

A Specific Feature in the Feeding Habits of a  
Chaetognath Population in its Natural Environment

by

S. Rakusa-Suszczewski<sup>x)</sup>

The plankton used as the basic material for this work was collected at five stations located in the central part of the North Sea on 9th-10th June 1965 (Table 1) by a Hensen net hauled vertically from the bottom to the surface. At stations 613, 616 and 617 the net was hauled three times; at stations 614 and 615 only once.

The quantity of Copepoda taken is shown in Table 2. The results are based on the analysis of 4 cm<sup>3</sup> sub-samples of plankton concentrated in 0.5 litre of water. Each individual Chaetognath was measured to 1 mm accuracy (except those from station 616). There were only two species of Chaetognatha. Parasagitta elegans Verrill (sensu Tokioka 1965) prevailed in number. The total numbers taken at successive stations amounted to 748, 456, 413, 2,189 (where a group of 590 individuals was measured) and 892 individuals, respectively.

The total number of Sagitta setosa Müller amounted to 4, 64, 159, 329 (where a group of 89 individuals was measured) and 398 individuals respectively. The length distribution of P. elegans was similar in all the stations investigated, but the length distributions of S. setosa differed. These length distributions were summed up to give the results shown in Tables 3 and 4.

The contents of the intestines were determined for each mm length-group and the results obtained at the respective stations were also summed up (Tables 3 and 4).

In the area investigated the food of Chaetognatha consisted mainly of Copepoda. In the present paper I wish to call attention to a specific feature of the feeding habits of the Chaetognath population in their natural environment. This feature may be formulated as follows: In each mm length-group of the length distribution of the predatory population, dependent on the morphological limits of the food available, the proportion of individuals devouring food of a certain size appears to give a symmetrical distribution. This is due to the three other characteristic properties of the feeding habits of Chaetognatha. They are, the existence of morphological limits of the available food, the tendency for food to be of larger size as the size of the predators themselves increases and also the presence of a single prey in each of the predatory individuals, as has been observed in most of the cases investigated, (Rakusa-Suszczewski (in press)). The two latter statements are corroborated by Reeve (1966) and Mironow (1960). The feature defined above is shown in Tables 3 and 4. The results referring to P. elegans seem to be better illustrated due to the abundance of material. Figure 1 shows the percentage length frequency distribution of the investigated population of predators and the proportion of individuals feeding on three species of Copepoda of different size. The latter is expressed by the value of the ratio of the number of individuals in a particular length-group containing the particular species of Copepoda to the total number of all individuals in the same mm length-group. The distribution approximates to the above hypothesis. It seems to be of consequence to point out that the number of individuals with food in their intestines to the number of all individuals found in successive stations amounted to 14.8, 18.2, 25.1, 20.0, 24.6%. However, the mean value of the number of individuals with food to the total number of individuals in each mm length-group is fairly constant and keeps near to 20%. The curves in Figure 1 illustrating this specific feature show some deviation due somewhat to technical reasons, such as the difficulty in the specific determination of the Copepoda in the intestines of Chaetognatha and particularly so in

<sup>x)</sup> Mr. S. Rakusa-Suszczewski,  
Sea Fisheries Institute,  
Gdynia, Poland.

small Chaetognatha. In consequence, a considerable number of individuals with food in their intestines were classified under the title of "Copepoda indeterminable". There are also some difficulties in determining the copepodite stages in the case of Calanus finmarchicus where the differences in size are quite significant. This specific feature observed in the feeding habits of Chaetognatha may contribute to the quantitative determination of real and potential predators of populations of Copepoda and perhaps also to the determination of the suitability of different species of Copepoda as food for Chaetognatha. It is worth mentioning that some similar features of feeding habits are shown also by some early larval stages of herring (Blaxter 1965, Hentschel 1950).

References

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Table 1. Hydrographic data.

Station number	Position	Depth in metres
613	56°59'N 00°59'E	92
614	56°42'N 01°42'E	94
615	56°24'N 02°22'E	72
616	56°07'N 03°05'E	74
617	55°48'N 03°45'E	50

Table 2. The composition of the Copepoda population with special attention to the age-structure of Calanus finmarchicus.

Copepoda Species \ Station Number	613	614	615	616	617
<u>Metridia lucens</u>	15	25			
<u>Centropages typicus</u>	+				1
<u>Calanus finmarchicus</u>					
copepodite I	59	4			5
copepodite II	40	9			4
copepodite III	31	137		7	8
copepodite IV	50	136	41	77	33
copepodite V	18	29	106	264	317
♂ and ♀	8	6	15	55	67
<u>Pseudocalanus elongatus</u>			21	36	82
<u>Paracalanus parvus</u>				9	90
<u>Temora longicornis</u>	2				3
<u>Anomalocera patersoni</u>			1		
<u>Acartia clausi</u>	10				
<u>Oithona</u> spp.	78	8			

Table 3. Length distribution of a population of Parasagitta elegans Verrill and the number of individuals in each mm length-group containing the various food types.

Stations 613-617

Length-group in mm	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Number of individuals	30	142	234	304	336	351	307	273	177	141	98	104	130	118	88	102	80	66	17	1
Food																				
Ova Copepoda					1															
<u>Microsetella</u> <u>norvegica</u>		1		1	2															
<u>Oithona</u> spp.		5	6	2	3	3		2												
<u>Paracalanus</u> <u>parvus</u>			1	1					2											
<u>Acartia</u> <u>ausi</u>					4		4													
<u>Pseudocalanus</u> <u>elongatus</u>	3	3	4	12	25	31	20	16	5	1	1			1			1	2		
<u>Temora</u> <u>longicornis</u>						1	1		3											
<u>Centropages</u> <u>typicus</u>								1												
<u>Metridia</u> <u>lucens</u>														1	1	1	1	1	1	
<u>Calanus</u> <u>finmarchicus</u>					2	5	9	6	11	6	12	8	12	17	11	16	16	12		
Copepoda indeterminable	5	24	26	54	42	38	32	23	13	11	6	3	2	2	3	1				
Appendicularia										2	2	2	4	2		1				
<u>Parasagitta/</u> <u>Sagitta</u>			1			3	2									2	1			
Clupea larvae									1											
Euphausiacea								1												
Pisces ova															1					

Table 4. Length distribution of a population of Sagitta setosa Müller and the number of individuals in each mm length-group containing the various food types.

Stations 614-617

Length-group in mm	3	4	5	6	7	8	9	10	11	12	13	14	15
Number of individuals	5	29	72	66	36	8	5	22	115	166	152	27	7
Food													
<u>Microsetella</u> <u>norvegica</u>									1				
<u>Oithona</u> spp.									1	1			
<u>Pseudocalanus</u> <u>elongatus</u>			1	2					4	1			
<u>Temora</u> <u>longicornis</u>										1	2		
<u>Calanus</u> <u>finmarchicus</u>									2	5	1	1	2
Copepoda indeterminable		1	4	6	2	1	1		10	9	7	1	
<u>Themisto</u> <u>abyssorum</u>										1	1		
Parasagitta/ <u>Sagitta</u>									1	6	2		
Appendicularia											1		

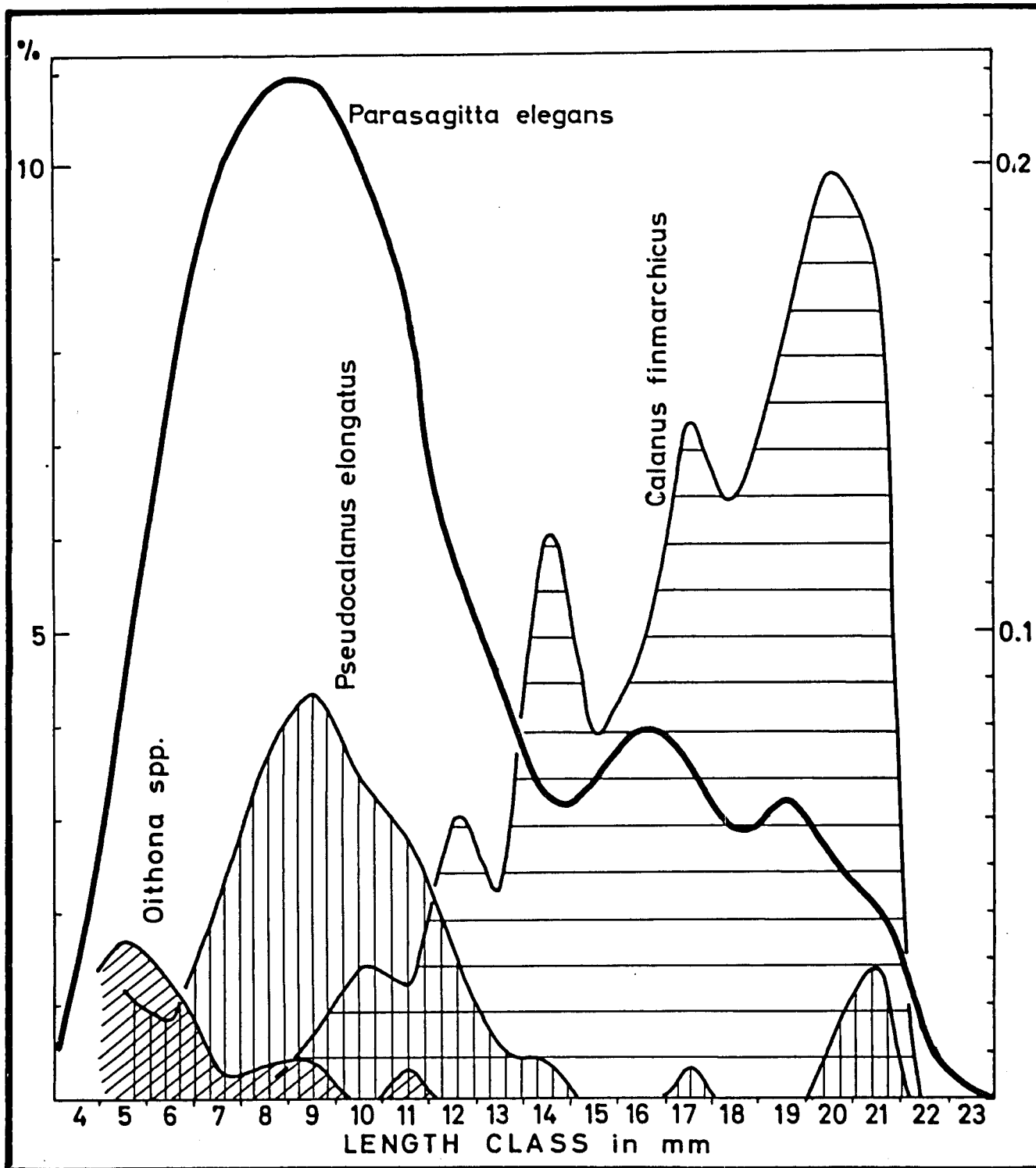


Figure 1. The % length frequency distribution of a population of *Parasagitta elegans* and the proportion of individuals at each length feeding on three species of Copepoda.