

Systematic and ecological study of recent Ostracoda from Al-Faw town, south of Iraq

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(Received: 25 April 2012 - Accepted: 1 November 2012)

Abstract - Three boreholes were taken from Al-Faw town, Basrah, South Iraq; at a depth of about 29m, from an area in the flood plain of Shatt Al-Arab River. The cores were constituted essentially of silty clay and clayey silt which predominates the recent sediments. They are characterized by gray dark thin layer of silty clay between 16-17 m. The results indicated the disappearance of fossils in this thin layer due to the absence of water circulation. Twenty-six species of Ostracoda were identified, twelve taxa were recorded for the first time in the study area, these are *Macrocyprina decora*, *Candona magnacauda*, *Cytherelloidea pracipua*, *Aurila* cf. sp., *Loxoconcha certinata*, *Loxocorniculum* cf. sp., *L. lilljeborg*, *Stigymatocythere indica*, *Neocytheromorpha reticulata*, *Cypridopsis* sp., *Cyprideis* sp., *Hemicytheridea* sp., *Krith* sp. as well as three eco-facies: Fresh water, brackish water and shallow marine Ostracoda.

Key words: Recent Ostracoda, systematic, ecofacies, Al-Faw town, south Iraq.

Introduction

Ostracoda is one of the best-documented group, within the whole of the animal kingdom, due to a wealth of characteristic features and well-calcified, tiny bivalve carapaces, which fossilizes easily (Jain, 1978; 1981). Ostracodes are known to inhabit wide variety of aquatic environment such as marine, brackish, fresh water, even terrestrial, and also dwell as parasites in the intestines of fishes (Puri, 1966). There are many factors affecting the life of ostracodes, such as: temperature, bottom topography, depth, salinity, pH., alkalinity, dissolved oxygen, food supply, substrate and organic matter content, but salinity represents an important factor controlling ostracodes.

During the late Holocene, the flood plain sediments of South Iraq were greatly influenced by irrigation artificial canal systems and were generally contaminated with reworked sands and silts, which were transported by irrigation water. Both ancient and modern river branches of the Tigris and Euphrates Rivers are densely bifurcated at the lower stretches of the plain (Sabah, 2010). The sediments area composed of sand, silt and clay where the silt percentage is dominant, and the size of sand is very fine. There is a characteristic gray dark thin layer of silty clay at a depth between 16-17 m, indicating the disappearance of fossils, this was represented by a pyritization and this layer may represent the upper-part of Al-Hammar formation (Sabah, 2010). Al-Hammar formation overlaid by recent stream sediment in unstable form, it consist of silt and clay, which was brought by the Tigris, Euphrates, Shatt Al-Arab river and Karun streams beside sediments brought by winds (Saeedy and Mullah, 1990).

Unfortunately, very little systematic and environmental studies were carried out in this area. Khalaf and Elwei (1989) studied some recent Ostracoda from Khor Al-Zubair, Southern Iraq. The marine and non-marine quaternary Ostracoda of southern Mesopotamia were reviewed by Al-Jumaily (1994). Al-Ali (2007) studied the fauna assemblages within the surface and subsurface quaternary sediments of the northwestern Arabian Gulf and Lower Mesopotamia. Issa (2000) made a sedimentological and paleontological study of the tidal flat recent sediments of Khor Al-Zubair and Khor Abdullah, Northwest Arabian Gulf. Al-Baidhany and Al-Badran (2005) studied the biofacies and sedimentary environment of recent sediment of southern Mesopotamian plain.

The present study is aimed at investigating the Ostracoda of Al-Faw Town which was not studied before.

Methods

Three boreholes were chosen from the flood plain of Shatt Al-Arab river, in Al-Faw town, south Iraq within the region of $48^{\circ} 25' 00''$, $48^{\circ} 35' 68''$ E, $30^{\circ} 00' 30''$, $29^{\circ} 54' 30''$ N, drilled by National Constructional Center-Basrah governorate (Fig. 1). A Rotary borer was used to take holes to a depth of 29 m, 29 samples were collected from each boreholes, each sample represented one meter depth, the weight of each sample was 50 g, sieved with a 0.063 mm sieve, washed by water and oven dried. Ostracoda separated by picking from sediments using stereo microscope. Identification was carried out according to Moore (1961), Howe (1962), Jain (1978), Malz (1982b), Whatley and Guahong (1988), Witte (1993a, b) and Betkovski and Meisch (1994).

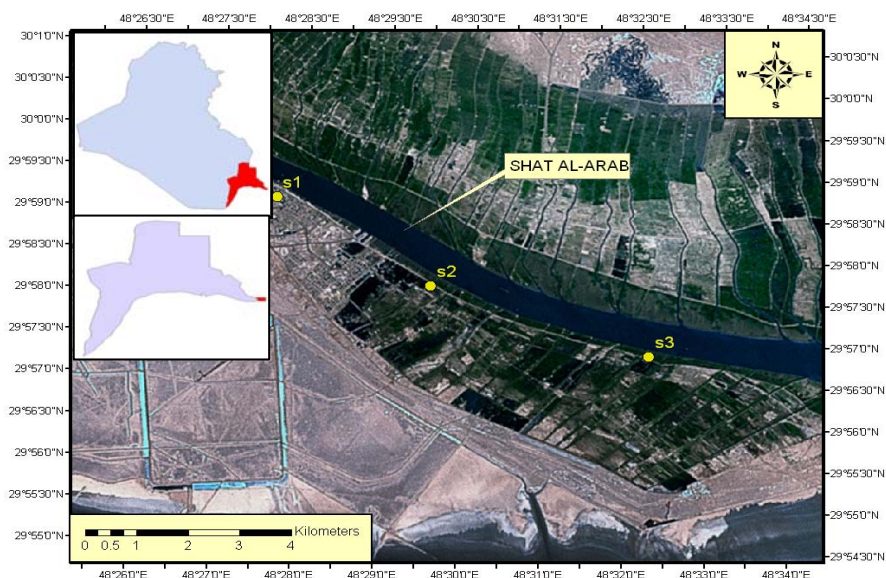


Figure 1. Map of the study area created by using Landsat image captured in 2006.

Results

Ecological Data for Selected Species:

Grekoﬀ (1971) in Al-Jumaily (1994), Stated that the ecology of existing Ostracoda can be applied to recognize it in marine and continental facies, which could be considered as the base of paleoecological analysis and reconstruction, so the following data is an attempt to summarize the ecological information for some selected species.

Depending on these studies, two types of Ostracoda assemblages were identified, these are:

1-Fresh water Ostracoda assemblage:

Candona:

Bathymetric range: Supralittoral to Eulittoral (0.6m) (Morkhoven, 1972 and Harten, 1984 in Al-Jumaily, 1994).

Candona compressa: Recorded from arid region (Delorme, 1970a).

Salinity range: 0.5-5.8 ‰ (Hiller, 1972); from DeDkker (1979) in Al-Jumaily (1994).

Candoniella:

Salinity range: 1.4-4.5 ‰ (Hiller, 1972; DeDkker, 1981 in Al-Jumaily, 1994).
Water-temperature range: 3-23.5 C° (Alm, 1961; from DeDkker, 1979 in Al-Jumaily, 1994).

Ilyocypris:

Bathymetric range: Epilittoral (Mourguirat, 1992 in Al-Jumaily, 1994).

I. gibba:

Salinity range: 0-3‰ (Loffler, 1961; from DeDkker, 1981 in Al-Jumaily, 1994).

Water-temperature range: 4-19 C° (Alm, 1961; from DeDkker, 1981 in Al-Jumaily, 1994).

I. brady:

Salinity range: 1‰ (Loffler, 1961; from DeDkker, 1981 in Al-Jumaily, 1994).
Water-temperature: Found in cold water (DeDkker, 1981 in Al-Jumaily, 1994).

Darwinula:

Bathymetric range: Supralittoral to Eulittoral (1.1 m) (Mourguiart, 1992), preferring clear, calm waters (Lindorth, 1956; from Carbonel *et al.*, 1988 in Al-Jumaily, 1994).

D. stevensoni:

Salinity range: 0-15‰ (Loffler, 1961; from DeDkker, 1981 in Al-Jumaily, 1994).

2-Brackish-water Ostracoda assemblage:

Cyprideis:

Bathymetric range: supralittoral to Eulittoral (0.6 m) (Morkhoven, 1972 and Harten 1984 in Al-Jumaily, 1994).

***C. torosa*:**

This species has the ability to live in wide spectrum of salinity (i.e. from oligohaline to hyperhaline 0.3-140 ‰). (Holmes, 1992b). On the other hand *C. torosa* is considered to be extremely productive species (Heip, 1976 and Herman *et al.*, 1983 in Al-Jumaily, 1994).

Ecofacies:

According to the available biotic data, the study area was divided into three eco-facies (Tables 1, 2 and 3):

Ecofacies A:

Salinity range: 0.5-5‰ (Oligohaline).

Ostracoda assemblage: Fresh water ostracodes such as *Candona compressa*, *Candona neglecta*, *Candonilla wanlessi*, *Cypridopsis* sp., *Ilyocypris gibba*, *Ilyocypris bradyi*, *Darwinula stevensoni* with few individuals of *Cyprideis torosa* which are generally characterized by noded, reticulate and thick wall valves.

Distribution: Station 1: Samples: 5, 6, 7 and 8.

Station 2: Samples: 5, 6, 7, 8 and 9.

Station 3: Samples: 5, 6, 7, 8 and 9.

Ecofacies B:

Salinity range: 18-30 ‰ (Polyhaline).

Ostracoda assemblage: Brackish-water ostracodes represented by the unique occurrence of *Cyprideis torosa* which has a full non-noded, slightly thin and smooth valves, sometimes there is a rare occurrence of *Carinocythereis indica*, *Hemicytheridea paki*, *Hemicytheridea* sp.

Distribution: This eco-facies which coincides with the sea-level fluctuation are not considered to be within Al-Hammar formation, because of the last transgression duration in the study area was at about 4000-5000 years, accordingly this time interval is not enough, by all means to deposit more than 100m of brackish-water sediments (Al-Jumaily, 1994 and Karim, 1994).

Station 1: Samples: 9, 10, 11, 12, 13, 14, 15 and 16.

Station 2: Samples: 10, 11, 12, 13, 14, 15, 16, 18 and 19.

Station 3: Samples: 10, 11, 12, 13, 14, 15, 16, 18 and 19.

Ecofacies C:

Salinity range: 30-40‰ (Euhaline).

Ostracoda assemblage: Shallow marine ostracodes such as: *Haplocytheria keyseri*, *Hemicytheridea paki*, *Carinocythereis indica*, *Krith* sp., *Neomonoceratina iniqua*, *Aurila* cf. sp., *Neocytheromorpha reticulata* in addition to rare existence of *Cyprideis torosa* which is characterized by slightly smaller size, very thin, non-noded, and smooth valves.

Distribution: This eco-facies represent the marine environment, which comprised Al-Hammar formation and other prior marine unite which may reflect other marine transgression during the quaternary in the study area (Al-Jumaily, 1994).

Station 1: Samples: 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29.

Station 2: Samples: 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29.

Station 3: Samples: 20, 21, 22, 23, 24, 25, 26, 27, 28 and 29.

Table 1. Occurrence of Ostracoda at station 1.

No. Sample*	Genus Name																												
	Eco-facies	Cypridopsis sp.	Candonilla wanlessi	Candona compressa	Candona neglecta	Candona magnacauda	Ilyocypris gibba	Ilyocypris bradyi	Darwinula stevensoni	Cyprideis torosa var. torosa	Carinocythereis indica	Hemicytheridea paki	Hemicytheridea sp	Aurila cf. sp.	Cyprideis sp.	Krith sp.	Haplocytheria Keyseri	Neomonoceratina iniqua	Neocytheromorpha reticulata	Loxocorniculum sp.cf. L. liljeborgi	Loxocochna cercinata	Cytherelloidea Pracipua	Stigmatocythere indica	Chrysocythere keiji	Macrocyprina decora	Heterocypris giesbrechti	Stenocypris hislopi		
1																													
2																													
3																													
4																													
5	A						X	X		X																			
6	A	X		X	X																								
7	A	X								X																			
8	A						X			X																			
9	B						X			X	X		X				X				X								
10	B									X	X	X	X				X							X	X				
11	B								X	X		X	X											X	X				
12	B							X		X	X		X	X		X	X				X					X			
13	B							X		X	X		X	X		X		X					X						
14	B		X							X	X	X	X			X								X					
15	B	X								X	X		X	X															
16	B									X	X		X	X		X		X						X					
17																													
18	C									X		X	X								X		X						X
19	C										X	X				X	X	X						X				X	
20	C																	X					X	X	X	X			X
21	C											X				X		X						X	X				
22	C																	X						X	X				
23																		X						X	X				
24										X										X		X	X	X	X				X
25										X											X		X	X			X		
26										X										X	X	X		X					
27										X													X	X	X	X	X		
28										X									X		X		X						X
29										X									X		X	X	X						X

*: one sample for every 1 m
X: presence of Ostracoda
Empty: absence of Ostracoda

Table 2. Occurrence of Ostracoda at station 2.

No. Sample*	Genus Name																										
	Eco-facies	Cypridopsis sp.	Candonilla wanlessi	Candona compressa	Candona neglecta	Candona magnacauda	Ilyocypris gibba	Ilyocypris bradyi	Darwinula stevensoni	Cyprideis torosa var. torosa	Carinocythereis indica	Hemicytheridea paki	Hemicytheridea sp	Aurila cf. sp.	Cyprideis sp.	Krith sp.	Haplocytheria Keyseri	Neomonocerotina iniqua	Neocytheromorpha reticulata	Loxocorniculum sp.cf. L. liljeborgi	Loxoconcha cercinata	Cytherelloidea Pracipua	Stigmatocythere indica	Chrysocythere keiji	Macrocyprina decora	Heterocypris giesbrechtii	Stenocypris hislopi
1																											
2																											
3																											
4																											
5	A		X	X	X	X	X		X																		
6	A	X	X	X		X	X																				
7	A	X							X																		
8	A		X	X	X	X			X																		
9	A	X		X	X				X																		
10	B								X		X	X		X			X										
11	B							X	X	X		X													X		
12	B							X	X	X		X		X			X			X					X		
13	B						X		X	X	X	X	X	X	X	X		X				X					
14	B		X						X	X	X	X		X			X						X				
15	B	X							X		X			X										X			
16	B								X		X			X			X							X			
17																											
18	B							X	X	X	X																X
19	B								X	X	X						X		X								
20	C													X			X		X				X	X	X	X	
21	C										X					X		X		X			X	X	X		
22	C																X		X				X	X			
23																	X		X				X	X			
24									X									X		X		X		X			X
25								X													X	X		X		X	
26								X												X	X		X				
27								X													X	X		X	X	X	
28								X										X		X		X			X	X	
29								X										X		X		X	X				X

*: one sample for every 1 m

X: presence of Ostracoda

Empty: absence of Ostracoda

Table 3. Occurrence of Ostracoda at station 3.

No. Sample*	Genus Name																												
	Eco-facies	Cypridopsis sp.	Candonilla wanlessi	Candona compressa	Candona neglecta	Candona magnacauda	Ilyocypris gibba	Ilyocypris bradyi	Darwinula stevensoni	Cyprideis torosa var. torosa	Carinocythereis indica	Hemicytheridea paki	Hemicytheridea sp.	Aurila cf. sp.	Cyprideis sp.	Krith sp.	Haplocytheria Keyseri	Neomonoceratina iniqua	Neocytheromorpha reticulata	Loxocorniculum sp. cf. L. liljeborgi	Loxocochna cercinata	Cytherelloidea Pracipua	Stigmatocythere indica	Chrysocythere keiji	Macrocyprina decora	Heterocypris giesbrechti	Stenocypris hislopi		
1																													
2																													
3																													
4																													
5	A			X	X	X	X	X	X																				
6	A	X		X	X			X	X																				
7	A	X	X							X																			
8	A		X		X		X	X		X																			
9	A	X				X				X																			
10	B			X	X					X		X																	
11	B								X	X	X		X																
12	B								X	X	X		X				X												
13	B									X	X	X	X	X	X	X		X					X						
14	B										X	X	X			X								X					
15	B									X		X		X															
16	B									X		X		X				X						X					
17																													
18	B									X		X		X															X
19	B										X		X			X		X											
20	C													X			X	X					X	X	X	X			X
21	C											X				X		X		X			X	X	X				
22	C																X	X		X	X	X	X	X	X				
23																	X		X	X	X	X		X					
24										X									X	X	X	X		X					X
25																				X	X	X		X					
26										X										X	X	X		X					
27										X										X	X	X	X	X	X	X	X		X
28										X									X		X	X	X						
29										X									X	X	X	X							X

*: one sample for every 1 m

X: presence of Ostracoda

Empty: absence of Ostracoda

Systematic account:

The occurrence of the recorded taxa is presented in (Tables 1, 2 and 3).

Subphylum: Crustacea (Pennant, 1777).

Class: Ostracoda (Latreille, 1806).

Subclass: Podocopa (Müller, 1894).

Order: Podocopida (Sars, 1866).

Suborder: Odocopina.

Superfamily: Cypridacea (Baird, 1845).

Family: Cyprididae (Baird, 1845).

Subfamily: Cypridinae (Baird, 1845).

Genus: *Heterocypris* (Claus, 1893).

Type species (by original designation): *Cypris incongruens* (Ramdohr, 1808).

Heterocypris giesbrechtii (Müller) Mckenzie, 1971 (Pl. 1, Fig. 1)

Cyprinotus giesbrechtii (Müller, 1898), pp: 277-279, Pl. 15, Figs. 14-22 (in Ellis and Messina, 1952).

Heterocypris giesbrechtii (Müller) Mckenzie 1971, (in Marten, 1984).

Heterocypris giesbrechtii (Müller) Al-Jumaily, 1994, Pl. 11, Fig. 4.

Previous records: Iraq (Recent) (Al-Jumaily, 1994).

Genus: *Stenocypris* Sars, 1889.

Type species (by original designation): *Cypris malcomsonii* (Brady, 1886).

Stenocypris hislopi (Ferguson, 1969) (Pl. 1, Fig. 2)

Stenocypris hislopi (Ferguson, 1969), pp: 68- 71, Pl. 70, Figs. 2-6.

Stenocypris hislopi (Ferguson) Al-Jumaily, 1994, Pl. 11, Figs. 5 and 6).

Previous Records: Iraq (Recent) (Al-Jumaily, 1994).

Genus: *Cypridopsis* (Müller, 1894).

Cypridopsis sp. (Pl. 1, Fig. 3)

Description: The Carapace is semi-ovate in shape, the edge of the front is a large rotation, while the rear edge of the paint with brushes, dorsal edge curved slightly, with convex ventral edge of a simple concavity near the rear edge, the largest rise of the shell is located in the front and the greatest length of the line under the middle of the body shell.

Family: Eucandonidae (Sawin, 1961).

Genus: *Candonilla* (Schneider, 1965).

Candonilla wanlessi (Staplin, 1963) (Pl. 1, Fig. 4)

Candona wanlessi (Staplin, 1963), pp: 789, Pl. 3, Fig. 12.

Candonilla wanlessi (Staplin)n. Comb. (Al-Jumaily, 1994), pp: 20, Pl. 3, Fig. 12.

Previous Records: Iraq (Recent) (Al-Jumaily, 1994).

Family: Macrocyprididae (G.W. Muller, 1912).

Genus: *Macrocyprina* (Triebel, 1960).

Macrocyprina decora (Brady, 1866) (Pl. 1, Fig. 5)

Cytherideis decora (Brady, 1866), v. 5, Pl. S, pp: 366, Pl. 57, Figs. 139c.

Macrocypris decora (Brady), Brady, 1880, v. 1, Pl. 3, pp: 44, Pl. 1, Fig. 3.

Macrocyprina decora (Brady), Hussain, 1998, pp: 3-4, Pl. 3, Figs. 15, 16.

Macrocyprina decora (Brady), Saridhar *et al.*, 2002, pp: 33-34, Pl. IV, Fig. 12.
Previous Records: India (Recent) (Saridhar *et al.*, 2002). This species is recorded for the first time here in Basrah.

Subfamily: Candoninae (Daday, 1900).

Genus: *Candona* (Baird, 1845).

Candona compressa (Koch) Brad, 1868 (Pl. 1, Fig. 6)

Cypris compressa Koch, 1873, No. 16 (in: DeDeckker, 1979).

Candona compressa (Koch) Brady, 1968, pp: 382, Pl. 26, Figs. 22-27 (in: Diebel and Pietrzeniuk, 1984).

Candona compressa (Koch) Al-Jumaily, 1994, Pl. 2., Figs. 11-14.

Previous Records: Iraq (Recent) (Al-Jumaily, 1994).

Candona neglecta (Sars, 1887) (Pl. 1, Fig. 7)

Candona neglecta (Sars, 1887), pp: 107 (In: Yassini and Ghahreman, 1976).

Candona neglecta (Sars), Al-Jumaily, 1994, pp: 18, Pl. 2, Fig. 15.

Previous Records: Iraq (Recent) (Al-Jumaily, 1994).

Candona magnacauda (Teeter, 1980) (Pl. 1, Fig. 8)

Candona magnacauda (Teeter, n., sp., 1980), pp: 343, Pl. 3, Figs. 1-5.

Previous Records: Southern Florida: Pleistocene Teeter (1980). This species is recorded for the first time in Basrah.

Family: Ilyocyprididae (Kaufmann, 1900).

Subfamily: Ilyocyprididae (Kaufmann, 1900).

Genus: *Ilyocypris* (Brady and Norman, 1889).

Type Species (by original designation): *Cypris gippa* (Ramdhor, 1808).

Ilyocypris gibba (Ramdhor) Brady and Norman, 1889 (Pl. 1, Fig. 9)

Cypris gibba (Ramidhor, 1808), pp: 91, 92, Pl. 3, Figs. 13, 14 and 17.

Ilyocypris gibba (Ramidhor) Brady and Basha, 1987.

Ilyocypris gibba (Ramidhor) Al-Ali, 2007, pp: 46, Pl. 7, Fig. 3.

Previous Records: Iraq (Recent) (Al-Jumaily, 1994, Al-Ali, 2007).

Ilyocypris bradyi (Sars, 1890) (Pl. 1, Fig. 10)

Ilyocypris bradyi (Sars, 1890), pp: 59 (In Diebel and Pietrzeniuk, 1975).

Ilyocypris bradyi (Al-Jumaily, 1994), pp: 22, Pl. 3, Figs. 17-19.

Previous Record: Iraq (Recent) (Al-Jumaily, 1994).

Superfamily: Cytheracea (Baird, 1850).

Family: Cytherideidae (Sars, 1925).

Subfamily: Cytheridenae (Sars, 1925).

Genus: *Cytherelloidea* (Alexander, 1929).

Cytherelloidea pracipua (Vanden Bold, 1963) (Pl. 1, Fig. 11)

Cytherelloidea pracipua (Vanden Bold, 1963), pp: 75, Pl. 1 Figs. 1-7.

Cytherelloidea pracipua (Vanden Bold) Swain and Gilby, 1974, pp: 277, Pl. 1, Figs. 5-6.

Previous Records: It was originally described from coral sands, Tobago, West Indies (Vanden Bold, 1963). This species is recorded for the first time from Basrah.

Genus: *Haplocytheria* Stephenson, 1936.

Haplocytheria keyseri Jain, 1978 (Pl. 1, Fig. 12)

Haplocytheria keyseri (Jain, 1978), pp: 99-100, Pl. 2.

Haplocytheria keyseri (Jain) Khalaf and Elewi, 1989, pp: 104, Pl. 1, Fig. 13.
Previous Records: Iraq: Khor Al-Zubair (Recent) (Khalaf and Elewi, 1989, Issa, 2006, Al-Ali, 2007).

Genus: *Cyprideis* (Jones, 1857).

Cyprideis torosa var. *torosa* (Jones), Kelinyi, 1972 (Pl. 1, Fig. 13)

Candona torosa (Jones, 1850), pp: 27, Pl. 3, Figs. 6a-e.

Cyprideis torosa (Joines) Jones, 1857, pp: 21, Pl. 11, Figs. 1a-i.

Cytheridea torosa (Jones), Brady, 1868, pp: 424-427, Pl. 28, Figs. 7-12.

Cytheridea littoralis (Brady, 1869), pp: 125-127.

Cytheridea littoralis (Brady), Sars, 1922-28, pp: 155-156, Pl. 72, Fig. 1.

Cyprideis torosa var. *torosa* (Jones), Kelinyi, 1972, pp: 62, Pl. 1, Fig. 1.

Previous Records: Iraq (Recent) (Al-Jumaily, 1994, Al-Ali, 2007).

Cyprideis sp. (Pl. 1, Fig. 14)

Description: The carapace is semi-ovate in shape, the edge of the anterior is a large rotation, while the posterior edge of the paint brushes, dorsal edge curved slightly, with convex ventral edge of a simple concavity near the posterior edge, the largest rise of the shell is located in the front and the greatest length of the line is under the middle of the body shell. This species is recorded for the first time in Basrah.

Family: Hemicytheridae (Puri, 1953).

Subfamily: Hemicytheridina (Puri, 1953).

Genus: *Hemicytheridea* (Kingama, 1948).

Hemicytheridea paki (Jain, 1978) (Pl. 1, Fig. 15)

Hemicytheridea sp.A (Paki, 1977), pp: 40, Pl. 1, Fig. 20.

Hemicytheridea paki (Jain, 1978), pp: 94-95, Pl. 2, Fig. f1-4.

Hemicytheridea paki (Jain), Al-Jumaily, 1994, Pl. V, Fig. 13-15.

Previous Records: Kuwait (Recent) (Al-Abdul-Razzag *et al.*, 1982), 1983a, b. Arabian Gulf (Recent) Paik, 1977, Iraq: (Al-Jumaily, 1994).

Hemicytheridea sp. (Pl. 2, Fig. 1)

Description: The present species is nearly similar to *Hemicytheridea reticulata* Kingma (1948), but differs in the larger size of carapace, in having comparatively thicker ridges and absence of marginal denticulations. This species has rather truncated posterior and instead of rounded posterior margin as noticed in *Hemicytheridea reticulata*. This species also resembles *Hemicytheridea paki* (Hain, 1978) in its general outline, the presence inner lamella but differs in having comparatively coarser reticulations. This species is recorded for the first time in Basrah.

Genus: *Aurila* pokory, 1955

Aurila cf. sp. (Maddocks, 1974) (Pl. 2, Fig. 2)

Aurila cf. sp. (Maddocks, 1974), pp: 210, Pl. 5, Figs. 4, 12-15.

Aurila cf. sp. (Maddocks), Paul, 1982, pp: 267, Pl. 1, Figs. 5-8.

Previous Records: Mexico (Recent) (Paul, 1982). This species is recorded for the first time in Basrah.

Subfamily: Krithina (Mandelstan) in Bubikan, 1958.

Genus: *Krith* (Brady, Grosskey and Robert Son, 1874).

Krith sp. (Pl. 2, Fig. 3)

Description: Carapace ovate, highest behind the middle, widest just behind the middle. Anterior end evenly rounded; dorsal margin arched in the left valve, ventral margin convex; posterior end obliquely truncate, narrowly rounded below. The posterior margin is more steeply truncate than the outline of the valves, which projects beyond it. The posterior end is incised in dorsal view. The left valve is overlapping the right along the dorsal margin, overlap strongest in anterior part. Length 0.60 mm; height 0.40 mm; width 0.37 mm.

Family: Loxoconchidae (Sars, 1925).

Genus: *Loxoconcha* (Sars, 1866).

Loxoconcha certinata (Bonaduce, Masoli and Pugliese, 1976) (Pl. 2, Fig. 4)
Loxoconcha certinata Bonaduce, Masoli and Pugliese, (Mohan *et al.*, 2001), p. 6, pl. 3, Fig. 18.

Previous Records: India (Recent) Bay of Bengal (Mohan *et al.*, 2001): The present species is recorded for the first time in the study area.

Genus: *Loxocorniculum* (Benson and Coleman, 1963).

Loxocorniculum cf. sp. *L. lilljeborgi* (Brad, 1868) (Pl. 2, Fig. 5)

Loxoconcha lilljeborgi (Brady, 1868), pp: 138, Pl. 13, Figs. 11-15.

Loxoconcha lilljeborgi (Brady Keij, 1954), pp: 358, Pl. 3, Fig. 4.

Loxocorniculum cf. sp. *L. lilljeborgi* (Brady), Hussain, 1998, pp: 7, Pl. 3, Figs. 1-2.

Description: This species is nearly identical to *L. lilljeborgi* in the general outline and nature of ornamentation but slightly shorter in length. It was originally reported from the western Indian Ocean by Brady (1808). The present species is recorded for the first time in the study area.

Family: Tracyleberididae (Sylvester-Bradley, 1948).

Subfamily: Tracyleberididina (Sylvester-Bradley, 1948).

Genus: *Stigmatocythere* (iddiqui, 1971).

Stigmatocythere indica (Jain, 1978) (Pl. 2, Fig. 6)

Carino cythereis (Tandonella) indica (Jain, 1978), pp: 110, Figs. 3j-1-3.

Stigmatocythere indica (Jain), Watley and Qanhong, 1988, pp: 9, Pl. 6, Figs. 20-21.

Stigmatocythere indica (Jain) Sridhar *et al.*, 2002, Pl. 2, Fig. 3j.

Previous Records: The beach sand of Mandvi, Kutch by (Jain, 1978) Kerala coast (Jain, 1981). East coast of India (Varma *et al.*, 1993). This species is recorded for the first time in the study area.

Carinocythereis indica (Jain, 1978) (Pl. 2, Fig. 7)

Carinocythereis cf. *hamata* (Paik, 1977), Pl. 3, Fig. 59.

Carinocythereis (Tandonella) indica (Jain, 1978), pp: 110-111, Pl. 3, Figs. J1-3

Carinocythereis indica (Jain) Al-Jumaily, 1994, pp: VII, Figs. 7-12.

Previous Records: Kuwait (Recent) (Al-Abdul-Razzaq *et al.*, 1982, 1983a). Arabian Gulf (Recent) (Paki, 1977). Iraq (Recent) (Al-Jumaily, 1994).

Genus: *Chrysocythere* (Ruggieri, 1962).

Chrysocythere keiji (Jain, 1978) (Pl. 2, Fig. 8)
Chrysocythere sp. A (Paik, 1977), pp: 40, Pl. 4, Figs. 65-67.
Chrysocythere keiji (Jain, 1978), pp: 113-114, Pl. 3, Figs. 11-2.
Chrysocythere keiji (Jain), Al-Jumaily, 1994, Pl. VII, Fig. 13.
 Previous Records: Kuwait (Recent) (Al-Abdul Razzaq *et al.*, 1982, 1983a).
 Arabian Gulf (Recent) (Paki, 1977). Iraq (Recent) (Al-Jumaily, 1994).

Subfamily: Arculacytherinae (Hatmann, 1981).

Genus: *Neocytheromorpha* (Guan) in Guan *et al.*, 1978.

Neocytheromorpha reticulata (Mohan *et al.*, 2001) (Pl. 2, Fig. 9)
Neocytheromorpha reticulata n.sp (Mohan *et al.*, 2001), Pl. 3, Fig. 7.
 Previous Records: India (Recent) Bay of Bengal, (Mohan *et al.*, 2001): The present species is recorded for the first time in Basrah.
 Description: Medium in size, the elongate a carapace is subreniform to sub ovate in lateral outline .The dorsal margin is gently sloping whereas the ventral margin is slightly sinuous at the middle. The surface is ornamented with sub oval to sub rounded ridges. The posterior margin is deeply depressed.

Family: Schizocytheridae (Howe, 1961).

Genus: *Neomonoceratina* (Kingma, 1948).

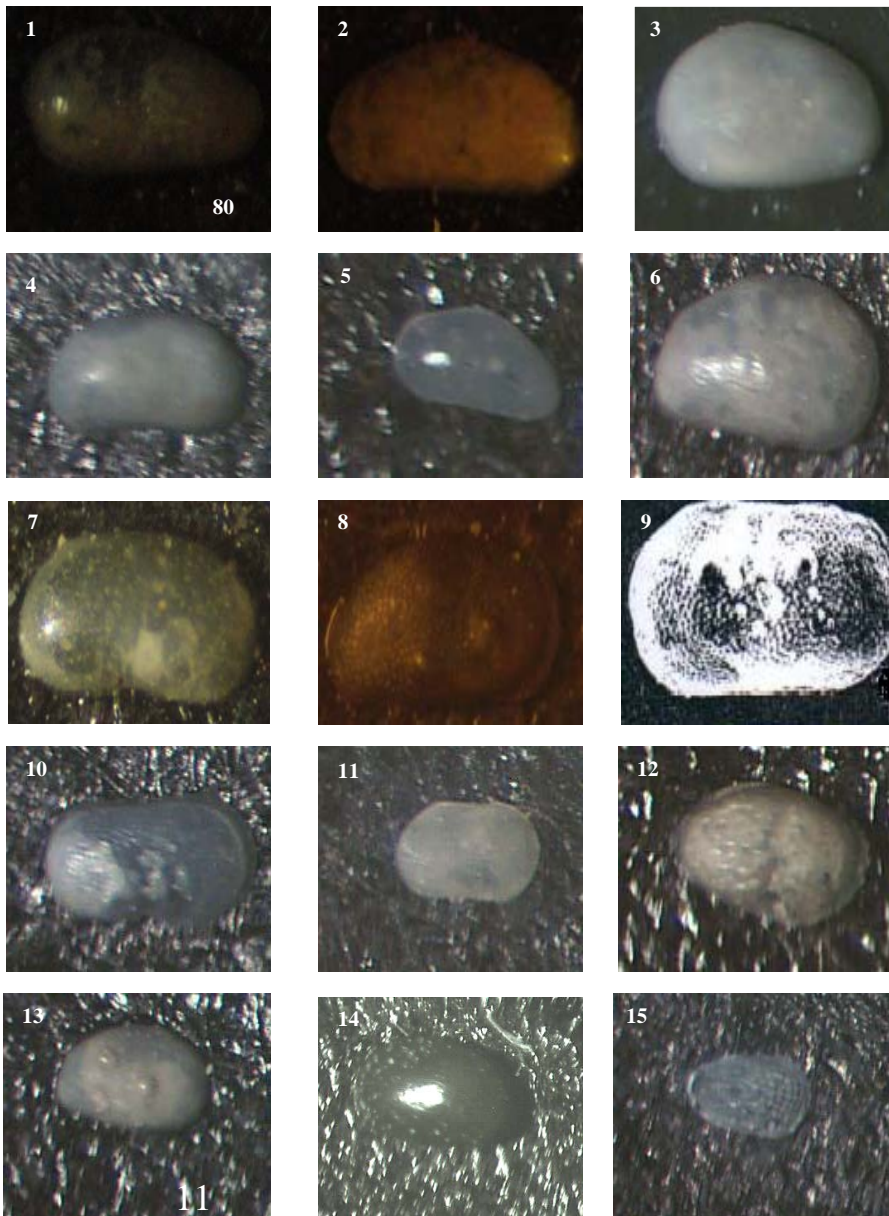
Neomonoceratina iniqua (Brady) Whatley and Quanong, 1987 (Pl. 2, Fig.10)
Cytherura iniqua (Brady, 1886), pp: 64-65, Pl. 8, Figs. 3-6 (in: Whatley and Quanong, 1987).
Neomonoceratina microreticulata (Kingma, 1948), pp: 96, Pl. 10, Figs. 10a, b.
Neomonoceratina delicata (Ishizaki and Kato, 1976), pp: 136, 138, Pl. 3, Figs. 1-3.
Neomonoceratina cf. *delicata* Ishizki and Kato, Jain, 1978, pp: 95, Pl. 2, Figs. 1-2.
Neomonoceratina cf. *delicata* Ishizki and Kato, Bhatia and Kumr, 1979, pp: 173, Pl. 1, Fig. 7.
Neomonoceratina iniqua (Brady) Whatley and Quanong, Al-Jumaily, 1994, Pl. VI, Fig. 15, Pl. VII, Figs. 1-6.
 Previous Records: Iraq (Recent), Khor Al-Zubair (Khalaf and Elwei, 1989, Al-Jumaily, 1994).

Superfamily: Darwinulacea (Brady and Norman, 1889).

Family: Darwinulidae (Brady and Norman, 1889).

Genus: *Darwinula* (Brady and Robertson, 1885).

Darwinula stevensoni (Brady and Reberston, 1870) (Pl. 2, Fig. 11)
Polycheles stevensoni (Brady and Reberstoni, 1870), pp: 52, Pl. 4, Figs. 1-7 (in Freels, 1980).
Darwinula stevensoni (Brady and Reberston) Kaufmann, 1900, pp: 393, Pl. 29, Figs. 6-9.
Darwinula stevensoni (Brady and Reberston) Al-Jumaily, 1994, Pl. IV, Fig. 4.
 Previous Records: Iraq (Recent) (Al-Jumaily, 1994).



Pl. 1

1- *Heterocypris giesbrech* (Muller) Mekenzie, 1971

2- *Stenocypris hislopi* Ferguson, 1969

3- *Cypridopsis* sp.

4- *Candonilla wanlessi* Staplin, 1963

5- *Macrocyprina decora* Brady, 1866

6- *Candona compressa* (Koch) Brad, 1868

7- *Candona neglecta* Sars, 1887

8- *Candona magnacauda* Teeter, 1980

9- *Ilyocypris gibba* (Ramdhor) Brady and Norman, 1889

10- *Ilyocypris bradyi* Sars, 1890

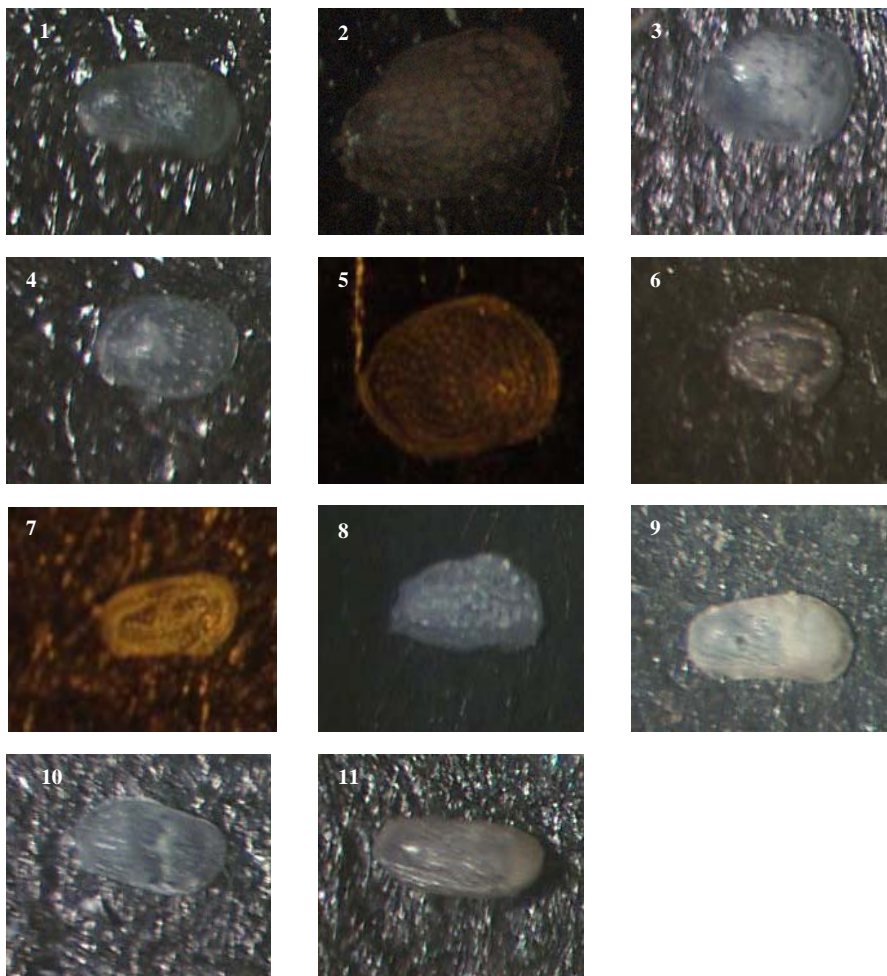
11- *Cytherelloidea principua* Vanden Bold, 1963

12- *Haplocytheria keyseri* Jain, 1978

13- *Cyprideis torosa* var. *torosa*. (Jones), Kelinyi, 1972

14- *Cyprideis* sp.

15- *Hemicytheridea paki* Jain, 1978



Pl. 2

1-*Hemicytheridea* sp. 80X

2-*Aurila* cf. sp. Maddocks, 1974

3-*Krith* sp.

4-*Loxoconcha certinata* Bonaduce, Masoli and Pugliese, 1976

5-*Loxocorniculum* cf. sp.L. *lilljeborgi* Brad, 1868

6-*Stigmatocythere indica* Jain, 1978

7-*Carinocythereis indica* Jain, 1978

8-*Chrysocythere keiji* keiji Jain, 1978

9-*Neocytheromorpha reticulata*. Mohan *et al.*, 2001

10-*Neomonoceratina iniqua* (Brady) Whatley and Quanong, 1987

11-*Darwinula stevensoni* Brady and Reberston, 1870

Conclusion

- There are twenty six species of marine and non-marine Ostracoda recorded from the study area (in Al-Faw town, south of Iraq), including twelve taxa recorded for the first time, which are: *Macrocyprina decora*, *Candona magnacauda*, *Cytherelloidea pracipua*, *Aurila cf. sp.*, *Loxoconcha certinata*, *Loxocorniculum cf.sp.*, *L. lilljeborgi*, *Stigmatocythere indica*, *Neocytheromorpha reticulata*, *Cypridopsis sp.*, *Cyprideis sp.*, *Hemicytheridea sp.* and *Krith sp.*
- Paleoecologically, there are three ecofacies proposed depending on the salinity which is controlling the distribution of Ostracoda.
- The species are influenced by fresh water, there is a decrease in salinity by fresh water fed by rivers as well as species indicate a saline water covered the region belonging to Al-Hammar formation because of transgression in mid-Holocene and fluctuation of the sea level during this period.

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دراسة بيئية وتصنيفية لأنواع الدرعيات (الأوستراكودا) الحديثة في الفاو جنوب العراق

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المستخلص - إختيرت ثلاثة أبار للدراسة في الفاو في محافظة البصرة جنوب العراق، لم يتجاوز عمقها 29 م، تقع منطقة الدراسة في السهل الفيضي لشط العرب والتي تتكون بشكل أساسي من الطين الغريني والغرين الطيني ومعظمها تمثل الرواسب الحديثة، تتميز هذه الرواسب بوجود طبقة غرينية طينية رقيقة ذات لون رمادي تقع بين عمق 16-17 م وبيننت نتائج الدراسة عدم ظهور المستحاثات في هذه الطبقة نتيجة لعدم وجود دوران المياه فيها. تم تشخيص 26 نوعاً، 12 منها شخصت لأول مرة في منطقة الدراسة هي: *Macrocyprina decora*, *Candona magnacauda*, *Cytherelloidea pracipua*, *Aurila cf. sp.*, *Loxoconcha certinata*, *Loxocorniculum cf. sp.*, *L. lilljeborg*, *Stigmatocythere indica*, *Neocytheromorpha reticulata*, *Cypridopsis sp.*, وقد شخصت ثلاث سحنات بيئية وهي درعيات المياه العذبة ودرعيات المياه المويحة ودرعيات المياه البحرية الضحلة.