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SPECIES DIVERSITY OF POLYCHAETE FAUNA OF DIGHA-TALSARI REGION OF WEST BENGAL, INDIA

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Polychaetes are one of the important natural foods of many economically important fishes, containing high calorific value and rich in protein. In the present investigation, taxonomic account, distribution pattern and habitat ecology of 24 species of polychaetes belonging to 14 genera in 12 families are studied. The analysis of the data shows that the majority of these species are restricted to areas located at the lower reaches, attributed to increased flow of sewage and wastes pouring into the sea. Many polychaetes are being used in aquaculture and agricultural sectors as live feed and biopesticide, respectively. The study has identified prospect of capturing and further culturing this group.

Key words : Polychaetes, taxonomic account, live feed, biopesticide.

Introduction

Polychaetes constitute the most abundant and diverse faunal group in all marine sediments from intertidal to deep sea (Annandale, 1922). Around 10,000 species have been described worldwide. Most of them are small and short-lived, with a high secondary production. Generally they form an important link in marine food webs. Due to the high calorific value and rich protein content, both the adult and larvae of polychaetes are considered to be one of the main food supplies to many economically important fishes (Meunpol, *et al*., 2005). In China, large quantity of Nereidae are exported to Japan as bait for recreational fishing besides being a delicacy in South China and Southeast Asia.

Since decades, yeast, bacteria, micro algae, ciliates, rotifers, copepods, cladocerans, brine shrimps and tubifex have been used as live feed in aquaculture practices. But global increase in establishment of number of shrimp hatchery units, the aquaculture sectors including larval and grow out feed producers and the aquarium trade, the demand for organisms like polychaetes as a live feed has also increased (Craig and Rutherford, 2005). In view of large demand for polychaetes as live feed, some companies have specialized the culture and supply of high quality polychaete worms to aquaculture hatcheries. This increased demand for these invertebrates is directly linked to their high palatability, attractability, digestibility and rich nutritional profile.

Polychaetes are also excellent bio-indicators of benthic environment, being the dominant macrofauna within the fine sediment (Palomo, 2002). A considerable work on the taxonomy of polychaetes has been done around the world. In India, the Zoological Survey of India has recorded 300 species of polychaetes, including 40 species from the brackishwater environment (Fauvel, 1932; Mishra, 1995, 1998). In addition, the taxonomy of polychaetes has also been done by Southern (1921); Fauvel (1953) and Mishra *et al.,* (1984). The present investigation was carried out to identify the presence of diverse groups of polychaete fauna in Digha-Talsari region of West Bengal, India for possible exploration in fisheries development on a regional basis.

Materials and methods

The Digha-Talsari site located close to the Gangetic mouth on the East coast of India, facing Bay of Bengal at a latitude 21 °36' N and longitude 87 °30' E was selected for the present study, especially in the backdrop of prevailing shrimp farming in this region, over the period May, 2004 to April, 2005. The polycheate fauna was sampled once in a week. Pelagic annelids were easily sampled by towing plankton net of 100 µm mesh size. Night fishing with artificial light was also employed to collect a lot of syllids, epitokous, nereids and many rare small species of polychaete larvae. The other necessary implements used for sampling polychaetes were stout spade, crowbar, chisel and canvas bucket, fisherman's basket with several glass jars and a number of glass tubes. Large specimens of polychaetes were easily collected once the dredge or trawls were on board and the contents scattered on deck. The contents were brought to the laboratory and allowed to dip inside the wash basin or glass vessels containing seawater which enabled the small specimens to come out from their hiding. The collected specimens were washed in brackishwater and allowed to slacken off up in 7% magnesium chloride ($MgCl_2$) prepared in brackishwater to avoid twisting or contravening of the specimens. Polychaetes of the family Phyllodocidae, Nereididae and Glyceridae were treated with sudden addition of absolute alcohol for overting their pharynx. They were preserved in 70-75% alcohol. The large species were kept for narcotization for a short time in 5% commercial solution of formalin before preserving in spirit. Delicate and brittle species were also narcotized prior to fixing in spirit. The narcotization was done gradually with increasing concentration of alcohol (5 to 10 %) to the seawater. Other anesthetics like cocaine, chloral were also used for narcotization occasionally. The collected polycheates were identified using identifying key stated by Fauvel (1953).

Results and discussion

In the present investigation, taxonomic account, distribution pattern and habitat ecology of 24 species of polychaetes, belonging to 14 genera under 12 families were studied. They were observed to inhabit in freshwater, brackishwater and sea. The errantiates and sedentarian polychaete fauna dominated the species composition at Digha (W.B.), Talsari (Orissa) and other adjacent areas. Certain species of polychaetes collected under the present study are presented in Fig. 1. A checklist of all polychaetes collected is also enlisted below.

Checklist

i. Family - POLYNOIDAE Malmgren, 1867.
Sub family - Lepidonotinae Horst, 1917
Genus - ***Lepidonotus*** Leach, 1816
Species - (1) *Lepidonotus tenuise* (Gravier)
Sub family - Harmothoinae Horst, 1917
Genus - ***Gattyana*** McIntosh, 1900.
Species - (2) *Gattyana fauveli* (New species)

ii. Family - AMPHINOMIDAE Savigny, 1818
Genus - ***Chloeia*** Savigny, 1818
Species - (3) *Chloeia parva.*

iii. Family - PHYLLODOCIDAE Williams, 1851
Genus - ***Eteone*** Savigny, 1818
Species - (4) *Eteone barantollae* Fauvel, 1932
(5) *Eteone ornata* Grube, 1878

iv. Family - NEREIDIDAE Jonston, 1865
Genus - ***Dendronereides*** Southern 1921
Species - (6) *Dendronereides heteropoda* (Southern)
Genus - ***Neanthes*** Kinberg, 1866
Species - (7) *Neanthes chingrighattensis* (Fauvel)
(8) *Neanthes chilkaensis* (Southern)
Genus - ***Perinereis*** kinberg, 1866
Species - (9) *Perinereis nigropunctata* (Horst)
(10) *Perinereis cultrifera* (Grube)
(11) *Perinereis nuntia* (Savigny)
(12) *Perinereis nuntia* Var. typica

(Savigny)

v. Family - NAPHTYDAE Grube, 1850
Genus - ***Nephtys*** Cuvier in Audouin & Milne Edwards, 1833
Species - (13) *Nephtys dibranchis* (Grube)
(14) *Nephtys oligobranchia* (Southern)

vi. Family - GLYCERIDAE Grube, 1850
Genus - ***Glycera*** Savigny, 1818
Species - (15) *Glycera convoluta* (Keferstein, 1862)
(16) *Glycera rouxii* (Audouin and Milne Edwards,1878)

vii. Family - ONUPHIDAE Kinberg, 1865
Genus - ***Diopatra*** Audouin and Milne Edwards, 1833
Species - (17) *Diopatra cuprea* (Bosc, 1802)

viii. Family - EUNICIDAE Grube
Genus - ***Marphysa*** (Quatrefages)
Species - (18) *Marphysa gravelyi* (Southern)

ix. Family - LUMBRINERIDAE Malmgren, 1867
Genus - ***Lumbrineris*** Blainville, 1828
Species - (19) *Lumbrineris heteropoda* (Marenzeller, 1879)
(20) *Lumbrineris polydesma* (Southern, 1921)
(21) *Lumbrineris notocirrata* (Fauvel, 1932)

x. Family - SPIONIDAE Sars
Genus - ***Polydora*** Bosc
Species - (22) *Polydora ciliata* (Johnston)

xi. Family - CAPITELLIDAE Grube, 1862
Genus - ***Parheteromastus*** Monro, 1937
Species - (23) *Parheteromastus tenuis* (Monro)

xii. Family - TEREBELLIDAE Malmgren
Genus - ***Loimia*** Malmgren, 1966
Species - (24) *Loimia medusa* (Savigny, 1818).

The density and diversity of polychaete fauna at Digha beach and Talsari area were sufficiently rich, which may be due to relatively stable sand, flat substratum and abundance of organic detritus (Mishra, 1998). The flat substratum was also rich in meiofauna population. Availability of rich meiofauna is highly essential for completing the food chain of beach fauna (Varshney and Govindon, 1995). But, it is difficult to explain the differences in density and specific occurrence of polychaetes at different horizontal levels in these areas. It may be due to their environmental preference and tolerance of component species. *Lumbrineris polydesma* was highly populated species recorded towards the canal area (muddy substratum) of the upper littoral zone of Talsari. The analysis of the data showed that the majority of these species were concentrated in the lower reaches, which decreased gradually towards the upper reaches. It was observed that the fluctuation of salinity in brackishwater zone highly affected the population of colony forming polychaetes with a declining trend with the increase in distance from the sea. Similar observation was also made by Mishra (1995). High abundance of *Lumbrineris polydesma* was recorded during June- July, 2004 (70 nos./sq.ft.), but it decreased in number (20-25 nos./sq.ft) during mid November to December, 2004. Some species of Nereididae family were also found in mud spattered area. The density of *Dendronereides heteropoda* was recorded as 20-30 nos/sq.ft while the population rate of *Glycera sp*. in mid littoral and sub littoral zone of Talsari was only 4-5 nos/sq.ft and in 2-3 nos/sq.ft, respectively. The population density of *Glycera alba* in upper littoral zone was found to be 2-3 nos /sq.ft. Some species of Nereididae, Onuphidae and Glyceridae were also recorded between 5 and 7 nos/sq.ft in the sub-littoral zone. Anthropogenic activities and indiscriminate waste disposal in Digha-Talsari region was observed during the present investigation. The *Parheteromastus* sp. was typically found in areas affected with sewage pollution. The dominant polychaetes of this region mentioned earlier found scattered in different places of the study area.

The main limitation using polychaetes as a biomonitor for pollution study is the paucity of its taxonomic and biological information (Dirk *et al.*, 1998). There is also dearth of information on the life history and seasonal variation of endemic

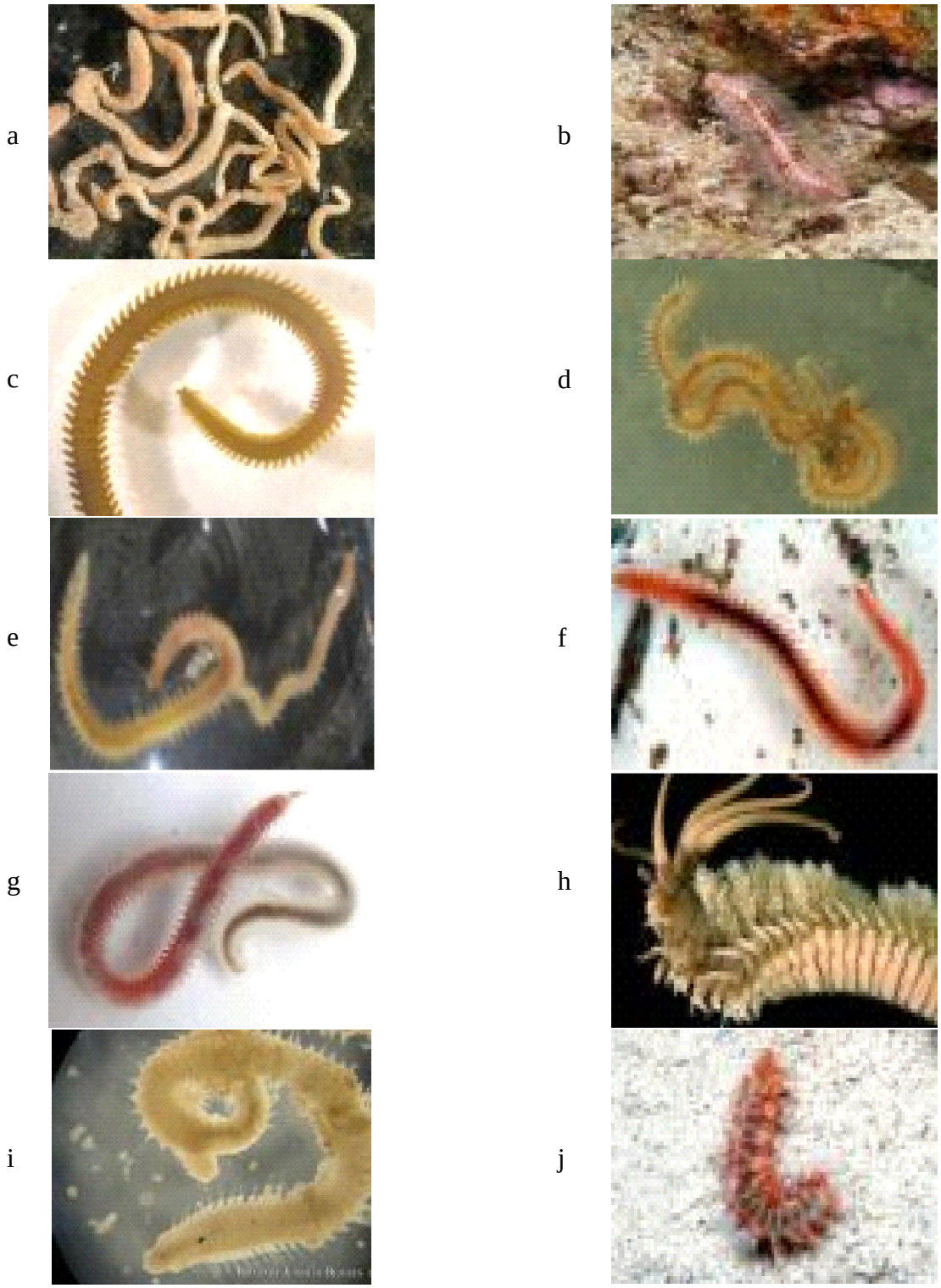

Fig. 1. *a* - *Gattyana* sp.; *b* - *Chloeia parva*; c - *Eteone* sp.; d - *Neanthes* sp.; e - *Perinereis cultrifera*; f - *Nephtys* sp.; g - *Glycera convoluta*; h - *Diopatra cuprea*; i - *Lumbrineris* sp.; j - *Loimia medusa*.

polychaete population. The knowledge on their natural responses to the various environmental parameters is limited and investigation on the ecotoxicology is still at an infant stage, complicating interpretation of field data. Application of organic pesticide obtained from *Lumbrineris heteropoda* is reported to be safe to human and domestic animals (Nitta, 1934). As this species is also available in the present collection, it indicates the possibility of judicious exploitation of it for the production of bio-pesticide.

Though the present study has only identified diverse group of polychaetes, there is a scope for establishing some kind of a co-management practice, roping in market oriented expertise, culture experts and Government agencies. It offers immense potential for economic and social benefits to the local community, and so, demands further investigation.

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