Fifth International Conference on the Geology of the Tethys Realm, South Valley University, January 2010, P. 55-70

ZOOGEOGRAPHY AND TAXONOMY OF THE RECENT MARINE OSTRACODA IN THE EGYPTIAN RED SEA MANGROVE PROTECTED AREAS.

S. A. Helal* and M. Abd El-Wahab**
*Geology Department, Faculty of Science, Fayoum University, Fayoum , Egypt
**National Institute of Oceanography and Fisheries, Red Sea Branch, Egypt

ABSTRACT

Fourty six surface samples representing the recent marine sediments in the mangrove ecosystem of the Egyptian Red Sea are treated for their Ostracoda content. These samples are collected from Wadi Gemal and Abu Ghoson areas. Fourty eight ostracode species have been identified, belonging to twenty eight genera and fourteen families. The percentages of the most common Ostracoda genera are *Xestoleberis* (42.11% at Wadi Gemal& 29.6% at Abu Ghoson respectively), *Ghardaglaia* (11.1% and 24.23%), *Loxoconcha* (9.57% and 11.88%), *Quadracythere* (11.4%and 8.43%), *Hiltrmannicythere* (2.5% and 5.82%) and *Loxocorniculum* (6.59% and 2.23%). These genera represent more than three quarters of the whole present assemblage in the sites. The studied fauna show a clear Indo-Pacific affinity with rare Mediterranean and cosmopolitan elements. The presence of such species is attributed to passive migration.

INTRODUCTION

Mangrove forests are important environmental element and ecologically significant habitat. Two species of mangrove trees have been recorded from the Egyptian Red Sea coast; *Avicennia marina* and *Rhizophra mucronata* (Zahran, 1965). The former one dominates the study area. The mangrove represents mosaic habitats containing both hard and soft ones. So, it provides living space in many parts of the world for more than 2,000 species of fish, invertebrates and epiphytic plants (Hamilton & Snedaker, 1984).

The present work aims to study the Recent Ostracoda, as a part of the invertebrate community, from mangrove environment of the Egyptian Red Sea coast. This study is mainly directed to: 1. Explore the Ostracoda population in the mangrove ecosystem. 2. Identify and systematic study of the recovered Ostracoda, as this work is the first in this item along the Egyptian Red Sea coast. 3. Throw some light on the environmental relations and probable role of Ostracoda in the mangrove ecosystem. 4. Study the zoogeography of the Ostracoda faunal assemblage.

The study area comprises two mangrove sites which is the largest occurrences of mangrove trees along the Egyptian Red Sea coast (Fig. 1). The first one, Wadi El Gemal Site, is situated in the south of Marsa Alam at lat. 24° 40\ 37\\ to 24° 41\ 13\\ N and Long. 35° 05\ 18\\ to 35° 04\ 57\\ E. The second one, Abu Ghoson area (El Qalaan site), is located at 40 Km south Wadi El Gemal between lat. 24° 21\ 29\\ to 24° 21\ 32\\ N and Long. 35° 18\ 23\\ to 35° 18\ 13\\ E.

Material and Methods

For collecting representing samples, each site of the two studied areas was subdivided into four transects and forty six surface bottom sediment samples were collected (18 samples from Wadi El Gemal and 28 samples from Abu Ghoson, Fig.1). Sediment samples were collected by grab sampler and some of them collected by pushing steel boxes into the sediment to obtain about 1/2 kg of sediment samples. These samples were collected in Jan. 2004. The oceanographic parameters affect the shore environments and simultaneously have the impression on the shore communities. The oceanographic parameters were measured using Hydrolab Instrument (model Surveyer[4], 1997) and the obtained results are introduced in Table 1.

Environmental Situation of the Mangroves

Mangroves are among the few plants able to live in a salty marine environment. They thrive in shallow, calm, nutrient rich environments. Mangroves protect reefs from terrestrial sediments and provide shelter among their roots for juvenile reef fish, such as snappers .They have indirect value in controlling coastal erosion and contributing to shoreline accretion (Chapman, 1977). These forests are extremely important ecologically and environmentally for the continued existence and maintenance of coastal fisheries, for the shoreline protection, a refuge for wild life including birds, for sediment stabilization; and to a minor extent mangroves provide forage for camels and other live stock as well as used as fire wood (Madkour & Mohamed, 2005).

Mangrove communities suffer from natural and human induced stresses .Globally, mangroves are destroyed by natural phenomena (cycles, tidal waves, eustatic sea level changes, coastal erosion, hypersalinity) and anthropogenic inputs (Odum and Johannes,1975, Saenger et al 1983). Human induced stresses, including overgrazing, solid waste disposal, overfishing, urbanization and changes in hydrological patterns threaten the survival of mangroves in Egypt. Loss of mangroves will not only deplete the resources available within their boundaries, but also would affect the productivity of offshore waters (Madkour & Mohamed, 2005). Moreover, oil industry, coastal engineering projects, reclamation, aquaculture and dredging of estuaries and the intertidal zone can destroy mangrove directly or indirectly through changing wadi courses and drainage patterns. For preventing or reducing the harmful effects of all these hazards all mangrove forests in Egypt are declared as protectorates by the laws no.102/1983,4/1994 and by Egyptian Prime Ministerial Decrees no. 1067/1983, 642/1995 and 143/2003.

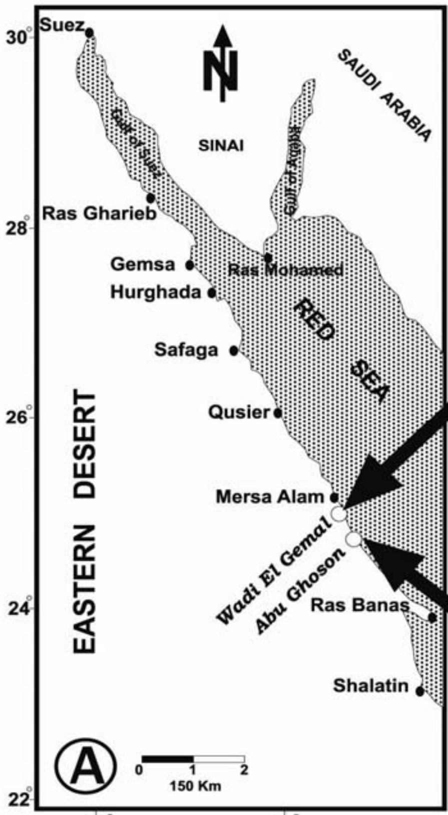


Fig. (1A). Egyptian Red Sea Coast and the location of the study area

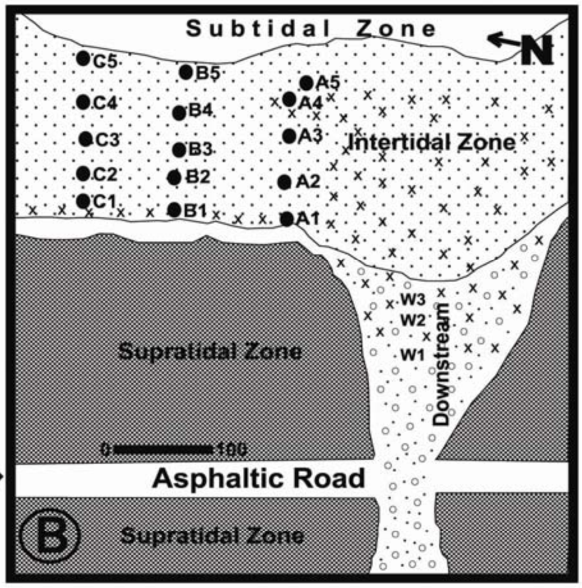


Fig. (1B). Distribution of collected samples and bottom facies of Wadi Gemal

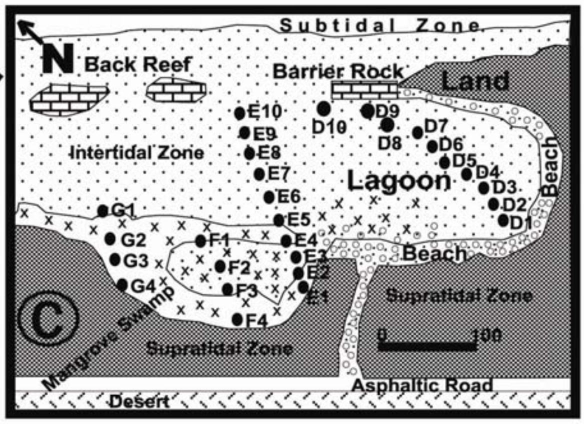
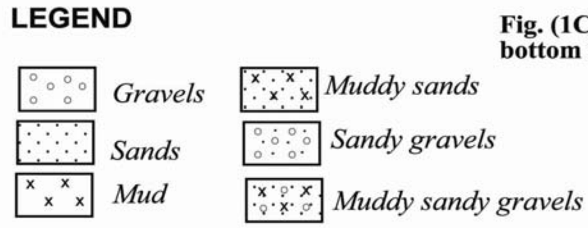


Fig. (1C). Distribution of collected samples and bottom facies of Wadi Abu Ghuson(Q'laan site)



Environmental Relations and Probable Role of Ostracoda in Mangrove Ecosystem.

The actual role of Ostracoda in the mangrove ecosystem was not fully understood. In the following paragraphs, we will try to discuss some key notes about this role. As we see above, the mangrove forests are shallow, sheltered, calm and considerably high productive environment. Consequently, Ostracoda must be of that forms adapted to photic, shallow, low energetic and nutrient rich environment. Algae and sea grasses are important elements in this community. Hence, phytal and plant dwelling Ostracoda are abundantly present.

Ostracoda have evolved a wide variety of nutrition systems including filter feeding and deposit –feeding (Pokorny, 1978). In captivity, most forms will live on a diet of algae, tomatoes or raw potatoes as well as on crushed snails, copepods or fresh raw meat (Morkoven, 1962). Recent marine benthic forms tend to be either crawlers or burrowers. They are filter-feeding on detritus or on diatoms, foraminifers and small polychaete worms. Such Ostracoda thrive best in muddy sands and silts or algae and sea grasses (Brasier, 1979). Some forms prefer vegetal substances, mainly algae such as Ulvaceae and diatoms. Paradoxostominae are known to suck the juices of water plants; the mouth in this group is especially adopted as a sucking organ for the purpose. Other forms seem to be omnivorous. Decaying vegetation as well as small animals forms a large part of their diet. Thus they act principally as scavengers (Morkhoven, 1962). The scavenger Ostracoda, through its nutrition habits, will consume and disturb the excess accumulation of the organic matter. This will

share in preventing the change of the environment to euxinic conditions. Normally, other biota support this role especially the burrowers, filter-feeding and deposit-feeding organisms. Beside Ostracoda, the environment is inhabited by rich communities of benthic forams, mollusks, bryozoans, echinoderms, craps, fishes, sea turtles, algae and sea grasses.

The community structure of the Ostracoda in the study area supports this view. All the recorded Ostracoda species are of the forms adopted for shallow, sheltered, and vegetated environments. The most common Ostracoda are *Xestoleberis* **(42.11% at Wadi Gemal& 29.6% at Abu Ghoson respectively),** *Ghardaglaia* **(11.1% and 24.23%),** *Loxoconcha* **(9.57%and11.88%),** *Quadracythere***(11.4% and 8.43%),** *Hiltrmannicythere* **(2.5% and 5.82%),** *Loxocorniculum* **(6.59% and 2.23%),** *Paranesidea***(3.4% and 1.74%), and** *Neonesidea* **(2.63% and 1.52%) in descending order. Mangrove trees, algae and sea grasses are commonly present allover the study area. The plant dominant environments not only introduce feeding but also offer protection for Ostracoda. According to Benson(1961),marine salt- marshes grasses such as the turtle grass(***Thalassia***) of Florida and the Gulf Coast and the eel grass(***Zostera)* **of the Pacific Coast offer protection for ostracode populations. These Ostracoda are absent in the intervening bar spots. Moreover, the type of algae and sea grasses determine the associated ostracode species. Benson(op.cit.) noted that a filigreed coralline algae growing in a tide pool can teem with species of** *Xestoleberis* **and** *Cyhtere***, whereas a neighboring different type of alga may be associated with numerous individuals of** *Loxoconcha* **or** *Hemicyther***e. Ostracodes living on or near green algae commonly are different from those of brown algae.**

In the study area, the algae and sea grasses are widely distributed. At Wadi Gemal area, the macro algae were found at a depth of 50-60 cm, in scattered pattern. The creeping green algae such as *Caulerpa racemosa* **was found in small aggregations covering vast areas of the sandy substrata and some dead corals as well. Also, small quantities of the green algae** *Halimeda tuna* **were found in between branches of corals. Seagrass species were found as spots forming large meadows, growing in sandy mud substrate such as** *Halophila stipulacea* **and** *Halodule uninervi***. The seagrass** *Halophila stipulacea* **was the dominant species forming separated patches. At Hamata area, the green algae forms a low dense mat that covered some of the swamp floor.** *Cystoseira myrica, Sargassum dentifolium* **and** *Turbinaria triquetra* **appeared forming scattered vegetation. The sea-grass vegetation was very limited, only a few spots of** *Halophila stipulacea* **were found in the sandy depressions around the corals. Also, the seagrass** *Thalassia hemprichii* **forms small scattered patches that occupied wide areas of the sandy flat.**

In this study, it is generally noted that the samples with higher percentages of Ostracoda, are those associated with algae and sea grasses(e.g. samples C3,C4,E1,E10,D3,D4,and D5). The patches occupied with the turtle sea grass *Thalassia hemprichii***, and** *Halophila stipulacea* **have yielded dense communities of** *Ghardaglaia triebeli***, followed by** *Hiltermannicythere rubrimaris***, and** *Sclerochilus rectomarginatus.* **The areas with the green creeping algae** *Caulerpa recemosa* **have yielded dense communities of** *Xestoleberis* **spp. followed by** *Loxoconcha* **spp. and** *Loxocorniculum* **spp.(e.g.samples A2, B3,and C4). The scattered vegetations of** *Cystoseira myrica***, and** *Sargassum dentifolium* **are inhabited by many** *Xestoleberis* **spp.,** *Ghardaglaia triebeli***,** *Hiltermannicythere rubrimaris***,** *Miocyprideis* **cf.** *spinulosa* **and** *Alocopocythere reticulata* **(e.g. samples D5,and D6).The presence of** *Turbinaria triquetra* **is accompanied with fairly high number of** *Callistocythere arcuata, Ghardaglaia and Hiltermannicythere***(e.g. sample D6). Also, this is associated with less abundant occurrences of** *Callistocythere arenicola, Neonsidea* **spp.,** *Paranesidea* **spp., and** *Trieblina* **sp.**

The substrate exerts a strong influence on benthic Ostracoda. It has often been observed that the size, shape and sculpture of benthic Ostracoda broadly reflect the stability, grain size and pore size of the substrata (Brasier,1979). Coarse-grained sediments, like clean sands or oolites, support only a small ostracoda population, whereas mud-mixed sands and pelitic sediments usually have a larger and much more diversified ostracode fauna(Pokorny',1978). They are scarce in Globigerina oozes and more scarces in euxenic black mud, evaporites, well sorted quartez sands and calcareous sand(Brasier,1979). Generally, mangrove sediments in the study area are composed of a combination of biogenic and terrestrial materials. Biogenic materials are either developed in situ or coming from the Red Sea landward migration, whereas terrestrial materials are derived from the hinterland old rocks and transported to the sea by different agents of transportations.

Mangrove sediments of the investigated area are composed basically of slightly gravelly muddy sand, whereas fine sand fractions are the most dominant in the intertidal zone. sediments are characterized by being poorly sorted, nearly symmetrical to Mangrove coarse skewed, and mesokurtic to leptokurtic fine sand. This reflects the trapping of fine material by plants and supply of coarse material by mollusca particles. Wadi El Gemal downstream is distinguished by abundance of sand fraction and relatively high mud content. The relatively high content of mud is due to the influence of terrigenous influx. Hamata area is characterized by high biogenic sand fraction, low mud and gravel content, respectively. In this study, it is generally observed that samples with gravelly muddy sand substrata are inhabited with dense communities of benthic ostracodes(e.g. samples D9,D8,D5,E10,E9,E8,C3,C4,and B5).

The samples with gravelly sandy mud substrata yielded poor benthic Ostracoda communities (e.g. samples F3, F4, G1, G2, and G3). Moreover, the sandy muddy gravels are very poor to totally barren from ostracoda. The recorded carapaces are mostly reworked or badly worn (e.g. samples W1,W2, and W3).

ZOOGEOGRAPHY

As the Red Sea is a northerly directed arm of the Indian Ocean, the ostracode fauna shows a clear Indo-Pacific affinity. Bonaduce et al. (1983) stated that "In fact, many genera are in common with the Indo-Pacific area: *Loxoconchella***,**

Australoecia, , *Saipanetta, Alocopocythere, Bishopina Moosella*". **Bate, 1971 noted that ten species are in common with the Red Sea and another arm of the Indian Ocean, the Persian Gulf(Abu Dhabi lagoon). These species are** *Xestoleberis rhomboidea* **Hartmann,** *X. rotunda* **Hartmann,** *X. multiporosa* **Hartmann,** *Neonesidea schulzi* **(Hartmann),** *Loxoconcha ornatovalvae* **Hartmann,** *Aglaiocypris triebeli***(Hartmann),** *Hemicytherura videns aegyptiaca* **Hartmann,** *Paradoxostoma longum* **Hartmann,** *Cytheroma dimorpha* **Hartmann and** *Alocopocythere reticulate* **(Hartmann). All these species are recorded in the present study except** *Hemicytherura videns aegyptiaca* **Hartmann which is absent in our material. Furthermore, Bate (op. cit.) showed that these species entered both regions (Red Sea and Persian Gulf)from the Indian Ocean independently. Bate (1971) collected species common to the Red Sea and the Persian Gulf from shallow water sediments off Bagamoyo, Tanzania (East Africa). Helal and Abd El-Wahab (2004) recoded 14 species present in both the Red Sea (Safaga Bay) and the Persian Gulf(Abu Dhabi lagoon). The majority of the recorded fauna belong to the Indo-Pacific realm. Out of 48 species, 41 species are of Indo- Pacific affinity., 3 species are Mediterranean and 4 species are cosmopolitan. A brief account on the zoogeography of each taxon has been given in the following table (Table. 2).**

Table 1. Oceanographic parameters measured in Jan. 2004 at Wadi El Gemal and Qalaan site.

Sample No.	Depth in cm.	Temp. °C	Bottom Facies	Salinity%	Do mg/L	pH	TDS g/L	Eh m v	SPC Ms/cm
W1	80	20.16	Coarse sand	12.29	7.17	8.48	13.14	348	20.65
W2	120	19.32	Medium sand	25.75	5.84	8.08	25.79	370	40.56
W3	80	24.66	Sandy gravel	40.02	7.43	8.31	38.28	343	50.02
A1	Beach	24.95	Biogenic coarse sand	40.57	7.29	8.42	30.70	334	60.45
A2	50	25.08	Biogenic coarse sand	40.33	8.42	8.45	38.49	334	60.05
A3	50	24.89	Biogenic medium sand	41.12	8.69	8.96	39.16	337	61.16
A4	40	24.5	Biogenic medium sand	41.14	8.59	8.48	39.18	338	61.18
A5	40	24.6	Mixed coarse sand	41.16	8.62	8.46	39.21	339	61.22
B1	Beach	25.18	gravelly sand	40.75	7.15	8.41	38.79	338	60.42
B2	50	25	Biogenic coarse sand	40.66	8.16	8.54	38.79	339	60.57
B3	50	24.95	Biogenic coarse sand	41.33	9.36	8.48	39.33	340	61.43
B4	40	24.98	Biogenic medium sand	41.31	9.60	8.49	39.32	345	61.46
B5	40	24.51	Biogenic medium sand	41.4	9.55	8.50	39.40	345	61.53
C1	Beach	24.59	Gravelly sand	41.26	7.83	8.47	39.29	332	61.40
C2	50	22.86	Biogenic muddy sand	41.49	9.48	8.50	39.43	339	61.65
C3	50	21.75	Biogenic medium sand	41.5	9.72	8.51	39.45	336	61.61
C4	40	23.18	Biogenic medium sand	41.61	9.43	8.52	39.53	345	61.75
C5	40	23.68	Biogenic coarse sand	41.52	8.90	8.53	39.47	345	61.64
D1	Beach	20.25	Biogenic coarse sand	40.42	6.01	8.42	38.75	270	60.43
D2	80	20.29	Biogenic coarse sand	40.44	6.00	8.64	38.81	271	60.73
D3	100	21.9	Biogenic medium sand	40.72	6.43	8.50	38.80	270	60.72
D4	100	20.46	Biogenic medium sand	40.61	6.25	8.51	38.68	278	60.50
D5	120	20.51	Biogenic medium sand	41.06	6.18	8.53	39.05	307	60.98
D6	140	20.28	Biogenic medium sand	41.17	5.89	8.53	39.11	310	61.18
D7	70	20.52	Biogenic fine sand	41.26	6.07	8.53	39.23	312	61.27
D8	30	20.64	Biogenic fine sand	41.28	6.55	8.53	39.25	313	61.32
D9	30	21.83	Biogenic medium sand	41.32	6.42	8.54	39.26	315	61.34
D10	20	23.23	Biogenic medium sand	41.00	7.71	8.57	39.07	278	61.02
E1	Swamp	22.38	Medium sand	41.42	6.60	8.55	39.39	324	61.60
E2	Swamp	22.39	Muddy sand	41.35	6.69	8.55	39.33	322	61.48
E3	Swamp	21.97	Muddy sand	41.30	7.43	8.55	39.32	318	61.40
E4	Swamp	22.44	Muddy sand	41.06	6.64	8.54	39.06	316	61.06
E5	Beach	22.02	Mixed gravelly sand	41.22	7.24	8.53	39.22	313	62.21
E6	Beach	21.63	Mixed gravelly sand	41.31	6.40	8.51	39.29	311	61.37
E7	20	22.42	Biogenic medium sand	44.29	5.24	8.46	41.80	322	65.36
E8	20	20.13	Biogenic medium sand	43.12	5.5	8.46	40.80	310	63.80
E9	30	20.11	Biogenic medium sand	43.10	5.40	8.44	40.60	309	63.70
E10	50	20.15	Biogenic medium sand	43.15	5.43	8.42	40.40	309	63.60
F1	Swamp	20.11	Muddy sand	43.10	5.30	8.40	40.60	308	63.50
F2	Swamp	22.44	Muddy sand	44.13	5.86	8.40	41.71	325	65.18
F3	Swamp	23.68	Muddy sand	44.54	6.12	8.43	42.01	325	65.69
F4	Swamp	23.67	Muddy sand	44.52	6.18	8.45	42.20	328	65.70
G1	Swamp	26.69	Muddy sand	45.29	7.96	8.48	42.70	330	66.71
G2	Swamp	26.65	Muddy sand	45.28	7.90	8.40	42.60	330	66.70
G3	Swamp	26.63	Muddy sand	45.27	7.86	8.38	42.50	330	66.69
G4	Swamp	26.61	Muddy sand	45.26	7.81	8.36	42.40	330	66.65

Table 2. Zoogeography of the recorded Ostracoda in the Red Sea mangroves

Species	Geographic niche	Authors
Paranesidea fracticorallicola	Indo-Pacific, Persian Gulf, Red Sea	Maddocks1969, Bonaduce et al.1983
Paranesidea fortificata	Indo-Pacific, Red Sea	Bonaduce et al.1983
Paranesidea sp.2	Red Sea	Bonaduce et al.1983
Neonesidea schulzi	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971, Bonaduce et al.1983 ,Helal& Abd El Wahab2004
Neonesidea sp.1	Red Sea	Bonaduce et al.1983
Triebelina jellinki	Cosmopolitan	Malz& Lord1988
Triebelina sertata	Cosmopolitan	Teeter1975, Malz& Lord1988
Ghardaglaia triebeli	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971, Bonaduce et al.1983 ,Helal& Abd El Wahab2004
Pontocypris sp. B *Bate*	Indian Ocean, Persian Gulf , Red Sea	Bate1971 and Helal& Abd El Wahab2004
Leptocythere arenicola	Red Sea	Hartmann1964, Bonaduce et al.1983
Callistocythere arcuata	Red Sea	Bonaduce et al.1980, Bonaduce et al.1983
Callistocythere cf. *C. litoralis*	Mediterranean Sea, Red Sea	Ruggieri1974, Hartmann1964, Bonaduce et al.1983
Caudites levis	Red Sea	Hartmann1964, Helal& Abd El Wahab2004
Alocopocythere reticulata	Red Sea, Persian Gulf , Oman Gulf	Hartmann1964, Bate1971, Paik1977
Tuberculocythere sp.1	Red Sea	Bonaduce et al.1983
Quadracythere borchersi	Red Sea, Mozambique	Hartmann1964&1974, Bonaduce et al.1983
Ruggieria?danielopoli	Red Sea	Bonaduce et al.1976, Bonaduce et al.1983
Hiltermannicythere rubrimaris	Red Sea	Hartmann1964, Bonaduce et al.1983, Helal& Abd El Wahab2004
Moosella striata	Red Sea	Hartmann1964, Helal& Abd El Wahab2004
Lankacythere sp.	Red Sea	Bonaduce et al.1983
Cyprideis litoralis	Cosmopolitan	Hartmann, 1964
Cypridies torosa	Cosmopolitan	Guillaume et al.,1985
Miocyprideis cf. spinolusa	Cosmopolitan	Kollmann1960, Gramann1971, Helal& Abd El Wahab2004
Loxoconcha idkui	Mediterranean Sea , Red Sea	Hartmann1964
Loxoconcha ornatovalvae	Red Sea, Persian Gulf	Hartmann1964, Bate1971
Loxoconcha sp.1	Red Sea	Bonaduce et al.1983
Loxoconcha n. sp.A Bate	Indian Ocean, Persian Gulf, Red Sea	Bate1971, Helal& Abd El Wahab2004
Loxocorniculum ghardaquensis	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971, Helal& Abd El Wahab2004
Loxocorniculum aff *.L. algicola*	Red Sea	Hartmann1974, Bonaduce et al.1983
Loxocorniculum sp. 1	Red Sea	Bonaduce et al.1983
Paracytheridea aqabaensis	Red Sea	Bonaduce et al.1976, Bonaduce et al.1983
Paracytheridea remanei	Red Sea	Hartmann1964, Helal& Abd El Wahab2004
Paradoxostoma breve	Mediterranean Sea , Red Sea	Hartmann1964, Bonaduce et al.1983
Paradoxostoma parabreve	Red Sea	Hartmann1964
Paradoxostoma longum	Red Sea, Persian Gulf	Hartmann1964, Bate1971
Paradoxostoma punctatum	Red Sea	Hartmann1964
Cytherois gracilis	Red Sea	Hartmann1964
Sclerochilus rectomarginatus	Red Sea	Hartmann1964
Cytheroma dimorpha	Red Sea, Persian Gulf , Oman Gulf	Hartmann1964, Bate1971, Paik1977
Abditacythere subterranea	Red Sea	Hartmann1964
Xestoleberis ghardaqae	Red Sea	Hartmann1964
Xestoleberis multiporosa	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971
Xestoleberis simplex	Red Sea	Hartmann1964
Xestoleberis rhomboidea	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971, Bonaduce et al.1983 , Helal& Abd El Wahab2004
Xestoleberis rotunda	Indian Ocean, Persian Gulf, Red Sea	Hartmann1964, Bate1971, Bonaduce et al.1983 , Helal& Abd El Wahab2004
Xestoleberis rubrimaris	Red Sea	Hartmann1964
Cytherella cf. *punctata*	Persian Gulf, Red Sea	Bate1971, Helal& Abd El Wahab2004
Cytherelloidea sp. A Bate	Persian Gulf, Red Sea	Bate1971, Helal& Abd El Wahab2004

TAXONOMIC DESCRIPTION

The present taxonomic work led to the identification of forty eight Ostracoda species belonging to twenty eight genera and fourteen families. Occurrence and brief systematic study are given for each identified species. Tables (3 and 4) show the taxonomic list, the total numbers of the studied species, percentage and their occurrence in the study area. Table 2 shows the occurrence elsewhere.

Order: Podocopida Müller, 1894.

Suborder: Podocopina Sars, 1866.
Superfamily: Bairdiacea Sars, 1888.
Family: Bairdiidae Sars, 1888.
Genus: *Paranesidea* **Maddocks, 1969.**
Paranesidea fracticorallicola **Maddocks, 1969. (Pl. 1, Fig. B).**
1983 *Paranesidea fracticorallicola* **Maddocks.- Bonaduce, Ciliberto, Minichelli, Masoli& Pugliese, p.477, fig. 3: 7-9.**
Occurrence*:* **This species is widely distributed allover the study area.**
Paranesidea fortificata **(Brady,1868)**
1983 *Paranesidea forcticata* **(Brady).-Bonaduce, Ciliberto, Minichelli, Masoli& Pugliese, p. 477, fig. 3: 4- 6.**
Occurrence*:* **This species is only represented by one carapace in Wadi Gemal (A2).**
Paranesidea **sp. 2 BCMMP, 1983. (Pl. 1, Fig. A).**
1983 *Paranesidea* **n. sp. 2 Bonaduce, Ciliberto, Minichelli, Masoli& Pugliese, p.477, fig. 3: 10-13.**
Occurrence*:* **This species is recorded from several samples in both Wadi Gemal and Abu Ghoson but it is generally rare and represented by only one carapace in most samples.**
Genus: *Neonesidea* **Maddocks, 1969**
Neonesidea schulzi **(Hartmann, 1964). (Pl. 1, Fig. D)**
1964 *Triebelina schulzi* **n. sp***.* **Hartmann, p.44, pl.4, 5, figs.14- 22** *.*
1971 *Neonesidea schulzi* **(Hartmann).-Bate, p. 246, pl. 1, fig. 1i.**
2004 *Neonesidea schulzi* **(Hartmann).-Helal & Abd El-Wahab, p.83, pl.1, fig. 2.**
Occurrence*:* **This species is widely distributed in the study area and represent the highest population recorded from samples E10 and D7 (23 and 17 carapaces respectively).**
Neonesidea **sp. 1 BCMMP, 1983. (Pl. 1, Fig. C, E)**
1983 *Neonesidea* **n. sp.1 Bonaduce, Ciliberto, Minichelli, Masoli& Pugliese, p.478, fig. 4: 6-9.**
Occurrence*:* **This species is generally rare in the study area. It is recorded from one sample in Abu Ghoson area (E10) and in Wadi Gemal from seven samples(A3,A5, B1, B2, B3, C4 and C5). In all these samples, it is represented by one or two carapaces only.**
Genus: *Triebelina* **Van den Bold,1946**
Triebelina jellinki **Malz & Lord, 1988**
1988 *Triebelina jellinki* **sp. nov. Malz & Lord, p.68, pl. 1, figs. 8-10; pl. 2, figs. 8-9.**
Occurrence: This species is very rare and represented by only one carapace in Wadi Gemal.
Triebelina sertata **Triebel, 1975. (Pl.1 ,Fig. G)**
1975 *Triebelina sertata* **Triebel.-Teeter, p. 422, Text-fig. 31.**
1988 *Triebelina sertata* **Triebel.- Malz & Lord, p.66, pl.1, figs. 1-7.**
Occurrence*:* **Although** *Triebelina sertata* **is recovered from eight samples in Wadi Gemal, it doesn't exceed four carapaces in any sample. In Abu Ghoson area, it is found in one sample only.**
Superfamily: Cypridacea Baird, 1845
Family: Paracyprididae Sars, 1923
Genus: *Ghardaglaia* **Hartmann,1964**
Ghardaglaia triebeli **Hartmann, 1964. (Pl. 1, Fig. f).**
1964 *Ghardaglaia triebeli* **n. sp. Hartmann, p.41, pl.6-9, figs.23- 40***.*
Occurrence*: Ghardaglaia triebeli* **is one of the dominant species in the study area.**
Family: Pontocyprididae Müller, 1894
Genus: *Pontocypris* **Sars, 1866**
Pontocypris **sp. B Bate, 1971**
1971 *Pontocypris* **sp. B. Bate, p.264, pl.1, fig.1h.**
2004 *Pontocypris* **sp. B Bate.- Helal& Abd El-Wahab, p.83, pl.1, fig.4.**
Occurrence: This species is very rare and represented by only one carapace (sample E5).
Superfamily: Cytheracea Baird, 1850
Family: Leptocytheridae Hanai, 1957
Genus: *Leptocythere* **G.O.Sars,1925**
Leptocythere arenicola **(Hartmann, 1964). (Pl.1 , Fig. I)**
1964 *Leptocythere* **(subgen***. Callistocythere) arenicola* **n. sp. Hartmann, pl.12, figs.52-57, pl.13, figs.58-59.**
1983 *Leptocythere arenicola* **Hartmann.- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.478.**
Occurrence*:* **This species is mainly founded in the lagoon facies of Abu Ghoson area. Rare occurrences are also recorded from the inertidal zone of Abu Ghoson and Wadi Gemal areas.**
Genus: *Callistocythere* **Ruggieri, 1953**
Callistocythere arcuata **BMMP, 1983. (Pl.1 , Fig. H)**
1983 *Callistocythere arcuata* **Bonaduce, Minichelli, Masoli and Pugliese.- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.478, fig.6: 1-3.**
Occurrence*:* **This species is widely distributed in the lagoon and swamp facies of Abu Ghoson area.**

Callistocythere **cf.** *C. litoralis*(G.W. Müller, 1894). (Pl.1 , Fig. J)
1964 *Leptocythere* **cf.** *litoralis* (*G. W.* Müller).-Hartmann, p.64, pl. 11, figs.46-51, pl.13, fig. 60.
1983 *Callistocythere* **cf.** *C. litoralis* (G. W. Müller, 1894).- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.481.
Occurrence*:* This species is generally rare and represented by only one or two carapaces in five samples (three samples in Abu Ghoson and two samples in Wadi Gemal).
Family: Hemicytheridae Puri,1953
Subfamily: Oriononinae Puri, 1974
Genus: *Caudites* **Coryell & Fields, 1937**
Caudites levis Hartmann, 1964. (Pl.1, Fig. M)
1964 *Caudites levis* n. sp. Hartmann, p. 117, pl.55, figs. 311-316.
2004 *Caudites levis* Hartmann.- Helal& Abd El-Wahab, p.84, pl.1, fig.7.
Occurrence: *Caudites levis* is commonly present in the study area except the swamp facies of Abu Ghoson where only one specimen of this species was recorded from sample F4.
Family: Campylocytheridae Puri, 1960
Genus: *Alocopocythere* **Siddiqui, 1971**
Alocopocythere reticulata (Hartmann, 1964). (Pl. 1, Fig. O)
1964 *Bradleya reticulata* n.sp.Hartmann, p.108, pl.46, fig.269; pl. 47-49,figs.274-288.
1971 *Alocopocythere reticulata* (Hartmann). - Bate, p. 246, pl. 1, fig. 2PP.
2004 *Alocopocythere reticulata* (Hartmann).- Helal& Abd El-Wahab,p.85, pl.1, fig.8.
Occurrence*:* This species is commonly present in Abu Ghoson area. It is exceptionally rare in Wadi Gemal and recorded from two samples only (one carapace for each).
Family: Cytheruridea Mueller,1894
Genus: *Tuberculocythere* **Colalongo& Pasini, 1980**
Tuberculocythere sp.1 BCMMP, 1983. (Pl. 1, Fig. L)
1983 *Tuberculocythere* n. sp.1 Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.485, fig. 7: 12.
Occurrence: This species is generally rare and only recoded by four carapaces in four samples at Abu Ghoson area.
Family: Trachyleberididae Sylvester-Bradley, 1948
Subfamily: Trachyleberidinae Sylvester-Bradley, 1948
Genus: *Quadracythere* **Hornibrook,1952**
Quadracythere borchersi (Hartmann, 1964). (Pl. 1 , Fig. K)
1964 *Hemicythere ? borchersi* n.sp. Hartmann, p.119, pl.56, figs.318-221; pl.57, figs.322- 323; pl.58, figs.324-330.
1983 *Quadracythere borchersi* (Hartmann).-Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.478.
Occurrence*: Quadracythere borchersi* is one of the most dominant species and occurs in all samples except two samples in Wadi Gemal(A4&W3) and three samples in Abu Ghoson(F3,G1&G2).
Genus: *Ruggieria* **Keij, 1957**
Ruggieria ?danielopoli BMP, 1983. (Pl. 1, Fig. N)
1983 *Ruggieria ? danielopoli* Bonaduce, Masoli and Pugliese(BMP).- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.482, fig.6: 4-8.
Occurrence*:* This species is only recorded from the lagoon facies at Abu Ghoson area.
Genus: *Hiltermannicythere* **Bassiouni, 1970**
Hiltermannicythere rubrimaris (Hartmann, 1964). (Pl. 2, Fig. M)
1964 *Cythereis ? rubrimaris* n.sp. Hartmann, p.115, pl.54, figs.306-310; pl.56, fig.317.
1983 *Hiltermannicythere rubrimaris*(Hartmann).-Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.481.
Occurrence*:* This species is one of the most dominant species in the study area.
Genus: *Moosella* **Hartmann, 1964**
Moosella striata Hartmann, 1964. (Pl. 2, Fig. N)
1964 *Moosella striata* n. sp. Hartmann, pl. 46, figs.270-273; pl.50-51, figs.289- 297.
2004 *Moosella striata* Hartmann.- Helal& Abd El-Wahab, p.87, pl. 1, fig.16.
Occurrence*: Moosella striata* is widely distributed in the study area with higher density in Wadi Abu Ghoson.
Genus: *Lankacythere* **Bhatia& Kumar, 1979**
Lankacythere sp. BCMMP. (pl. 2, Fig. O)
1983 *Lankacythere* sp. Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.482, fig.6: 9-12.
Occurrence*:* This is a very rare species and is represented by only one carapace in Wadi Gemal(sampleB3), and three carapaces in Wadi Abu Ghoson(sampleD2).
Family: Cytherideidae Sars, 1925
Subfamily: Cytherideinae Sars, 1925
Genus: *Cyprideis* **Jones,1857**
Cyprideis litoralis (G. S. Brady, 1868). (Pl. 2, Fig. D, E)
1964 *Cyprideis litoralis* (G. S. Brady) .- Hartmann, p.46, pl.10, figs.41-45.

Occurrence*:* **This species is recoded from the swamp facies at Abu Ghoson area. Only two carapaces are recorded from Wadi Gemal (sample A2).**
Cypridies torosa **(Jones, 1850)***.* **(Pl. 2, Fig. A, B, C)**
1985 *Cypridies torosa* **(Jones).- Guillaume, Peypouquet& Tetart, p.342, figs.1-2.**
1985 *Cypridies torosa***(Jones) Boukhary& Guernet, p.36, pl.2, fig.11.**
Occurrence: This species is widely distributed in the swamp facies at Abu Ghoson area. It is also recorded from one sample at Wadi Gemal (sample A1).
Genus: *Miocyprideis* **Kollmann, 1960**
Miocyprideis cf. spinulosa **(G. S. Brady, 1868). (Pl.2, Fig. F)**
1868 *Cytheridea spinulosa* **n. sp. G. S. Brady, p. 182-183, pl. 8, figs. 1-6.**
1960 *Miocyprideis spinulosa* **(Brady).-Kollmann, p. 178, pl.18, figs.12-13, Pl.19, fig.16.**
1971 *Miocyprideis cf. spinulosa* **(G. S. Brady).-Gramann, p.124, pl.15, figs.8-10.s**
Occurrence: This species has restricted occurrences in Abu Ghoson as it is recoded from the central part of the lagoon and the eastern part of the Swamp. It is very rare in Wadi Gemal and only one carapace is recoded from sample C3.
Family: Cytheridea Baird, 1850
Subfamily: Loxoconchinae Sars, 1825
Genus: *Loxoconcha* **Sars, 1866**
Loxoconcha idkui **Hartmann, 1964. (Pl. 2, Figs. I)**
1964 *Loxoconcha idkui* **n. sp. Hartmann, p.55, pl. 18, figs.83- 85; pl. 19, figs. 86- 91.**
Occurrence*:* **This species is widely distributed in both Wadi Gemal and Abu Ghoson area.**
Loxoconcha ornatovalvae **Hartmann, 1964**
1964 *Loxoconcha ornatovalvae* **n. sp. Hartmann, p.58, pl. 20, figs. 92- 100.**
Occurrence*:* **It is one of the most common species allover the study area.**
Zoogeography: **Red Sea (Hartmann,1964).**
Loxoconcha **sp.1 BCMMP, 1983. (Pl. 2, Fig. G)**
1983 *Loxoconcha* **n. sp. 1 Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.489, fig. 9: 1-4.**
Occurrence*:* **This species is rare and only recorded from two samples(C4&W3) in Wadi Gemal.**
Loxoconcha **sp. A Bate, 1971. (Pl. 2, Fig. H)**
1971 *Loxoconcha* **sp. A Bate, p. 246, pl. 1, fig. 1, I .**
Occurrence*:* **This species has a localized distribution and present only in the lagoon facies of Abu Ghoson area.**
Genus: *Loxocorniculum* **Benson and Coleman, 1963**
Loxocorniculum ghardaquensis **(Hartmann, 1964). (Pl. 2, Fig. I)**
1964 *Loxoconcha ghardaqensis* **n.sp. Hartmann, p.52, pl.15, figs.67-72; pl.16, figs.73- 76; pl.17, figs.77-79; pl.18, figs.80- 82.**
1971 *Loxocorniculum ghardaquensis* **(Hartmann).- Bate, p. 254.**
Occurrence*:* **This species is widely distributed in the study area.**
Loxocorniculum **aff.** *L. algicola* **(Hartmann,1964). (Pl. 2, Fig. L)**
1983 *Loxocorniculum* **aff.** *L. algicola* **(Hartmann).- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.489, fig.8: 5-8.**
Occurrence*:* **This species is widely distributed in Abu Ghoson area but generally rare in Wadi Gemal .**
Loxocorniculum **sp.1 BCMMP, 1983. (Pl. 2, Fig. K)**
1983 *Loxocorniculum* **n. sp. 1 Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p. 486, fig. 8: 1-4.**
Occurrence*:* **This is a widely distributed species in Wadi Gemal and the lagoon facies of Abu Ghoson area.**
Family: Paracytherideidae Puri, 1957
Subfamily: Paracytherideinae Puri, 1957
Genus: *Paracytheridea* **G. W. Müller, 1894**
Paracytheridea aqabaensis **Bonaduce, Masoli& Pugliese, 1976. (Pl. 3, Fig. A)**
1983 *Paracytheridea aqabaensis* **Bonaduce, Masoli& Pugliese- Bonaduce, Ciliberto, Minichelli, Masoli and Pugliese, p.482, fig. 6: 13.**
Occurrence*:* **This species is rare and represented by only one carapace(sample C4) at Wadi Gemal.**
Paracytheridea remanei **Hartmann, 1964. (Pl. 3, Fig. B)**
1964 *Paracytheridea remanei* **Hartmann, p.65, pl.23, figs.114-120; pl.24, figs.121-124.**
Occurrence*:* **This is a rare species and is recoded from three samples in Wadi Abu Ghoson(one carapace for each), and from three samples in Wadi Gemal.**
Family: Paradoxostomidae
Subfamily: Paradoxostominae
Genus: *Paradoxostoma* **Fischer,1885**
Paradoxostoma breve **G. W. Mueller, 1894. (Pl. 3, Fig. D)**
1964 *Paradoxostoma breve* **G. W. Mueller.- Hartmann, p.83, pl.36, figs.204-209.**
Occurrence*:* **This species is recorded from the lagoon facies at Abu Ghoson area.**
Paradoxostoma parabreve **Hartmann, 1964. (Pl. 3, Fig. F)**
1964 *Paradoxostoma parabreve* **n. sp. Hartmann, p.84, pl.38, figs.222-225; pl.39, figs. 231-233.**

Occurrence*:* **This is a very rare species and only one carapace is recorded from sample(A5) in Wadi Gemal**

Paradoxostoma longum **Hartmann, 1964. (Pl. 3 , Fig. C)**

1964 *Paradoxostoma longum* **n. sp. Hartmann, p.87, pl.37, figs.210- 216.**

Occurrence: This species is common in the lagoon facies at Abu Ghoson and is rare in Wadi Gemal (only one carapace from sample B5 and another from sample C2).

Paradoxostoma punctatum **Hartmann, 1964. (Pl. 3, Fig. G)**

1964 *Paradoxostoma punctatum* **n. sp. Hartmann, p.89, pl.39, figs.226- 230.**

Occurrence*:* **This species is represented by one carapace in Wadi Gemal, sample(A3).**

Genus*: Cytherois* **G. W. Mueller ,1894**

Cytherois gracilis **Hartmann, 1964. (Pl. 3, Fig. K)**

1964 *Cytherois gracilis* **n. sp. Hartmann,p.91, pl.40, figs.234-239; pl. 41, figs.240-241.**

Occurrence*:* **Only one specimen of this species was recorded from Wadi Gemal area, sample C4.**

Genus*: Sclerochilus* **G.O.Sars,1866**

Sclerochilus rectomarginatus **Hartmann, 1964. (Pl. 3, Fig. I)**

1964 *Sclerochilus rectomarginatus* **n. sp. Hartmann, p.93, pl.41, figs.242-243; pl. 42, figs.224-250.**

Occurrence: This is a common species and nearly found in all samples except the western part of the mangrove swamp of Wadi Abu Ghoson(samples F2, F3, F4, G1, G2, G3 and G4). It represents the closest conditions in the study area

Subfamily*: Cytherominae*

Genus*: Cytheroma* **G.W.Mueller,1894**

Cytheroma dimorpha **Hartmann, 1964. (Pl. 3, Fig. J)**

1964 *Cytheroma dimorpha* **n. sp. Hartmann, p.96, pl.43, figs.251- 255; pl.44, figs. 226- 259.**

Occurrence: This species is only recorded from the middle part of the lagoon in Wadi Abu Ghoson.

Genus: Abditacythere **Hartmann, 1964**

Abditacythere subterranea **Hartmann, 1964. (Pl. 3, Fig. E)**

1964 *Abditacythere subterranea* **n. sp. Hartmann, p.100, pl.45, pl. 260- 268.**

Occurrence*:* **This species is recorded from the middle part of the lagoon in Wadi Abu Ghoson and from the intertidal zone at Wadi Gemal.**

Family: Xestoleberididae Sars, 1928

Subfamily: Xestoleberidinae G. O. Sars, 1928

Genus: *Xestoleberis* **G. O. Sars, 1866**

Xestoleberis ghardaqae **Hartmann, 1964. (Pl.3, Fig. M)**

1964 *Xestoleberis ghardaqae* **n. sp. Hartmann, p.71, pl.27, figs.142-148; pl. 28, figs.149- 153.**

Occurrence: *Xestoleberis ghardaqae* **is common in the study area.**

Xestoleberis multiporosa **Hartmann, 1964. (Pl.3, Fig. Q)**

1964 *Xestoleberis multiporosa* **n. sp. Hartmann, p.69, pl.25, figs.132-134, pl.26, figs.135- 141.**

Occurrence*:* **This species is common in Wadi Gemal but it is less common in Abu Ghoson area as it is recorded from three samples only.**

Xestoleberis simplex **Hartmann, 1964. (Pl.3, Fig. P)**

1964 *Xestoleberis simplex* **n. sp. Hartmann, p. 80, pl.25, figs.125- 131.**

Occurrence*:* **This is a very dominant species as it is recorded from most samples in both Wadi Gemal and Abu Ghoson area.**

Xestoleberis rhomboidea **Hartmann, 1964. (Pl.3, Fig. O)**

1964 *Xestoleberis rhomboidea* **n.sp. Hartmann, p.75, pl.32, 33, figs.177-186** .

1971 *Xestoleberis rhomboidea* **Hartmann.-Bate, p. 246, pl.1, fig.1, b; pl.2, fig.1,2 b.**

2004 *Xestoleberis rhomboidea* **Hartmann.- Helal& Abd El Wahab, p.90, pl.1, fig.17.**

Occurrence*:* **This is one of the most dominant species in the study area.**

Xestoleberis rotunda **Hartmann, 1964. (Pl. 3, Fig. L)**

1964 *Xestoleberis rotunda* **n. sp. Hartmann, p.81, pl. 24, figs.162-163; pl.29, figs.156-161; pl. 28, figs.154,155 .**

1971 *Xestoleberis rotunda* **Hartmann.- Bate, p. 246, pl. 1, fig. 1c.**

2004 *Xestoleberis rotunda* **Hartmann.- Helal& Abd El Wahab, p.90, pl.1, fig.18.**

Occurrence*:* **This is one of the most dominant species in the study area.**

Xestoleberis rubrimaris **Hartmann, 1964. (Pl. 3, Fig. N)**

1964 *Xestoleberis rubrimaris* **n. sp. Hartmann, p.77, pl. 34 & 35, figs.187-203.**

Occurrence*:* **This is a rare species and is recorded from only three samples in Wadi Gemal (sample A2,B2&B3).**

Suborder: Platycopina Sars, 1866

Family: Cytherellidae Sars, 1866

Genus: *Cytherella* **Jones, 1849**

Cytherella **cf.** *punctata* **Brady, 1868. (Pl. 3, Fig. H)**

1971 C*ytherella* **cf.** *punctata* **Brady.- Bate, p. 246, pl. I, fig.1u.**

2004 C*ytherella* **cf.** *punctata* **Brady.- Helal& Abd El Wahab, p. 90, pl.1, fig.19.**

Occurrence*:* **This species is very rare (one carapace is recorded from Wadi Abu Ghoson, sample D1).**

Genus: *Cytherelloidea* **Alexander, 1929**
Cytherelloidea **sp. A Bate, 1971. (Pl. 3, Fig. R)**
1971 C*ytherelloidea* **sp. A Bate, p. 246, pl. I, fig.1s.**
2004 C*ytherelloidea* **sp. A Bate.- Helal& Abd El Wahab, p.90, pl.1, fig.20.**
Occurrence*:* **This species is very rare (one carapace is recorded from Wadi Gemal, sample A2).**

Table 3. Distribution Chart of Ostracoda in Wadi El Gemal area

	Species / Sample No.	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	W1	W2	W3	Total	%
1	*Ghardaglaia treibeli*	7	10	2	2	14	1	4		1	2	7	21	75	33	4	2	7	3	195	11.1
2	*Quadracythere borchersi*	2	15	11		5	1	6	10	5	13	35	7	18	49	19	1	4		201	11.4
3	*Hiltermannicythere rubrimaris*	2	2	2		3	1		2			1	1	5	20	4		1		44	2.5
4	*Neonsidea schulzi*	1	3	3		2		5	4		3	1	1	2	8	2		1		36	2.0
5	*Paranesidea fracticorallicola*	4		3	1	1		4	5	1	5	2	2	4	9	5	1	2	3	52	3.0
6	*Paranesidea* **n.sp.2**	2								1		1				1			1	6	0.34
7	*Triebelina sertata*	1	4	2		3		2				1			2				1	16	0.91
8	*Triebelina jellinki*			1																	
9	*Paranesidea fortificata*		1																	1	0.06
10	*Loxocorniculum aff. algicola*	1							1											2	0.1
11	*Loxocorniculum ghardaquensis*	8	18	8				3	4		3	3	2	3	5	1		2	2	62	3.53
12	*Loxoconcha ornatovalvae*		26	12		5	2	2	16	1	4	9	13	28	29	1		6	2	156	8.9
13	*Loxoconcha idkui*		1	2		2			2		2									9	0.5
14	*Loxoconcha* **n. sp.1BCMMP**														2				1	3	0.17
15	*Caudites levis*		8	7		1			7	3	5		6	17	17	2		2	1	76	4.3
16	*Cytherelloidea* **sp. Bate**		1																	1	0.06
17	*Moosella striata*		2	1		2	1	1	1			3	1			1		1	2	16	0.91
18	*Leptocythere arenicola*		1	1										1	1					4	0.23
19	*Sclerochilus rectomarginatus*		9	2		1		1	5	2	6	3	1	5	5	4		3	1	48	2.73
20	*Neonesidea* **n.sp.1BCMMP**			3		1	1	2	1						1	2				11	0.63
21	*Lankacythere* **sp.BCMMP**								1											1	0.06
22	*Paradoxostoma punctatum*			1																1	0.06
23	*Paradoxostoma parabreve*					1														1	0.06
24	*Abditacythere subterranea*			3											1					4	0.23
25	*Paradoxostoma longum*										1		1							2	0.1
26	*Callistocythere* **cf.** *littoralis*													1	1					2	0.1
27	*Paracytheridea remanei*		1										2	2						5	0.28
28	*Alocopocythere reticulata*										1		1			1				3	0.17
29	*Cytherois gracilis*														1					1	0.06
30	*Paracytheridea aqabaensis*													1						1	0.06
31	*Xestoleberis rotunda*	10	17			5	2	6	9	1	3	28	28	58	82	8	4	5	12	278	15.82
32	*Xestoleberis rhomboidea*	8	6			7	2	4	11	2	2	14	10	28	64	6	1	1		166	9.45
33	*Xestoleberis simplex*	6	4			1			6			12	18	39	28	3	1	2	2	122	6.94
34	*Xestoleberis multiporosa*		20			2			8	1		8	13	30	44	3				129	7.34
35	*Xestoleberis ghardagae*		4			1			3	1	1	3	3	9	8	2		1		36	2.05
36	*Xestoleberis rubrimaris*		6					2	1											9	0.51
37	*Loxocorniculum* **n.sp.1BCMMP**	6	10	8				4	2		4	4	3	2	4	1	2	1	1	52	2.96
38	*Cypridies littoralis*		2																	2	0.1
39	*Cypridies torosa*	3																		3	0.17
	Total	61	171	77	3	57	11	46	99	19	55	135	144	328	322	70	12	94	42	1757	
	Species no. per sample	14	23	18	2	18	8	14	20	11	15	17	19	19	22	19	7	15	13		

Table 4: Distribution chart of Ostracoda in Abu Ghoson site

Species / Sample No.	E1	E2	E3	E4	F1	F2	F3	F4	G1	G2	G3	G4	E5	E6	E7	E8	E9	E10	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	Total	%
Ghardaglaia treibeli	32	13	5	22	10			13	1	1		4		13				43	5	34	39	269	102	33	97	149	242	42	1169	24.23
Quadracythere borchersi	8	6	2	5	14	9		1			2	3	17	13	4	36	49	50	4	13	16	4	3	3	105	6	11	22	406	8.43
Hiltermannicythere rubrimaris	11	9	5	2	7	3		6	1	1	1	1	15		3	1	4	30	2	4	10	119	93	27	20	3	2		280	5.82
Neonsidea schulzi				5	2			1					2				4	23	3	3	2	5	4	2	17	2			75	1.56
Paranesidea fracticorallicola	3	2		7	4	2		1		1			5	1			5	9	3	3	3	5	4	2	7	2	4		73	1.51
Paranesidea n. sp. 2 BCMMP				1		1							3				1	2					1		3				12	0.23
Triebelina sertata																		3											3	0.06
Tuberculocythere n.sp.1BCMM					1			1				1							1										4	0.08
Cypridies torosa	3	4		3		3		2	4		3														3				25	0.52
Loxocorniculum ghardaquensis	3	2		4	3						1	1	6	3	1	5	4	4	3		3	2			10		2	2	59	1.23
Loxoconcha ornatovalve	6	10	4	20	10			5		2		7	29	7		15	52	59	11	11	12	18	13	6	49	6	6	4	362	7.52
Loxocorncha idkui			3	2	2	2		3							1			6		2					8	2			31	0.64
Loxocorniculum aff. *L. algicola*	1	2		1	1							1	3	1		1	2	1	1		1				4		1	1	20	0.42
Ruggieria?danielopoli																				2		8	5	4	7			2	28	0.58
Caudites levis	2		1	4				1					1			2	3	19	8	1		5		3	4	2		2	58	1.20
Cypridies littoralis	1	3		1	2	4	3																						15	0.31
Moosella striata	23	5		15	8	8					1		3	4	1	3	4			5	10	4		3	50	4	2		153	3.18
Leptocythere arenicola												1				1	3	2		4		6	10	3	1	4			35	0.73
Sclerochihus rectomarginatus	2	6	1	6	3								17		2	4		12		4	7	14	5	5	20	3	6	7	124	2.58
Neonesidea n. sp. 1																		1											1	0.02
Lankacythere sp.																				3									3	0.06
Loxoconcha sp. A Bate	4	5	5	9	8			2		2		3	15	2		2	22	24	8	4	5	12	9	1	33	1	2	1	179	3.72
Paradoxostoma breve																		2				8	5	3	1				19	0.4
Abditacythere subtrranea																		1				10	7	2	1				21	0.44
Paradoxostoma longum																		3				5	4	2	2	3	2	2	2	0.04
Cytheroma dimorpha																						3	4	2					9	0.19
Callistocythere cf. *littoralis*																1	2					1							4	0.08
Paracytheridea remanei	1	1																	1										3	0.06
Alocopocythere reticulata	6	5	2		1	2							5	1			3			4	1	3	6	25	10	3		1	78	1.62
Callistocythere arcuata			1		2							1				4	4			5		13	10	15	2				57	1.18
Miocyprideis cf. *spinolusa*		4		1	2																	19	27	25	2				80	1.66
Pontocypris sp. Bate													1																1	0.02
Xestoleberis rotunda	26	16	3		10	4		3		2	3	4	13	3		6	11	130	12	40	28	18	14	9	53	115	101	2	626	12.59
Xestoleberis rhomboidea	14	10	4		14	3		5			1	2	8	1	1		2	70	6	30	13	22	13	11	38	84	85	8	445	9.24
Xestoleberis simplex	8	5		8	4	4		4					12		1	4	3	84	3	18	6	24		6	17	50	24	2	287	5.96
Xestoleberis multiporosa	6	2											3																11	0.23
Xestoleberis ghardagae	2		1	3															4	3	2	6	18		16				55	1.56
Cytherella cf.*punctata*	1																												1	0.02
Total	173	110	37	112	110	45	3	48	6	9	12	29	158	46	14	90	178	578	73	193	159	603	357	192	580	439	490	98	4814	
Species no. per sample	21	19	13	19	20	12	1	14	3	6	7	12	18	11	8	14	18	22	16	20	16	25	21	22	27	17	14	14		

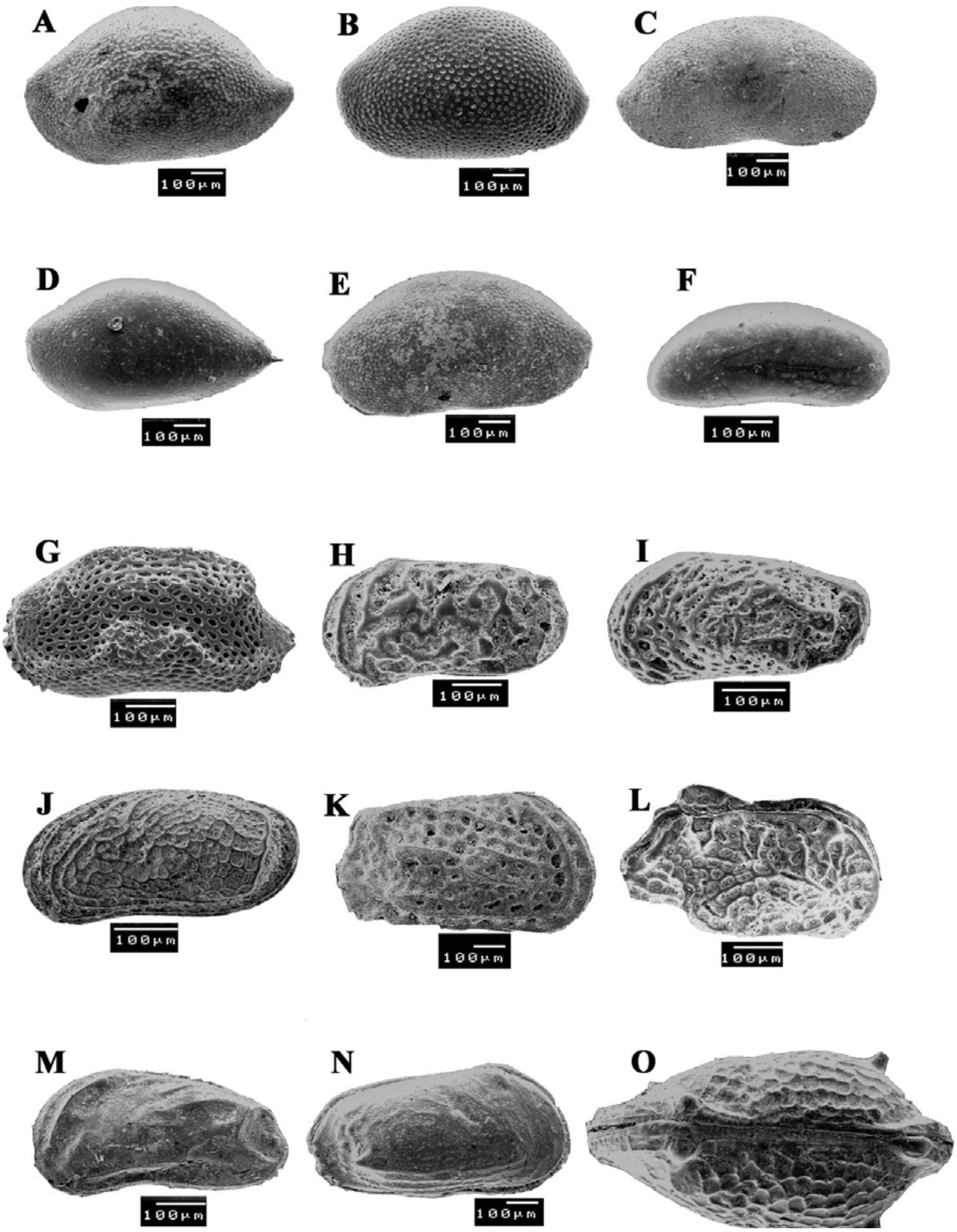


plate 1

Fig.A :*Paranesidea* n.sp.2 BCMMP,1983 ; LVC, ♂,sample no. A1 . Fig. B: *Paranesidea fracticorallcola* Maddocks,1969; LVC,♀, sample no. A1 . Fig. C,E: *Neonesidea* n.sp.1BCMMP,1983; C,RVC; E,LVC, ♂, sample no. A2 . Fig.D: *Neonesidea schulzi* (Hartmann,1964); LVC , ♂, sample no. A1 . Fig. F: *Ghardaglaia triebeli* Hartmann,1964 ; RVC , ♂, sample no. D7 . Fig.G :*Triebelina sertata* Triebel,1948; LVC , ♂, sample no. A1 . Fig. H: *Callistocythere arcuata* BMMP,1980, LVC , ♂, sample no. D2 . Fig.I: *Callistocythere cf.C.littoralis* (G.W.Mueller, 1894) ,LVC , ♂, sample no. D6 . Fig.J : *Leptocythere arenicola* Hartmann,1964 ; LVC ,♀ sample no. D2 . Fig.K :*Quadracythere borchersi* (Hartmann,1964) ; RVC, ♀, sample no. C5. Fig. L: *Tuberculocythere* n.sp.1 BCMMP,1983; RVC, ♂, sample no. A3. Fig. M : *Caudites levis* Hartmann,1964 ; LVC , ♂, sample no. A3 . Fig.N: *Ruggieria(?) danielopoli* BMP,1976; RVC, ♂, sample no. D7.
Fig. O*: Alocopocythere reticulata* (Hartmann,1964) ; DVC, ♂, sample no. D6.

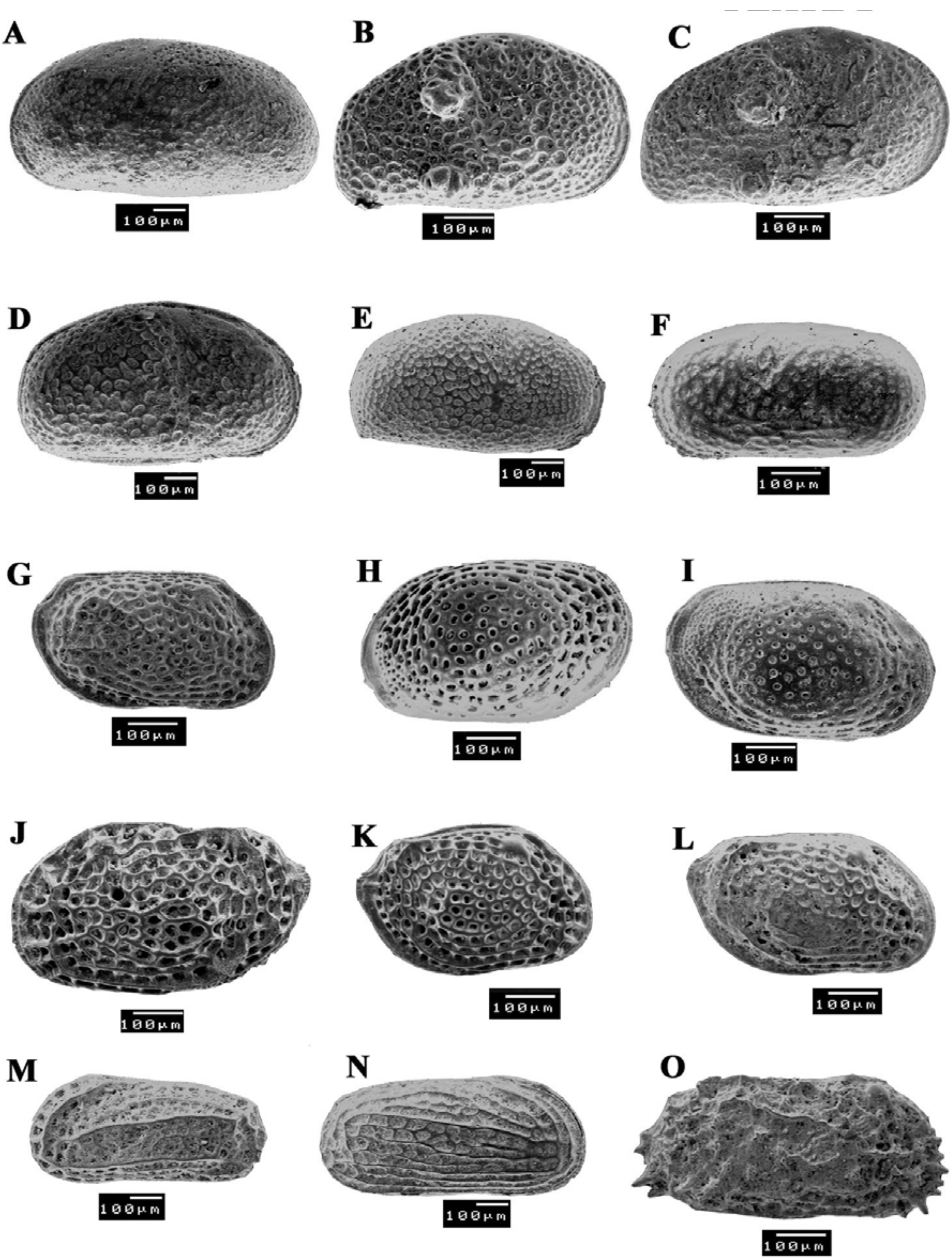


plate 2

Figs.A,B,C: *Cyprideis torosa* **B(Jones,1850); A, LVC, ♂; sample no.F2; B, C, morpho type with hollow tubercles; B, RVC; C, RVC, ♀; sample no.E2 . Figs. D, E** *:Cyprideis littoralis* **(G. S. Brady,1868); D, LVC, ♀, sample no.E2; E, RVC, ♂, sample no.D7 . Fig.F :** *Miocyprideis cf spinolusa* **(Brady,1868); RVC, ♀, sample no. D 4. Fig.G :** *Loxoconcha* **n. sp.1 BCMMP,1983; RVC, ♂, sample no. A 3. Fig. H :***Loxoconcha* **sp.A Bate,1970; LVC, ♀ ,sample no.D7 . Fig.I :***Loxoconcha idkui* **Hartmann,1964; RVC, ♂,sample no. A 3 . Fig. J:** *Loxocorniculum ghardaquensis* **(Hartmann,1964); LVC, ♀ ,sample no. A 1. Fig. K :***Loxocorniculum* **n. sp.1BCMMP,1982; LVC, ♀, sample no. A 1. Fig.L :***Loxocorniculum aff.L. algicola* **(Hartmann,1974); RVC, ♂ ,sample no. A 1 . Fig. M:** *Hiltermannicythere rubrimaris (***Hartmann,1964); LVC, ♂ ,sample no. D 4. Fig. N:** *Moosella striata* **Hartmann,1964 ;RVC, ♀; sample no.B5 . Fig.O :***Lankacythere* **sp. BCMMP,1983 ; RVC, ♂ ,sample no. D2.**

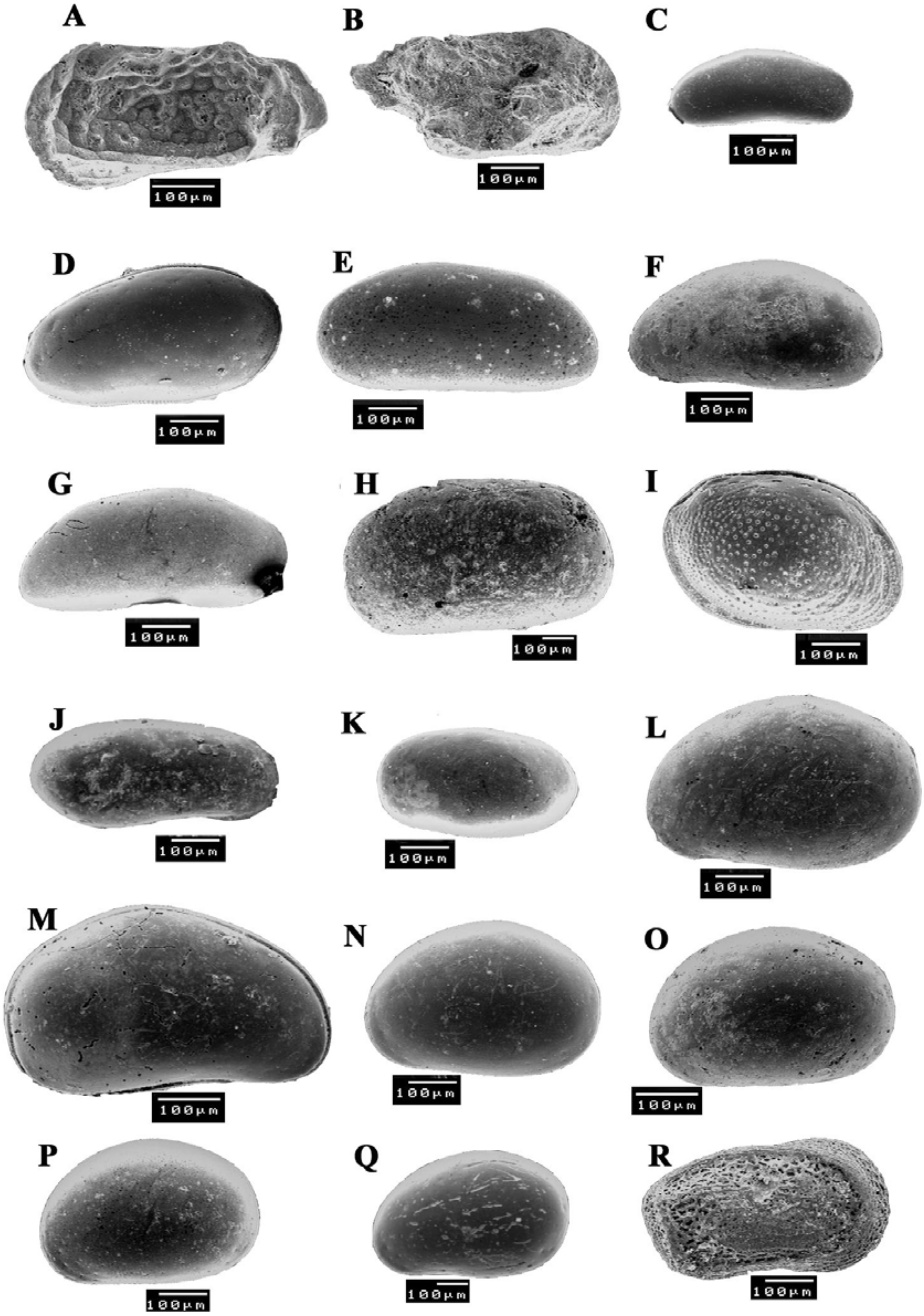


plate 3

Fig. A: *Paracytheridea aqabaensis* **BMP,1976; LVC, ♀, sample no. E 1. Fig. B***: Paracytheridea remanei* **Hartmann,1964; RVC, ♀, sample no. E 2 . Fig. C:** *Paradoxostoma longum* **Hartmann,1964; RVC♂ ,sample no. C 2. Fig. D***: Paradoxostoma breve* **G. W. Mueller,1894; RVC, ♂ ,sample no. A 5. Fig. E:** *Abditacythere subterranea* **Hartmann,1964, LVC,♀, sample no. C 2 . Fig. F:** *Paradoxostoma parabreve* **Hartmann,1964; RVC, ♂, sample no. A 3. Fig. G:** *Paradoxostoma punctatum* **Hartmann,1964; RVC, ♀, sample no. E 5 . Fig. H:** *Cytherella cf. punctata* **Brady, 1868; LVC, ♀, sample no. E 1. Fig. I :** *Sclerochilus rectomarginatus* **Hartmann,1964; RVC, ♂, sample no E 5. Fig. J :** *Cytheroma dimorpha* **Hartmann,1964; LVC, ♀, sample no. D 6 . Fig. K:** *Cytherois graclis* **Hartmann,1964; RVC, ♂, sample no. C 4 . Fig. L :** *Xestoleberis rotunda* **Hartmann,1964; RVC, ♂, sample no. A 2 . Fig. M:** *Xestoleberis ghardaqae* **Hartmann,1964 ;LVC, ♀; sample no. A 2 . Fig. N :** *Xestoleberis rubrimaris* **Hartmann,1964 ; ♀, RVC , sample no. A 2 . Fig .O:***Xestoleberis rhomboidea* **Hartmann,1964 ; RVC , ♂; sample no. D 2.. Fig.P :***Xestoleberis simplex* **Hartmann,1964; RVC, ♀; sample no. A 1. Fig. Q:** *Xestoleberis multiporosa* **Hartmann, 1964; RVC, ♂; sample no. A 1. Fig. R:** *Cytherelloidea* **n. sp. 1 BCMMP, 1983 ; RVC, sample no. A 3.**

DISCUSSION

Mangroves are shallow sheltered environments dominated by phytal elements. The inhabitants will be, normally, of those taxa characteristic for such environments. The recorded ostracoda are represented by benthic, phytal and shallow water forms. The percentages of the dominant genera are *Xestoleberis* (42.11% at Wadi Gemal& 29.6% at Abu Ghoson respectively), *Ghardaglaia,* (11.1% and 24.23%), *Loxoconcha* (9.57%and11.88%), *Quadracythere*(11.4%and8.43%), *Hiltrmannicythere* (2.5% and 5.82%) and *Loxocorniculum*(6.59% and 2.23%).

The present association is composed mainly of Indo-Pacific faunal elements with some endemic species. Rare Mediterranean and cosmopolitan species are recorded. These taxa may be transported to the studied area by the birds, since mangrove trees serve as nesting sites for migrating birds. Ships, floating woods and derived algae and other plants are another possible reasons. Migration between the Red Sea and Mediterranean is a known phenomenon. Generally, it is a unidirection migration from the Red Sea to the Mediterranean via the Suez Canal(Lessepsian migration of Por,1978. Anti-Lessepsian migration is rare but currently cited (for more details, refer to Por,1978; Fouda& Abu Zeid,1990; and Kandeel,2002). Deciding whether the Mediterranean species introduced in the study area through anti-lessepsian migration or through passive migration need more investigations along the migration route (i.e. along the northern parts of the Red Sea, Gulf of Suez and the Suez Canal).

CONCLUTIONS

The study of 46 surface bottom sediments samples collected in Jan. 2004 from two mangrove sites in the Egyptian Red Sea , 18 samples from Wadi EL Gemal and 28 samples from Abu Ghoson , revealed the detection of somewhat diversified Ostracoda community. 48 podocopid and platycopid Ostracoda species belonging to 28 genera and 14 families are identified. They are represented by benthic, phytal and shallow water forms. The percentages of the dominant genera are *Xestoleberis* (42.11% at Wadi Gemal& 29.6% at Abu Ghoson respectively), *Ghardaglaia* (11.1% and 24.23%), *Loxoconcha*(9.57%and11.88%), *Quadracythere*(11.4%and 8.43%), *Hiltrmannicythere* (2.5% and 5.82%) and *Loxocorniculum*(6.59% and 2.23%). Zoogeographically, the majority of the identified fauna showed an Indo-Pacific affinity. Some species of Mediterranean and cosmopolitan affinities (3 and 5 respectively) are recorded. This phenomenon was attributed to passive migration.

REFERENCES

Bassiouni, M. A., 1970, *Falunia(Hiltermannicythere*), a new subgenus from the Gulf of Naples, and related fossil forms, Revista Espaniola Micropaleont., 2 (2): 117- 130.

Bate, R. H., 1971, The distribution of recent Ostracoda in the Abu Dhabi Lagoon, Persian Gulf. Oertli, H.J. (ed.), Paleoecologie des Ostracodes Pau 1970, Bull. Centre Rech. Pau-SNPA, 5 Suppl.: 239-256, 3 fig., 3pL., Pau 1971.

Benson, R. H., 1961, Ecology of Ostracode Assemblage. In Moore, R. C.(ed.) Treatise on Invertebrate Paleontology, Pt. Q, Arthropoda 3, Geol. Soc. Amer. And Univ. Kansas Press: Q56-Q63.

Bonaduce, G., Masoli, M., and Pugliese, N., 1976, Benthic Ostracoda from the Gulf of Aqaba. Pubblicazioni Stazione Zoologica di Napoli, 40: 372-428.

Bonaduce, G., Masoli, M., Minichelli, G., and Pugliese, N., 1980, Some new benthic Ostracoda species from the Gulf of Aqaba(Red Sea). Bollettino Societa Paleontologica Italiana, 19: 143-178.

Bonaduce, G., Ciliberto, B., Minichelli, G., Masoli, M., and Pugliese, N., 1983, The Red Sea Benthic Ostracodes and their geographical distribution. Applications of Ostracoda (R. F. Maddocks, ed.) Univ. Houston Geosc. 1983: 472-491.

Boukhary, M. and Guernet, Cl., 1985, Ostracoda of the Pleistocene of Fayoum: systematic view and new observations about the characteristic of an old Lake. Revue De Micropaleont. 28(1):32-40.

Brady, G.S., 1868, A monograph of the recent British Ostracoda. Trans. Linnean Soc. London. 353-495, Pls. 23-41. Gramann, F.,1971. Ostracoden aus Neogene und Quartar der Danakil-Senke (Nordost-Athiopien).- Beih.geol. Jp.,106:109-142, Abb. 6, Pl.14-18.

Brasier, M. D. 1979, Phylum Crustacea- Ostracods. In Microfossils. George Allen& Unwin Pubblishers:193.

Chapman, V. J., 1977, Wet coastal ecosystems. Elsevier, Amsterdam: 428.

Fouda, M. M., and Abou Zeid, M. M., 1990. Bivalves of the Suez Canal Lakes. Proc. Zool. Soc. A.R. Egypt, 21(1990):231-240.

GEF World Bank, 1998, Egyptian Red Sea Coastal and Marine resource Management Project. Scientific report. 38P.

Gramann, F.,1971, Ostracoden aus Neogene und Quartar der Danakil-Senke (Nordost-Athiopien).- Beih.geol. Jp.,106:109-142, Abb. 6, Pl.14-18.

Guillaume, M., Peypouquet, J. and Tetart, J., 1985, Atlas des ostracodes de France: Quaternaire et Actuel. Memoires Elf-Aquitane, 9, Pau 1985.

Hamilton, L.S. and Snedaker, S. C., 1984, Handbook for mangrove area management, Unesco, Paris, 123p.

Hartmann, G., 1964. Zur Kenntnis der Ostracoden des Roten Meeres. – Kieler Meeresforschungen, 20, sonderheft, Kiel 1964.

Hartmann, G., 1974, Zur kenntnis des Eulitorals des afrikanischen westkűste zwischen Angola und Kap der Guten Hoffnung und der afrikanischen Ostkuste von Sudafrika und Mozambique unter bosenderer Berucksichtigung der

Polychaeten und Ostracoden. Teil III. Die ostracoden des Untersuchungsgebiets. Mitteilungen Hamburgischen Zoologischen Museum und Institut 69: 229-520.

Helal, S. A. and Abd El-Wahab, M.,2004, Recent ostracodes from marine sediments of Safaga Bay, Red Sea, Egypt. Egypt. Jour. Paleontol., Vol. 4, 2004,p. 75-93.

Kandeel, E. K., 2002, Ecological and biological studies on some bivalves in Lake Timsah and the Bitter Lakes. Ph. D. Thesis, Fac. Sci., Suez Canal Univ. Egypt

Kingma, J.T., 1948, Contribution to the Knowledge of the Young- Cenozoic from the Malayan Region – Diss. Utrecht: 1- 119 , 11Pl., Utrecht.

Kollmann, K., 1960, Cytherideinae and Schulerideinaen. subfam. (Ostracoda) aus dem Neogen des Ostlichen Osterreich. – Mitt. Geol. Ges. Wien, 51:98-195 5Abb. 4 Tab., 21 Taf., 1 map, Wein.

Madkour, H. A. and Mohammed, A. W., 2005, Nature and Geochemistry of surface sediments of the Mangrove environment along the Egyptian Red Sea coast. Sedimentology of Egypt. 13: 371- 384.

Malz, H. and Lord, A., 1988, Recent ornate bairdiid Ostracoda: Origin and distribution. In Hanai, T., Ikeya, N. and Ishizaki, K.(eds). Evolutionary biology of Ostracoda, its fundamentals and applications, Elsevier, Amsterdam-New York-Oxford-Tokyo, 1988 :63-74.

Morkhoven, E.P.C.M. Van, 1962, "Pos-Paleozoic Ostracoda. Vol. 1,: 1-204, 79 figs., 9pls., Elsevier, Amsterdam, London, New York.

Odum, W. E., and Johannes, R. E., 1975, The response of mangrove to man- induced environmental stress. In Ferguson Wood, E. J., and Johannes, R. E.(eds.) Tropical marine pollution., Elsevier, Amsterdam : 52-62.

Paik, K. and Lee, E., 1988, Plio-Pleiostocene Ostracods from the Sogwipo Formation, Cheju Island, Korea. In Hanai, T., Ikeya, N. and Ishizaki, K.(eds). Evolutionary biology of Ostracoda, its fundamentals and applications, Elsevier, Amsterdam-New York-Oxford-Tokyo, 1988 :541-556.

Pokorny, V., 1978, Ostracoda. In Haq, B. and Boersma, A.(eds). Introduction to marine micropaleontology. Elsevier Biomedical, New York-Amsterdam- Oxford, 1978:109-149.

Por, F. D., 1978, Lessepsian migration- The influx of Red Sea biota into the Mediterranean by way of the Suez Canal. Springer-Verlag Berlin Heidelberg New York : 328.

Ruggieri, G., 1974, Revision della ostracofauna marina quaternaira di Imola (Bologna). Rev. espan. Mircopaleont. 6, 3: 419-446, 10 Abb., Madrid.

Saenger, P., Hegerl, E. J. and Davies, J. S., 1983, Global status of mangrove ecosystems. Comm. Ecol., 3, IUCN, Switzerland : 1-80.

Teeter, J.W., 1973, Geographic distribution and dispersal of some recent shallow- water marine ostracoda. The Ohio Journal of science 73(1):1- 46.

Teeter, J.W., 1975, Distribution of Holocene marine Ostracoda from Belize. In Wantland, K. F. and Pusey, W. C.(eds.)Belize shelf-carbonate sediments, clastic sediments and ecology. Stud. Geol. Amer. Assoc. Petroleum Geologists, 2: 400-499.

Zahran, M. A., 1965, Distribution of the mangrove vegetation in U.A.R. Egypt. Bull. Inst. Desert D'Egypt. :6-11.