

REFERENCES

- ALLDREDGE, A. 1976. Appendicularians. *Sci. Am.*, 235(1): 94-102.
- MILLER, R. H. 1971. *Adv. Mar. Biol.*, 9: 1-100.
- PAFFENHOFER, G. A. 1973. *Mar. Biol.*, 22(2): 183-185.
- STRICKLAND, J. D. H. AND T. R. PARSON 1968. *Bull. Fish. Res. Bd. Canada*, 167: 311.
- GOODBODY, I. 1982. Tunicata. In: S. P. Parker (Ed.) *Synopsis and Classification of Living Organisms*. Vol. 2: 823-829.

DISTRIBUTION OF CHAETOGNATHA OFF QUEEN MAUD LAND, ANTARCTICA

ABSTRACT

Chaetognaths from the zooplankton samples collected during the third Indian Scientific Expedition to Antarctica (1983-84) between the latitude 67°30'S and 68°30'S and longitudes 14°00'E and 20°00'E off Queen Maud Land, outside the pack ice were studied. This investigation revealed the occurrence of *Eukrohnia fowleri*, *E. hamata*, *Sagitta gazellae* and *S. tasmanica*. Among these four species, *E. hamata* formed 93% of the total chaetognaths. The numerical abundance of chaetognaths from the stations located in the southern, middle and northern latitudinal grids was studied and the spatial distribution of the species was reported.

THE DISTRIBUTION of chaetognaths of the Southern Ocean was extensively studied by David (1955, 1958, 1965). Further, the chaetognaths from the Antarctic Ocean were reported earlier by Ritter-Zahony (1911), Burfield (1930) and recently by Alvarino *et al.* (1983 a, b), Hagen (1985), Kapp and Hagen (1985), Hagen and Kapp (1986) and Srinivasan and Mathew (1988). Altogether 14 species of the genera *Eukrohnia* (*E. bathyantartica* David 1958, *E. bathypelagica* Alvarino 1962, *E. fowleri* Ritter-Zahony 1909, *E. hamata* (Moebius 1875) *Heterokrohnia* (*H. fragilis* Kapp and Hagen 1985, *H. longicaudata* Hagen and Kapp 1986, *H. longidentata* Kapp and Hagen 1985, *H. mirabilis* Ritter-Zahony 1911) and *Sagitta* (*S. gazellae* Ritter-Zahony 1909, *S. macrocephala* Fowler 1905, *S. marri* David 1956, *S. maxima* (Conant 1896), *S. planctonis*, Steinhilber 1896, *S. tasmanica* Thomson 1947) are so far known from the Antarctic waters.

The aim of this study is to examine the chaetognaths off Queen Maud Land and study the spatial distribution of the species involved based on the samples collected from 21 stations.

Material and methods

The material for this study was collected by the second author during the Third Indian Scientific Expedition to Antarctica, from 21 stations located between 67°30'S and 68°30'S and 14°00'E and 20°00'E off Queen Maud Land, Antarctica. The zooplankton samples were collected as open oblique hauls from 100 m to surface with a 60 cm mouth diameter Bongo net having a mesh size of 0.4 mm. A TSK flow meter was attached to the net for estimating the quantity of water filtered. The samples were preserved in 4% neutralised formaldehyde. The volume of the zooplankton was determined by displacement method as followed by Mathew (1986). The chaeto-

gnaths from the entire samples were sorted out, identified, numerically counted and standardised for 1,000 m³ of water filtered. The details of the sampling stations are given in Table 1.

be 255 per 1,000 m³ of water. Further the average number of chaetognaths from the stations located in the southern, middle and northern latitudinal grids was 308 specimens

TABLE 1. Details of the zooplankton sampling stations

Station No.	Date	Time Hrs.	Position		Station Depth (m)	Zoopln. cc/1000 m ³	Chaetognaths/1000m ³
			Lat. °S	Long. °E			
1	2-3-1984	1100	68°30'	14°00'	3528	20.95	446
2	2-3-1984	1730	68°30'	15°00'	3739	36.53	240
3	2-3-1984	2030	68°30'	16°00'	3484	38.49	126
4	2-3-1984	2340	68°30'	17°00'	3710	185.13	528
5	3-3-1984	0240	68°30'	18°00'	3982	96.12	784
6	3-3-1984	0600	68°30'	19°00'	4163	25.42	18
7	3-3-1984	1335	68°30'	20°00'	3801	41.29	15
8	3-3-1984	1645	68°00'	20°00'	4072	63.44	95
9	3-3-1984	1855	68°00'	19°00'	4163	45.51	92
10	3-3-1984	2140	68°00'	18°00'	4163	107.85	656
11	4-3-1984	0045	68°00'	17°00'	3891	216.35	154
12	4-3-1984	0445	68°00'	16°00'	3800	91.66	122
13	4-3-1984	0800	68°00'	15°00'	3759	134.91	17
14	4-3-1984	1100	68°00'	14°00'	3077	116.53	224
15	4-3-1984	1515	67°30'	14°00'	3352	142.15	433
16	4-3-1984	1730	67°30'	15°00'	2996	248.83	929
17	4-3-1984	2000	67°30'	16°00'	4072	54.57	231
18	4-3-1984	2230	67°30'	17°00'	4525	119.35	115
19	5-3-1984	0100	67°30'	18°00'	4344	188.69	100
20	5-3-1984	0400	67°30'	19°00'	4549	32.30	16
21	5-3-1984	0655	67°30'	20°00'	4254	74.62	19

Results and discussion

The average zooplankton biomass from the investigated area was 99.8 cc per 1,000 m³ and the biomass for the stations occupied in the southern latitudinal grid (64.88 cc/1,000 m³) was less than the biomass obtained from the middle (108.51 cc) and northern latitudinal grids (121.81 cc). So a two-fold increase in the zooplankton production was observed between the southern and northern latitudinal grids.

The average numerical count for the 21 stations was estimated and found to

per 1,000 m³, 194 per 1,000 m³ and 263 per 1,000 m³ respectively. So altogether, 40% of the specimens were from the southern latitudinal grid, 34.5% from the northern grid and the remaining 25.5% from the middle grid. This does not give a clear picture of increase or decrease of chaetognaths from south to north or north to south latitudes. As pointed out by Mathew (1986) chaetognaths were highly irregular in distribution with random aggregations.

The numerical abundance of chaetognaths was inversely proportional to the zooplankton

biomass. The average number of chaetognaths per station per 1,000 m³ from northern latitudinal grid was 263, where the zooplankton biomass was 121.81 cc. Whereas the chaetognath number per station per 1,000 m³ in the southern latitudinal grid was 308, where the zooplankton biomass was only 64.88 cc.

southern (146) grid stations, where the zooplankton biomass was also less.

Spatial distribution studies clearly show that the chaetognaths were well concentrated in the southern sector between 16°00'E and

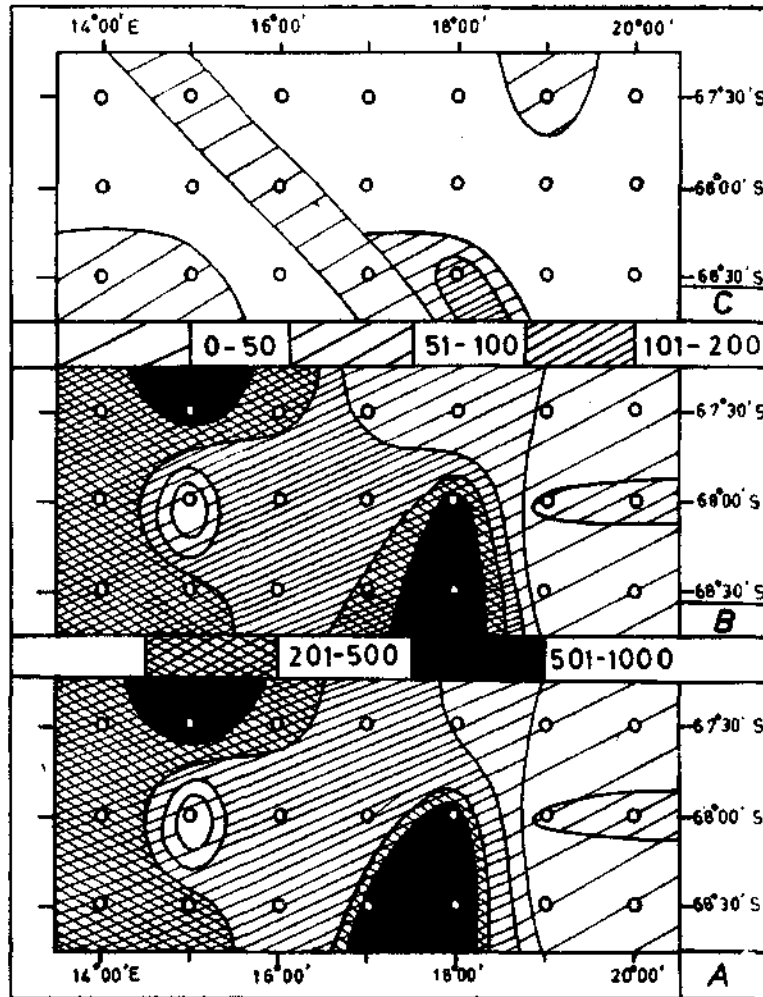


FIG. 1 a. Spatial distribution of *Chaetognatha*, b. Spatial distribution of *Eukrohnia hamata* and c. *Sagitta gazellae*.

However, in the case of euphausiids, more number per station (301/1,000 m³) was found in the northern grid stations, where the zooplankton biomass was also more and less numbers were found in the middle (168) and

19°00'E (Fig. 1 a). Further, the overall spatial distribution of chaetognaths indicates the abundance of these organisms in the middle and western region of all the three latitudinal region than in the eastern region.

Among the 12 zooplankton groups (Amphipoda, Appendicularia, Chaetognatha, Copepoda, Euphausiacea, Fish eggs, Fish larvae, Gastropoda, Ostracoda, Polychaeta, Pteropoda and Siphonophora) found in the samples, Chaetognatha occupied the third place in the order of abundance (1.34%), the Copepoda was the dominant group (91.39%) followed by Fish eggs (3.93%) (Mathew, 1986). Chaetognaths were found in all the samples and they were represented by *Eukrohnia fowleri*, *E. hamata*, *S. gazellae* and *S. tasmanica*. Among these four species, *E. hamata* was the dominant one and it formed 93% of the total chaetognaths followed by *S. gazellae* (4%), *S. tasmanica* (2%) and *E. fowleri* (1%). *E. hamata* was found in all the samples from the 21 stations. The concentration of *E. hamata* was more in the middle and western sector of all the three latitudinal grids than in the eastern sector of three latitudinal grids (Fig. 1 b).

S. gazellae was noticed only in seven stations and they were very few in number. In the northern most latitudinal grid, it was found

in the second and sixth stations. In the middle latitudinal grid, it occurred only in the third station and in the southern most latitudinal grid, it was noticed in the first, second, fourth and fifth stations (Fig. 1 c). So the distribution of this species was more or less in a diagonal manner.

E. fowleri formed only 1% of the total chaetognaths and this was found in three stations (18, 19, 20) located in the northern most latitudinal grid. *S. tasmanica* formed 2% of the total chaetognaths and it was found in only one station (5) located in the southern most latitudinal grid.

The authors thank Dr. Asket Singh, Zoological Survey of India, Calcutta, Dr. A. N. T. Joseph, Marine Biological Station, Madras and Dr. P. S. B. R. James, Director, Central Marine Fisheries Research Institute, Cochin for the facilities provided. The second author is indebted to Dr. H. K. Gupta, leader of the expedition for all the facilities given on board the ship FINNPOLARIS.

Zoological Survey of India,
Marine Biological Station, Madras.

M. SRINIVASAN
K. J. MATHEW*

* Central Marine Fisheries Research Institute,
Cochin.

REFERENCES

- ALVARINO, A., S. C. HOSMER AND R. F. FORD 1983 a. *Antarctic Res. Ser.*, 34 : 129-338.
- , D. F. VERFAILLIE AND R. F. FORD 1983 b. *Ibid.*, 39 : 69-204.
- BURFIELD, S. T. 1930. *Brit. Ant. (Terra Nova) Exped.* 1910, *Zoology*, 7 (4) : 204-228.
- DAVID, P. M. 1955. *Discovery Rep.*, 27 : 235-278.
- 1958. *Ibid.*, 29 : 200-229.
- 1965. In: Mieghem, J. Van, Oye P. Van (Ed.) *Biogeography and ecology in Antarctica. Monogr. Biol.*, 15 : 196-223.
- HAGEN, W. 1985. *Meeresforsch.*, 30 : 280-291.
- AND H. KAPP 1986. *Polar Biol.*, 5 : 181-183.
- KAPP, H. AND W. HAGEN 1985. *Ibid.*, 4 : 53-59.
- MATHEW, K. J. 1986. *Dept. of Ocean Development Tech. Publ.*, 3 : 149-159.
- RITTER-ZAHONY R. VON 1911. *Dt. Suedpolar Exped.*, 13 : 1-71.
- SRINIVASAN, M. AND K. J. MATHEW 1988. *Workshop on Antarctica Studies held at New Delhi during May 3-5, 1988. Dept. of Ocean Development and CSIR. Abstract* 49.