

Shoaling of sergestid shrimp *Acetes johni* (Crustacea Decapoda : Sergestidae) associated with swarming of gammarid amphipods

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Aggregation of sergestid shrimp *Acetes johni* and gammarid amphipods was observed at a station (22° 07' N; 67° 03' E) in the northern Arabian Sea during September 1991. Shoaling occurred in the surface layer at night resulting in high zooplankton standing stock (5.81 ml. m⁻³). The sergestid shrimps and gammarid amphipods formed 94.7% of the zooplankton population, the former constituting more than half of the biomass of the sample. Their numerical abundance decreased with depth. The adaptive significance of swarming behaviour in marine plankton is briefly discussed.

Swarming is common among the tropical zooplankters and along the Indian coast in forms like cladocerans, amphipods, pteropods and copepods. The present communication deals with a coincidental occurrence of shoals and swarms of two ecologically different taxa in the north Arabian Sea.

While taking surface (1-0 m) and oblique (500-0 m) hauls of zooplankton as a part of programme to study the effects of the Gulf oil spill in the western EEZ of India, surface samples collected from a coastal station (Fig. 1) were found to be exceptionally rich with shoals of gammarid amphipods (*Atylus* sp.). The duplicate samples were collected on 20 September 1991 during *FORV Sagar Sampada* cruise 94. The samples were compared with those from the adjoining station where the similar phenomenon was not observed. Water samples were analysed for physico-chemical parameters following standard methods.

The ambient water temperature, salinity and dissolved oxygen values in the surface and 500 m depth layers at swarming station were : 27°C, 36.54 × 10⁻³, 420 μmol. l⁻¹ and 13.2°C, 35.83 × 10⁻³ and 23 μmol. l⁻¹ respectively. The values of these parameters at the adjacent non swarming station were almost the same. The shoaling of sergestid shrimps (*A. johni*) and swarming of gammarid amphipods (*Atylus* sp.) occurred in the surface water resulting in high zooplankton biomass (5.81 ml. m⁻³). The zooplankton biomass value was poor for the oblique samples taken from 500 m (0.53 ml. m⁻³). The low biomass value could be due to the oxygen deficiency in deeper waters in the oxygen minimum layer of Arabian Sea from Seychelles to Bombay and Bombay to Cape Guardafui¹. Biomass values were comparatively low for surface and oblique samples

taken from the non swarming area (Table 1). During the present study, the dense congregations of plankton comprised of mainly sergestid shrimp (*A. johni*) and amphipods of suborder Gammaridea. These together constituted more than 94% of the total zooplankton in the surface layer at night (Table 1) while groups like hydromedusae, siphonophores, cladocerans, ostracods, euphausiids, chaetognaths, tunicates, fish eggs and larvae formed the rest. The overwhelming assemblages of sergestid shrimps (*A. johni*) and gammarid amphipods (*Atylus* sp.) could be referred to as a condition close to "monotone" plankton². Faunal diversity was relatively higher in the oblique zooplankton samples where the dominance of these two taxa was dwarfed by copepods. Calanoid copepods of genera

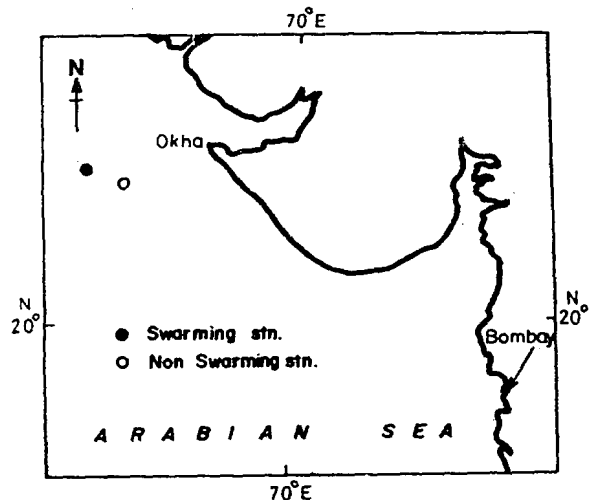


Fig. 1—Station location

Table 1—Zooplankton biomass and percentage occurrence of common groups in samples collected at the swarming and non swarming stations in the north Arabian Sea

Biomass & Groups	Swarming station		Non-swarming station	
	Sampling depth (m)	Sampling depth (m)	Sampling depth (m)	Sampling depth (m)
	1-0 m	500-0 m	1-0 m	500-0 m
Zoopl. biomass (ml.m ⁻³)	15.81	0.53	1.24	0.86
Zoopl. groups				
Sergestids (<i>Acetes</i>)	63.58	8.69	1.85	2.01
Amphipods	31.11	2.73	3.53	4.52
Siphonophores	0.19	5.71	1.08	0.66
Polychaetes	0.24	7.30	2.51	0.24
Copepods	4.07	64.22	71.78	67.52
Decapods	0.25	2.16	3.53	6.97
Lucifers	0.08	0.62	0.36	—
Euphausiids	0.03	4.33	7.58	11.33
Chaetognaths	0.12	0.67	1.22	2.19
Tunicates	0.05	0.38	0.94	0.55
Fish eggs	0.10	0.90	1.87	0.71
Fish larvae	0.06	0.22	0.64	0.34
Miscellaneous	0.12	2.07	3.11	2.96

Pleuromamma, *Undinula*, *Eucalanus*, *Rhincalanus*, *Euchaeta* and *Lucicutia* were common as reported earlier from the oxygen minimum layer in the Arabian Sea³.

Swarming was reported to be a regular or seasonal phenomenon caused by the fluctuations in environmental conditions or due to interactions between different environmental factors resulting in population explosion of certain organisms⁴. The adaptive advantages of these dense aggregations may also result in swarming of a few forms. The synchronous movement of the swarm would render greater protection from predators. The swarming would also facilitate organisms to cluster in local eddies thereby restricting their dispersion by currents. The amphipod swarm comprised mostly of adult females and males of *Atylus* sp. indicating that such aggregations could greatly help in breeding. During the present study, the shoaling of *A. johni* was observed during September, unlike in *A. cochinchensis*⁵ where it was reported in June. Temporal variability in this behaviour of the species of *Acetes* in the north Arabian Sea and Cochin backwater is interesting.

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