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RESPONSE OF THE MANGROVE MUDSNAIL *TEREBRALIA PALUSTRIS* (SINNAEUS) (PROSOBRANCHIA : POTAMIDIDAE) TO DIFFERENT SUBSTRATA

A. V. S. Rambabu, B. V. Prasad and M. Balaparameswara Rao

Department of Zoology, Nagarjuna University, Nagarjunanagar-522 510

Abstract

The substratum is known to play an important role in the distribution of muddy shore molluscs. The mud snail *Terebralia palustris* occurs abundantly in the mangal at Nizampatnam (15° 54′ N; 80° 43′E) in the Krishna estuarine region on the east coast of South India. The response of this snail to different types of substrata *viz.* sand (100%), muddy sand (75% sand and 25% mud), intermediate (50% sand and 50% mud), sandy mud (25% sand and 75% mnd), mud (100%) and plants, was studied. *T. palustris* was found to prefer the substrata with plants. The results are discussed and are compared with those of the other muddy shore forms.

Introduction

Substratum is one of the most important physical factors in influencing the distribution patterns of animals in the coastal waters. Many workers (Brady, 1943 ; Smith and Newell, 1955 ; Wieser, 1956 ; Teal, 1958 ; Meadows, 1964 ; Croker, 1967 ; Sameoto, 1969 ; Longbottom, 1970 ; Jones, 1970 ; Fenchel, 1975 a ; b ; Maurer *et al.*, 1979) have stressed the effect of substratum on the distribution and abundance of animals. Bacescu (1972) stated that the different kinds of sub strata present a major factor in regard to the horizontal distribution patterns of animals. Though studies on the reaction of temperate molluscs, especially *Hydrobia* spp. to different substrata, are extensive (Newell, 1962, 1965 ; Fenchel, 1975 a, b ; Fenchel *et al.*, 1975 ; Barnes, 1979 ; Barnes and Greenwood, 1978 ; Wells, 1978 ; Walters and Wharfe, 1980), very few studies have been carried out on the tropical muddy-shore molluscs (Balaparameswara Rao and Sukumar, 1981).

Since the data on the response of the intertidal animals, particularly muddy-shore forms to different types of substrata are useful in understanding their distribution, zonation and abundance, an attempt has been made in the present investigation to study the response of the tropical mud snail *Terebralia palustris* to different types of substrata.

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Material and Methods

Nizampatnam (15° 54′N ; 80° 43′ E) is a major fishing village in the Krishna estuarine region. The physiography of the study area has been described by Balaparameswara Rao and Sukumar (1982). *Terebralia palustris* for the laboratory experiments were obtained from the mud flats at Nizampatnam. The animals were acclimated in the laboratory in glass troughs with natural sediment brought from the ambient environment, for 2-3 days before they were used for the experiments.

Substratum preference experiments on *T. palustris* were carried out by the method outlined by Wells (1978), by studying the ability of the snails to discriminate between different types of substrata by subjecting the animals to different mixtures of natural sediment and to plants of the natural habitat. The plants were used as substratum as *T. palustris* was found only in areas with mangrove coverage and found on plant stems, in its natural habitat.

Experiments were performed using 6 types of substrata *viz.* sand (100%), muddy sand (75% sand and 25% mud), intermediate (50% sand and 50% mud), sandy mud (25% sand and 75% mud), mud (100%) and plants. The soil substrata were parepared by mixing (v/v) pure sand (~1.00—0.06 mm) and mud (silt+ clay) (<0.06 mm) collected from the ambient conditions.

The experiments were carried out over an experimental period of 96 hr using plastic troughs (area~1964 sq. cm) and in each trough 6 equal sections were denoted. Substratum samples were placed in each section to about 2 cm height, sea water of salinity~15‰ was added upto a height of 3 cm over the substrata and it was changed every 24 hr. The substrata-water temperature during the experiment was 29°C± 1°C. In each section 10 snails were released. The response of the snails to the substrata was studied by counting their numbers in different sections at the end of 24, 48, 72 and 96 hr.

All the experiments were repeated thrice. The results were pooled and 'analysis of variance' (Bailey, 1959) was followed to test the influence of substratum and time (days) on the movement of snails.

Results

The results of the response of *Terebralia palustris* to different types of substrata are presented in Table 1. The number of *T. palustris* was maximum on the substratum with plants (37.69%) and its number was low in substrata with sand content ≥50%.

Table 2 shows the results of ANOVA on *T. palustris*. The high variance ratio for *T. palustris* (420.295) suggests that the texture

TABLE 1. *Response of* Terebralia palustris *to a mixture of sand and mud in different proportions and to the presence of plants*

	% of sand					Plants
	0	25	50	75	100	
Average number of snails	11.62	12.11	7.0	4.42	2.25	22.62
% of snails	19.36	20.18	11.66	7.37	3.75	37.69

TABLE 2. *Results of analysis of variance : Influence of substratum and time (days) on the response (movement) of* Terebralia palustris

Source of variation	S.S.	d.f.	M.S.	Variance ratio	Result
Texture of the substratum	1065.8681	5	213.1736	420.295	Highly significant
Time (days)	0.0006	3	0.0002	0.00039	Not significant
Residual	7.6080	15	0.5072	—	—

of the substratum has a significant influence on the movement of snails. The movement of the snails, however, was not influenced by time ($P>0.05$).

Discussion

A correlation between the number of snails and the grade of deposit was observed in *Hydrobia* spp. by Newell (1965) and Wells (1978) and in the tropical mud snail *Telescopium telescopium* by Rambabu and Balaparameswara Rao (1986). Texture of the substratum seems to be an important factor in determining the distribution pattern of *T. palustris* also. Substratum preference experiments nave shown that *T. palustris* prefers substrata with high percentage of mud (50—100%). Newell (1965) attributed the differences in the abundance of *Hydrobia ulvae* on different substrata to the feeding habits of the snails. He suggested that the micro-organisms such as bacteria on which *H. ulvae* feeds increased with finer sediments and related the abundance of micro-organisms to nitrogen values in the sediment. The occurrence of high organic nitrogen in finer grade deposits was reported by Longbottom (1970). The density of *T. palustris* in the field was found to be high at stations where the organic matter in the soil was high (1.17%—2.8%).

A relationship between the occurrence of *H. ulvae* and macrophytes was observed by Spooner and Moore (1940) and Holme (1949). Nicol (1936) noted that the snail was often found in association with *Enteromorpha*, which may feature in its diet. In the present investigation also *T. palustris* showed a relationship with mangroves. The number of *T. palustris* was maximum on substratum with plants (37.69%). In the field also it was found on vegetation and was abundant in areas of dense mangrove vegetation (Rambabu, 1986). At present the reasons for this relationship are not known. Next to plants, *T. palustris* showed preference for the finer sediments (75% mud) (20.18% snails). Macnae and Kalk (1962) while studying the ecology of mangrove swamps at Inhaca Island, Moçambique, found that *T. palustris* feeds on microflora and organic content of the upper layers of the soil.

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