

DISTRIBUTION OF SOME CHAETOGNATHA IN THE INDIAN OCEAN

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INTRODUCTION

Chaetognaths occur in all the oceans, at the surface and at different depths. Every species has its own pattern of distribution generally controlled by the hydrographic features, salinity and temperature. Further, light and pressure also influence the vertical distribution. In the open ocean, light affects the distribution of epi-and upper meso-planktonic species, while pressure affects the vertical distribution of the lower meso and bathy-planktonic species. Results of a study on horizontal and vertical distribution of 20 species of Chaetognatha found in samples collected from various parts of the Arabian Sea, Bay of Bengal and Indian Ocean, are presented in this paper.

MATERIAL AND METHODS

1,56,650 specimens of chaetognaths from 406 zooplankton samples collected from 259 stations in the Arabian Sea, Bay of Bengal and Indian Ocean during the expedition cruises of Indian Navy Ships Darshak, Kistna, Royal Indian Marine Surveyor 'Investigator', Russian Research Vessel 'Vityaz' and the regular cruises of Indo-Norwegian Research Vessel 'Varuna', were examined for this study. Among the 406 samples, 256 were collected from 200 metres below surface, while the remaining samples were from various depths ranging between 300 and 1730 metres. Twenty species belonging to the genera, *Eukrohnia* Ritter-Zahony, *Krohnitta* Ritter-Zahony, *Pterosagitta* Costa and *Sagitta* Quoy and Gaimard, present in the samples were examined.

RESULTS AND DISCUSSION

The distribution of chaetognaths was studied under two major heads namely, horizontal and vertical.

Horizontal distribution : The 20 species of chaetognaths can be grouped under, cosmopolitan, Indo-Pacific and endemic species.

Cosmopolitan species : Ten species of this category from the present samples are, *Sagitta bibunctata* Quoy and Gaimard, *S. decipiens* Fowler, *S. enflata* Grassi, *S. macrocephala* Fowler, *S. maxima* (Conant) *Krohnitta subtilis* (Grassi), *Pterosagitta draco* (Krohn) and *Eukrohnia fowleri* Ritter-Zahony. These species found in the surface and sub-surface waters of the Atlantic, Indian and Pacific Oceans are considered as cosmopolitan species.

Indo-Pacific species : Out of the remaining 10 species, the following 8 species are common to the Indian and Pacific Oceans : *S. bedoti* Beraneck, *S. ferox* Doncaster, *S. neglecta* Aida, *S. pacifica* Tokioka, *S. pulchra* Doncaster, *S. regularis* Aida, *S. robusta* Doncaster and *K. pacifica* (Aida). This may be due to the fact that the Indian and Pacific Oceans are connected and the exchange of water between the two Oceans takes place through the Indonesian Archipelago. It is said that the warm water species of the Indian and Pacific Oceans are connected along the Indonesian Sea and the cold water species are connected along the Australian-Tasmanian Sea (Alvarino, 1964).

Endemic species : The remaining 2 species, *S. bombayensis* Lele and Gae and *Eukrohnia minuta* Silas and Srinivasan are believed to be endemic to the Indian Ocean. *E. minuta* has been described as a meso-planktonic form and the same species has been recorded from the deeper waters of the Arabian Sea by Srinivasan (1972). *S. bombayensis* was described from Bombay Harbort, while Rao (1958) reported it from Lawsons Bay, Waltair and Pathansali (1974) from Malaysian waters. This is a typical neritic species seen in coastal waters.

Vertical distribution : Chaetognaths occur at all depths of the sea. Species found in the upper 200 metres of the sea are epi-planktonic, those between 200 and 1000 metres are meso-planktonic and those that occur below 1000 metres are bathy-planktonic.

Epi-planktonic species : The 14 species listed under this category are : *S. bedoti*, *S. bibunctata*, *S. bombayensis*, *S. enflata*, *S. lyra*, *S. hexaptera*, *S. neglecta*, *S. pacifica*, *S. pulchra*, *S. regularis*, *S. robusta*, *P. draco*, *K. subtilis* and *K. pacifica*. Generally large number of species are seen in the upper 200 metres of the ocean than in deeper waters and the number of specimens of each species decreases with increasing depth. The general pattern of distribution of chaetognaths from the west coast of India shows that they are more abundant in the continental shelf regions than in the adjacent oceanic waters (Srinivasan, 1976).

Among the chaetognaths along the west coast of India, *S. enflata* is the dominant species representing 56% of the specimens from the shelf area, while the remaining are from the oceanic waters (Srinivasan, 1976). Further, the numerical abundance of this species is more before the south west monsoon than during the monsoon (June-August) and post-monsoon (September-December). *S. bedoti* is the next abundant species in the shelf area than in the oceanic waters, with 65% of the specimens from the shelf waters and the remaining from oceanic waters.

Unlike *S. bedoti* and *S. enflata*, *S. pacifica* is more abundant in the oceanic waters, than in the shelf areas, with 70% of the specimens from the oceanic waters and the remaining from the shelf region. Similarly 64% of *P. draco* are from the samples of the oceanic waters. Among the remaining 10 species of the epi-planktonic region, the

6 species *S. bibunctata*, *S. hexaptera*, *S. pulchra*, *S. regularis*, *S. robusta* and *K. pacifica* are seen in more abundance in the oceanic waters than in the shelf waters, while 4 species, *S. bombayensis*, *S. ferox*, *S. neglecta* and *K. subtilis* are found in more numbers in shelf waters than in oceanic waters.

Meso-planktonic species : The 5 meso-planktonic species are *S. decipiens*, *S. lyra*, *S. macrocephala*, *S. maxima* and *E. minuta*, collected from various depths (1730-0 m, 1300-0 m, 700-0 m, 400-0 m and 300-0 m). As all the specimens were collected from vertical open tows, the exact depth at which they were caught cannot be ascertained. But these species are well known as meso-planktonic forms (Fagetti, 1972 ; Nair, 1978 ; Silas and Srinivasan, 1969). On the west coast of India, Srinivasan (1976) encountered more than 84% of the specimens of *S. decipiens* from the oceanic region and the rest from the shelf region. Even in the shelf region, this species was not seen during the pre-monsoon and monsoon periods (January-August). It is assumed that this species could have been transported into the shelf area along with the upwelled sub-surface waters along the west coast of India during August to October (Banse, 1968).

Bathy-planktonic species : Only one species, *E. fowleri* falls under this category, but the exact depth at which this species occurred in the net was not known as the samples were from various depths to surface. However, the species has been placed under this category by several earlier workers (Colman, 1959 ; Fagetti, 1972 ; Nair, 1978 ; Silas and Srinivasan, 1969) from Atlantic, Indian and Pacific Oceans. The species was collected from the Arabian Sea at a minimum depth of 600-0 metres, while the maximum number of specimens (44) was obtained from the sample collected between 1200-0 metres.

SUMMARY

Horizontal and bathymetric distribution of 20 species of Chaetognatha belonging to the Genera *Eukrohnia*, *Krohnitta*, *Pterosagitta* and *Sagitta* from various parts of the Arabian Sea, Bay of Bengal and Indian Ocean, revealed that 10 species are cosmopolitan, 8 are Indo-Pacific and the remaining 2 are endemic to Indian Ocean. Their vertical distribution showed, 14 species are in the upper 200 metres, 5 species are between 200 and 1000 metres and the remaining one species below 1000 metres. Among the 14 epi-planktonic species, 6 are abundant in the shelf area while the remaining are more numerous in the offshore waters.

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