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Contribution to the knowledge of the Baltic sprat (*Sprattus sprattus*)

by
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Introduction

Swedish fishing for sprat in the Baltic is far less important than on the west coast of Sweden. Some sprat are taken as a secondary catch in herring trawls. Sometimes, when there is a great demand for sprat in the canning factories of the Swedish west coast, Baltic sprat are used. Annual catches remain below 100 tons a year along the whole Swedish Baltic coast. Before trawling for herring developed most sprat were taken by beach seine. Such fishing from the coast of Östergötland has been going on since the middle of the eighteenth century at least (EHLINHOLOM, 1753).

Sweden has not therefore participated in the enormous development of sprat fishery in the Baltic during the last decade. Nevertheless, sprat samples have been analysed, and the material has been treated in the same way as the sprat sampled from the west coast. Some of the results are presented below.

Results

1. As is known there are in the Baltic sprat more age groups than in sprat from the Kattegat and Skagerak (HESSLE, 1927, ELWERTOWSKI, 1960). This has been confirmed by our investigations. At most ten year classes have been found, eight and nine year classes are not uncommon in certain areas. In the Skagerak and Kattegat at most seven year classes have been found and catches with more than five year classes are rare (Fig. 1). When examining the age composition in different parts of the Baltic it is found that there are more year classes in the open sea sprat.

2. An examination of the different age classes (omitting the first one as this is always underrepresented in the catches) shows that sprat in the second period of growth (starting from May/June after the year of birth) are not common in the central parts of the sea (Fig. 2). Sprat of the second

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period of growth occur regularly in coastal waters and in the archipelago. This is also confirmed by the experience of Swedish Baltic fishermen, who say that the smaller sprat are found closer to the coast.

It is interesting to note that such a differentiation according to age is not found in the Kattegat and Skagerak although the sprat fished in the skerries with purse seines is somewhat smaller. In the Baltic many of the younger sprat in the second and third period of growth must migrate into the open sea.

3. Males are less numerous than females (Fig. 3). There are big variations in the sex ratio in all sprat samples investigated, but there is a clear trend for the number of males to decrease in older age classes. Presumably it is only in the first period of growth that males are as numerous as females. Most of the old sprat in the central Baltic are females.

4. The growth of the Baltic sprat has been reported to be bad from the second period of growth onwards (Fig. 4). Differences are reported between the growth in the western Baltic (Bornholm basin and Kiel bay) and the eastern and northern Baltic. In the former area growth is much faster and comparable to that of the sprat in Skagerak and Kattegat. Comparisons show that differences in the growth of west coast sprat and the northern Baltic sprat are very great: in the third period of growth differences are about 1 to 2 cm in these small fish. There are no notable variations in the growth rate in different parts of the eastern and northern Baltic.

5. L_1 measurements have been made (from otoliths) and it has been found that sprat from the northernmost parts of the Baltic tend to have a lower L_1 than those from the Bornholm basin. West coast samples have an intermediate position:

		Skagerak & Kattegat 1970														
		2	3	4	1	4	5	6	3	2	2	1				
Baltic 1960- 1969	Bothnian Sea	1	1													
	E Gotland		1				1									
	W Gotland		1	1	1		1	1	1							
	Hanö Bay				1			1					1			
	Bornholm							1		1						
		8.0	1	2	3	4	8.5	6	7	8	9	9.0	1	2	3	cm

L_1 as calculated from sprat in the 3rd period of growth from different parts of the Baltic and as a comparison, from the Skagerak/Kattegat (males and females)

6. There are few analyses of meristic characters in the Baltic sprat. In a previous paper (LINDQUIST, 1968) it was said that sprat from the northernmost parts both of the Baltic and the Skagerak (and also the North Sea) have more vertebrae. In the southern Baltic (and the southern North Sea) they have fewer. It is supposed that this is due to the comparatively short time of high mean temperatures in all northern waters.

Our samples have been reexamined, new observations have been added and the material has been split up into age groups. Although there is great variability it is obvious that sprat from the Bornholm basin, the western Baltic and the Belt sea in general have fewer vertebrae. The same low values (or still lower) are found in rather isolated fjords in Bohuslän (and in the Danish Limfjord). East and north of the Bornholm basin and in the Kattegat and Skagerak the mean values are higher, and the highest values are found in the Gulf of Bothnia and in northern Bohuslän (west coast). East of Gotland the values are lower than west of the island, indicating perhaps that the

distribution of mean values resembles that of the general hydrographic conditions (Fig. 5, 6).

Conclusions

The offshore central parts of the Baltic proper contain sprat mainly of older age classes. One can say that a "Pool of seniors" is found there. How this pool is formed is not known, perhaps after the spawning migration of the sprat from the coast to the open sea. The older sprat will not return to the coast during the autumn. They congregate in the deeper waters east of Gotland.

Growth and L_{∞} point to the fact that the Bornholm area and the sea to the west of Bornholm contain a sprat which is different. ELWERTOWSKI (l.c.) pointed out that the sprat of the Bay of Gdansk differ from these of the Bornholm basin in mean length, growth, age, fecundity, etc. The mean number of vertebrae in the southern Baltic and Belt sea sprat is different from that in more northern waters.

Fig. 6 shows the trend in the development of the discussed characters. This may be taken as an example how subpopulations are formed by the influence of many forces at the same time.

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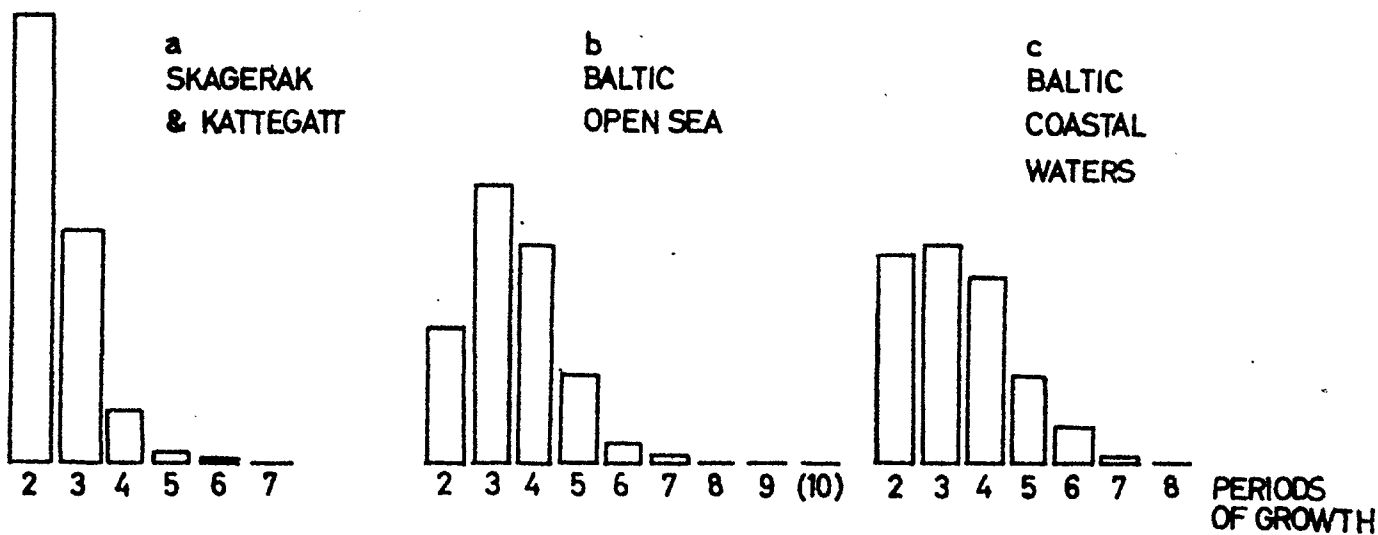
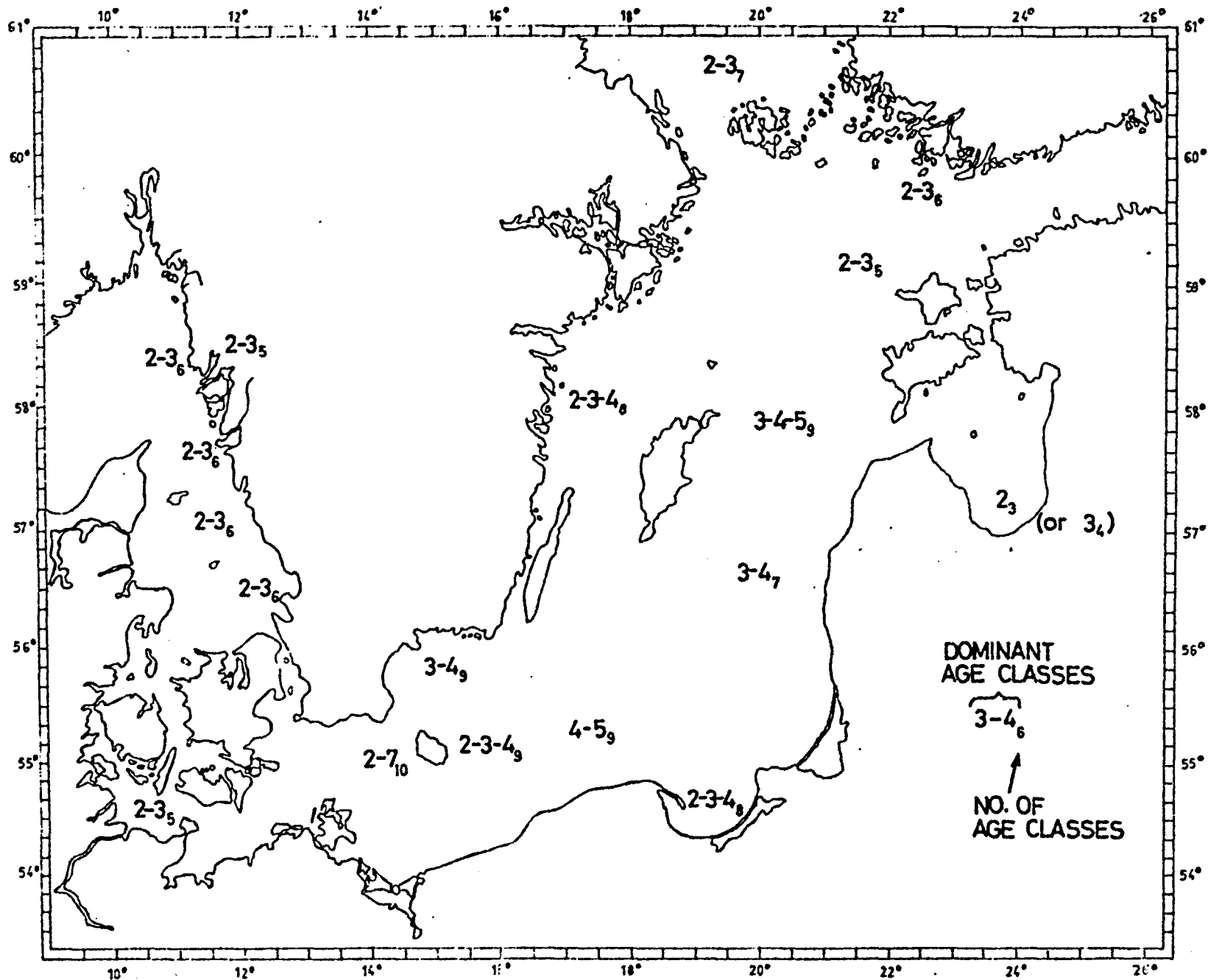


Fig. 1 Age classes of the sprat according to own investigations.
 a) after LINDQUIST 1966; about 400 samples;
 b) 17 samples; 3 samples; see also HESSLE 1927; MORAWA 1955,
 RECHLIN 1967

Fig. 2 Number of age classes and dominant age classes



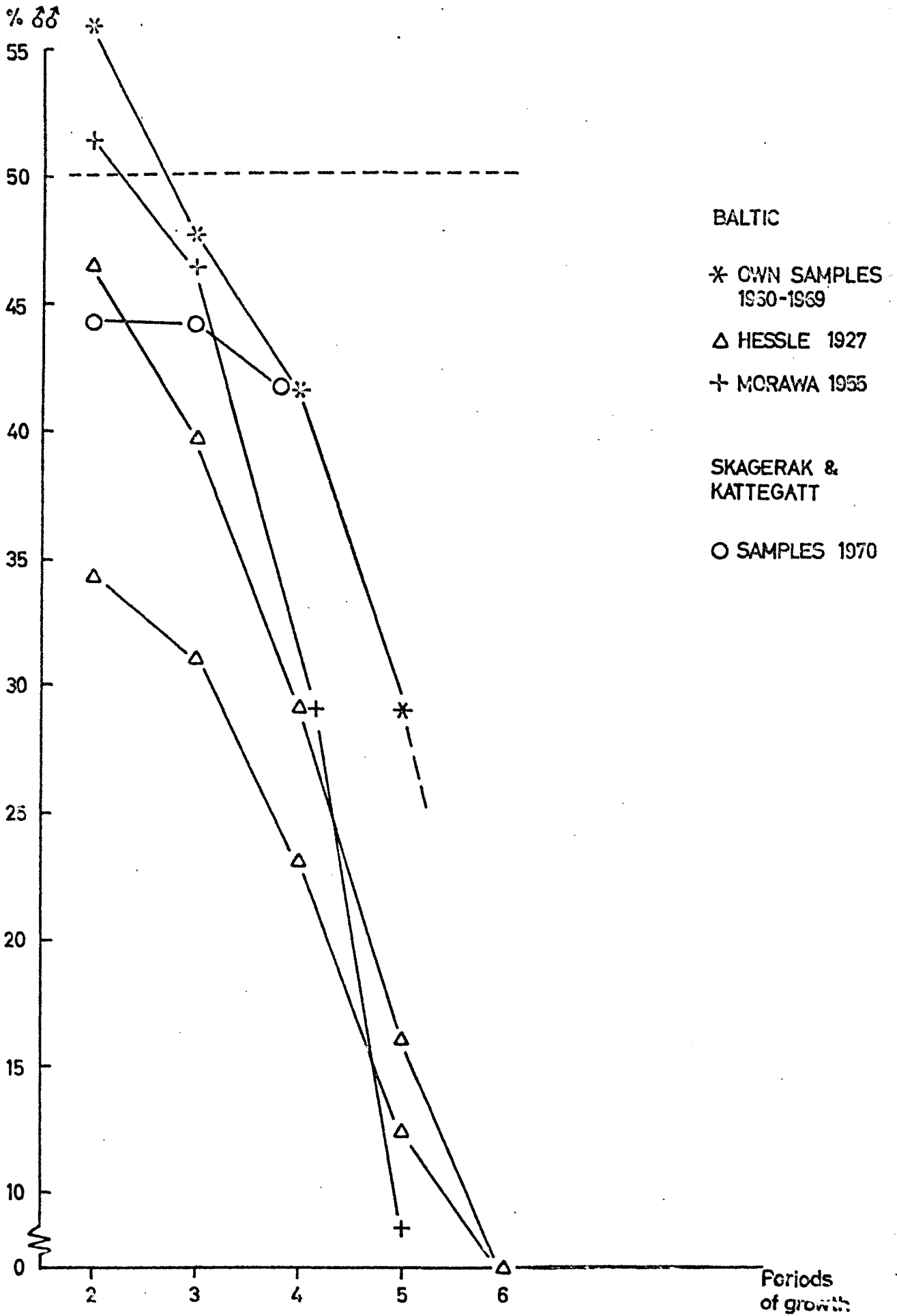


Fig 3 Percentage of males

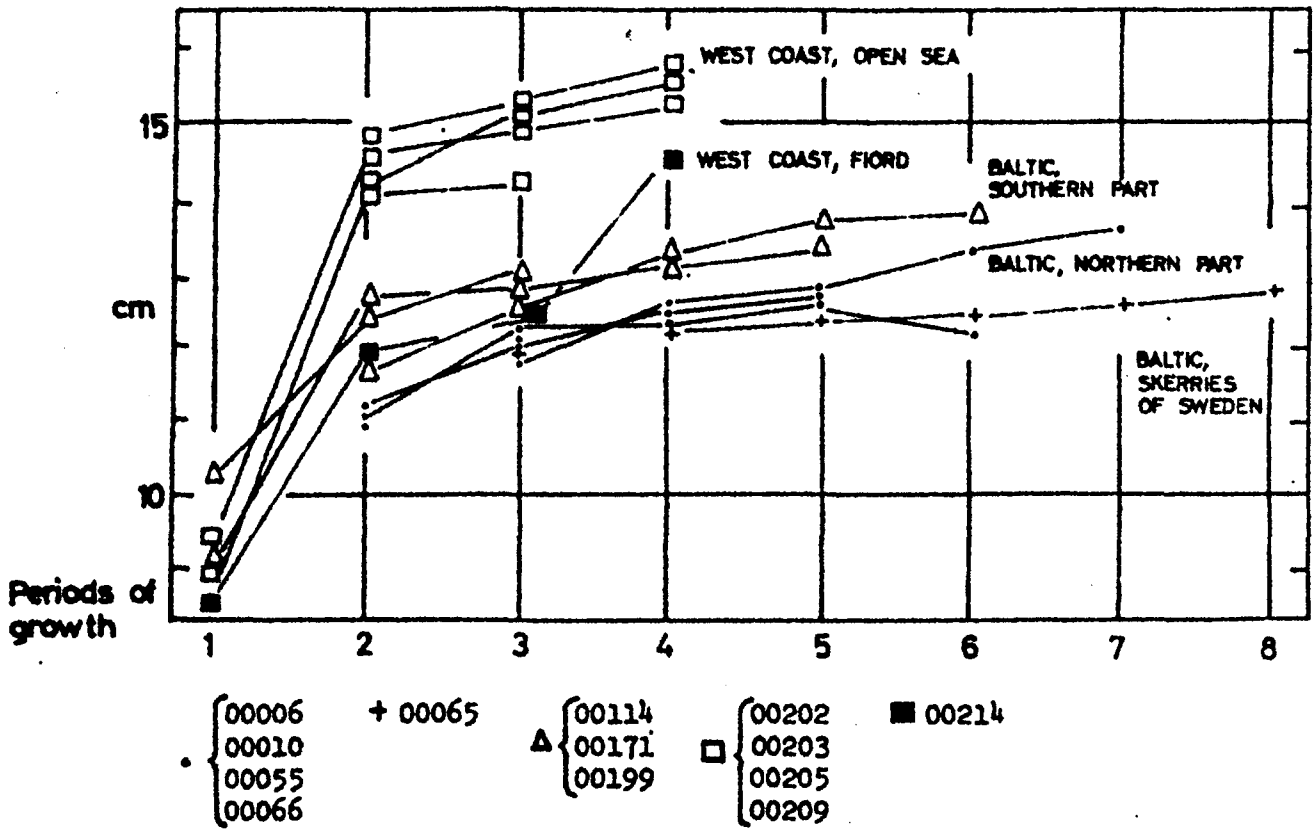


Fig. 4 Growth of the SPRAT (Acc. to own samples; males and females)

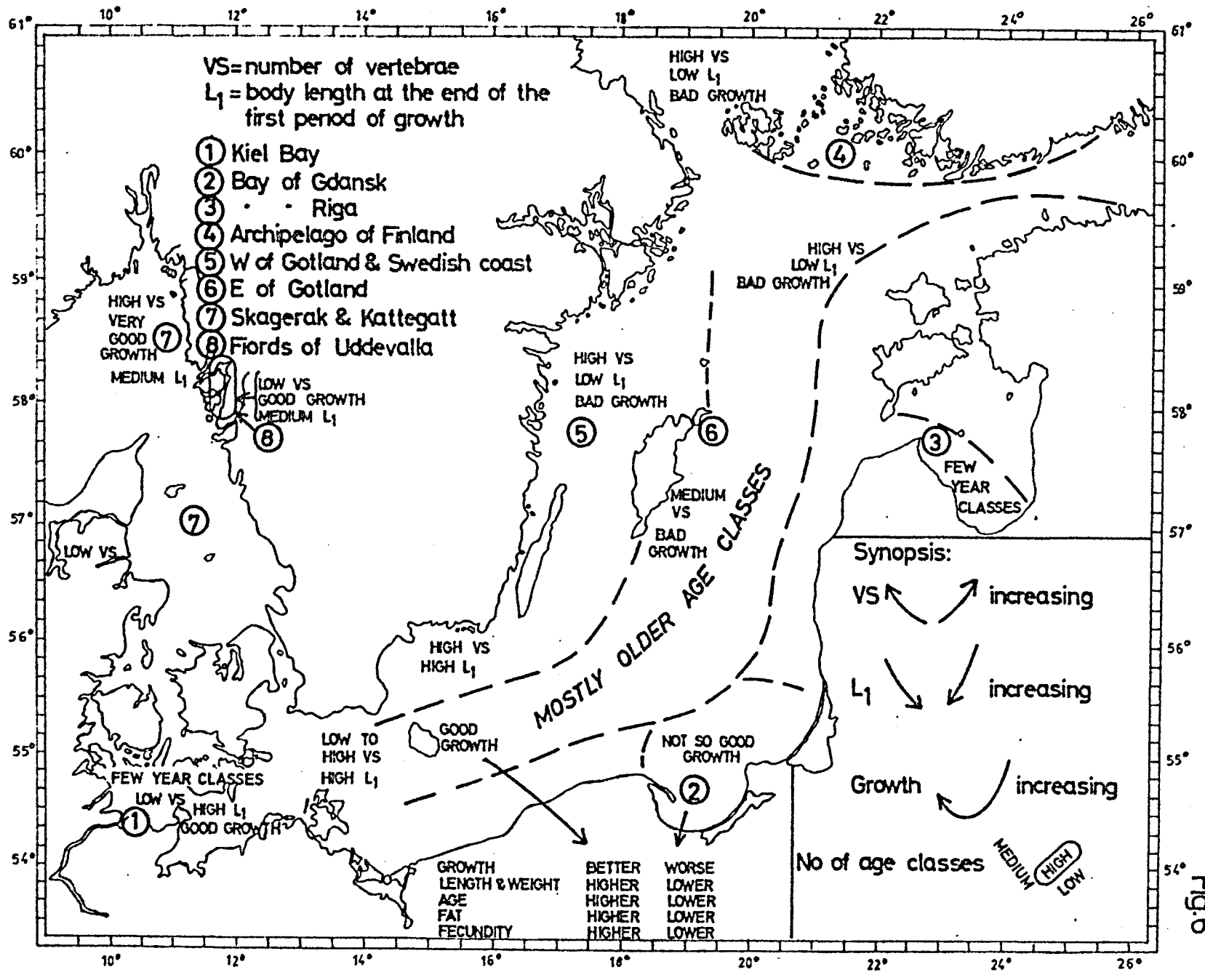


Fig.6