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MOVEMENT OF COMMON ROCK CLINGER LIMPET, *CELLANA* SP. ON THE ROCKY SHORE OF MANORA, KARACHI, PAKISTAN

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ABSTRACT

Limpets are abundant in the mid tidal zone. They are clearly visible over the rocks, big boulders, stones, pebbles, sticks and commonly are attached upon other organisms and adhere over the substratum by means of their foot that is meant for movement over their rocky regime. Their movement can be traced by observing radular depressions over the rock surface. Movement is synchronous with the tides. They move when they are touched by the incoming tides. It is the most conspicuous practice over the smooth rocks and over those surfaces having microlagal growth. They mostly move for food at sunset and look to be stationary during the day time.

KEYWORDS: Limpets, Radiular depressions, Incoming tides, Rocky shore, Manora.

INTRODUCTION

The prosobranch limpets reside in the intertidal and sub-tidal zones of the rocky shores (Steneck, 1982). They feed upon macro and micro algal food (Steneck, 1982, Humayun & Chaghtai, 2012).The genus *Cellana* is widely distributed along the shores of India, Ceylon, Pakistan, Japan and Australia (Rao & Ganapati, 1971). Numerous species of limpets reflect homing behavior; it is the return of an animal to a particular point on the substratum (Steneck, 1982, Santina, 1993 and Shanks, 2002). It helps them to avoid predation, to save them from wave shocks, and minimize desiccation stress for those limpets that are exposed at low tide (Wallace, 1972). Limpets are often the dominant grazers on rocky shores worldwide and can play an important role in community structure (Branch, 1981; Hawkins & Hartnoll, 1983).

As grazers they must move to obtain food and, given their ecological importance, considerable effort has been expended in determining the spatial and temporal patterns in their foraging. Early studies were mostly anecdotal (Orton, 1929) but the comparison of location on successive emersions was progressed (Jones, 1948). More recent, studies have focused on the temporal partitioning of movement, and have involved assessing activity, either visually (Hawkins & Hartnoll, 1982; Little & Stirling, 1985) or with the aid of automatic recording (Chelazzi *et al*., 1990). Time lapse videography of limpets mounted with light-emitting diodes are also being used to observe the movements of the population of the *Cellana* (Davies *et al*., 2006). Factors operating at smaller spatial or temporal scales are able to alter limpet attitude. These factors might be relevant to the substratum topography (Erlandsson *et al*., 1999), climate and weather (Burrows & Hughes1989; Little, 1989), food availability (Della Santina *et al*., 1994), or the existence of other species which may contest for space (Ruiz Sebastian *et al*., 2002). In the present paper an effort has been made to highlight movement of the tropical limpet *Cellana* sp., on the rocky coast of Manora.

MATERIAL AND METHODS

Movement patterns, speed of *Cellana* sp., was recorded at the rocky shore of Manora Beach (24^{o}. 47´, 39" N 66^{o} 58´ 21" E DMS system) of the Karachi coast. During the period of Feb. 2008-Jan. 2009 for the period of one year. Total 120 animals were tagged during one year to investigate movement on the rocky shore**.** The speed determination was done by wrist watch. The nocturnal movement was observed with the help of torch. For movement studies an attempt was made to choose possible lowest low tide.

The distance covered by the tagged limpets and nature of the rock surface were taken into computation. The size of limpets, type of surface, speed and distance covered by the limpets was taken into account.

RESULTS AND DISCUSSION

The maximum distance covered by *Cellana* sp., on rough surface was 16cm with size 42mm and minimum distance was 11cm with size 35mm (Fig. 1). The maximum distance at smooth surface was recorded 25cm with size 20mm and minimum was 14cm with size 38mm (Fig. 2). The minimum speed was observed 5cm/h at rough surface and maximum speed 13cm/h was observed on smooth surface. The minimum speed was 7cm on the smooth surface as shown in following Table 1.

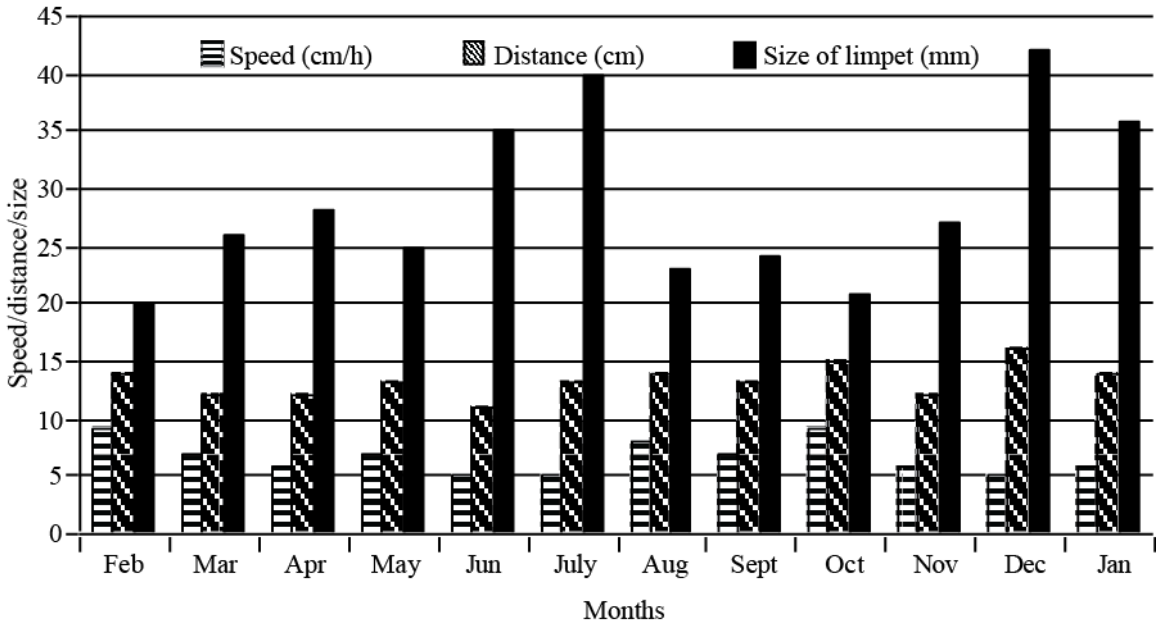

Fig. 1. Graph showing speed, distance and size of *Cellana* sp., on rough surface.

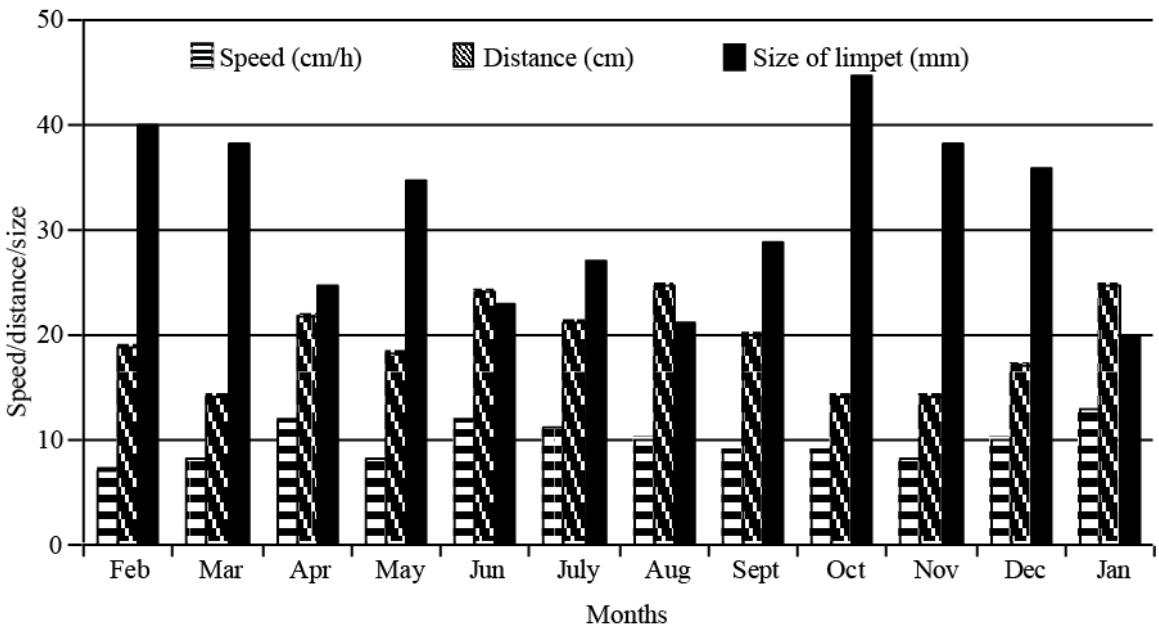

Fig. 2. Graph showing speed, distance and size of *Cellana* sp., on smooth surface.

Table 1. Showing distance covered and speed of movement on rough and smooth surface.

Min distance on rough surface	11cm	Min speed on rough surface	5cm/h
Max distance on rough surface	16cm	Max. speed on rough surface	9cm/h
Min distance on smooth surface	14cm	Min speed on smooth surface	7cm/h
Max distance on smooth surface	25cm	Max speed on smooth surface	13cm/h
Avg. distance on rough surface	13.5cm	Avg .speed on rough	7cm/h
Avg. distance on smooth surface	19.5cm	Avg. speed on smooth	10.5/h

Movement is synchronous with the tides was said to be isophasic by (Chelazzi *et al*., 1988). In limpets it is evident in *C. toreuma* (Hirano, 1979a), C. *nigrolineata*, *C. testudinaria* (Hirano, 1979b) and in the Acmaeid limpets *Acmaea limulata* (Eaton, 1968), *A. pelta* (Craig, 1968), *A. digitalis* (Miller, 1968) and *A. scutum* (Rogers, 1968). In all these limpets, however, with the exception of *C. grata* and *C. toreuma*, tide is not the only factor influencing movement. *Cellana grata* did not follow the tide completely (Williams & Morritt, 1995). They came to rest before low water, as has also been reported for *C. Toreuma* (Hirano, 1979a). Thus a term better describing their behaviour than 'isophasic' is zonal shuttling (Chelazzi *et al*., 1988). *C. grata* forages continually while mobile then its primary foraging zone is at the

top of the shore (Williams & Morritt1995). Della Santina & Naylor (1993) have provided solid proof of an endogenous rhythm: for *Patella vulgata*. Little *et al*., (1988) suggested that water cover was the stimulus for *Patella vulgata* on horizontals to become active. The *Cellana* sp., cling itself firmly over the rocks when the shore area is exposed or they have to experience dry circumstances. They only move when they are washed up by the incoming tides. They usually seem to locomote when tides are rising up or falling down. The same pattern of movement was also described by Rao and Ganapati in 1971 on working over *Cellana radiata* in India. There is no proof of seasonal migration in *Cellana* sp., as already pointed out by Black, 1977; Creese, 1980 and Rao and Ganapati in 1971). The moment speed is greater on the smooth surface as compared to rough also matches with observations of Rao & Ganapati (1971).

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