

This paper not to be cited without prior reference to the author.

International Council for the
Exploration of the Sea

C.M.1974/ L:16
Plankton Committee

The distribution of chaetognaths off North-West Africa in connection with biotic and abiotic factors

by

Sabine Hadlich,

Biological Section, Department for Marine and Fisheries
Biology, Rostock University, Rostock, GDR



The purpose of these investigations was to obtain a summary of the species occurring in the area concerned, to determine their distribution and to find out whether the different species can be used as indicators for different hydrographical conditions.

In order to check the suitability of the chaetognaths to act as indicators, it is best to use material taken from an area containing relatively clearly bounded water bodies. It is for this reason that the samples used were taken from the upwelling area to the south and north west of Cap Blanc. The following tables summarise the genera, the corresponding species and the values obtained for their relative dominance which occur in the investigated area (Tab. 1).

The chaetognaths are such a uniform division with respect to morphology, biology and ecology that certain regularities can be derived from the distribution of all representatives within the investigated area alone. It has been possible, by representing the abundancies of the chaetognaths as isoplankton, to show that the population density is dependent upon the character of the water body. Comparison of the colonisation of the investigated area by chaetognaths and its oceanological situation with the production-biological data shows extensive agreement. The highest chaetognath abundancies were observed in areas with the highest zooplankton mass. It can thus be assumed that food availability is a very, and perhaps the most important factor for the distribution of the chaetognaths in this area.

In the case of very high numbers of individuals as frequently occur in coastal waters, only a few species are generally involved. The variety of species decreases considerably as the coast is approached.

The following table summarises the numbers of individuals as a function of the distance from the coast.

Table 2:

Distance from the coast (km)	Number of species ϕ	Number of individuals	Diversity index = $\frac{\log(\text{numb. of spec.})}{\log(\text{numb. of ind.})}$
10	4,4	3953	0,0011
20	7,3	2043	0,0038
30	8,2	658	0,0125
40	8,4	316	0,0266
50	8,2	431	0,0190

The number of species found also increased with the depth, although the total pattern of the vertical distribution indicates a definite decrease in the number of individuals with increasing depth. No vertical migration was observed.

In order to permit characterisation of the different water bodies on the basis of biological data, the response of all species to changes in temperature and salinity was investigated. In this way it was intended to eliminate species or groups of species which are typical for a particular water body and could thus act as indicators.

The initial hypothesis was that there is no connection between temperature and salinity on the one hand and the occurrence of the species or group of species on the other. The correlation coefficients were calculated for the temperature and salinity in order to contradict this original hypothesis. Although it could not always be proved by significant correlation coefficients, it was nevertheless possible to classify, by means of graphs, the chaetognaths from the area investigated into groups of cold water species (e.g. the Eriderici group *S. minima*, *S. hispida*), groups of warm water species

(e.g. *S. enflata*, *S. hexoptera*) and groups of neutral species (e.g. the Serratodentata group, containing the genera *Eukrohnia* and *Krohnitta*).

It was possible to prove with a probability of error of 1% that the Friderici group is typical for the cold on-shore water containing plenty of zooplankton, whereas *S. enflata* prefers warm off-shore waters.

The Serratodentata group is unsuitable for use as an indicator within the range of temperatures and salinities found in the investigated area due to its wide tolerance range.

Sagitta minima, another species which occurs in sufficient numbers to permit proof of statistical correlations showed in the graphical representation increased occurrence in cold coastal waters, but the correlation coefficient was too low for a significant relationship.

Future investigations should deal with the drawing up of Chaetognathoplankton community lists according to the classical example set by RUSSEL (1935) in order to permit unambiguous characterisation of the water body.

Reference:

- ALVARINO, A. (1965): Chaetognaths. *Oceanogr. Mar. Biol. Ann. Rev.*, 3, 115-194
- FURNLSTIN, J. (1957): *Revue des Travaux de L'institut des pêches Maritimes*. Paris

Tabelle 1

Genus	Eukrohnia	Dominance %	Krohnia	Dominance %	Sagitta	Dominance %	Pterosagitta	Dominance %
species	E. homata) E. fowleri)	0,4	K. subtilis) K. mutebbii)	1,2	S. lyra S. hexaptera S. enflata S. serratod.) S. tasmanica) S. friderici) S. tenuis) S. bipunct. S. planct.) S. zetesios) S. regularis S. minima S. decipiens) S. neodec.) S. hispida	1,1 0,7 5,1 30,9 39,1 0,05 0,05 0,3 19,8 0,3 0,4	P. draco	0,1