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PTEROPODS, SPECIES COMPOSITION AND RELATIVE ABUNDANCE IN NORTHERN ARABIAN SEA

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A series of surface plankton sampling was done along thirteen transects in the northern Arabian sea bordering Pakistan during January to June 1977. Ten species were collected in the survey. *C. acicula* was found most dominant in frequency of occurence (number of stations.) as well as in abundance i.e. (number of speciman) encountered. *S. subula* was second ranking in abundance and *L. inflata* was second in occurence, these three species together constituted 74% of all thecosomes collected.

Key words : Pteropods, Northern Arabian sea, Relative abundance

INTRODUCTION

The euthecosomatous pteropods are remarkable constituents of zooplankton. Pteropods are highly modified for planktonic existence. Their shells form the pteropod ooze found in sediments of the ocean floor. There are thirty five known species in the world, majority of which occur in tropical and subtropical seas. Pteropods are known to contribute substantially to the diet of planktivorous fishes and whales [1]. They exhibit diurnal vertical migrations and some species are considered as hydrographic indicators [2].

Little is known about systematics and distribution of euthecosomatous pteropods in northern Arabian sea adjoining the coast of Pakistan. Only a single report by Frontier [3] exists about Pteropods of Persian gulf, gulf of Aden and Arabian sea. To help overcome this lack of knowledge this study was undertaken. Present paper is documenting the species composition and relative abundance of Pteropods occuring in the surface, coastal and offshore waters of Pakistan, during northeast and southwest monsoon seasons of 1977.

MATERIAL AND METHOD

The pteropods were sorted from zooplankton samples collected during January to June 1977 on board Dr. Fridtjof Nanson. Seventy five stations were sampled along thirteen transects covering the entire territorial waters off Pakistan coast between 61.5E and 67.9E meridan, 22° N and 25.58° N Latitudes (Fig. 1). Zooplankton samples were collected with a Bongo net having a mouth diameter of 60 cm and mesh size of 180-150 um. Plankton net was towed from surface or from 50 meters depth in oblique hauls for five minutes.

Identification of euthecosomatous pteropods was based on taxonimic criteria used by Meisenhiemer [4], Isamu Yamaji [5] and Rottman [6].

RESULTS

Out of 75 staions Pteropods were found at 27 stations. Total number of 3120 euthecosomatous pteropods separated from the plankton samples belonged to 3 families, 6 genera and 10 species (Table 1). *Creseis acicula* was most frequently occurring and dominant species. It was found on 15 stations located in eastern sector off Sind coast and western sector, off Mekran coast during January to June. *C. acicula* was captured, in January at station 45, in February, at stations No. 19, 35, 45 65 and 68, in March at station 6, 8, 32 and 43, in April at station 2, 36, 45, at station 55, in May and at st. 58 and st 62 in June. The temperature and salinity of sea water at those stations are given (Table 2). *Limacina inflata* ranked second in frequency of occurence, it was observed at 10 stations from February to June, in February it was captured at station 53, in March at station 35, 49, 54, 65 and 68, during April at station, in May at station 33, in June at st. 56 and 62. *Limacina leseuri was* observed at 8 stations from March to June. In March at station 49 and 65, in April at station 6 and st. 8. In May at station 26 and 56 and in June at station

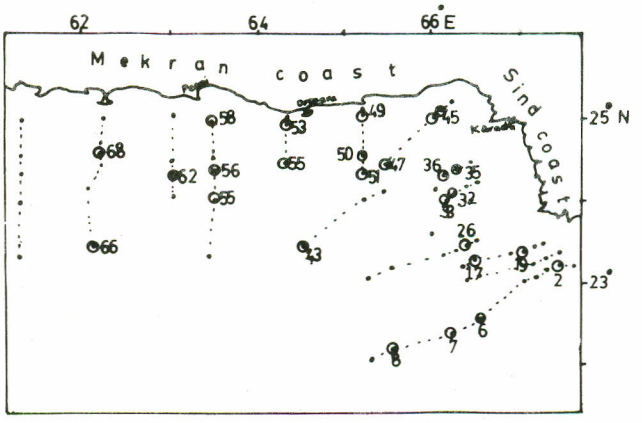

Fig. 1 Stations of R/V Fridtjof Nanson in the northern Arabian sea, numbered are those where pteropods were hauled.

Table 1.

S. No.	Station no.	Date	Temperature of sea °C	Salinity o/00	Time of D/N of haul
1	7	21.1.77	24.0	36.30	N
2	45	1.2.77	22.0	36.40	N
3	53	4.2.77	23.0	36.4	N
4	32	20.2.77	23.0	36.2	D
5	19	11.3.77	24.5	35.8	N
6	35	15.3.77	25.0	35.9	N
7	45	18.3.77	23.0	35.8	N
8	49	20.3.77	24.5	35.8	N
9	50	21.3.77	24.5	35.9	N
10	54	23.3.77	23.5	35.9	N
11	65	31.3.77	22.5	36.1	N
12	68	31.3.77	22.5	36.1	D
13	6	3.4.77	24.5	36.4	N
14	8	18.4.77	27.0	36.2	N
15	43	24.4.77	27.5	36.7	N
16	32	24.4.77	27.0	36.3	N
17	46	27.4.77	28.0	36.4	D
18	54	3.5.77	27.0	36.7	N
19	55	4.5.77	27.5	36.7	N
20	2	22.5.77	29.0	36.3	N
21	26	25.5.77	27.0	36.3	N
22	33	30.5.77	28.0	36.3	N
23	36	30.5.77	27.0	36.4	D
24	45	31.5.77	26.0	36.4	N
25	49	2.6.77	23.0	36.3	N
26	51	2.6.77	24.0	36.3	N
27	62	16.6.77	29.0	36.5	N
28	56	17.6.77	29.0	36.5	D
29	58	17.6.77	28.0	36.4	D

49 again. *Hyalocylix striata* was captured at 7 stations all in the eastern sector, in January at st. 7, in February at st. 32, in March at st. 35 in April at st. 8 and 32 and in May at st. 26 and 33. *Styliola subula* was found on five stations from January to March; in January at st. 7. In February at 32, in March at st. 19, 45 and 49 and at an off-shore station No. 43 in April *Creseis virgula* was found at 4 staions during March to May, in March at station No. 45, in April at st. 8 and 43, and in May at station 55, only few specimen were observed. *Recluzia rollandiana* was seen in March only at stations 49, 50 and 54, a limited area in the western sector. *Limacina trochiformis* was found at three stations at st. 6 and 8 in April and at st. 33 in May. *L. bulimoides* occured at two stations, at st. 45 in February and st. 6 in April. *Cavolina longirostris* was observed at two stations, at station 43 in May and at st. 54 in March.

DISUCSSION

The present study has extended the known ranges of many of the species several hundred miles northward to the coast of Pakistan, Frontier (1) has reported only two species, *L. trochifromis* and *L. inflata* from offshore waters, off Mekran coast during April to June 1961; he reported *L. inflata* in great abundance off Sind and Mekran coast.

L. trochiformis and *L. inflata* have been dominant species in northern Indian ocean, off the western coast of Australia [7]. *L. inflata* was reported in abundance from waters off Kenya and Somalia, and southern coast of India, Goa, Cochin and Madras. [8]. *L. inflata* lives at depth

Table 2

Family	Species	Station no.	Total no. of stations	Month of occurrence
1. Janthinidae				
	Recluzia rollandiana (Recluz)	49,50,54	3	March
2. Cavolinidae				
	Creseis acicula Rang	2, 6, 7, 8, 19, 32, 35, 36, 45, 49, 55, 58, 62, 65, 68	15	Jan to June
	C. virgula RANG	8, 43, 45, 55	4	Feb. to May
	Styliola subula Quoy 2 Gaimard	7, 19, 32, 43, 49, 35	5	Jan. to March
	Hyalocylix striata	7, 8, 26, 32, 33, 35	7	Jan to April
	Cavolina longirostris	43, 54	2	March to May

(Continued.....)

(Table 2, continue)

2. Limacinidae

Limacina inflata (D'orbigny)	33, 35, 49, 53, 54, 55, 56, 62, 65, 68	10	Feb to June
L. leseuri	6, 7, 8, 26, 49, 55, 65	8	Jan. to May
L. trochiformis	6, 8, 33	3	Jan to May
L. bulimoides	6, 45	2	Feb. to April
Total		58	

Stationwise and monthwise occurrence of pteropods in northern Arabian sea during F.J. Nanson Cruises of 1977

(maximum abundance at 100 meters) in tropical waters [10] while in colder seas of wetern North Atlantic where surface temperature lie between $17^{o} - 19.4^{o}$ it lives on the surface [2]. *L. inflata* was now found at $22\text{-}29^{o}$ in surface waters of N. Arabian sea. *C. acicula* and *C. virgula* are species tolerant of coastal conditions *C. acicula* occur in western Pacific near Phillippines [10], coastal waters off Burma [11] Gulf of Aden [3] and South China sea [6].

Styliola subula is known as a subtropical oceanic species common in Indian Ocean between 5^{o} N and 30^{o} S, only a single previous record from the central Arabian sea exists in the literature [9]. Sakthivel [9] reported it in abundance from off Somalia, East Indies and Central Indian Ocean. While *L. lesueri* and *L. bulimoides* are subtropical species, Sakthivel [12] found *C. virgula* and *H. striata* in slight abundance in Indian Ocean along 78^{o} E meridian in 1973-74 cruise, while he had noted *L. inflata, L. trochiformis, C. acicula, Cavolina longirostris* in great abundance in the Arabian Sea water mass of the equatorical region during 1962-63 and *L. lesueri S. subula* and *L. bulimoides* to be more numberous in the east Indian and subtropcial water mass. It means there is an annual and seasonal variation in abundance of various species. The broad continental shelf off Sind delta in eastern sector is found rich in pteropods also as it was rich in euphausiids (Fatima [13]) and ichthyoplankton (Ali Khan, [14]).

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