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A NOTE ON *PHASCOLOSOMA ARCUATUM* (GRAY) [SIPUNCULA : PHASCOLOSOMATIDAE] IN THE HOOGHLY-MATLA ESTUARY, WEST BENGAL, INDIA

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INTRODUCTION

While conducting benthic surveys of the tropical sipunculans of the mangrove belt in West Bengal, some information about the environment of *Phascolosoma arcuatum* (Gray) was obtained. The area is a new locality record for the species. Further, *P. arcuatum* was described by Gray (1828) from material collected in India. No specific locality was named. Rice and Stephen (1970) redescribed Gray's type and showed that *P. arcuatum* was a senior synonym of *P. lurco* Selenka, Bulow and de Man (1883).

HISTORICAL REVIEW

The only estuarine sipunculan so far recorded from India is a *Phascolosoma* (=*Physcosoma*) sp. reported from Port Canning, Lower Bengal by Annandale (1907). Whether it was *P. arcuatum* is not known. *P. arcuatum*, however, is well known from the mangrove areas of Java and Malaysia (Sluiter, 1891 ; Harms and Dragendorff, 1933 ; Chuang, 1965 ; Green and Dunn, 1976) and of N. E. Australia (Edmonds, 1980 ; Green, 1975).

GENERAL CHARACTERS OF THE AREA SURVEYED

The mangrove area including both swamps and forests of lower Bengal covers a fairly vast area starting from Sagardweep on the extreme west up to the River Matla in the east along the Indo-Bangladesh border. The species under

consideration is of Austro-Malayan distribution, whence it might have taken a wide adaptive dispersal towards India through Bangladesh in the further west. By virtue of its wide adaptive capacity the species occurs not only in non-mangrove coralline bed but also in mangrove coralline and muddy bed. In the muddy bed it constructs galleries and 3-5 such galleries are observed occurring side by side.

In fact, the Hooghly-Matla estuary comprises certain belts of which a few have been selected as sites for collection such as Gangasagar forming the southernmost end of the Sagardweep and Chemaguri on the bank of the Mooriganga, Harinbari on the bank of the Hooghly, Jhingakhali on the bank of the Raimangal and Jharkhali on the bank of the Vidya. Of the three main streams two are important, viz., the Mooriganga and the Vidya ; of these the former is the main tributary of the river Hooghly while the latter constitutes confluence with the river Matla. The third stream, i.e., the Raimangal meets the Kalindi that pours into the Bay of Bengal along the Bangladesh border. This riverrine system takes part in the formation of the Hooghly-Matla estuarine complex. During the period of extensive survey in the littoral zone, it has been observed that the specimens of *P. arcuatum* occur abundantly in the intertidal niches of all the above mentioned localities depending on the variable nature of hydrological and edaphic condition amidst the biotic association being correlated with the views of Chaudhury (1982). The other subzone, i.e., subtidal one, is, however, occasionally visited by the species and the collector may find the species on proper exploration of this subzone.

Observations on Ecological Behaviour

Observations have been made on the methods of borrowing and feeding of *P. arcuatum*. An individual of 5 cm trunk-length, in a particular case, for example, was taken out alive from its burrow and then released on the exposed muddy substratum at the actual site of collection. On being disturbed, the specimen remained for half an hour with its introvert retracted. Subsequently, it started gently relaxing

and tilting the trunk portion only along its ventral side on the substratum so as to reach the preparatory srage for burrowing. Immediately afterwards, it just raised the anterior part of trunk off the ground, when the introvert becomes gradually everted. With further relaxation of the trunk and introvert, the latter at this stage touches the ground and slowly exposes the tentacular crown. By now, the animal lies with its entire trunk juxtaposed to the ground and the introvert remaining somewhat in an arched manner. Then it contracts the trunk so as to bring the body forward and eventually to an erect position when it fixes the introvert in the soil and sets out to burrow stealthily the soil particles with the aid of tentacles until it is completely hidden in the tube thus formed. The time for entire operation took about a couple of minutes. The particular spot of location of the individual was re-examined after about two hours, when the burrow could be traced out while chopping out by shovel a portion of the sub-soil from its entrance. It was noticed that the burrow reached straightway for about 20 cms downwards, then taking a 'U' turn to reach again the soil surface and that the individual remains in one of the arms up to a depth of about one cm from the surface.

The shape of the burrows of other specimens is apparently like a 'L' or hook, though actually it is 'U' or hairpin-like, since one of its arms is sometimes blocked by silt.

In feeding *P. arcuatum* was observed to extend its tentacles on the ground surface for the purpose of ingestion of muds and withdrawing the same from time to time to remove the accumulated debris. The tentacular crown, however, immediately retracts when touched by a laboratory glass dropper, if not by pouring drops of water from it. The animal has been noticed to feed in the afternoon during densely cloudy weather. The time of feeding, however, may be variable and was also observed at night by Green (1975).

On dissection it was found that the gut was full of mud. The gut contents reveal the presence of sporozoans, copepods and diatoms. The bulk of the organisms was constituted by diatoms.

Discussion

Analysing from the view point of occurrence of *Phascolosoma arcuatum* from different areas in West Bengal, as presently surveyed, the species is restricted in the mangrove region only. It is found throughout the intertidal zone starting from above the mean high water spring tide (M.H.W.S.) to below the mean low water spring tide (M.L.W.S.) water levels, being exposed to a marked degree of variations in respect of both the highest and lowest rates of salinity. Similar observations were also made by the earlier workers on the occurrence of the species in other mangrove belts of Australo-oriental region, though unfortunately none of them could successfully explore the species from the broader spectrum of mangrove ranges, as has been presently done. Nonetheless, the species elicits its preference for dwelling in the mangrove to the non-mangrove belts.

Oglesby (1969) has pointed out that the salinity is the principal controller of the distribution of estuarine worms, and their distribution can be linked to their osmoregulatory ability. Studies on the salinity tolerance has been made on certain sipunculan species (Vide, Peebles and Fox, 1933 ; Tarifeno, 1975) although no such experiment has even been conducted for *P. arcuatum* in relation to the knowledge of its survival at the highest or lowest level of salinity tolerance. But the species penetrates at the Raimangal estuary down to 8.1‰as observed in the present field study. So it is evident that the species in question has a wide range of adaptability starting from mangrove to non-mangrove niches under both the marine and estuarine conditions. It may further be stated that *P. arcuatum* also contributes its might towards the process of aeration of soil particles, thus aiding in luxurient growth of vegetation and indirectly checking flood of the mangrove area. It is also known to enter into a characteristic food chain ecosystem, devouring the soilmicrobes and then in turn, being consumed by mud-dwelling fishes like *Boleophthalmus boddaerti*, *Thyrsoidea macrura*, *Anguilla bengalensis* and other allied species. It may further

be mentioned that a few marine animals are quite tough, since they can well tide over difficult situations related to problems of water and salt balance, desiccation, 0_2 – paucity, temperature limitation, etc., as stated by Oglesby (1969). On the basis of actual observation in nature, some of these factors may be correlated in that almost all the specimens of *P. arcuatum* at Chemaguri have been found in semi-terrestrial-habitat where these abiotic factors have been found to a marked degree.

SUMMARY

The species *Phascolosoma arcuatum* (Gray) is newly recorded from the mangrove zone of the Hooghly-Matla estuary, West Bengal. Some information about the ecological behaviour and the environment of the species is given.

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