J. mar. biol. Ass. India, **47** (1) : 101 - 105, Jan - June, 2005

NOTE

Penaeoid and Sergestoid shrimps from the deep scattering layer (DSL) in the Arabian Sea

P.K. Karuppasamy[1] and N.G.Menon[2]

[1] *National Institute of Oceanography, Regional Centre, Cochin - 682 018, India*
saams2007@yahoo.com
[2] *Central Marine Fisheries Research Institute, Cochin - 682 018*

Abstract

Results of a preliminary study on the occurrence and distribution of seventeen species of Penaeoid and Sergestoid shrimps from the deep scattering layer (DSL) of the Indian EEZ of Arabian Sea are presented here based on the IKMT samples collected during FORV *Sagar Sampada* cruises from May 1998 to December 2002.

The deep scattering layer (DSL) occurs in the depth realm from surface down to 1000m in the oceanic waters. The organisims here migrate towards the surface at dusk and descend from the surface at dawn. This daily-observed phenomenon has been attributed to diurnal vertical migration of micronektonic animals. These organisms of the scattering layers hide from predators in the darkness of deep waters during the day and swim upward to feed themselves in the plankton rich surface waters at night. The DSL is predominated by a variety of penaedian and sergestidean shrimps. They are an abundant component of oceanic microneckton and constitute an important link between zooplankton and higher tropic levels in pelagic ecosystems. However, carnivorous decapods may potentially play an important role in the transfer of carbon from the surface to the deep ocean due to their marked vertical migrations and the production of fast sinking faecal pellets.

The samples collected on board of FORV *Sagar Sampada* during May 1998 to December 2002 under the Marine Research and Living Resources (MRLR) programme of Department of Ocean Development (DOD) were utilized for the species distribution study of economically and ecologically important groups of pelagic shrimps. Seventeen species of pelagic shrimps (8 Penaeoidea and 9 Sergestoidea) are reported in this paper from the DSL fauna of Indian EEZ of Arabian Sea and form first report on stratification of penaedian and sergestidean species composition from the area. Today it's clear that the mesopelagic resources especially the pelagic shrimps have assumed importance in view of their potential for human consumption and for the production of value added products.

The authors are grateful to The Director, Central Marine Fisheries Research

Institute -Kochi for providing facilities and DOD New Delhi, Government of India for funding the project and for granting Research Fellowship to the first author during the tenure of study.

Material and methods

The samples were collected with a 2.5 m (4 m vertical opening) Isaacs-Kidd Midwater Trawl (IKMT) during May 1998 - December 2002 onboard FORV *Sagar Sampada* in the area between 06-21°N and 66-77° E. The sample depth varied from 50 to 750m in the shelf to deep oceanic waters while the station depth ranged from 100-4300m. The echo sounders with frequency of 38 kHz and 120 kHz were used for obtaining continuous traces of echoes from various depth zones at different times of day and night or continuously. After ascertaining the depth of occurrence of DSL in the acoustic recordings from the echo sounder, the gear was operated. The net was operated for 30 minutes obliquely along the DSL at a towing speed of 3-knots/hour for collection of the samples.

Results and discussion

The pelagic shrimp species represented in the collection from the DSL are listed with the following particulars: species name, number of specimens, length, latitudes and longitudes, sampling position and depth in meters. Additional details of species and illustrations are available in the published works. Alcock, 1901; Barnard, 1947; Bate, 1881; Bate, 1888; Bouvier, 1906; Burkenroad, 1940; Chace, 1976; Dana, 1852; De Haan, 1833–1850; Faxon, 1893; George and Rao, 1966; Hanson, 1919; Holthuis, 1955; Judkins, 1978; Kemp, 1910; Kensely, 1971a&b; Kishnouye, 1905; Milne-Edwards, 1830, 1837; Muthu, 1971; Nataraj, 1947; Nobili, 1905; Omori, 1992; Perfez Farfante and Kensely, 1997; Rafinesque–Schmaltz, 1815; Ramadan, 1938; Tirmizi, 1960; Thompson, 1829; Wood– Mason and Alcock, 1891; Yaldwyn, 1957.

Class : Crustacea

Order : Decapoda

Infra order: Penaeidea

Super family : Penaeoidea Rafinesque - Schmaltz, 1815

Family: Penaeidae Rafinesque - Schmaltz, 1815

Pelagopenaeus balboae (Faxon, 1893)

Material : Two male adults.

Locality : Lat. 12°30′N - Long. 73° 03′E and Lat. 12°59′N - Long. 69° 58′E

Depth : 50 and 200 m

Total length : 60 and 70 mm

Funchalia danae Burkenroad, 1940

Material : One male

Locality : Lat. 17° 30′ N - Long. 67°24′ E

Depth : 60 m

Total length : 60 mm

Remarks: Very few specimens were recorded in the entire collection.

Family: Benthesicymidae Wood - Mason, 1891

Gennadas praecox Kemp, 1910

Material : One male

Locality : Entire Indian EEZ of Arabian Sea

Depth : 500 m

Total length : 60 mm

Gennadas sordidus Kemp, 1910

Material : Several specimens

Locality : Lat.07° 07′N - 10° 31′N and Long. 68° 32 E′- 77° 12′E

Depth : 50 – 350 m

Total length : 20-40 mm

Gennadas scutatus Bouvier, 1906

Material : Several specimens

Locality : Lat.07° 59′N - 10° 30′ N and Long. 70°26′ E - 76°02′ E

Depth : 60 - 200 m

Total length : 26- 42 mm

Gennadas parvus Bate, 1881

Material : One male,

Locality : Lat. 07° 07′N - Long. 77°12 E′

Depth : 50 m

Total length : 40 mm

Remarks : Species of the genus *Gennadas* are small and entirely pelagic forms. They were recorded from the depth range of 50 to 750 m and distribution indicated strong vertical migrations.

Family : Solenoceridae Wood - Mason, 1891

Hymenopenaeus aequalis (Bate, 1888)

Material : Two specimens

Locality : Lat. 13°09′N - Long. 73°40′E

Depth : 370 m

Total length : Male 25 mm, female 40 mm

Solenocera hextii Wood-Mason, 1891

Material : One male specimen

Locality : Lat. 16° 30′N - Long. 72°14′E

Depth : 205 m

Total length : 40 mm

Remarks : Both the species are benthic.

Super family : Sergestidae Dana, 1852

Family : Sergestidae Dana, 1852

Sergestes seminudus Hansen, 1919

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 50 - 350 m

Total length : 26 - 46 mm

Sergestes semissis Burkenroad, 1940

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 50 - 400 m

Total length : 15 - 35 mm

Sergestes orientalis Hansen, 1919

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 50 - 350 m

Total length : 15 - 35 mm

Sergia inous Faxon, 1893

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 50 - 500 m

Total length : 30 - 60 mm

Remarks : Among the more common midwater (mesopelagic) inhabitants, *Sergestes* spp. are most abundant natant decapod in this area. It is small, slim-bodied and reaches a total length of 5 cm. Donaldson (1975) reported that *S.simssis* feeds on euphausiids and copepods and is preyed upon by tuna, rockfishes, squids, mesopelagic fishes, and fin whale and seiwhales.

Genus : *Acetes* H. Milne Edwards, 1830

Acetes japonicus Kishinouye, 1905

Material : Several specimens

Locality : Lat. 16° 78′N - Long. 73° 85′E

Depth : 30 m

Total length : 20 - 25 mm

Remarks : *Acetes* spp. near the shore are exploited as human food.

Family : Luciferidae De Haan, 1849

Lucifer typus H.Milne - Edwards, 1837

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 10 - 750 m

Total length : 5-10 mm

Lucifer penicillifer Hansen, 1919

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 10 - 750 m

Total length : 5-10 mm

Lucifer hanseni Nobili, 1905

Material : Many specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 10 - 750 m

Total length : 5-10 mm

Lucifer orientalis Hansen, 1919

Material : Several specimens

Locality : Entire Indian EEZ of Arabian Sea

Depth : 10 - 750 m

Total length : 5-10 mm

Remarks : The species of the genus *Lucifer* formed major component of the pelagic decapods. They play dominant role in the food web, often becoming major components in the diets of shore fishes and large fishes. Huang (1987) found variations in

abundance of *Lucifer* and the catch of *Decapterus maruadsi*. Sometimes it is a good indicator of the presence of core pelagic fishing grounds.

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