Bull. zool. Surv. India, 1 (2) : 157-160, 1978

ABNORMAL SWARMING BEHAVIOUR OF THE SEDENTARY POLYCHAETE (*LOIMIA MEDUSA* VAR. *ANNULIFILIS* GRUBE, 1871 : TEREBELLIDAE) OFF WALTAIR COAST

P. DHANDAPANI

Zoological Survey of India, Calcutta

ABSTRACT

The swarming of terebellid polychate worms (*Loimia medusa* var. *annulifilis* Grube, 1871) on the seasurface observed along the continental shelf off Waltair coast (east coast of India), at about 10 fathom line for a stretch of 5 km. is recorded here as a case of abnormal activity. The worms were of wide range of sizes and had no morphological changes indicative of epitokous condition. Individual worms were surfacing and sinking continuously.

As no previous record of swarming or surfacing of either juveniles or adult terebellid worms is known, it is considered that these worms have reacted to changes in the environmental factors such as anaerobic conditions developing at the sea-bed.

INTRODUCTION

The phenomenon of swarming associated with spawning is common among polychaetes, and has been reported in a number of families. viz, Neridae, Syllidae and Eunicidae (Koringa, 1947 ; Clark, 1961 ; 1965 ;). Records of non-spawing swarming migrations are also available in sedentary polychaetes belonging to Scalebregmidae (Fage & Legender, 1925 ; Clark, 1954) and Polyoptholmidae (Fage & Legender, 1925 ; Thampi, 1958). However, swarming in most of the polychaetes have been observed mainly during nights, but rare instances of their spawning during day are also known (Verrill, 1873 ; Herpin, 1928). The occurrence of terebellid polychaetes during the day time, therefore, is considered to be of interest as there are no previous records of their swarming behaviour.

OBSERVATIONS

On the early hours of 8. 7. 1966, during a routine plankton collection trip off Waltair coast along the 10 fathom line, worms of an inch or more in length were found surfacing sporadically all over the sea surface and then sinking. The behaviour of the surfacing worms was noteworthy in the sense that on reaching the surface they spread out their tentacles and drifted for a second or two and then sank. A horizontal five minute haul was taken against the current with a 0.5 m organdie net which yielded about 1578 worms. The worms varied from 0.5 to 3.5 cm in length,

majority of them being between 2.5 to 3 cm. At the time of collection it was low tide period and the weather was cloudy. The worms were identified as *Loimia medusa* var. *annulifilis* Grube, 1871. As the research boat was engaged in plankton collection at other stations off the coast, a subsequent plankton collection from this same station could be collected only after a gap of five days. Since no worms were seen surfacing on this day, in addition to the usual five minute horizontal haul, a vertical haul of five minute duration was also taken with the same net in order to verify the presence of these worms, which could collect forty-three worms from the mid-water level.

Information from the fishermen of the coast indicated that this was the first time that they came across this sort of worms surfacing, and added that fishing on this day was far below normal since the worms interfered with their fishing operations by entangling themselves in the nets. Fishing on this day was far below normal. It was further learnt from the fishermen, who were fishing on all these five days duration, that the worms were surfacing only on the first day and subsequently were encountered only at the depths in reduced numbers. These observations indicate that the worms were gradually resettling at the bottom after this unusual phenomenon.

The collected worms were transfered into a glass jar containing surface sea-water from the same station and the behaviour inside the jar was studied at the laboratory. All the worms in the jar swam to the surface by a wriggling movement and with their tentacles widely spread out. After exposing their tentacles for a few seconds on the water surface they sank to the bottom. This behaviour continued for about two hours. Later they began resting at the bottom of the jar for longer periods before they surfaced again. After a period of four hours even this surfacing and wriggling activity of the worms stopped and the worms settled as a heap at the bottom of the jar. Two of the worms started to rebuild their tubes by using the few sand grains that were present at the bottom of the jar by chance. This indicates the possibility of the other worms too to rebuild their tubes in case sand grains were present.

The worms were pink in colour, and through their transparent body wall could be seen the orange coloured alimentary canal and brown coloured associated organs. The coelomic fluid of the thoracic region was spacious and filled with fluid. Waves of peristaltic movement could be seen passing through the body from the anterior to the posterior end. The dorsal blood vessel was also clearly visible. The tentacles had alternately arranged rings of brown and cream colour patterns.

When a well grown animal was pressed under a coverslip, no eggs were extruded from the body as it should if the worms were mature enough to spawn. Microscopic examination of the coelomic fluid of the thoracic region showed the presence of round and irregularly shaped cells, presumably amoebocytes and trophocytes (Leibman, 1946 ; 1947).

Discussion

As known from the earlier reports, swarming of polychaete worms was invariably associated with spawning, although non-spawning swarming migrations are also known. A few phyllodocids have been observed to swarm as a prelude to their return to the bottom for egg-laying in mucous capsules (Gravier, 1896 ; Gravier and Danton, 1928 ; Clark, 1954). The significance of these migrations are not known. Analysing the swarming of polyoptholmids, Thampi (1958) observed that "it is influenced neither by lunar periodicity nor maturity but could be

considered as a photopositive reaction although there is no conclusive evidence for this".

There are clear reasons to believe that the swarming behaviour exhibited by the present species could not be attributed to spawning because, (1) the animals were not mature, (2) morphological changes usually associated with maturity of errand polychaetes like enlargement of eyes, modification of setae etc. were not found, (3) specimens of varied sizes were found in the swarm and (4) previous studies from the same area indicate that the terebellids breed between October and April, but the present swarming was observed in July.

The occurrence of varied sizes of worms in the swarm is of particular interest since the observations of earlier workers indicated that the worms of approximately the same size and stage of maturity alone are known in spawning swarm. However, *Perineris cultefera* (Herpin, 1928) and *Neris ra.a* (Gravier and Danton, 1928) have been observed, sometimes, to swarm before they are fully epitokous.

An examination of earlier records show that the swarming behaviour of marine organisms occur either during spawning or just before spawning which is associated with the phases of the moon (Koringa, 1947 ; Clark, 1961). In the present instance, although the worms were observed to swarm during the last phase of the moon, it is difficult to associate it with the lunar cycle since the swarm mostly consisted of immature worms. Whether the swarming behaviour could be taken to indicate a pelagic phase in the bottom living sedentary *Loimia medusa*, as it is in *Arinicola marina* (Meek and Storrow, 1924), in Scalebregmidae (Clark, 1954) or in Ophilidae (Thampi, 1958) is difficult to ascertain.

CONCLUSION

Keeping in mind the observations on the behaviour of the captive worms in the laboratory, one could presume that these worms were subjected to some unusual or otherwise unfavourable conditions in their niche, hence were migrating to the surface. Since their swimming power was practically nil, except for the wriggling movement of the body, the worms naturally sank back to the bottom only to reappear again at the surface in order to avoid the unfavourable conditions at the sea-bed. The occurrence of these worms in decreasing numbers on subsequent days also indicates that this unfavourable bottom condition at the sea was diminishing gradually day by day.

Since the hydrological parameters such as temperature, salinity, pH, turbidity and dissolved oxygen content were not taken from the station of observation, it is difficult here to attribute whether any drastic change in any of these parameters could have caused this swarm. But the only possible reason which could have caused this swarming or surface migration is presumably a possible oxygen depletion at the sea-bed, since the exposure of tentacles by these worms above the seasurface at the time of surfacing seems to be suggestive of an attempt for respiration of atmospheric air through their tentacular surface.

ACKNOWLEDGEMENT

The author is thankful to Dr. B. Krishnamoorthy of the Central Marine Fisheries Research Institute, (where this piece of work was undertaken), for his encouragement and valuable suggestions during the study and preparation of this article.

REFERENCES

CLARK, R. B. 1954. Pelagic swarming of Scalebre-

gmidae (Polychaeta). *Annual Rep. Scottish Mar. Biol. Assn.* : 20-22.

CLARK, R. B. 1961. Origin and formation of heterineries. *Biol. Rev.*, **36** : 199-236.

CLARK, R. B. 1965. Endecrinology and reproductive biology of polychaetes. *Oceanogr. and Mar. Biol. Ann. Rev.* **3** : 211-255.

FAGE, and LEGENDER, R. 1925. Essimages an *Scalebregma inflatum*, observes pendent des peches a la limiere. *Acad. Sci. Paris* (*C. R.*). **180** : 1373-'75.

GRAVIER, C. 1896. Recherches sur la Phyllodociens. *Sci. France et Belg. Bull* **29** : 298-389.

GRAVIER, C. and DANTON, J. L 1928. Peches nocturnes a' la lumiere dans la baic d' Alger. *Ann. Inst. Oceanogr. Monaco.*, **5** : 1-186.

HERPIN, R. 1928. "Estudes sur les essimages des annalides Polychaetes". *Bull. Biol. France et Belg.* **62** : 208-277.

KORINGA, P. 1947. Relations between the moon and the periodicity in the breeding of marine animals. *Ecol. Monogr.*, **17** : 347-381.

LEIBMAN, E. 1946. On the trophocytes and trophocytosis : a study on the role of leucocytes in nutrition and growth. *Growth*, **10** : 291-330.

LEIBMAN, E. 1947. The trophocytes and their function. *Experientia*, **3** : 442-451.

MEEK, and STORROW, B. 1924. On the pelagic phase of *Arinicola marina* and *Eteone artica*. *Ann. Mag. Nat. Hist. Ser.* **9**, **14** : 453-455.

THAMPI, P. R. S. 1958 : Pelagic swarming of *Polyophtholmus*. (Family Ophilidae-Polychaeta) *J. Bombay. nat. Hist. Soc.*, **35** : 371-374.

VERRILL, A. E. 1873. "Report upon the invertebrate animals of the Vineyard sound and the adjacent waters with an account of the physical characters of the region". *U. S. Commercial Fish and Fisheries* : 295-778.