

Five Bivalve Species from the Recently Discovered Coral Reef in the Marine Coastal Waters of Iraq

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Abstract

In the present report five bivalve species are newly recorded from the recently discovered coral reef in the coastal waters of Iraq, North West Arabian Gulf. The bivalves were inhabit a hard coral substratum as well as sand and mud substrata, at depth ranging from 7-10 m. The region is characterized by high temperature subtropical climate (temperature range: 14-34 C°). The identified mulluscan bivalves namely *Chlamys livida*, *Pinna bicolor*, *Malvifundus normalis*, *Barbatia decussate*, and *Lithophaga robusta*. All the present specimens bivalves were living animals and they classified according to morphological characteristics. Specimens were deposited at the Genetic Legacy Laboratory and Museum of the Marine Science Center/ University of Basrah.

1- Introduction

Before the oil century, pearl fishing and trading were very familiar in the Arab Gulf countries (Literathy *et al.*, 2002), and peoples were very qualified in this work using free-diving for gathering oysters from the sea bed. But after oil production, the Gulf countries including Iran become a major oil producers and their economy mostly dependent on oil. However, because of the high-long term petroleum activities, the Gulf/ ROPME Sea Area was subjected to a noticeable amount of oil pollution and therefore it was signed as a very sensitive sea area (MEMAC, 2010). The ROPME states, except Iraq, have been conducted many surveys within the farmworks; the ROPME- IAEA contaminant screening project (1994-2005), and the Mussel Watch Programme (2006 and 2011) (ROPME, 2013a; ROPME, 2013c). In these projects some bivalve species such as pearl oyster, rock oyster and Asiatic clams were used for the contaminants detection (bio-indicator) and therefore, they were considered of great ecological importance.

Several trips were conducted to the Iraq Marine Waters, during the period 2010-2012 and many macrobenthic samples were taken by dredge and trawling. In all these cases non of these bivalves were detected (Ali *et al.*, 2013). Fortunately, in March 2014, a German- Iraq scientific team published their report on the "Discovery of a living coral reef in the coastal waters of Iraq (Pohl *et al.*, 2014) and after this exiting discovery, further investigation were carried out to identify the associated macrobenthos communities particularly, living bivalves. The aim of the present article is to make a new records of five species of bivalves in the coral reef at the Iraqi marine coastal waters which may be appropriate for a mussel watch monitoring and / or the studies of impact of climate changes on biodiversity.

2- Materials and Methods

The present study was based on samples of living bivalves collected from the coral reef area in the coastal water of Iraq, by the scientific diving techniques, including underwater photography. The detail information of the coral reef area, including location and environmental characteristics, is given in Pohle *et al.* (2014). The site was visited 4 times, in May 2013, June 2014, December 2014 and June 2015, using the research vessel "Al-Bahith" of the Marine Science Center/ University of Basrah. Specimens of oysters, scallops, clams and mussels were collected from the rocky, sandy and muddy sea beds and photographs on ship board before preserved in 95% ethanol or frozen for further laboratory studies. In the laboratory the shells were washed and dried by fine tissue before rephotography. Morphological measurements of the shells were taken either with vernier caliper to the nearest 0.01 mm., or by ruler to the nearest 0.05mm., the total shell length (TL), and total shell width (TW) were measured.

Identification of bivalves were made possible by using different current taxonomic literatures available in the region such as : Ahmed (1970); Bosch (1982); Jones (1986); Hayward, 1990; Bernared *et al.*, 1993; Plaziat & Younis, 2005 and Al-Yamani *et al.* (2013)

Underwater photos and videos, were used for conformation and for further ecological informations.

3- Results

Several species of bivalves were found in the area of the coral reef of the coastal waters of Iraq. Five of them were identify in the present study, all of the collected specimens of the five species were liveing animals. These species are:

The pearl oyster *Pinna bicolor* (Gmelin, 1971), the scallop *Chlamys lividis* *(Lamark, 1819), the clam *Barbatia decussats* (Sowerby I, 1833), the oyster *Malvifundu normalis* (Lamark,1819) and the mussel *lithophaga*

robusta (Jousseume MS in Lamy, 1919) (Table 1).

Illustrations of these species is given in Fig. (1). *Pinna bicolor*, is the largest bivalve species found in the coral reef area, it is an equivalve, inequilateral, triangular shape large oyster, the largest collected specimen is of a 310mm. shell length and 160 mm width. Only 2 individuals were obtained in the December 2014 trip and a further 2 individuals appeared in the June 2015 trip.

Chlamys livida, is a pictinid scallop, it is relatively the most abundant bivalve species found in the coral reef area, 59 individuals were collected during the sampling periods, their sizes were ranging from 35.0-90.0 mm. in length.

Malvifundus normalis, an oestreid, thick, rugose, T-shaped shell oyster, 9 individuals were obtained during the December 2014 trip and 23 individuals were found during the June 2015 trip, their sizes were ranging from 42.0-55.0 mm. in length.

Barbatia decussata, a clam with a thick and strong shell, tumid oval and of equivalve, with white color and brown strips, only 1 and 2 individuals were obtained during May 2013 and December 2014 trips respectively, whereas, 6 individuals were obtained during the June 2015 trip, their sizes were ranging between 10.0 and 65.0 mm. in length.

Lithophaga robusta, is an elongate, equivalve, brown color mytilid mussel. Only 2 specimens were collected in the May 2013 trip, the size of the larger one was 40.0 mm in length and 21. mm in width. For further descriptions of the species, see (Al-Yamani, *et al.* 2013) and the numbers of the collected of specimens of each species during the sampling periods are given in Table (2).

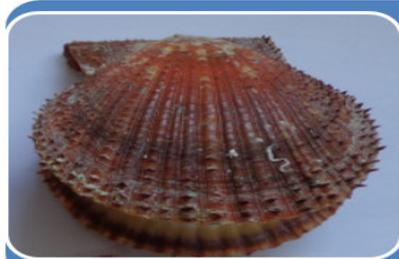
Table (1): Taxonomic identification of the five bivalve species from the coral reef of Iraq.

Phylum	Class	Subclass	Order	Family	Genus	Species
Mollusca	Bivalvia	Pteriomorphia	Arcoida	Arcidae	<i>Barbatia</i>	<i>Decussata</i>
=	=	=	Mytiloida	Mytilidae	<i>Lithophaga</i>	<i>robusta</i>
=	=	=	Pectinoida	Pectinidae	<i>Chlamys</i>	<i>livida</i>
=	=	=	Nuculanoida	Ostreidae	<i>Malvifundus</i>	<i>normalis</i>
=	=	=	Nuculanoida	Pinnidae	<i>Penna</i>	<i>bicolor</i>

Table (2): Bivalve species, number and location of the collected samples in the coral reef recently discovered in the Iraqi Marine water during the period May 2013 to June 2015.

Bivalve species	<i>Chlamys livida</i>				<i>Pinna bicolor</i>			<i>Malvifundus normalis</i>			<i>Barbatia decussata</i>			
	May 2013	Jun 2014	Dec. 2014	Jun. 2015	Jun 2014	Dec. 2014	Jun. 2015	Jun 2014	Dec. 2014	Jun. 2015	May 2013	Jun 2014	Dec. 2014	Jun. 2015
SR - Car wreck 29° 36' 630" N 48° 49' 891" E	3		2			1					1		1	
SR-Coral garden II 29° 36' 590" N 48° 48' 212" E			18				1		9	3			1	4
SR -Lobster point 29° 36' 901" N 48° 47' 909" E			1											
SR - Gorgonians hill 29° 36' 924" N 48° 48' 557," E			11			1								6
SR - Sponge city 2										9				
SR - Sponge city 3														1
SR- Eagle Ray			2				1			11				1
Whipe coral desert		3						6					1	

Fig. 1: Photographs showing the five bivalve species identify from the Iraq coral reef.



- Class: Bivalvia
- Family : Pictinidae
- Genus : *Chlamys livida* (Lamarck, 1891)
- Common name: Scallops
- Coral Reef of Iraq/June 2014
- Length: 8.0 cm
- Subtidal



- Class: Bivalvia
- Family: Pinnidae
- Genus: *Pinna bicolor* (Gmelin, 1791)
- Common name: Pearl Oyster
- Coral Reef of Iraq/June 2014
- Length: 31.0 cm.
- Subtidal



- Class: Bivalvia
- Family: Malleidae
- Genus: *Malvifundus normalis* (Lamarck, 1819)
- Coral Reef of Iraq/June 2014
- Length: 10 cm.
- Subtidal



- Class: Bivalvia
- Family: Arcidae
- Genus: *Barbatia decussata* (Sowerby I, 1833)
- Coral Reef of Iraq/June 2014
- Length: 6 cm



- Class: Bivalvia
- Family: Mytilidae
- Genus: *Lithophaga robusta* (Jouseaume, 1919)
- Coral Reef of Iraq/June 2014
- Length: 2.1 cm
- Subtidal

4- Discussion

Recently, a unique coral reef had been discovered in the turbid coastal waters of Iraq (Pohl, *et al.*, 2014). From an environmental view point, this coral complexes, live in one of the most extreme coral-bearing environment on earth, where the seawater temperature ranges between 14 and 34C° and a turbid seawater. Obviously, the coral reef wasn't detected before by the satellite images like many others in the Gulf due to the turbid coastal waters of Iraq. Furthermore, it wasn't discovered before because of the absence of any scientific diving activities in the region. However, in addition to the living corals, the results of several scientific diving expeditions exemplified the existence of many macrobenthic invertebrate species and other fauna communities as well.

In the light of this finding, the macrobenthos team of the Marine Science Center, University of Basrah initiated an ecological programme to study this community, giving the priority to the taxonomic diagnosis of the bivalve species found in the area, as they represents a useful biota for many environmental studies, especially, the climate change impacts and monitoring of the chemical contaminants (Sara, *et al.*, 2011; ROPME, 2013 a, b, c). In the present investigation we recognized five bivalve species, were three of them, *C. lividis*, *P. bicolor* and *M. normalis*, are an ideal biota for the Mussel Watch Programme proposed by ROPME to be in the Iraq marine waters. This programme have been conducted several year ago in the ROPME Sea Area (The Arab Gulf Countries) and Iran. In this programme various species of pearl oyster, rock oyster and clams, were used as contaminants bio-indicators. Moreover, the presence of these bivalves is valuable, their numbers are, in general, very low (Table 2). In fact, the scuba sampling techniques used in the present investigation reveal any doubt about the data, like density or distribution of the coral reef in the region. Moreover, examination of the underwater videos taken during the 2013-2015 trips confirmed the results of sampling data. These bivalve species were more or less, regularly present in the successive samples, my indicate that they are a permanent community in the coral reef area. On the other hand, the nearest site in which these species were found is located at the Kuwait sea shore, Failka Island (29° 21' 02"N; 48° 29' 59" E) as far as 90 miles of the present site (Jones, 1986; Al-Yamani, *et al.* 2013). However, none of these species was mentioned in the previous reports in Iraq and Kuwait Waters such as Ahmed (1975) and Jones (1986) in Iraq and Kuwait Waters including the recent work of Al-Yamani *et al.* (2013).

From the environmental impacts point of view, it must be pointed out that, although the present survey is the first carried out in the coral area, but in fact there were several previous surveys carried out in the surrounding Iraqi Marine Waters by using fish trawlers, for example, Ali (1997); Ali, *et al.* (2001) whom surveyed the shrimp resources noticed a large number of bivalves and gastropods species usually appeared as a bycatch with the commercial fishes in the trawls. Conversely, our recent investigations (Ali *et al.*, 2013 and 2016) showed quite different results, as almost the whole molluscan community was disappeared from the trawls and dredge samples. Our justification is that two factors are mainly have their adverse impacts on these sensitive benthic fauna, the organic and inorganic pollution of the sea bed (Al-Azab *et al.*, 2005; De Mora *et al.*, 2004 & 2010), and the over-fishing by intensive trawling operations where the sea bed and the benthic fauna are severely distroid (Mohamed *et al.*, 2005).

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