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Diversity and distribution of True Crabs (Brachyura) from intertidal rocky shores of Qeshm Island, Persian Gulf

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ABSTRACT: Rocky shores are one of the most important habitats of marine environment in coastal areas. This study was done in 2010-2011 to investigate the diversity of true crabs in intertidal rocky shores of Qeshm island. Samples were collected from intertidal zones during the low-tide at 5 stations. The specimens were fixed in 70% Etanol and transferred to laboratory for identification. Altogether, 15 crab species belonging to 8 families and 14 genus were identified. 4 species were from Portunidae, 3 species from Eriphiidae, 2 species from Majidae,2 species from Grapsidae were identified. The others families including Euryplacidae, Leucociidae, Pilumnidae and Xanthidae families have the lowest species richness with only 1 species per family. Portunidae family with 4 species in intertidal zone had the highest species richness amongst studied stations. 3 species of Eriphia smithi from Eriphiidae family, Leptodius exaratus from Xanthidae family and Thalamita crenata from Portunidae family were present at all three intertidal zones (High tide, Mid tide and Low tide).

Keywords: *Identification; Distribution; Diversity; True crabs; Intertidal zone; Qeshm Island; Persian Gulf*

INTRODUCTION

True crabs (Brachyuran) account for more than 17% of crastacea and Because of high nutritional value (proteins and minerals), the extraction of chitin and chitosan for pharmaceutical and chemical applications and using their skins as food for livestock and poultry are valuable in the world (saeedpour, 1994).

Recently, due to human activities such as illegal harvesting, over-water supplying and aquatic ecosystems such as coastal pollution,crab populations have been encountered to serious damages. Therefore, identification, biological and ecological study of these animals, is an important help to protect and restore their populations, do research activities, development of economic species and make more food resources and entrepreneurship in the coastal areas.

Among various shores, rocky shores, because of bed stability and a variety of habitats such as algal cover,presence of cracks and fissures in rocks, spaces available under stone fragments, and tidal pools filled with water in the tidal range at ebb-tide time, have more diversity and distribution of macrobenthos (especially crabs) than muddy and sandy beaches. Therefore, in these areas crabs have high diversity (Nybakken, 1993).

Studies on true crabs were done by Hosseini (1993) in Bushehr. Hosseini reported 10 species from 8 families. Bahmani (1994) reported 30 species from 8 families in province Hormozgan between Bandarabbas and Bandarlengeh. Sharafi (1998) reported 21 species from 6 families. Naderloo (2005) reported 56 species from 12 families in subtidal zone of Persian Gulf. Ghiasnezhad (2007) reported 10 species from 7 families in southern shores of Qeshm island, and Asgari (2008) reported 19 species from 10 families in southern shores of Qeshm island.

Purposes of this study were identification of intertidal zone crabs of Qeshm island rocky shores, evaluating distribution of crabs at intertidal zone of the island, comparison of crabs diversity in studied stations and evaluation of habitat conditions (bed type, bed slope and morphology) of rocky shores intertidal zone.

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MATERIALS AND METHODS

Totally 5 stations were selected on rocky shores area in both Northern and Southern part of island, 4 stations at south and 1 station at north part of island (Fig. 1).

Sampling was done in summer and winter of 2010-2011 in ebb-tide. 3 transects were applied in each station. Transects were considered as 3 regions of high tide, mid tide and low tide. Then specimens at transect line even under stone were collected. Etanol 70% were used to fixation and maintaining specimens. All of collected specimens were identified after they were transferred to marine biology laboratory of sciences and researches university.

Body shape such as carapace shape, frontal shape and its antero-lateral parts, number and arrangement of teeth, orbit shape, chelipeds and feet shape, ventral segments, male's gonopods shape are important to identification crabs (Stephensen, 1945; Serene, 1984; Apel and Spiridonov, 1998) and studies done in Iran (Naderloo, 2005; Ghotbeddin, 2011) were used to identifiy specimens.

RESULTS AND DISCUSSION

By studies performed during two sampling seasons 15 specimens of true crabs were identified in intertidal shores of Qeshm island that included 8 Families, 14 Genus and 15 Species. Among these, the family Portunidae with 3 Genus *Charybdis, Portunus, Thalamita* and 4 Species of *C. hellerii, P. segnis, T. crenata and T. prymna* had maximum number of genus and species and other families had less genus. Species richness and presense or absence of species related to place and time (Table 2). On this basis, stations 1 and 4 eachother with 9 species had maximum species number, station 3 was positioned at second place, Station 5 at third place and finally station 2 with 5 species had the least species number. According to Table 2, species *Charybdis hellerii* was observed only at station 1, *Menaethiops sp*. and *Nursia persica* only at station 3 and *Eucrate haswelli* only at station 5. *Leptodius exaratus* was the only species that present at all stations. During two sampling seasons number of species were 12 in summer and 11 in winter.

It must be noted that *Charybdis hellerii, Heteropilumnus trichophoroides, Lydia tenax* and *Portunus segnis* were observed only in summer and Eucrate haswelli، Menaethiops sp. and Nursia persica were observed only in winter. It was observed that crabs were mostly present at Mid tide zone, and Low tide and High tide zones had less diversity (Table 3). Only 3 species, *Eriphia smithi, Leptodius exaratus* and *Thalamita crenata* were present at all three intertidal zones.

CONCLUSION

A lot of factors influence population combination of rocky shores. Among them bed type has a great influence on Macrophones population. Also, some species can play an important role on species richness and

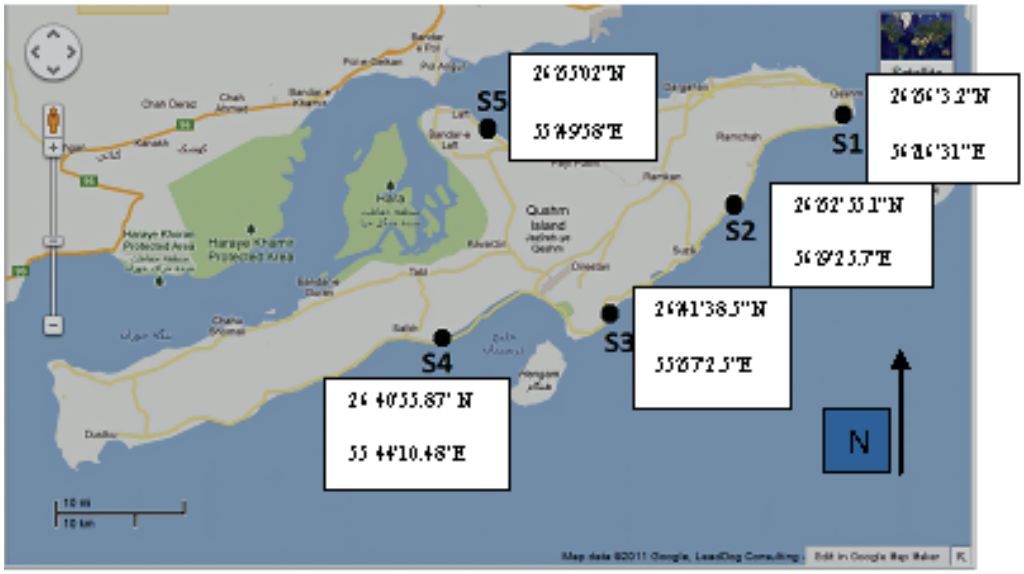

Fig. 1: The Qeshm island and sampling stations

Table 1: sampling stations

Name	Station No.	Latitude
Cinema darya	S1	26°56'3.26"N , 56°16'31"E
Biotechnology	S2	26°52'55.1"N , 56°9'25.7"E
Shibderaz	S3	26°41'38.5"N , 55°57'2.5"E
Salakh	S4	26°40'55.87"N , 55°44' 10.48"E
Laft	S5	26°55'02"N , 55°49' 58"E

Table 2: True crabs at 5 stations during studied seasons at Qeshm island (2010-2011)

Family	Species	Stations					Summer	Winter
		S 1	S 2	S 3	S 4	S 5		
1) Eriphiidae	1) Epixanthus frontalis				+	+	✓	✓
	2) Eriphia smithi	+	+	+	+		✓	✓
	3) Lydia tenax	+			+		✓	
2) Euryplacidae	4) Eucrate haswelli					+		✓
3) Grapsidae	5) Grapsus albolineathus	+	+	+	+		✓	✓
	6) Metopograpsus messor	+			+	+	✓	✓
4) Leucociidae	7) Nursia persica			+				✓
5) Majidae	8) Menaethiops sp.			+				✓
	9) Micippa philyra			+	+		✓	✓
6) Pilumnidae	10) Heteropilumnus trichophoroides					+	✓	
7) Portunidae	11) Charybdis hellerii	+					✓	
	12) Portunus segnis	+			+		✓	
	13) Thalamita crenata	+	+		+	+	✓	✓
	14) Thalamita prymna	+	+	+			✓	✓
8) Xanthidae	15) Leptodius exaratus	+	+	+	+	+	✓	✓
	Sum	9	5	7	9	6	12	11

population combination. Among other factors. Shape, size and height of tidal pools also wave-influenced being of pools have a great effect on diversity and aboundance of intertidal zone Organisms. According Table 2, maximum species diversity was at stations 1 and 4 each with 9 species, and minimum species diversity was at station 2 with 5 species. High diversity at 1 and 4 stations can be due to presence of stones with high holes at high tide zone, and Grapsidae crabs were seen aboundantly at high tide zone of this stations. At mid tide zone of these stations, There was a large amount of tidal pools and therefore they were proper

Table 3: Vertical distribution of identified species at 3 intertidal zones

Species	High tide	Mid tide	Low tide
Epixanthus frontalis		◄———	———►
Eriphia smithi	◄———	———	———►
Lydia tenax	◄———	———	
Eucrate haswelli		◄———	———
Grapsus albolineathus	◄———	———	
Metopograpsus messor	◄———	———	
Nursia persica		◄———	———
Menaethiops sp.		◄———	———
Micippa philyra		◄———	———►
Heteropilumnus trichophoroides	◄———	———	
Charybdis hellerii		◄———	———
Portunus segnis	◄———	———	
Thalamita crenata	◄———	———	———►
Thalamita prymna		◄———	———►
Leptodius exaratus	◄———	———	———►

Table 4: List of identified crabs of Qeshm island intertidal zones

Species	Naderloo 2005	Ghiasnezhad 2007	Asgari 2008	First report in Current study 2010-2011
Epixanthus frontalis	+			
Eriphia smithi		+	+	
Lydia tenax				+
Eucrate haswelli	+			
Grapsus albolineathus		+		
Metopograpsus messor			+	
Nursia persica			+	
Menaethiops sp.				+
Micippa philyra			+	
Heteropilumnus trichophoroides	+			
Charybdis hellerii	+			
Portunus segnis	+	+	+	
Thalamita crenata		+	+	
Thalamita prymna				+
Leptodius exaratus		+	+	

places for density of different crabs. crabs depending on morphologic and physiologic capabilities, select different environments for habitat. This is due to easy accessibility to food, shelter for growing and survival (sharafi, 1998)..Station 1 and 4 obtain suitable environment for crabs considering habit, shelter, nutrition and reproduction and therefore these stations were rich areas. The reason of low diversity at station 2 was that this station did not have morphologically large stones at high tide zone, so that, a great types of crabs such as Eriphiidae were not seen at this station. At mid tide zone of this station there were small and shallow tidal pools resulting less species richness of crabs at this station.

Crab diversity was not same at three intertidal zones. At high tide zone crab diversity decreases due to improper echological conditions such as light, temperature, high evaporation, dry weather and low humidity during ebb-tide. Temperature is a very important factor that can directly influence distribution and abundance of this area's organisms. High temperature at intertidal zones usually causing dry areas and decreas diversity and aboundance of different species. Mid tide area of intertidal zone had maximum crab diversity that it could be due to high humidity, proper growth conditions, presence of high algae that are very important for crabs nutrition, and low zone slope.

Low tide areas are always under water even ebb-tide times, therefore are more exposed to erosion. Also, this area has less slope, holes or foramens, so that it is not suitable place for crabs to live. Then, it had less species richness than high tide and mid tide zones.

According to study performed on rocky shores of southern Qeshm island by Giasnezhad (2007), 10 species, 10 genus from 7 family and 2 infraorder has been introduced that except infraorder Anomora 9 species has been identified from which 4 species namely *Leptodius exaratus, Thalamita crenata ,Eriphia smithi* and *Grapsus albolineatus* were similar with current study species. The only difference was that this project has been done 4 seasonal, but current study has been done only in 2 seasons (summer and winter).

Also, according to study about true crabs' species diversity at intertidal zones of south shores of Qeshm island performed by Asgari (2008), 19 species belonging to 10 families and 2 infraorder have been identified that regarding aboundance, species *Thalassograpsus harpax* and *Scopimera crabricauda* on rocky and sandy shores, respectively were more than other species. Of 19 crab species identified, 14 true crabs had been reported from rocky shores and of this number there were 6 species *Thalamita crenata, Eriphia smithii, Metopograpsus messor, Nursia persica, Micippa philyra* and *Leptodius exaratus* that were common with current study species. It must be pointed that this project has been done monthly.

In rocky beds, natural holes in stones are proper places for various species crabs to live, because of protected crabs from hunter, water movements or other environmental pressures. For example, clefts of rocky shores are suitable place for crowding crab species of family Grapsidae (cooper, 1997).

Also, tidal pools of mid tide zones are suitable places for hiding and preventing from drying. Most of Portunid species are seen at this places.

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