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Results of the Juvenile Herring and Groundfish Survey of GDR in NAFO Division 5Z and Statistical Area 6A in Spring of 1979

by

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Introduction

In 1979 the GDR took part in the Juvenile Herring and Groundfish Survey with R/V "Eisbär". The investigations were done in cooperation with the NEFC, Woods Hole in the period from 20 April to 9 May. US-scientists participated in this cruise.

Methods and mode of work:

The methodology of this survey was in principle the same as in the 1975, 1976 and 1977 surveys (Res. Doc. 78/VI/78). Only the differing items are described below.

During the 1979 survey 57 fishery stations, 58 Bongo stations and 43 Newston stations were taken (fig. 1).

The working area (offshore strata: 1-13, 15, 23, 25; inshore strata: 28, 11, 14) was moved more to the west in comparison with the earlier years.

Four of the 57 fishery stations couldn't be used for an analysis because of net damages. These four stations were subsequently disregarded.

All stations were taken with the GDR herring bottom trawl HG 600 without rollers.

On all fishing stations, except one, temperature measurements were carried out by XBT.

Surface and bottom water temperature isograms are shown in figures 2 and 3.

A direct comparison between the survey in 1979 and the surveys 1975-1977 is difficult by reason of the different working periods and areas. Totally 54 fish species and 8 invertebrate species were investigated.

Fishery results:

The total catch amounted to 19.127 kg fishes and invertebrates. The mean catch per tow was 361 kg (5 Ze = 261 kg; 5 Zw = 587 kg; 6 A = 235 kg). The smallest catch per tow amounted to 34 kg in division 6 A and the highest was 3.000 kg in division 5 Zw. In nearly all catches the spiny dogfish (Squalus acanthias) was dominating.

A review of the unit catches and the most important species in the catches is given in figure 4.

The catches of herring and mackerel were very low (table 1). Herring was caught only in 16 tows. Most of them were taken in the inshore area south of Long Island at water depths of 22-45 m. In depths of about 60 m only single individuals were existing. In greater depths no herring was caught (Fig. 5).
Mackerels were available in 14 tows. The catches were done mainly at the shelf slope at depths of 76-132 m. In the nearshore area south of Long Island a smaller number of mackerels was caught at depths of 22-60 m (Fig. 5).

Biological results

Herring:

A review of the age and length compositions is given in table 2 and 3. In division 5 Ze only one specimen was caught (L_t = 22 cm; age group 3). In Division 5 Zw only 11 specimens of herring were investigated. All these herring belong to the 1976 year class. The modal length division 6A amounted to 31-34 cm and the 6year old fishes dominated.

The 1976 year class, which is estimated as a strong one, shared the total catch to only 7 %. Juvenile herring of age group 2 were not recorded in the working area. The length-weight-data are given in table 8.

By means of regression we get the following length-weight relation ship (Division 5 Zw + 6 A): $W = 1.85 \cdot L_t^{3.41} (r^2 = 0.73)$.

The value for the stratified mean weight (all age groups) per tow for strata 1-25 is nearly the same as in 1977. (1977: 0.194, 1979: 0.190).

Including the results of the fishery in the inshore strata for the calculation the mean weight value increased by about 53 % compared to 1977.

The stratified mean number for age group 3 (strata 1-25) decreased from 0.210 in 1977 to 0.052 in 1979.

The best herring catches were done at bottom water temperatures from about 5 °C. The total range in which herring was caught was 4.4 - 7.4 °C.

The sex ratio ♂ : ♀ was 55 : 45. It is noticable that 60 % of the herring food were fish larvae, probably such of Ammodytes americanus.

Mackerel:

The age and length compositions are given in the tables 4-7. In divisions 5 Zw and 6 A the age groups 4 and 5 dominated, whereas in division 5 Ze the age groups 5 to 7 were prevailing. The modal lengths varied between 35 and 37 cm.

Juvenile mackerels of the age groups 1 and 2 were not found in the working area.

The length-weight data are presented in table 9. By means of regression we get the following formulas for the length-weight relation:

division 5 Ze: $W = 0.07 \times L_f^{2.52}$ (r^2=0.89)

division 5 Zw: $W = 0.01 \times L_f^{3.13}$ (r^2=0.98)

division 6 A : $W = 1.763 \times L_f^{3.52}$ (r^2=0.88)

The mackerel growth was better than in earlier years.

In comparison with the spring survey 1977 the stratified mean weight per tow for the strata 1-25 increased from o.161 (1977) to 0.383 (1979). Including the inshore strata for the calculation the value will be 0.397 for 1979.

The total bottom temperature range in which mackerel was caught, was 4.9-11.9 °C. The females dominated with 58 %.

Other species:
A review of the length distributions, mean lengths and mean weights of selected species is given in table 10 and figures 6-10.

Summary

- The spiny dogfish (Squalus acanthias) was dominating. The catches of herring and mackerel were very low (herring 193 specimens; mackerel - 148 specimens)

- juvenile herring (age group 2) and juvenile mackerel (age groups 1 and 2) were not found in the working area
- in herring the year class 1973 were predominant, whereas in mackerel the age groups 4-7 prevailed.
- The stratified mean weight per tow for strata 1-25 for herring was nearly the same as in spring 1977. The value for mackerel increased by about 138 %.

Table 1: Number of useable stations, catches and mean lengths of herring and mackerel
Juvenile Herring and Groundfish Survey 1979, GDR

Division	No. of stations	Herring Catch (No.)	Herring Catch (kg)	Herring mean length (L_t, cm)	Mackerel Catch (No.)	Mackerel Catch (kg)	Mackerel mean length (L_f, cm)
5 Ze	13	1	0.1	22.50	73	41.7	37.03
5 Zw	18	18	3.2	24.86	51	25.7	35.95
6 A	22	184	49.6	32.60	24	17.2	37.83

Table 2: Herring age-length key. April 1979; Div. 5 Zw

L_t (cm)	Year class (No. aged) 1976	length composition (%o)
23	1	56
24	5	278
25	5	278
26		
27		
28		
29		
30		
31		
32		
33		389
Total	11	1001

Number of age samples: 1
Number of length samples: 2
Number of fish measured: 18

Table 3: Herring age-length key. May 1979; Stat. Area 6A

	Year class (No. aged)								total aged	length compos.
L_t(cm)	1976	1975	1974	1973	1972	1971	1970	1969	(No.)	(‰)
25	1								1	5
26	1								1	5
27		1							1	11
28		2	2						4	27
29		1	1						2	22
30		1	8	4					13	92
31			4	22	3				29	185
32			1	30	5				36	255
33				13	7	1	1		22	168
34				3	9	2	1	2	17	130
35						6	5		11	71
36						1	2		3	16
37						1			1	5
38								1	1	5
Total	2	5	16	72	24	11	9	3	142	997

Number of age samples: 6
Number of length samples: 13
Number of fish measured: 184

Age composition

Age	3	4	5	6	7	8	9	≥10	Total
‰	11	43	109	500	185	76	54	22	1000

Table 4: Mackerel age-length key. April 1979; Div. 5Ze

	Year class (No. aged)								total aged	length compos.
L_f(cm)	1975	1974	1973	1972	1971	1970	1969	1968	(No.)	(o/oo)
34	1								1	14
35	2	9	1	1					13	192
36		13	8	5					26	370
37		3	8	4	1				16	219
38			2	3	3				8	123
39				1			1		2	41
40						2		1	3	41
Total	3	25	19	14	4	2	1	1	69	1000

Number of age samples: 2
Number of length sampl. 2
Number of fish measured 73

Age composition

Age	4	5	6	7	8	9	10	11	Total
o/oo	41	356	274	205	68	27	14	14	999

Table 5: Mackerel age-length key. May 1979; Div. 5 Zw

	Year class (No. aged)								total length
L_f(cm)	1976	1975	1974	1973	1972	1971	1970	1969	aged compos. (No.) (o/oo)
32	2								2 48
33									
34	1	6	2						9 238
35	1	6	6	1					14 381
36		2	1	3	1				7 167
37					1	2			3 71
38					1				1 48
39						1		1	2 48
Total	4	14	9	4	3	3		1	38 1001

Number of age samples 2
Number of length samples 3
Number of fish measured 42

Age composition

Age	3	4	5	6	7	8	9	10	Total
o/oo	95	381	238	95	71	95	-	24	999

Table 6: Mackerel age-length key. May 1979; Stat. Area 6A

	Year class (No. aged)								total aged	length compos.
L_f(cm)	1975	1974	1973	1972	1971	1970	1969	1968	No.)	(o/oo)
34	2								2	125
35	1	4							5	208
36	1		1						2	83
37			1						1	83
38								1	1	83
39							1	1	2	208
40						1			1	125
41						1			1	83
Total	4	4	2			2	1	2	15	998

Number of age samples 2
Number of length samples 8
Number of fish measured 24

Age composition

Age	4	5	6	7	8	9	10	11	Total
o/oo	208	167	83	42	-	167	167	167	

Table 7: Mackerel length composition. April 1979; Div. 5 Zw

L_f(cm)	length composition (o/oo)
35	222
36	333
37	333
38	111
Total	999
Number of length samples	1
Number of fish measured	9

Table 8: Herring length-weight relation. Spring 1979; Div. 5 Zw and Stat. Area 6A

Division	5 Zw		6 A	
L_t(cm)	mean weight (g)	No. of weighed	mean weight(g)	No. of weighed
23	95.0	1		
24	97.0	5		
25	109.0	5	120.0	1
26			120.0	1
27			140.0	1
28			170.0	4
29			180.0	2
30			212.3	13
31			241.0	30
32			259.7	36
33			285.7	23
34			318.2	17
35			339.1	11
36			393.0	3
37			380.0	1
38			500.0	1
Total	102.3	11	259.4	144
No. of weight samples		1		6

Table 9: Mackerel length-weight relation. Spring 1979; Div. 5 Ze, 5 Zw and Statistical Area 6A

Division	5 Ze		5 Zw		6 A	
L_f (cm)	mean weight(g)	No. of weighed	mean weight(g)	No.of weighed	mean weight(g)	No.of weighed
32			360.0	2		
33						
34	500.0	1	476.0	10	483.8	3
35	507.9	14	486.0	15	464.0	5
36	531.5	27	521.4	7	510.0	2
37	605.6	16	570.0	3	500.0	2
38	641.1	9	640.0	1	700.0	1
39	746.7	3	690.0	2	735.0	2
40	686.7	3			800.0	1
41					830.0	1
Total	571.5	73	494.8	40	561.9	16
No. of weight samples		2		2		2

Table 10: Length distribution of selected species. Spring 1979
Juvenile Herring and Groundfish Survey (GDR)

	measuring method	Div.	length range(cm)	main range (5 %-limit; cm)	Ø-length (cm)	Ø-weight (g)	n meas.
Alosa pseudoharengus	L_f	5Ze	18-32	25-30	27.41	331	55
Merluccius albidus	L_t	5Zw	29-40	32-38	35.25	344	122
		6A	27-52	35-40;42-43	39.25	508	
Gadus morrhua	L_t	5Zw	24-129	69;78-90;96-102	85.97	8655	58
		6A	3-114	72-81;87;96-99;114	72.08	7306	31
Melanogrammus aeglefinus	L_f	5Ze	16-82	24-28	28.64	438	281
Urophycis tenuis	L_t	5Zw	13-95	30-35	35.47	396	253
U. chuss	L_t	5Ze	11-41	18-20;22;29-33	26.67	191	349
		5Zw	16-48	27-35	31.99	230	1264
		6A	16-51	19-20;22-27;29-30; 33	27.74	194	792
Stenotomus chrysop	L_f	5Zw	13-32	17-24	20.68	230	522
Macrozoarces americanus	L_t	5Ze	18-88	53;55;60;	60.14	1261	155
		5Zw	16-81	31-32	44.76	611	170
		6A	15-75	30-35;52	41.63	528	224
Poronotus triacanthus	L_f	5Zw	10-22	12-16;18-20	16.79	115	643
		6A	10-23	11-20	15.68	102	136
Limanda ferruginea	L_t	5Ze	17-49	27-31;36;38	32.26	390	68
		5Zw	19-46	29-36;	33.34	354	232
		6A	16-45	28-28;31-35	30.70	296	94
Pseudopleuronectes americanus	L_t	5Zw	10-45	19;21-27	24.53	206	151
		6A	12-41	23-30	26.73	290	199
Illex illecebrosus	L_M	6A	13-23	14-18	16.58	109	146

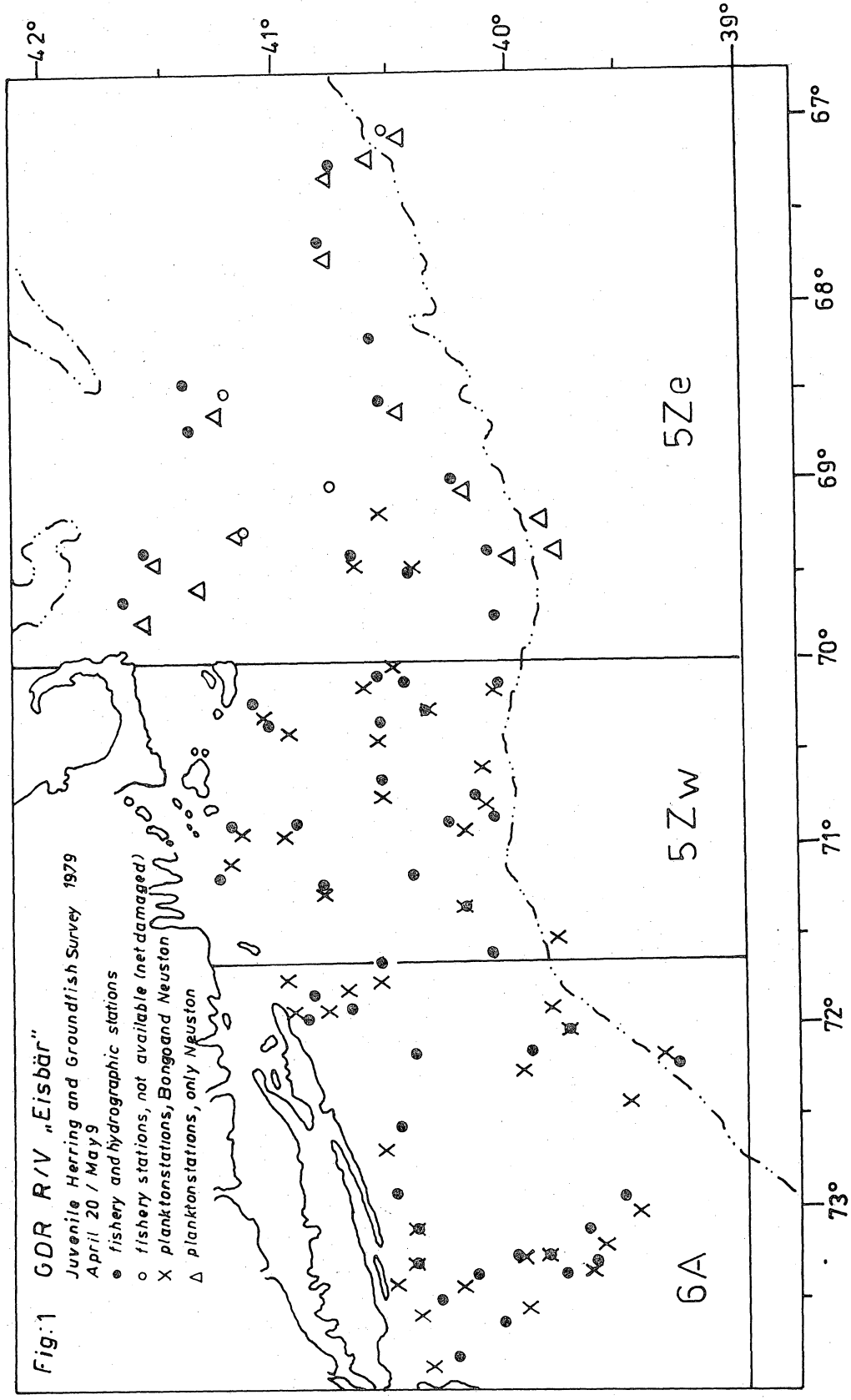

Fig:1 GDR R/V „Eisbär"
Juvenile Herring and Groundfish Survey 1979
April 20 / May 9
● fishery and hydrographic stations
○ fishery stations, not available (net damaged)
× planktonstations, Bongoand Neuston
△ planktonstations, only Neuston

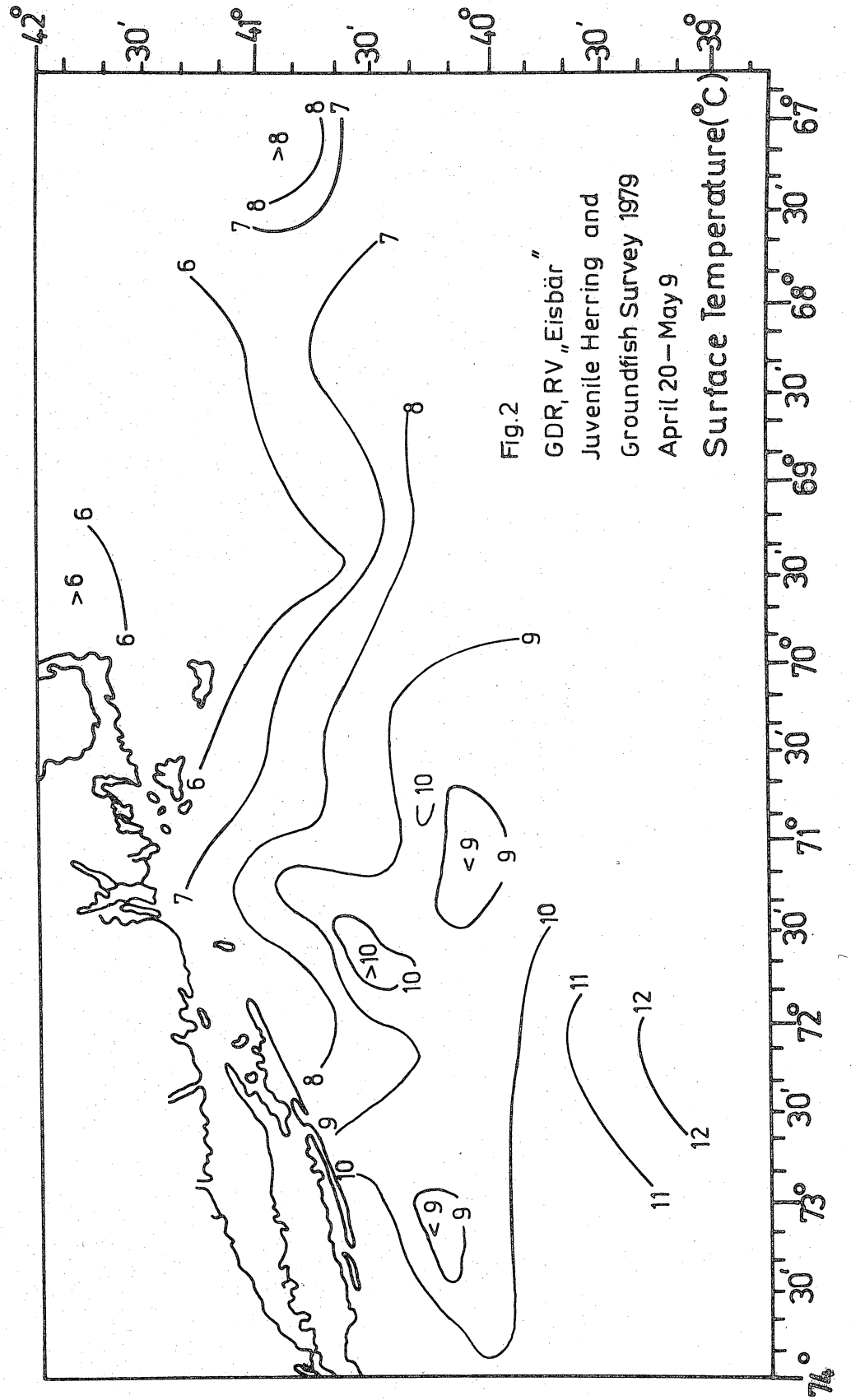

Fig.2
GDR, RV „Eisbär"
Juvenile Herring and
Groundfish Survey 1979
April 20 – May 9

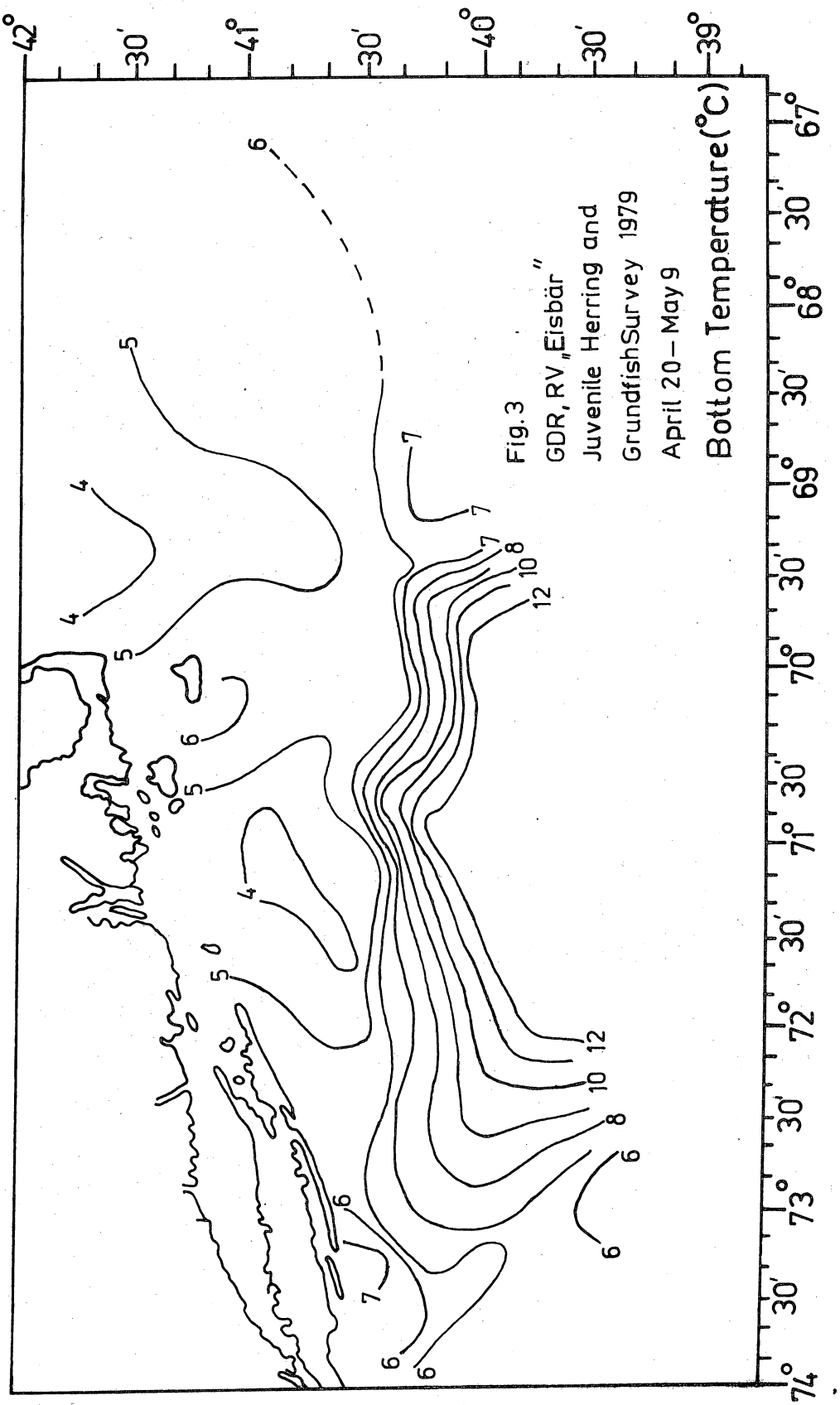

Fig. 3
GDR, RV „Eisbär"
Juvenile Herring and
GrundfishSurvey 1979
April 20 – May 9

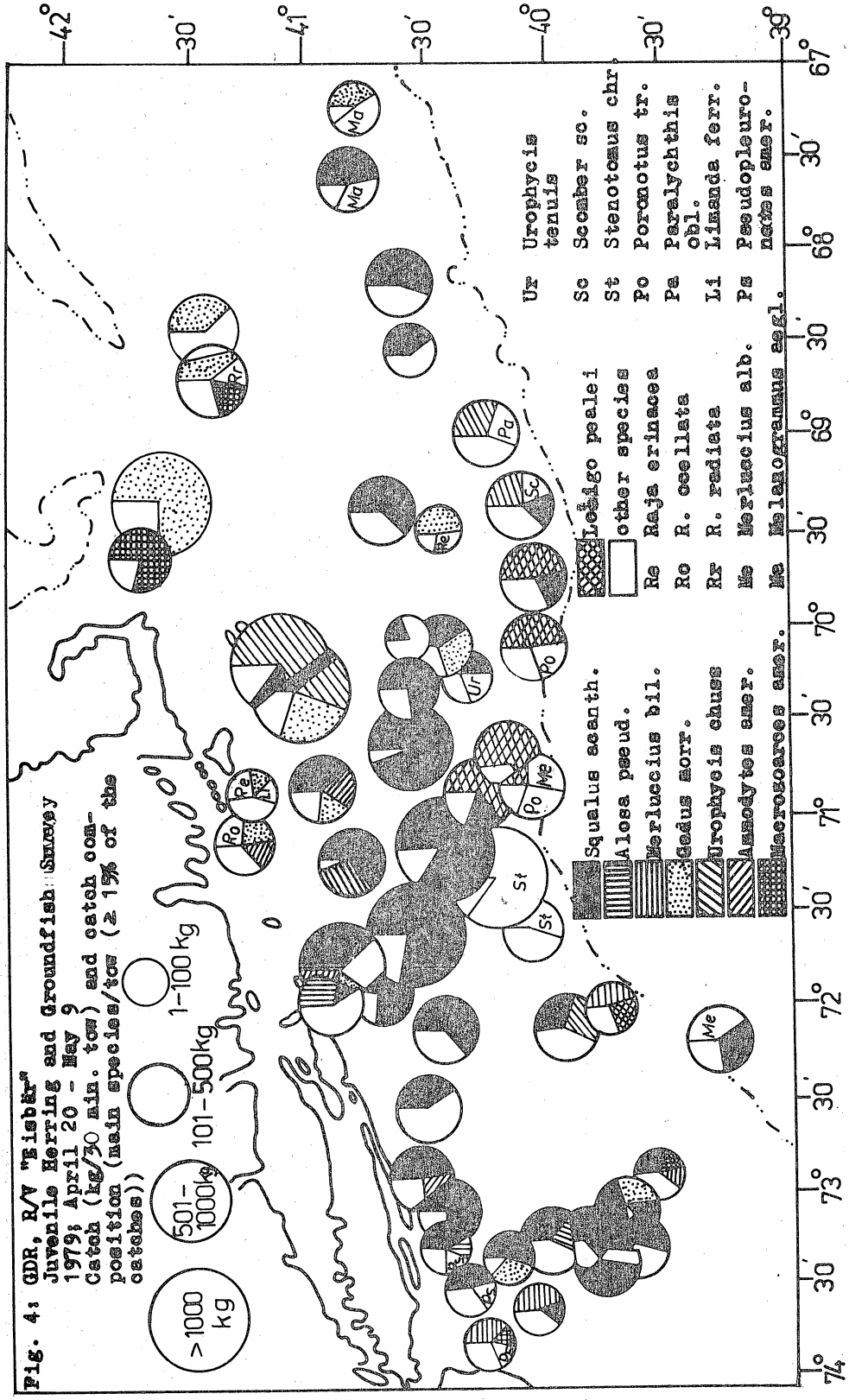
Fig. 4: GDR, R/V "Elbe"
Juvenile Herring and Groundfish Survey
1979; April 20 - May 9
Catch (kg/30 min. tow) and catch composition (main species/tow (≥ 15% of the catches))
>1000 kg
501-1000kg
101-500kg
1-100 kg
Gadus morr.
Urophycis chuss
Amodytes amer.
Macrozoarces amer.
Melanogrammus aegl.
Ur Urophycis tenuis
Sc Scomber sc.
St Stenotomus chr.
Po Porcnotus tr.
Pa Paralychthis obl.
Li Limanda ferr.
Ps Pseudopleuronectes amer.
42°
41°
40°
39°
67°
68°
69°
70°
71°
72°
73°
74°
30'

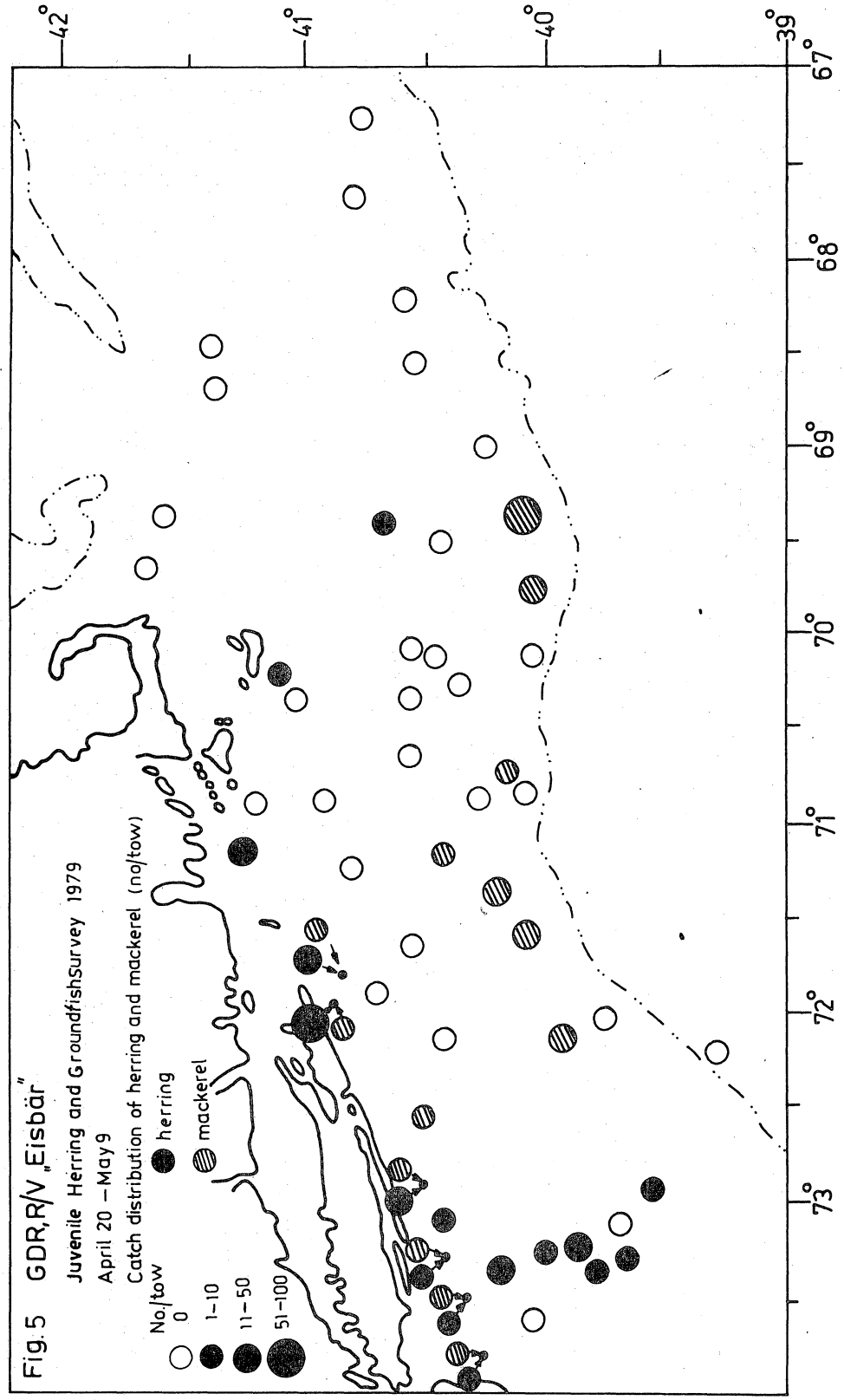
Fig.5 GDR,R/V „Eisbär"
Juvenile Herring and Groundfishsurvey 1979
April 20 – May 9
Catch distribution of herring and mackerel (no/tow)
No./tow
0
1-10
11-50
51-100
herring
mackerel
42°
41°
40°
39°
67°
68°
69°
70°
71°
72°
73°

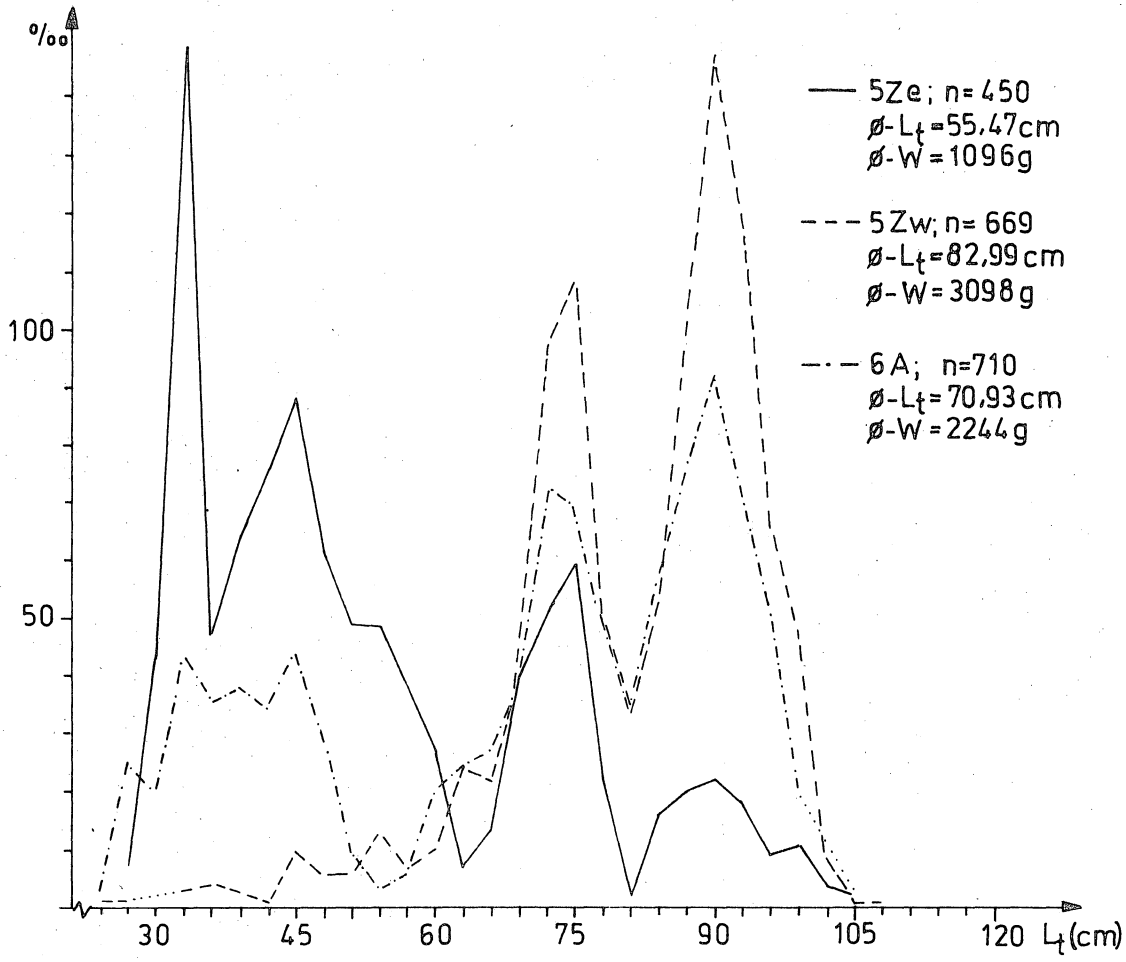

Fig.6 : Length distribution of spiny dogfish (Squales acantias)

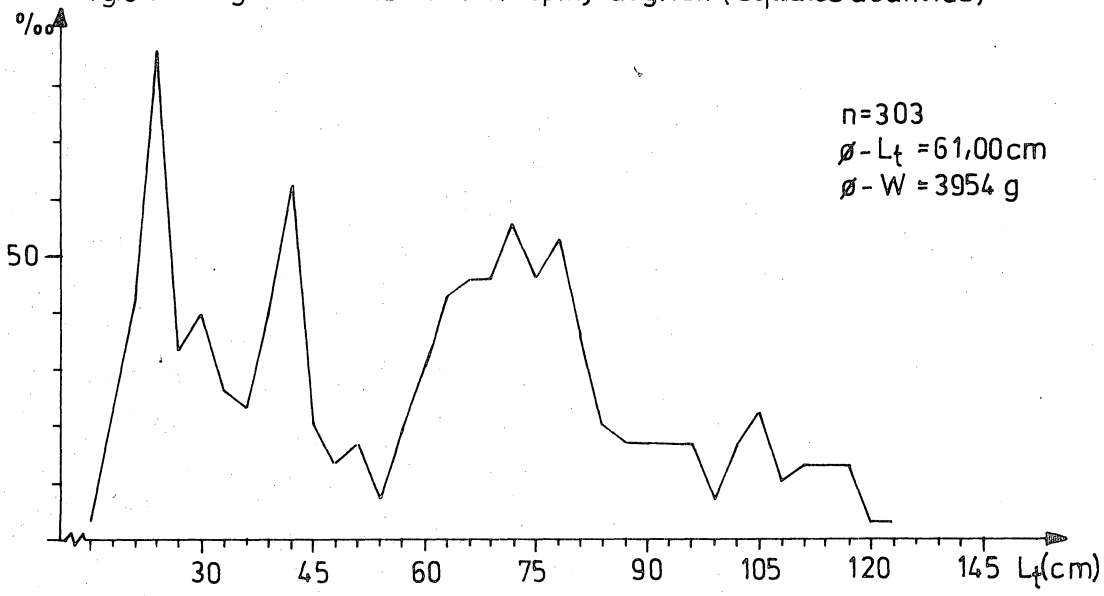

Fig.7 : Length distribution of cod (Gadus morrhua) in division 5Ze

Fig.8

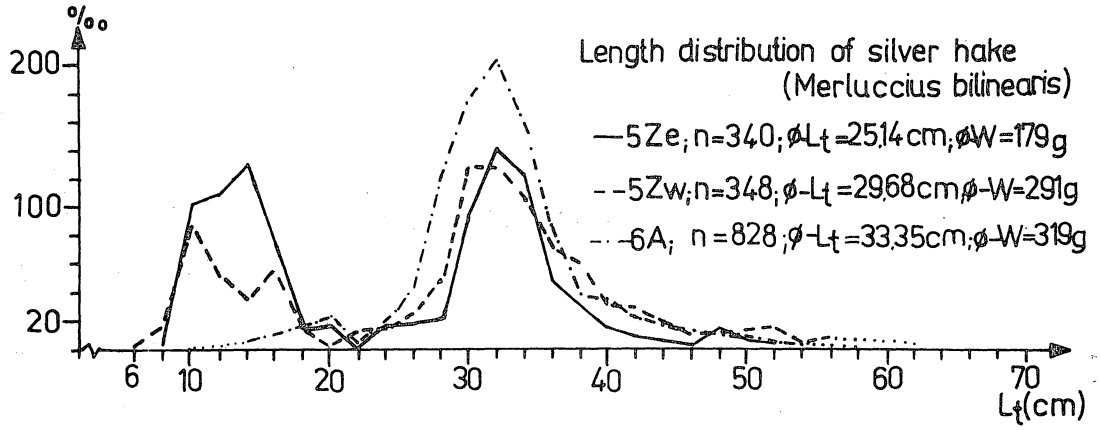

Fig.9

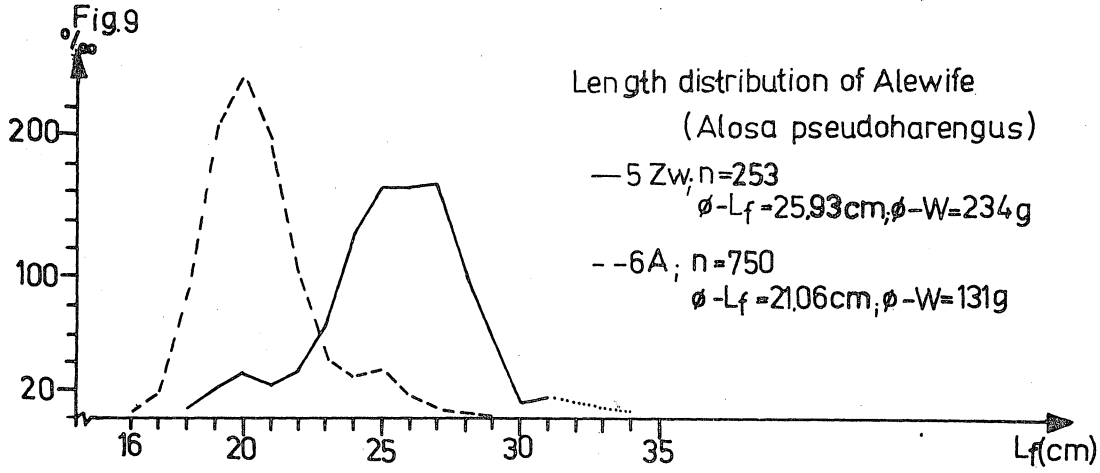

Fig.10