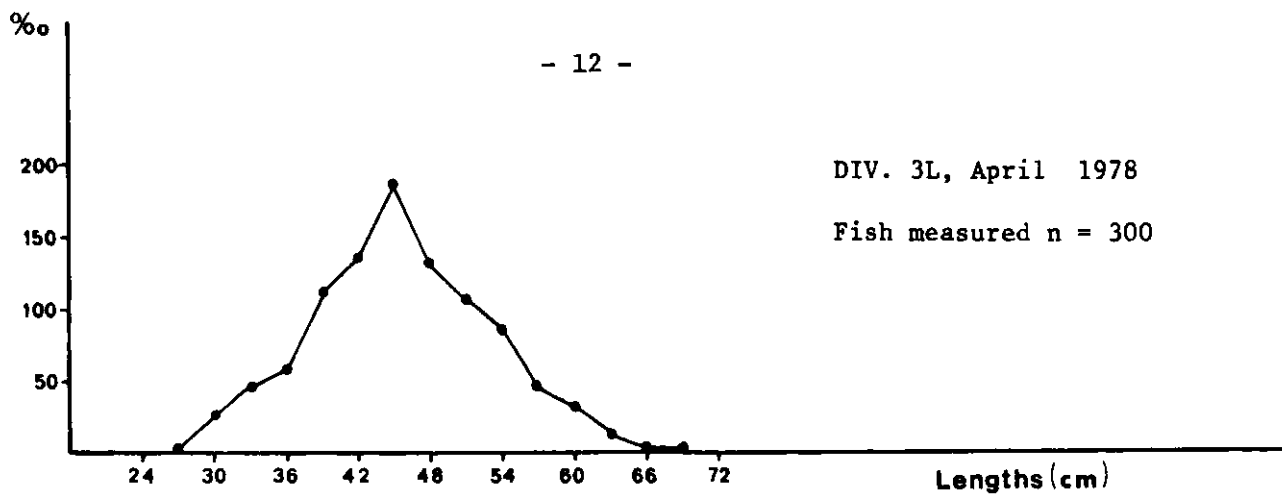


FIG. 2 Cod length frequencies and age composition, Div. 3L, 1978

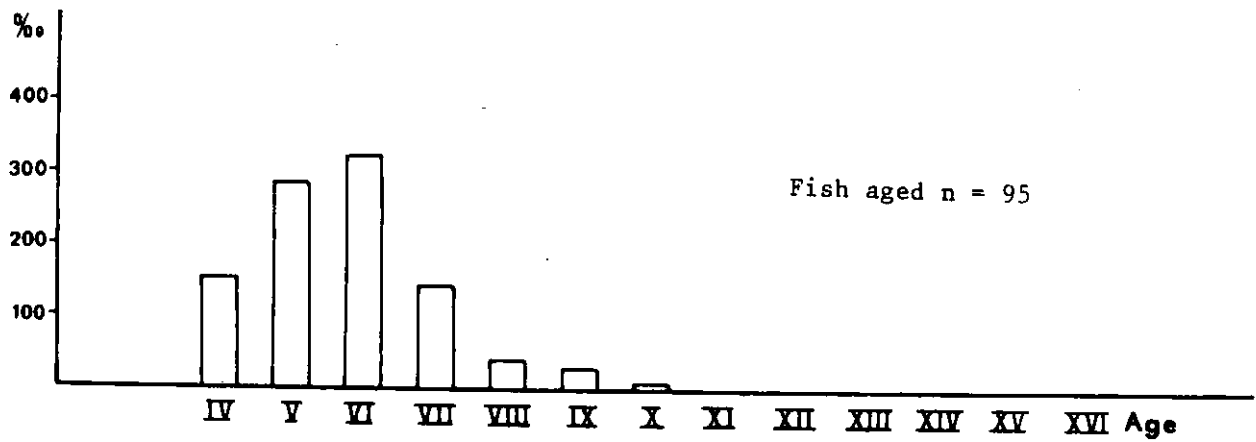
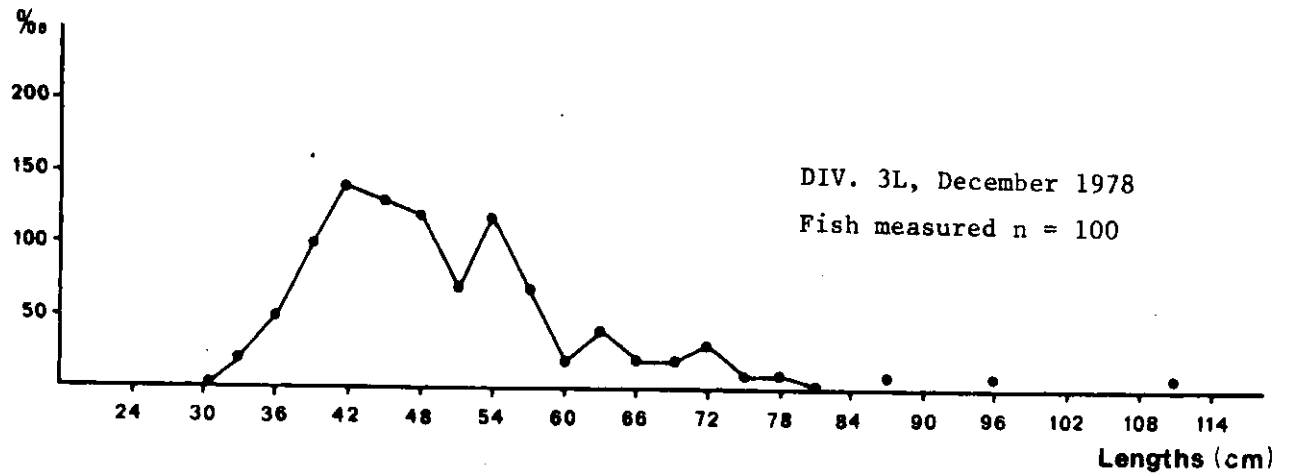


FIG. 2. Cont'd.

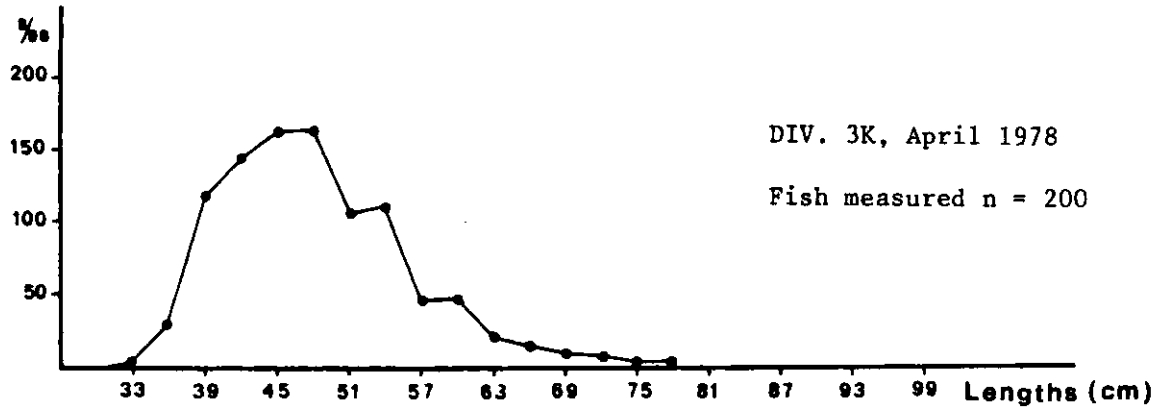
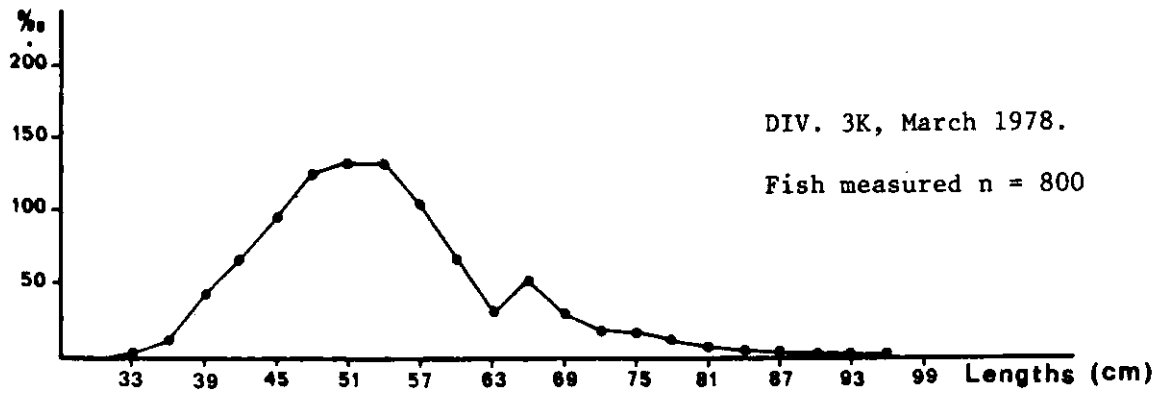


FIG.3 Cod length frequencies, Div. 3K, 1978

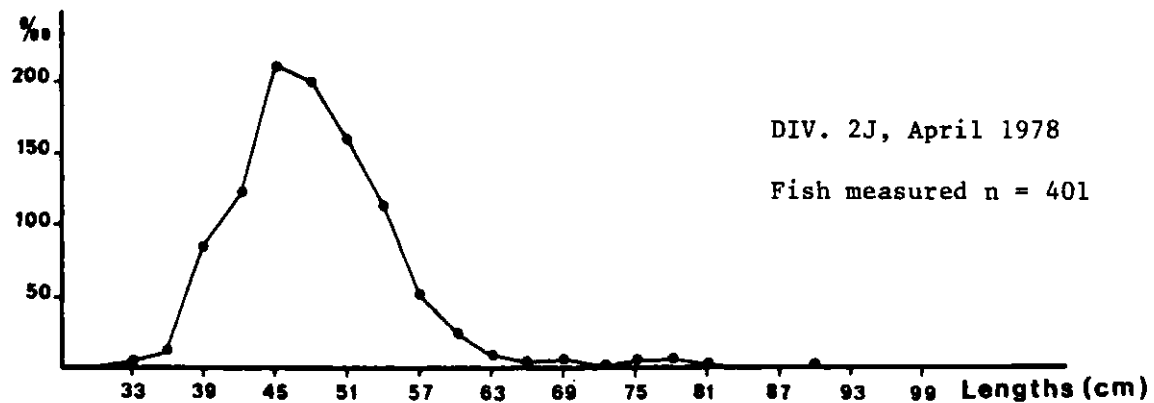
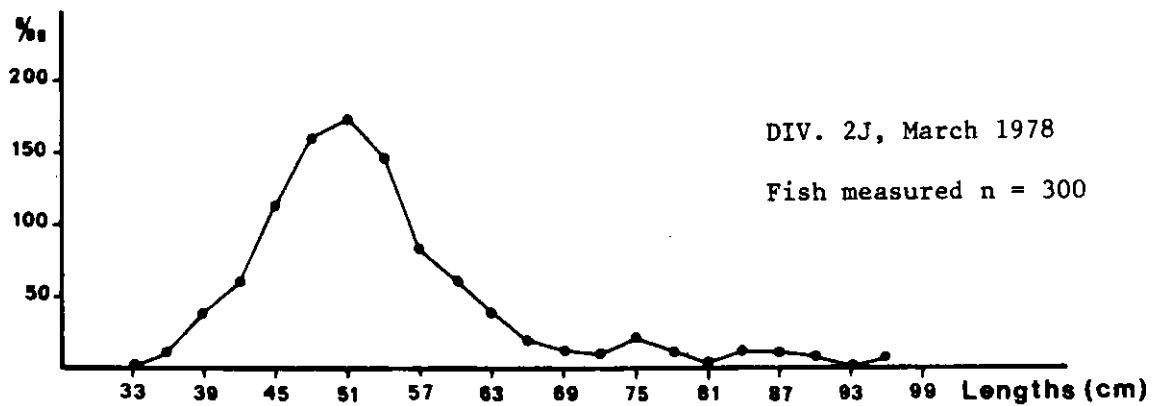


FIG.4 Cod length frequencies, Div. 2J, 1978

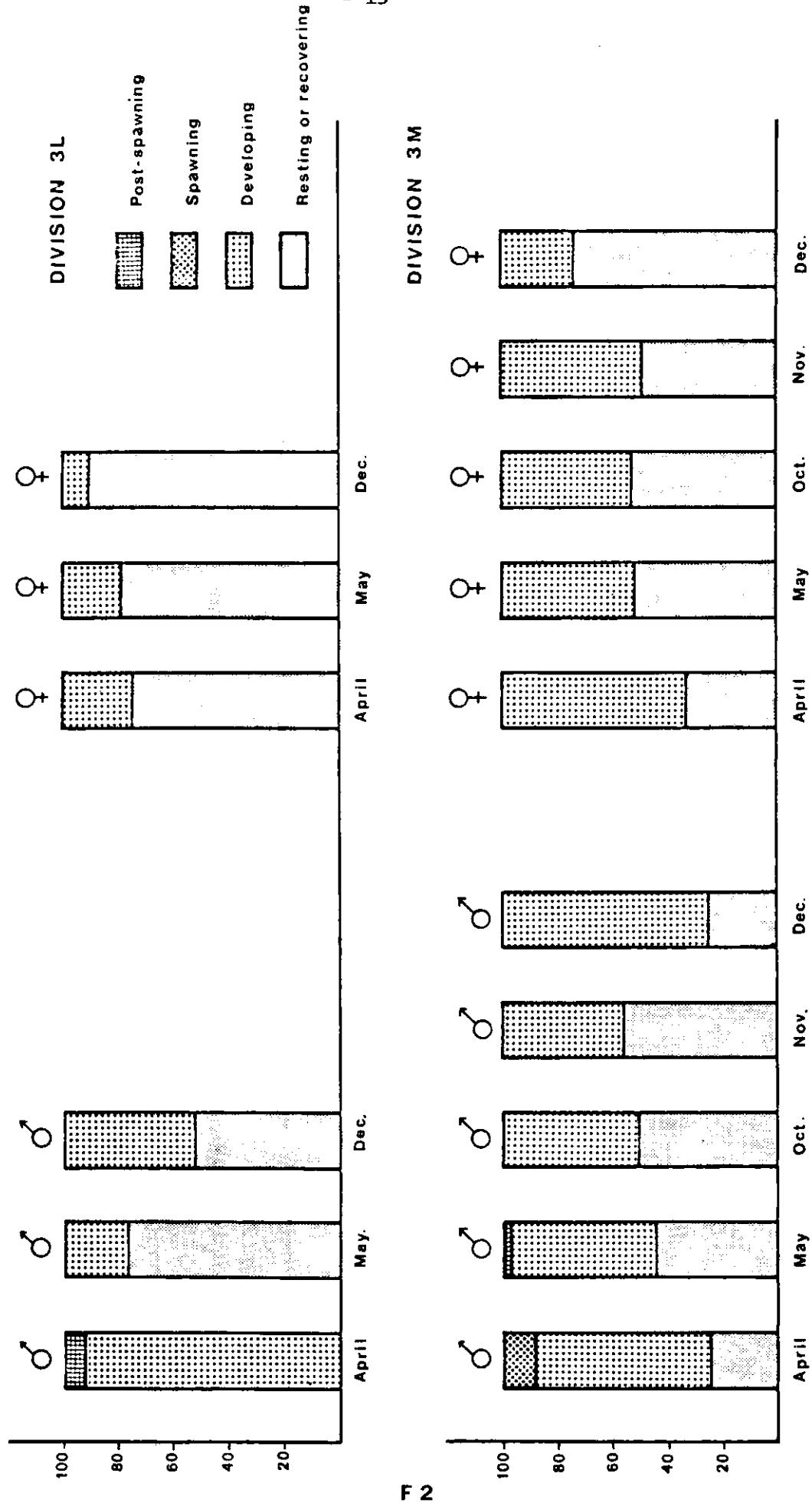


FIG. 5 Stages of maturity in the 2 Divisions sampled.

