Systematic Description Ostracods Fauna from the Lower Tar Member (Zimam Formation) Northern Ghadamis Basin

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Abstract: Ostracods are widely used for geological studies due to their small size, widely distributed, and have had rapidly evolving lineage, so that we have studied these creatures from Zimam Formation (Lower Tar Member) exposed on the southern edge of the Ghadamis Basin in order to systematic accounts of Upper Cretaceous ostracods.

Twenty seven samples were collected and processed from outcrop section north of Al Qaryat Al Sharqhia which belongs to the Lower Tar Member. Lithologically consists of marl, Clay, limestone, and dolomitic limestone with gypsum in parts.

Eighteen species recorded belong to fourteen genera, four species has wide geological distribution in North Africa and the Middle East, one new species proposed (Cytherelloidea dabai) and the remaining species left under open nomenclature, although they shows similarities to earlier described fauna which reported from North Africa and the Middle East.

The ostracods species recording from the Lower Tar Member indicate deep to shallow marine environments.

Keywords: Ostracods, Zimam Formation, Ghadamis Basin, Cretaceous.

INTRODUCTION

Our purpose of this study is to find out systematic description of the Ostracoda fauna of the Maastrichtian Lower Tar Member (Zimam Formation) in Ghadamis Basin North West.

Location of the study section: The material which forms the basis of this study was collected from the outcrop 20 km north of Alqaryat Alsharghia northern Ghadamis Basin (Fig. 1), between:

Longitude	30°	33’	47’’	N
Latitude	13°	34’	93’’	E

General geology of Ghadamis Basin: The Ghadamis Basin is one of several “interior sag” basins on the North African craton. These basins are dominated by Paleozoic clastics and unconformably overlain by Mesozoic sands, carbonate and evaporites.

The Ghadamis Basin is a large basin located in northwestern Libya and extends westward into parts of southern Tunisia and eastern Algeria, where it is known as Berkine and Illizi basins respectively. This basin is bounded from the east by the Hun Graben, north by Nafusah Uplift, south by the Gargaf Arch and to the west by the Themboka High.

Basin evolution: The Ghadamis Basin was affected by three post-Ordovician orogenies. These are the Caledonian, Hercynian, and Albian, summarized by (Anketell, 1996; Guiraud, 1998 and klitzsch, 2000). The Caledonian Orogeny is the first tectonics caused deformation of strata, and

resulted in uplift and erosion of Silurian and older sediments over the NW-trending Tripoli-Tibesti Uplift. The effect of tectonics was formed sub-basins of the eastern part of the Ghadamis Basin (Zamzam Depression).

The Hercynian Orogeny was a major period of deformation and erosion during the Late Carboniferous and Permian. During this period the Nafusah Uplift emerged, reversing the regional dip and deeply eroded the Paleozoic, and formed the north side of the basin. There was also renewed uplift, along with erosion of the Gargaf Arch.

The Albian Orogeny took place during the end of Cretaceous-Early Paleocene. During this period all the western Libya became emergent, with termination of deposition in this area. This may have been the final uplift that affected the Gargaf Arch. There were however, further episodes of uplift and deformation

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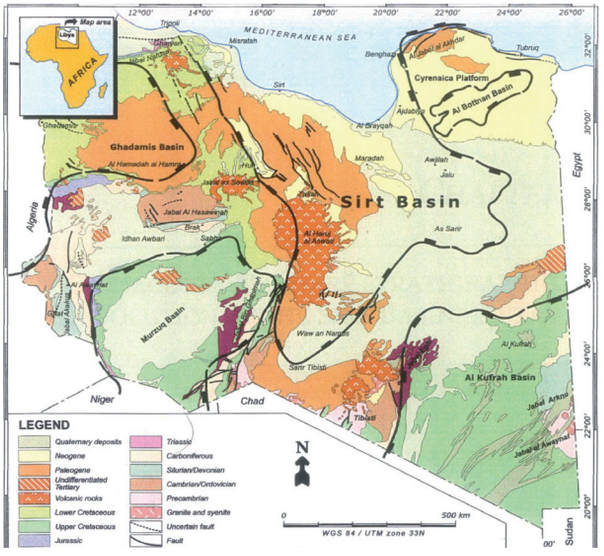


Fig. 1. Location map of the study section

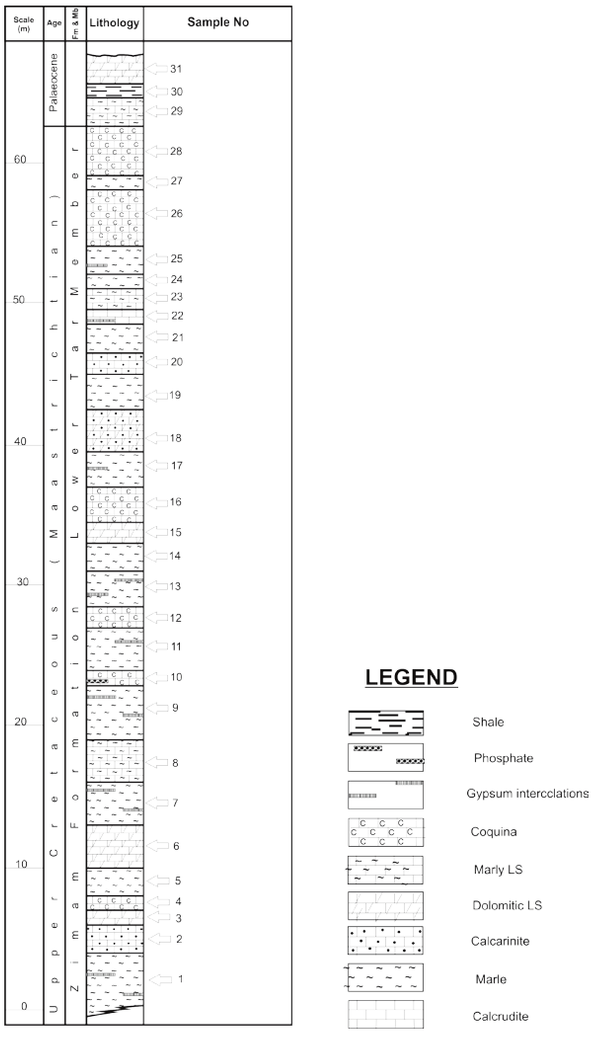


Fig. 2. Measured section and the position of the s

during the Tertiary, mainly strike-slip movements to the north and west, including the present offshore (Tripoli –Gabes Basin), these shaped the Nafusah Uplift.

ZIMAM FORMATION

Introduction: The section of Lower Tar Member has been studied and measured north of Al Qaryat Al Sharqhia (Fig. 2), and the samples were collected, processed and analysed following conventional method. This member considered to be Maastrichtian in age by previous workers. The Lower Tar considered as the oldest member in the Zimam Formation.

Jordi and Lonfat (1963) introduced the term Zimam Formation after Wadi Zimam which includes the claystone, marl, limestone and dolomitic limestone sequence of Maastrichtian-Danian age. The Lower Tar Member outcrops from the Hun graben to Wadi Suf Ajjin in the north and over a great part of Ghadamis Basin to the south of Mizda and extends to Tunisia and Algeria westward.

They subdivided Zimam Formation into Tar Marl and Had Limestone members (Fig. 3), which broadly correspond to Socna and Gheriat formations of Burollet's (1960). Subsequently, the Tar Marl Member was further divided into Lower and Upper Tar members, with a fossiliferous limy interval between them, termed as 'Socna Mollusc Bed'.

The type section of Zimam Formation originally described in an isolated hill, about 3.5 km north of Wadi At Tar Al Kabir (Lat. 29°22'30"N Long. 15°42'16"E) popularly known as Wadi Tar. A rounded SW part of the hill feature represents the type section for Lower Tar Member and the flat topped elongated feature represents the type section for the Upper Tar and Had members.

The Zimam Formation has a conformable relationship with the underlying Mizdah and overlying Shurfah formations, south of Jabal Assawda. The Lower Tar Member grades into a more clastic facies termed as Bin Affin Member by Furst (1964).

Gohrbandt (1966b) and Barr and Weegar (1972) following the definition of Jordi and Lonfat have added more data on the Zimam Formation. Eliagoubi (1975) has described a rich assemblage of planktonic foraminifera from the surface outcrops of the Lower Tar Member and its

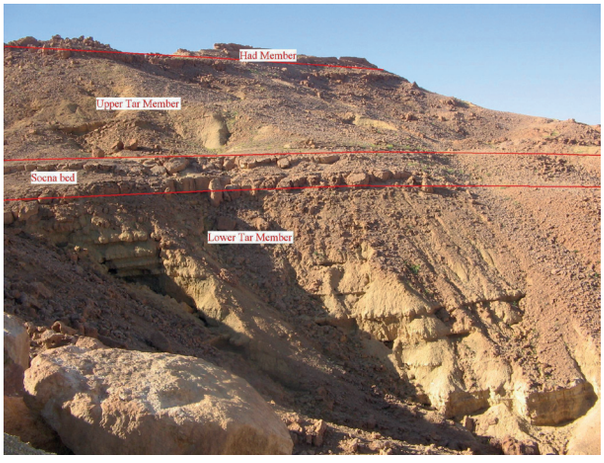


Fig. 3. Show thefour rock units of the Zimam Formation.

subsurface equivalent in Sirt Basin.

He has subdivided the Maastrichtian by planktonic foraminiferal assemblage into *Globotruncana fornicate* and *Globotruncana conica* zones , the *Globotruncana conica* zone has been further subdivided into *Globotruncana gansseri* and *Globotruncana contusa* subzones .

Energoprojekt (1975) subdivided the Zimam Formation into lower Tar Marl Unit, Socna Unit, Upper Tar Marl Unit and Had Limestone Unit.

The preserved thickness of Zimam Formation varies from 40 m in the western part (Djeneien sheet) to 265 m in the eastern part (Bani walid sheet). In the type area the exposed thickness averages 150 m.

The Zimam Formation is very rich in microfossils in the lower part, indicating deepening of the area of deposition with open sea connection, whereas, the upper part shows gradual shallowing as indicated by cross bedded Had Limestone which contains shallow water assemblage of Algae and foraminifera, suggesting littoral environment of deposition, extending up to the neritic zone.

Lower Tar Member: Jordi and Lonfat (1963) originally described the Lower Tar Member as a succession of marl and shale, dark green at the base, red very fossiliferous towards the top grading into 12 m of yellow lime-mudstone.

In the type area, the Lower Tar Member sequence starts with dark green gypsiferous clay alternating with greenish-yellow marl and few thin bands of marlstone together constituting the lower two third of 80 m thick succession. Macrofossils are rare in this part being represented by *Exogyra overwegi* and *Agerostrea ungulata,* but the rich microfaunal assemblage is dominated by planktonic foraminifera. This sequence gradually grades into the alternation of organodetrital limestone, calcilutite/calcarenite succession rich in fossils. The upper one third part of the exposed strata forms prominent dark red to brownish band which becomes buff to light brown towards the top and capped by a meter thick bed of unfossiliferous red brown calcarenite. The upper level of Lower Tar Member is characteristically developed with abundant fossils mostly represented by *Exogyra overwegi, Agerostrea ungulata, Omphalocyclus macroporus,* and others.

The unfossiliferous red brown layer, in a highly fossiliferous sequence, mark the top of the Lower Tar Member in the western part of Hun Graben, but is not traceable in the western part of Al Hammadah Al Hamra Plateau, where the last appearance of *Exogyra overwegi, Omphalocyclus macroporus* assemblage mark the top of Lower Tar Member.

The lower boundary with Thala Member is better exposed in the area of Wadi Zamzam and south of Wadi Suf Al Jin in Bani Walid and Al Qaryat Ash Sharqiyah Sheet, and can be traced into the Tunisian border in the west. The northern most outcrops of Lower Tar Member are traceable up to latitude 31°50'N in Bani Walid Sheet.

The boundary between Thala and Lower Tar Member is mostly gradational and has been marked at the top of the prominent calcarenite band which becomes porous and chalky in Nalut Sheet, and partly silicified and dolomitized in Al Qaryat Al Gharbiyah and Al Qaryat Ash Sharqiyah Sheets.

The Lower Tar Member exhibits facies variation from a predominantly gypsiferous-clay, marl sequence on the western part of Hun Graban (Hun Sheet) to marl calcarenite and gypsum alternations with some layers of gravel, conglomeratic material and slumped blocks interstratified in the middle part, with cross bedded calcarenites in the upper part of the sequence in Al Qaryat Al Gharbiyah and Al Qaryat Ash Sharqiyah Sheets. Further west and northwest the calcarenites become well stratified forming prominent scarps in Nalut, Ghadamis and Shawa Sheets. This part of the sequence was interpreted by Jordi and Lonfat (1963) as Had Limestone, leading him to conclude that the Had Limestone Member directly rests on the Lower Tar Member in the western part of Ghadamis Basin. In this part the Upper Tar Member and Had Member are preserved as small isolated slumped blocks, with greatly reduced thicknesses.

In the southern part of Ghadamis Basin the Lower Tar Member directly rests on the sandstones of Hasawnah Formation (Cambrian). In Jabal Al Hasawnah sheet it consists of a basal conglomeratic layer with rounded quartz pebbles and marly matrix. A thin fossiliferrous discontinous horizon is present near the base, overlain by marlstone, calcarenite intercalations with considerable amount of sand, about 4-6 m thick layer of chalky calcilutite with characteristic quartz geodes has also developed 10 m above the base of the sequence. The lower part dominated by hard cross bedded calcarenite-calculite alternation, contains rare fragments of *Inoceramus*. Gray green gypsiferous claystone appears in the middle part followed by marlstone and cross bedded calcarenite with *Omphalocyclus macroporus* and *Exogyra overwegi* locally developed as *lumachell*. This sequence laterally grades into predominantly sandy facies represented by Bin'Affin Member.

Generally, in the eastern and northeastern part of Ghadamis Basin the Lower Tar Member is represented by claystone and gypsiferous marl sequence in the lower part with common planktonic foraminiferal assemblage, and gradual shallowing in the upper part is reflected by the organodetrital

Limestone and calcarenites are rich with Oysters and larger foraminifera. In the central part of the basin the lower and middle levels of Lower Tar Member, contain a number of stratified gypsum horizons, and slumped blocks, gravel layers followed by cross bedded calcarenites in the upper level suggesting lagoonal to very shallow marine environment of deposition. In the southern part of Ghadamis basin the sand content increases appreciably till it develops into a distinct lithostratigraphic unit. The presence of a conglomeratic horizon at the base of the sequence in this part marks a major unconformable surface and confirms the transgressive nature of Zimam Formation over the underlying sediments.

The thickness of the Lower Tar Member in the western and southern part of the basin varies from 40 to 50 m (Djeneien and Jabal Al Hasawnah Sheets) increasing in the central part to 80-120 m (Al Qaryat Al Gharbiyah and Al Qaryat Ash Sharqiyah Sheets). A maximum thickness of 290 m is known from the subsurface (Eliagoubi, 1975).

Based on foraminifera assemblage a Maastrichtian age is assigned to the Lower Tar Member. The characteristic Upper Maastrichtian by index species such as *Abathomphalus mayaroensis* (Bolli) is rare in these beds as well as in other parts of NW Libya (Barr and Weeger 1972; Salaj 1979).

The pervious authors have recorded *Globotruncana falsocalcarata* from the upper part of the type section of Lower Tar Member. This species has been found to be restricted to the Upper Maastrichtian interval as evidenced from the record of this species from Egypt (Kerdany and Abdelsalam, 1969), Pakistan (Dorreen, 1974) and Iraq (Kassab, 1975). The Lower Tar Member represents the Maastrichtian interval in this region.

Salaj (1979) on the occurrence of planktonic foraminiferal assemblage of *Globotruncana acra rugosa* zone in association with *Neoflabellina rugosa* (d'Orb.), *Bolivina incrassata incrassata* (Reuss), from Al Qaryat Al Gharbiyah Sheet, suggests the possibility of extending the lower age limit of Lower Tar Member upto uppermost part of Campanian. On the other hand Gohrbandt (1966b) observes that the main part of Jordi and Lonfat's (1963) Lower Tar Member is known from the subsurface, and based on the presence of *Globorotalites michelinianus* (d'Orb.) may ranges down to Campanian-Santonian. These observations were not confirmed by Eliagoubi (1975) who studied the biostratigraphy of Lower Tar Member from the surface and subsurface and he suggested a Maastrichtian age for these beds. Salaj & Nairn, 1991 suggested a new formation and they named it Algarbiyah Formation (Upper Campanian–Upper Maastrichtian), previously called Lower Tar Member of the Zimam Formation. Algarbiyah Formation comprises three members , (Bir Bu al Ghurab Member, Lawdh Allaq Member and Lower Tar Member).

Bin'Affin Member: The term was originally introduced by Furst (1964) to include the facies change of Lower Tar Member into a predominantly sandy facies south of Jabal Assawda, which named after Sarir Bin' Affin. It crops out between latitude 26°30'N and longitude 28°30'N.

In the type area the Bin Affin Member is characterized by greenish yellow silty to fine sandy dolomitic marls containing a bone fragments bed with shark teeth and molluscan fossils, southwards dominantly poorly bedded sandy or clayey sandy facies has developed. A conglomeratic horizon has been recorded from bore holes. In the upper part of the sequence reddish brown to black brown

elongated iron oxide concretions perpendicular to the bedding plane are common. The lower contact with the underlying Palaeozoic Formations is sharp but the contact with Nubian Sandstone is marked by the absence of large scale cross bedding, and the presence of calcareous cement in the Bin'Afffn Sandstone which also contains rare molluscan shells and *Omphalocylus macroporus* The upper contact with the Upper Tar Member and their equivalents, the Dor El Gani Marl is marked by a prominent hard yellowish brown fossiliferous dolomitic limestone, occasionally sandy which is well developed throughout the region.

Furst (1964) had measured a composite type section for Bin' Affin Member, in two separate depressions between Dor El Gani and Wadi Kapir.

A maximum thickness ranges from 80-100 m has been recorded from surface and subsurface data. The Bin'Afffn Member directly rests on the marine Lower Carboniferous sequence in Wadi Kapir; southwards till at 26°25'N. It overlies the Nubian Sandstone, further south the contact is concealed but appears to rest directly on the basement rocks.

North of Lat 28°N, a small area in the SW part of Al Washkah and SE part of Jabal Al Hasawnah Sheet the Bin'Afffn Member sediments are exposed. Based on the record of fossils from Al Washkah and Jabal Al Hasawnah Sheet a Maastrichtian age has been assigned to this member.

Upper Tar Member: Jordi and Lonfat (1963) was first described this member as a succession of marl and lime mudstone, with thick shaly interrelations in the middle part and a fossiliferous limy interval in the lower part. In the type area the Upper Tar Member starts with about 4m thick bedded dark green to gray claystone grading into light yellow marlstone and followed by 8-10 m alternations of calcarenites and calcilutites. The calcarenites are rich with molluscan fossils, in some places appearing like *lumachelle*. The molluscan fossils mostly belong to the pelecypod families Carditidae and Tellinidae and gastropod superfamily Cerithiacea, with rare nautiloids, oysters and echinoids. This interval was referred by Jordi and Lonfat (1963) as 'Socna Mollusc Bed', due to its well development in the vicinity of Socna. This fossiliferous interval is followed by nearly 25 m thick, three bands of greenish yellow claystone with marly appearance, separated by less than one meter thick calcarenite bands containing few molluscan fossils. The claystones are poorly in fossils, but have yielded discorbis pseudoscopus (Nakkady), few rotalids and ostracods along with some reworked microfauna present in the Lower Tar Member. The uppermost 30 m succession consists of alternation of yellowish cream marly occasionally nodular limestone, calcilutite and fossiliferous calcarenites. These beds have yielded a shallow water foraminiferal and algal assemblage, and have undergone slight dolomitization, with resulting recrystallization of the contained fauna. These are in turn overlain by the cross bedded, cream coloured but weathering reddish brown limestones of Had Member (Megerisi & Mamgain 1980)

The exposed thickness of Upper Tar Member in the type area where both the lower and upper contacts are exposed averages 70 m, and shows little variation in the western part of Hun Graben, but gradually reduces in thickness towards Jabal Assawda averaging around 10 m south of it. Similarly the thickness of Upper Tar Member gradually reduces in the NW and SW parts of Ghadamis Basin, it does not cropout in Nalut Sheet.

Jordi and Lonfat (1963) stated that the Had Limestone directly rests on the Lower Tar Member could not be accepted by the work of Novovic (1977) who observed that the Zimam Formation in (Nalut Sheet) to be considered to represent the Lower Tar Member. In this area, the upper 10-15 m thick level is characterized by dark gray to yellowish and pinkish white dolomitic limestone, occasionally sandy and saccaroidal with interbeds of marly limestone, giving it an appearance of a condensed sequence of alternating hard and soft beds which characterize the Had Member. Novovic (1977) has recorded *Omphalocyclus macroporus* (Lamarck), *Exogyra overwegi* and *Inoceramus regularis,* etc. from these beds.

Socna Bed: Jordi and Lonfat (1963) informally used the term Socna Mollusc bed to distinguish the basal fossiliferous horizon of Upper Tar Member (Fig. 3). Because of its homonymy with the Socna Formation of Burollet (1960) and unconfirmed record of *Nerinea* sp from these beds; Energoprojekt (1975) expanded the concept of Jordi and Lonfat (1963) by including the uppermost fossiliferous interval of Lower Tar Member in these beds and terms the new combination as 'Socna Unit'. The main controversy however continues on the age of these beds.

The Upper fossiliferous interval of Lower Tar Member abounds in thick shelled oysters like *Exogyra overwegi, Agerostrea ungulata,* and larger foraminiferal genera *Omphalocyclus* and *Siderolites;* whereas the basal fossiliferous level of Upper Tar Member abounds in *Venericardia* and representatives of carditidae, tellinidae and cerithiacea and thin shelled oyster *Ostrea cellae.* Locally, as in the type section and near the mouth of Wadi Zimam, this interval also contains common *Siderolites* along with the above assemblage, some worn out and reworked specimens of *Omphalocyclus, Globotruncana, Rugoglobigerina, Pseudotextularia,* etc. were also recovered from these beds and the immediately overlying yellowish green claystones. The Maastrichtian elements present in this interval are reworked, though no characteristic Paleocene planktonic foraminiferal species were found in the type area, but *Globoconusa* has been recorded from the southern margin of Hun Graben in Al Washkah Sheet, represented by *Globoconusa daubgergensis* (Bronnimann), confirming the Paleocene age to this interval.

This fossiliferous interval, averaging 12 m in thickness in the type area shows a gradual thinning towards south, where the fossiliferous calcarenites average 2 m in thickness in the southern margin of Hun Sheet and continue with the same thickness in Al Washkah and Jabal Al Hasawnah Sheets. Their individuality is lost in the western and northwestern part of the Ghadamis` Basin where the calcarenites laterally merge into the claystone-marl succession.

The mapping teams of Industrial Research Centre do not consider this level as a distinct mappable unit, and the criteria to delimit the lower and Upper Tar Member boundary is based on a combination of factors including the last appearance of *Omphalocyclus - Exogyra* assemblage.

Based on fossil records, Danian (basal Paleocene) age is assigned to the Upper Tar Member, which was deposited in a shallow marine neritic to littoral environment of deposition (Megerisi & Mamgain 1980.

Had Member: Jordi and Lonfat (1963) introduced the name Had Limestone Member after Wadi Had, but the type section located in Wadi At Tar Al Kabir where the exposed thicknes about 50m of dolomite and dolomitic limestone with the intercalation of chalky marl.

In the type area the Had Member starts with a massive cavernous, creamy coloured, cross bedded dolomitic limestone, weathering reddish-brown, forming three prominent benches, separated by slightly dolomitize chalky limestone, rich in molluscan fossils. These hard dolomitic limestones form a prominent scarps and plateau surface in the western part of Hun Graben, covering large area of Ghadamis Basin. The middle limestone level is a thin bedded and contains Molluscan fossils, the top level is medium to coarse grained, creamy white on fresh surface, without visible fossils, but broken by huge columnar joints. The existence of joints in the Had Member has been explained by Antonovic (1977). He reported that due to the slumping of underlying soft marly horizons, affected by solution, resulting in large open fractures of the overlying hard resistant dolomitic limestones, aided by gravity sliding.

The thickness of Had Member ranges from 50 m in the type area to around 5 m south of Jabal Assawda, and together with Upper Tar Member averages 25 m in Ghadamis Sheet. The reduced thickness has eliminated the characteristic three prominent dolomitic limestone levels, which nearly merge into one, prominent brown weathering, grayish white crystalline dolomitic limestone with marly and occassionaly chalky intercalations (Megerisi & Mamgain 1980).

The chalky interval is very rich in macrofossils, mostly represented *by Tellina* sp, *Turrietella* sp, and *Nautilus* sp and *Echinods* etc. Ostracods are rare occasional ooids are present, but locally near Suknah, they have developed into dominant components of the dolomitic limestone. Based on the fossil record and its stratigraphic position of Paleocene (Montian) age has been assigned to this member, a shallow marine neritic to littoral environments.

Previous work on the upper Cretaceous Ostracoda from Libya: Literature survey shows that most micropaleontological work has been carried out on foraminifera. Few ostracods studies have been done by Salahi (1966) who investigated Upper Cretaceous, Palaeocene, Early Eocene and Oligocene ostracoda from the Zaltan region. He described sixty species of which forty-five were new but not nomenated due to their wide stratigraphic range.

El Waer (1992) studied the Tertiary and Upper Cretaceous ostracoda from NW Libya. He described one hundred and thirty species and sub-

species belong to fifty-five genera and sub-genera. El-Sogher (1996) investigated the Late Cretaceous and Paleocene ostracoda from the Waha Limestone and Hagfa Shale of the Sirt Basin.

Salaj & Nairn (1991) studied the Upper Cretaceoucs ostracoda from the northren Ghadamis Basin.

SYSTEMATIC DESCRIPTIONS

The systematic order used follows that of the Treatise (1961) on Invertebrate Palaeontology (Q).
Subclass Ostracoda Latreille,1806
Order Podocopida, Muller, 1894
Family Cytherllidae Sars, 1866

Cytherella sp1
Pl. 1, Figs. 4, 5, 6
Material: 30 carapaces and 22 valves.
Diagnosis: Carapace ovate to subrectangular in lateral view, right valve strongly overlapping the left valve except the antero-ventral and central-anterior, the surface of carapace is smooth.
Description: Carapace elongate to ovate in lateral outline, anterior margin well rounded, posterior margin obliquely rounded, dorsal margin almost straight in anterior, 2/3 posterior convex, ventral margin nearly straight in the left valve and slightly convex in the right valve, maximum height at 1/3 length from anterior, maximum length above center height, in dorsal view anterior margin tapered, surface of carapace is smooth, internal feature not seen, sexual dimorphism not distinct.
Dimension of figured specimens (in μm):

	Length	Height	L/H	Width
Male left carapace	480	425	1.13	----
Female right carapace	740	460	1.6	----

Remarks: The figured species is very similar in lateral outline to the *Cytherella saidi,* described from Shurfa Formation (Aburass Member) in Sirt Basin by Gammudi 1996, but the later species differ in having finely punctuate, also the studied species similar in lateral outline to *Cytherella sp* described from Eocene of Tripoli Basin, by Whatley and Arias (1993), but the later species differ in less overlapping left valve by right valve on the dorsal margin.
Occurrence: Occurs in the Lower Tar member (Zimam Formation) Ghadamis Basin.

Cytherella sp 2
Pl. 1, Figs. 1, 2, 8
Material: 32 carapaces and 15 valves.
Description: Carapace subrectangular in lateral view, anterior margin evenly rounded posterior margin rounded, dorsal margin nearly straight and sub parallel to ventral margin, maximum height at 1/3 length from posterior, maximum length at mid height, surface of carapace is smooth and slightly pronounced anterior rim, internal feature not known and sexual dimorphism well distinct male more elongate than female.
Dimension of figured specimens (in μm).

	Length	Height	L/H	Width
Male right carapace	660	330	2.0	---
Female right carapace	540	300	1.8	---
Female right carapace	611	345	1.77	---

Remarks: The figured species is very similar in lateral out line to *C. lagenalis* which described from late Paleocene to early Eocene of Egypt by Bassiouni and Luger (1990) apart from later species shows strong overlapping and more elongate, also the studied species shows similarities in lateral out line to *C. symmetrica* described from Paleocene-Eocene of Tarabulus Basin by Whately and Arias (1993), but later species differ in having small pits.
Occurrences: Occurs in outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin.

Cytherella sp3
Pl. 1, Fig. 7
Material: 2 carapaces.
Description: Carapace subrectangular in lateral outline, anterior margin broadly rounded, with pronounced anterior rim, posterior margin obliquely rounded, dorsal margin and ventral margin almost parallel, maximum height at 1/3 length from posterior, maximum length at the mid height, surface of carapace punctuate except central area of the carapace where weakly punctuate, the surface of carapace corroded.
Dimension of figured specimens (in μm):

	Length	Height	L/H	Width
Right carapace	520	290	1.79	---

Remarks: This is not well preserved carapace and has very week pits, the lateral outline of the figured specimens shows similarities to the *Cytherella joaalensis* described from shallow marine in West Africa by Witte (1993).
Occurrence: Occurs in Lower Tar Member (Zimam Formation) Ghadamis Basin

Genus *Cytherella* Jones, 1849
Type species: *Cytherina Ovate* Roemer,1840

***Cytherella mohamadi* Gammudi, 1996**
Pl. 1, Fig. 3, Pl. 2, Fig. 8
1996 *Cytherella Mohamadi* Gammudi,1996 p. 30, pl, 2, Fig. 4-9
Material: 2 carapaces.
Diagnosis: A species of *Cytherella* with distinct marginal rim around anterior, ventral and postero-ventral area anterior margin evenly rounded, ventral margin concave, dorsal margin centrally concave.
Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Left carapace	525	295	1.77	---
Right carapace	542	300	1.8	---

Remarks: This species is identical in lateral out line to *Cytherella mohamadi* originally described from Upper Paleocene Sirt Basin. But the studied species shows smaller size than the original species 540 µm cf 750 µm, (the small size refer to not reach to adult stage).
Occurrence: Occurs in outcrop of Lower Tar Member (Zimam Formation) and Upper Palaeocene in the Sirt Basin.

Genus *Cytherelloida* Alexander 1928
***Cytherelloida dabai* sp. nov**
PL. 2, Figs. 1-7, Pl. 3, Figs. 1-4
Material: 24 carapaces and 17 valves.
Derivation name: in honor of Ibrahim Daba a geologist who in comma since four years
Diagnosis: Carapace subrectangular in lateral outline, surface of the carapace is smooth, well distinct anterior marginal rim, and short ridge parallel to ventral margin lies on the 1/3 carapace length from ventral, with clear subcentral depression and vertical posterior rim clearly joined short dorsal margin ridge with sharp angle.
Holotype: Male left carapace Pl. 3, Fig. 3
Paratype: Seven specimens Pl. 2, Fig. 1-7
Type locality: Al Quariyat Al Sharghiah
Type horizon: Lower Tar Member.
Description: Carapace subrectangular in lateral view, anterior margin evenly rounded, posterior margin well rounded in the right valve and truncated in the left valve, dorsal margin straight to slightly concave at 1/3 length from anterior, ventral margin almost straight to slightly concave at the middle, surface of carapace is smooth with sub central depression and reticulated by anterior margin rim, and short horizontal ridge lies parallel to ventral margin at 1/3 high, with additional vertical posterior ridge ending with node at the postero-dorsal area while it is upper part bending interiorly.
Dimension of figured specimens in (µ m).

	Length	Height	L/H	Width
Male left carapace	666	365	1.82	---
Male right carapace	645	363	1.77	---
Female right carapace	590	355	1.66	---
Male right carapace	680	380	1.78	---
Female left carapace	680	375	1.81	---
Male right carapace	660	365	1.83	---
Female left carapace	675	400	1.68	---
Female right carapace	611	366	1.67	---
Male left carapace	666	360	1.85	---
Male left carapace	682	322	2.11	---
Female left carapace	675	400	1.68	---

Remarks: The figured species shows some similarities in lateral outline to *Cytherelloida ghorabi* which described from Middle Maastrichtian of Dakhla Formation, Egypt (Bassiouni and Luger, 1990). The later species differ in having nearly straight dorsal margin and less pronounced posterior rim and having median ridge.
Also the figured species differ from *Cytherelloida araromiensis* which described from Lower Tar Member by Salaj and Nairin 1991 in more pronounced dorsal ridge and truncated posterior margin, as well as having short median ridge.
Occurrences: Occurs in the outcrop of the Lower Tar Member (Zimam Formation) Ghadamis Basin.

Suborder *Podocopina* Sars, 1866
Superfamily *Bairdiacea* Sars, 1888
Family *Bairdiidae* Sars, 1888
Type Species *Bairdia sp 1*
Pl. 6, Figs. 1, 2, 3
Material: 42 carapaces and 60 valves.
Description: Large carapace with typical outline of the genus, posterior margin lower and narrower than anterior, left valve larger than right and clearly overlapping through dorsal margin postero-ventral and anterior, left valve slightly convex ventral margin while right valve straight, dorsal margin in the left valve broadly rounded, surface of carapace is smooth, the maximum height centrally, the maximum length at 1/3 from ventral margin, internal features not known, sexual dimorphism not distinct.
Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Left carapace	950	570	1.66	---
Right carapace	1000	662	1.51	---

Right carapace	1020	670	1.52	---

Remarks: The species *Bairdia sp.1* is very similar to *B. group ilaroensis* which described from Danian (Haghfa Shale) Sirt Basin Libya by keen *et al* (1994), but the later species differ in having highly arched dorsal margin, also our species shows similarities with *Bairdopilata ilaroensis*, Reyment and Reyment which described from Paleocene of Nigeria by Swain *et al* (1983), but the Nigerian species differ in more pointed posterior margin.
Occurrence: Occurs in outcrop of Lower Tar Member (Zimam Formation) Ghadames Basin.

Bairdia sp 2
Pl. 6, Figs. 4, 5, 6
Material: 8 carapaces and 19 valves.
Description: Large carapace subtriangular in lateral view, anterior margin obliquely rounded, pointed posterior end, dorsal margin broadly rounded, ventral margin nearly straight in the middle, greatest height at mid- length, maximum length about 1/3 of the height from ventral margin, the left valve strongly overlapping the right valve except in posterior end, internal feature not observed, sexual dimorphism not distinct.
Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Right carapace	1100	745	1.46	---
Left valve	960	560	1.71	---
Dorsal view	855	---	---	370

Remarks: Bairdia sp 2 shows some similarities to *Bairdia sp 1*, the later species more arched and the ventral margin more convex in the left valve.
Occurrences: Occurs in the outcrop of Lower Tar Member (Zimam Formation), Ghadames Basin.

Super Family *Cypirdacea* Baird, 1845
Family *Paracyprididea* Sars,1923
Genus *Pontocypris*
species A
Pl.7, Figs.1-8
Material: 24 carapaces and 20 valves.
Description: Carapace subtriangular in lateral view, anterior margin well rounded, posterior margin sharply pointed dorsal margin highly arched particularly left valve, ventral margin almost straight, maximum height about mid of the carapace, maximum length at 1/3 height from ventral, left valve strongly overlapping the right valve, surface of carapace is smooth, with distinct sexual dimorphism, the male been shorter than female, internal feature not been observed.

Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Male left carapace	922	420	2.19	---
Female right carapace	1050	525	2.0	---
Female left valve	975	500	1.95	---
Dorsal view	800	---	---	400
Male right carapace	925	416	2.22	---
Female left carapace	910	430	2.11	---
Female left valve	930	483	1.92	---
Female right carapace	910	450	2.02	---

Remarks: The figured species similar in lateral outline to *Paracypris trosliensis* Apostolescu,1956 which have been described from Paris Basin, but the later species differ in less arched dorsal margin and ventral margin slightly concave, also it is very similar in lateral view to *Paracypris paramaghaghaensis* which described from Eocene NW offshore Libya by El Waer (1992), but the figured species slightly differ in highly arched dorsal margin.
Occurrences: Occurs in outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin.

Genus *Pontocyprella recurva* Eskr,1968
Pl. 6, Figs. 7, 8 & Pl. 9, Fig. 6.
1968 *Pontocyprella recurva n. sp*. Eskar, p 323, pl 1,Figs 6,7, pl 4, Fig 7
1982 *Pontocyprella recurva*, Eskar, Donze *et al* p 281,pl.2, Figs 1,2
1992 *Pontocyprella recurva* Eskar, El-Waer,p 73,pl 57, Figs 1-3
1996 *Pontocyprella recurva* Eskar, Gammudi, p 62, pl 11, Figs 4-7
Material: 4 carapaces and 2 valves.
Description: Carapace elongate to ovate in lateral outline, with prominent overlapping convex left valve by the right in the antero-dorsal area, anterior margin obliquely rounded dorsally posterior margin pointed, ventral margin concave in the right valve and straight in the left valve, surface of carapace is smooth, no internal features been observed in the studied specimens, but original species has adont hinge as mentioned by Eskar (1968).

Dimenssion of figured specimens in (µm):

	Length	Height	L/H	Width
Male left valve	760	310	2.45	---
Female right carapace	625	258	2.42	---
Male right carapace	760	360	2.11	---

Remarks: This species was described from Danian (Zeubbeus Fm) near El-Kaf Tunisia by Eskar (1968) as well as recorded from Maastrichtian-

Danian of El Kaf section by Donze *et al*1982, the Maastrichtian-Paleocene of offshore Libya by El-Waer (1992) and Wathly *et al* (1993), also recorded this species from Eocene of offshore Tripoli Basin, their illustration shows difference from *P. recurva* in it is more tapered posterior margin and larger size (1.5 mm cf 0.7-0.94 mm).

Occurrences: Occurs in Maastrichtian–Paleocene of Libya and Tunisia.

Superfamily Cytheracea Baird, 1850
Family Brachcytheridae Puri, 1945
Brachycythere* cf *B. dakhlaensis

Pl.5, Figs.1-5

Material: 70 carapaces and 10 valves.

Description: Carapace subtriangular in lateral outline, anterior margin slightly obliquely rounded with prominent spines, posterior margin pointed with well prominent spines, dorsal margin arched with well pronounced eye spot clearly seen in the right valve, ventral margin slightly convex, maximum height nearly at the middle of carapace, maximum length at 1/3 length from ventral margin, surface of the carapace ornamented with weakly developed pits.

Dimension of figured specimens in (μm):

	Length	Height	L/H	Width
Male right carapace	800	47	1.70	---
Female left carapace	845	460	1.83	---
Female right carapace	880	480	1.83	---
Male left carapace	890	460	1.93	---
Dorsal view	820	---	---	420

Remarks: The figured species is very similar in lateral outline to the species have been described from Middle Maastrichtian of Egypt by Bassiouni and Luger (1990), the later species differ in more obvious pits in the posterior area, also our species shows similarities to the *Brachcythere angulata* described from Conacian-Maastrichtian in Pakestan, but the later species differ in well distinct pits of different size.

Occurrences: Occurs in outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin.

Family *Bythocytheridae Sars*, 1926
Genus *Monoceratina Roth*, 1928
Type species *Monoceratina Ventral Roth*, 1928
***Monoceratina Salemi* Gammudi, 1996**

Pl. 9, Figs. 3, 4, 5.

1996 *Monoceratina salmi* Gammudi, 1996 p. 72, pl. 13, figs. 11,12.

Material: 3 carapaces.

Diagnosis: A species of *Monoceratina* with distinct subcentral vertical sulcus, short caudal process and 2-3 weakly developed ribs in the swollen area.

Dimension of figured specimen in (μm):

	Length	Height	L/H	Width
Female right carapace	480	275	1.75	---
Female right carapace	512	280	1.82	---
Male right carapace	500	240	2.0	---

Remarks: This species is identical to *Monoceratin salmi* Gammudi, 1996, which described from the Paleocene outcrops (Bu Ras Member of Shurfa Formation) Sirt Basin in lateral outline and surface ornamentation, but slightly larger than *Monoceratina Salmi* (493μm cf 404μm).

Occurrences: Occurs in outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin and Palaeocene outcrop Bu Ras Member (Shurfa Formation) Sirt Basin.

Family: *Trachyleberididae* Sylvester-Bradley 1948
Subfamily *Buntonia* Aspostolescu, 1961
Genus *Protobuntonia* Grekoff,1954
Type species *Protobuntonia nakkadii* Bassiouni, 1970

Pl. 4, Figs. 5-8.

1971 *Protobountonia nakkadii* Bassiouni, p.23, pl. 2, Figs. 1-3.

1982 *Protobuntonia nakkadii* Bassiouni, Donz *et al* p. 295, pl. 12 Fig.1, pl. 14, Fig.6.

1990 *Protobuntonia nakkadii* Bassiouni, Bassiouni & Luger, p. 845, pl. 23, Figs.23,24.

1994 *Protobuntoni nakkadii* Bassiouni, Keen *et al* Pl.16.2, Fig.12.

Material: 20 carapaces and 3 valves.

Diagnosis: A species of *Protobuntonia* subtriangular in lateral view, surface of carapace smooth to finely punctate, 1-2 faint ribs parallel to ventral margin clearly seen in left valve with weakly eye tubercle.

Dimension of figured specimen (in μm):

	Length	Height	L/H	Width
Female left carapace	800	460	1.73	---
Male left carapace	915	480	1.90	---
Female right carapace	800	440	1.81	---
Male right carapace	820	440	1.86	---

Remarks: The studied species are typical to *P. Nakkadii* recorded from Maastrichtian Sirt Basin Libya, Keen *et al* 1993. the figured specimen slightly different in lateral outline to the specimens recorded from Late Maastrichtian-Paleocene of Tunisia by Donze *et al* (1982), and Lower Danian

by Said (1978) which have amore tapered posterior, also Basssiouni (1970) recorded larger specimens from Middle Paleocene of Jordan.
Occurrences: Occurs in outcrop of Lower Tar (Zimam Formation) Ghadamis Basin.

Genus *paracosta Siddiqi*, 1971
Type species *paracosta pervinquiri,* Donze *et al* 1982
Pl. 4, Figs. 1-4.
1982 - *Paleocosta pervinquiri* Donze and R. Said, n.sp,Donze *et al* p. 284, pl.3, Figs.4-10
1990 *Paracosta pervinquiri*, Bassiouni and Luger, p. 834, pl. 20, Figs. 7-10,12
1996 *Paracosta pervinquiri*, El Sogher, p. 323, pl. 30, Figs.1-5
Material: 45 carapaces and 10 valves**.**
Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Male right carapace	690	333	2.07	---
Female left carapace	625	320	1.95	---
Ventral view	680	---	---	285
Female right carapace	630	320	1.96	---

Discussion: Although being smaller, the present specimens agree very well with the description and figured given by Donze *et al* (1982), except for slight differences in details of reticulation in the antero- median and postero- median parts of the valve.

Remarks: The figured species in this study is the same species illustrated by Bassiouni and Luger 1990, in lateral outline, this species differ from Donze *et al* 1982, Bassiouni and Luger, 1990 and El Sogher, 1996, in smaller size and the longitudinal ridges not well pronounced may be due to environmental changes.
Occurrences: This species was first described from the late Maastrichtian to early Paleocene from Tunisia (Donze *et al* 1982) and Middle Maastrichtian of the Dakhla Formation Egypt (Bassiouni and Luger, 1990), and from Waha limestone (Maastrichtian) and Hagfa Shale (Danian) of Sirt Basin, also in the outcrop of Lower Tar Member (Zimam Formation), Ghadamis Basin.

Family *Krithidae* Mandelstam,1960
Subfamily *Krithinae* Mandelstam, 1960
Genus *Krithe* Brady Crosskey and Robertson, 1874
Krithe sp A
Pl. 10, Figs. 5-8
Material: 80 carapaces and 19 valves.
Description: Carapace subrectangular in lateral view, anterior margin evenly rounded, posterior margin obliquely rounded, dorsal margin convex, ventral margin slightly concave at the middle of the right valve, straight in the left valve, maximum height at 1/3 from posterior margin, maximum length below the middle of carapace, surface of carapace is smooth, the left valve strongly overlapping the right valve in particularly at anterior, posterior and dorsal areas, internal feature not known, sexual dimorphism is not distinct.
Dimension of figured specimens (in µm):

	Length	Height	L/H	Width
Male right carapace	570	280	2.03	---
Female left valve	560	280	2.0	---
Carapace dorsal view	535	---	---	245
Female left carapace	570	265	2.15	---

Remarks: The figured species shows some similarities to *Krithe aljurfae* which described from Maastrichtian of Tripoli Basin by El Waer, 1992 the later species differ in less arched dorsal margin and less overlapping left valve to right valve, also the studied species similar to *Krithe echlosa*, which described from Paleocene Sirt Basin by Gammudi (1996) but later species differ in having circular depression posterior and less arched dorsal margin.
Occurrences: Occurs in outcrop of the Lower Tar Member (Zimam Formation) Ghadames Basin.

Family *Xestoleberididae* Sars, 1928
Genus *Xestoleberis* Sars,1866
***Xestoleberis* sp A**
Pl. 10, Figs. 1-4
Material: 30 carapaces and 2 valves
Description: Carapace oval shaped in lateral outline, anterior margin rounded, posterior margin broadly obliquely rounded to sub truncated, dorsal margin highly arched, ventral margin slightly convex, carapace surface smooth and swollen, maximum height nearly at middle carapace, maximum length at 1/3 height from ventral, internal features not seen, sexual dimorphism not obvious.
Dimension of figured specimen in (µm):

	Length	Height	L/H	Width
Right carapace	400	300	1.33	---
Right carapace	430	310	1.38	---
Left carapace	425	300	1.41	---
Dorsal view	400	---	---	350

Remarks: The figured species is very similar in lateral out line to *Xestolebris Kiseibanesis* which described from Late Paleocene-Early Eocene of Egypt by Bassiouni & Luger (1990) the later species differ in having more truncated posterior margin and ventral margin almost straight.
Occurrences: Occur in outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin.

Family *Trachyleberididae*, Sylvester-Bradley, 1948
Genus Paragrenocythere Al-Furiah, 1975
Paragrenocythere. cf P. Gravis
Pl. 8, Figs. 1-8 and Pl. 9, Figs. 1,2.
Material: 48 carapaces and 10 valves.
Description: Carapace subrectangular in lateral view, anterior margin well rounded and decorated with small spines especially antero-ventral margin, posterior margin pointed with obvious posterior cardinal angle in postero-dorsal area, dorsal margin straight, ventral margin nearly straight, surface ornamentation with coarse reticulation, and has subcentral tubercle with ventral ridge starts from 1/3 length from anterior and nearly parallel ventral margin ending with coarse node at 1/3 length from posterior, eye tubercle well pronounced dorsal ridge starts behind eye tubercle ending with a node posteriorly clearly seen in the left valve, maximum height at eye tubercle and maximum length lies below subcentral tubercle, Sexual dimorphism distinct male been more elongate than female.
Dimensions of figured specimens (in μm):

	Length	Height	L/H	Width
Female left carapace	916	483	1.89	---
Male right carapace	1000	466	2.14	---
Ventral view	900	440	2.04	---
Male right carapace	1000	500	2.0	---
Left valve (inside)	860	410	2.09	---
Male left carapace	1000	450	2.22	---
Male right carapace	1000	450	2.22	---
Left carapace	916	500	1.83	---
Right carapace	966	416	2.32	---
Dorsal view	1000	---	---	500

Remarks: The figured species very similar in lateral out line to *Paragrenocythere gravis* which described from Maastrichtian–Upper Paleocene of Libya, the later species differ in having more pronounced dorsal ridge and shorter in length (778μm) also the studied species differ from *P.Gravis* which described by Al Furaih (1977) from Lower Paleocene in Saudi Arabia, the later species has subrounded posterior margin and shorter in length.
Occurrence: Occurs in the outcrop of Lower Tar Member (Zimam Formation) Ghadamis Basin.

Genus *Oertliella Pokorny* 1964
Oerteliella Khargensis
Pl. 5, Figs. 7,8.
1990 *Oertliella khargensis* Bassiouni & Luger, 1990. p.30, pl.18, Figs.1-5
Material: 34 carapace and 21 valves.
Diagnosis: This species charactrized by obliquely rounded posterior marginal and row of spines running in abroad curve below middle of carapace anteriorly to postero-ventral margin corner
Dimension of figured specimens (in μm):

	Length	Height	L/H	Width
Male left carapace	1000	486	2.05	---
Male right carapace	950	438	2.16	---

Remarks: The figure species differ from the original species described by Bassiouni & Luger (1990), in more prominent spines in the anterior and posterior area as well as larger size.
Occurrences: First described from Middle Mastrichtian of Egypt. In the present specimens it occurs in Lower Tar Member (Maastrichtian) Ghadamis Basin.

Genus A
Pl. 5, Fig. 6
Material: One carapace
Description: Carapace subrhomboidal in lateral view, anterior margin rounded, posterior margin with well pronounced caudal process directed upward, dorsal margin nearly straight, ventral margin almost straight anterior and curved upward posteriorly, carapace surface corroded with well pronounced postero-ventral ala, and weakly median sulcus starts from dorsal downward, and has slightly depression at antero-dorsal area, faint parallel ribs occurs at the ventral margin.
Dimension of figured specimens in (μm):

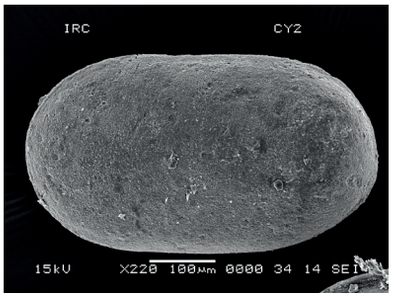
	Length	Height	L/H	Width
Right carapace	800	400	2.0	---

Remarks: This species is not very close to *Cytheropteron* except it has long caudal process, this makes it difficult to correlate with former genus, so it may be considered a new genus.
Occurrences: Occurs in outcrop of the Lower Tar Member (Zimam Formation) Ghadamis Basin.

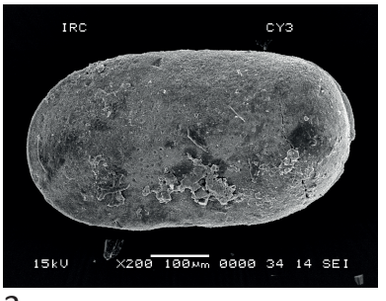
Sample no.	Thickness(in m)	Lithology
31	2	Calcilutite, yellow-light gray, medium hard, dolomitic in parts
30	1	Shale, gray- green, soft, fissil,
29	2	Calcilutite, yellow- light gray, medium hard,marly,with fossil fragment
28	3	Calcarenite, light gray- light brown, highly macrfossil content,medium hard,
27	1	Marl, light gray-light green, soft, fossilferous
26	3.5	Calcarenite, light brown-brown, rich with macrofossils, medium hard
25	2	Marl, light green- green, soft gypsiferous, fossilferous
24	1	Marl, light gray-light green,
23	1.5	Calcilutite, yellow- white, medium hard, marly,
22	1	Calcilutite, yellow- cream, soft- medium hard, marly in parts, slightly gypsiferous
21	2	Marl, light gray- light green, rich with macrofossils
20	1.5	Calcarenite,yellow- light gray, medium hard,with chert nodules
19	2	Marl, light gray- green,soft,
18	3	Calcarenite, yellow-white, hard,with fossil fragment, slightly dolomitic,
17	2	Marl, gray- light green, soft, gypsiferous
16	2.5	Calcarenite, light gray- light brown, fossiliferouce(exogari overge), highly fractured
15	1.5	Calcilutite, yellow-cream, hard, slightly dolometic.
14	2	Marl, white-yellow, soft with macrofossils.
13	2.5	Marl, as sample 11
12	1.5	Calcarenite, light brown –light gray, hard, rich in macrofossil,
11	3	Marl , yellow-light gren, soft, with gypsium streaks.
10	1	Calcarenite, light brown- red, medium hard, with phosphatic nodulls, and shell debris.
9	4	Marl, yellow, light green, soft, with shell fragment, gypsiferous in parts.
8	3	Calcilutite, cream to yellow, marly in parts,
7	3	Marl, light gray to light green, soft with streaks of gypsium, macrofossil are abundant.
6	3	Calciludite,white-cream, medium hard, slightly dolometic.
5	2	Marl, white-yellow, soft, gypsiferous.
4	1	Calcarenite , light gray, well sorted, subrounded shell fragment.
3	1	Calcilutite, white-yellow,slightly dolometic.
2	2	Calcarenite,yellow, hard, shell fragment observed, with gypsiferous marl in parts.
1	4	Marl,yellow-light green,gypsiferous.



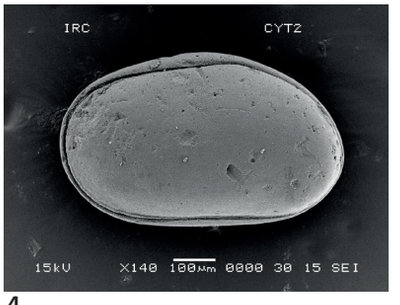
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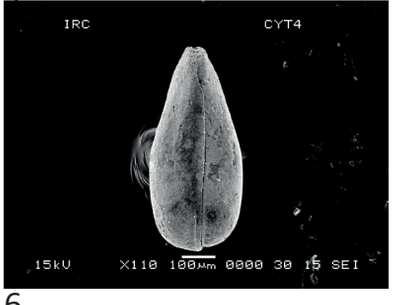
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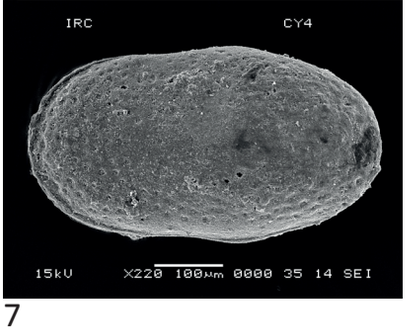
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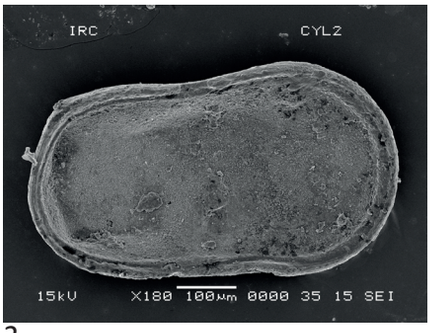
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PLATE I

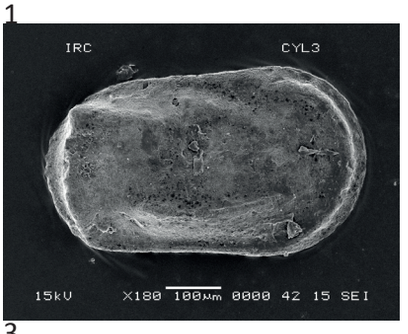
***Cytherella* sp. 2**
Plate I - 1 Male right carapace
Plate I - 2 Female right carapace
Plate I - 8 Female left carapace
Cytherella Mohamdi
Plate I - 3 Female left carapace
Cytherella sp. 1
Plate I - 4 Male left carapace
Plate I - 5 Female right carapace
Plate I - 6 Dorsal view
***Cytherella* sp. 3**
Plate I - 7 Female right carapace



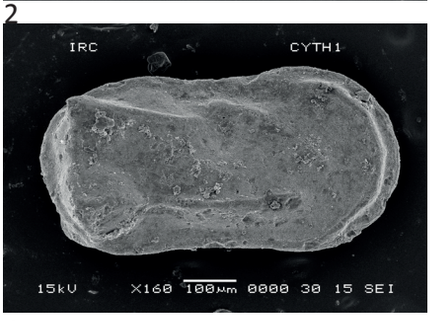
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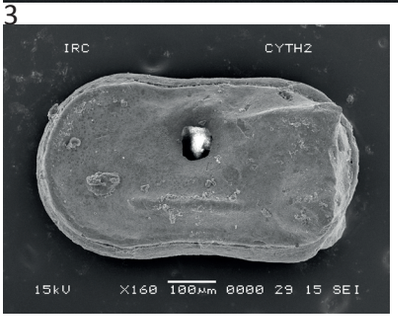
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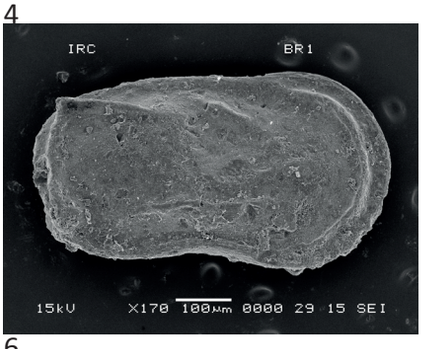
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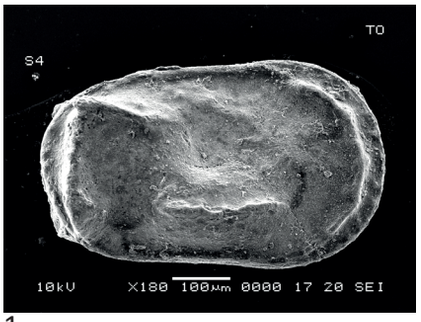
PLATE II

***Cytherelloida dabai* sp nov**

Plate II - 1	Male left carapace
Plate II - 2	Male right valve
Plate II - 3	Female right carapace
Plate II - 4	Male right carapace
Plate II - 5	Female left carapace
Plate II - 6	Male right carapace
Plate II - 7	Female left carapace

Cytherella mohamdi

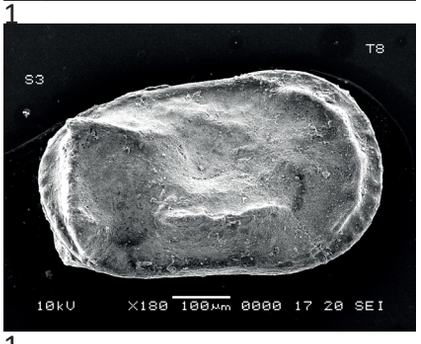
Plate II - 8	Female right carapace



1



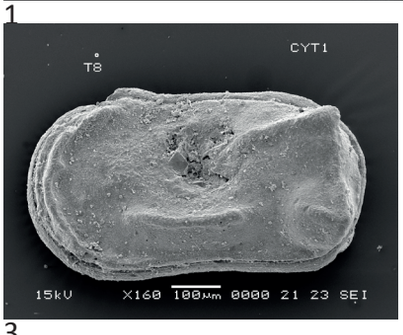
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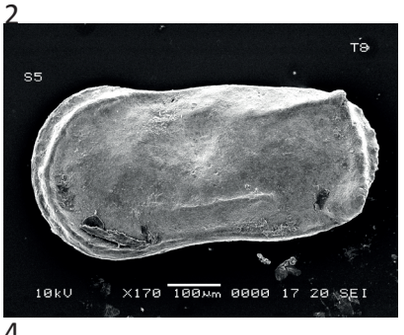
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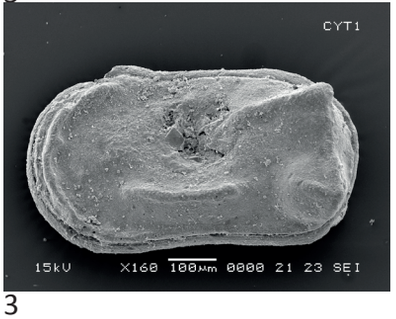
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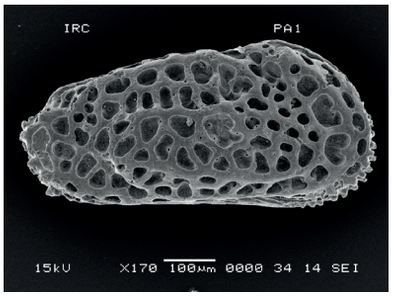


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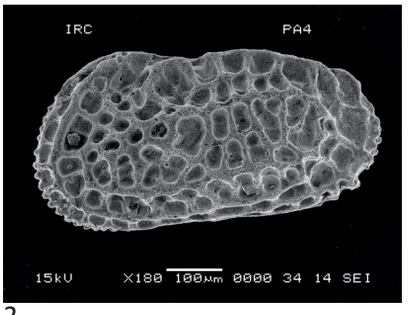
PLATE III

***Cytherelloida dabai* sp nov**

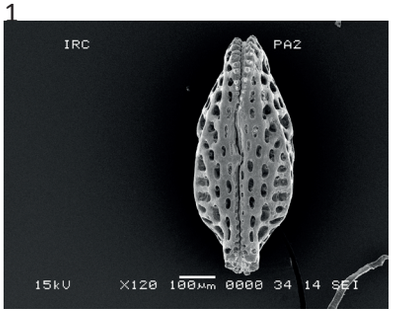
Plate III - 1 Female stereoscopic paired right carapace
Plate III - 2 Male stereoscopic paired left carapace
Plate III - 3 Female stereoscopic paired left carapace
Plate III - 4 Male stereoscopic paired left carapace



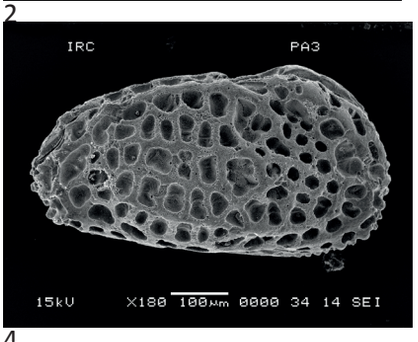
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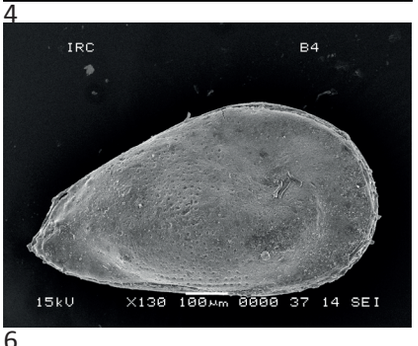
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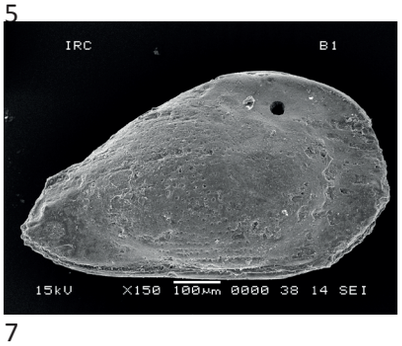
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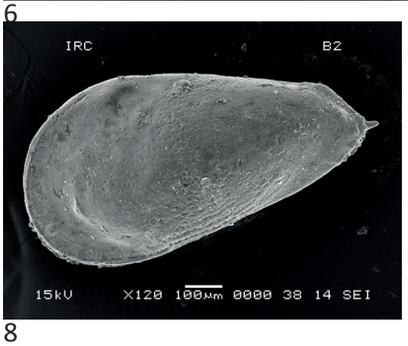
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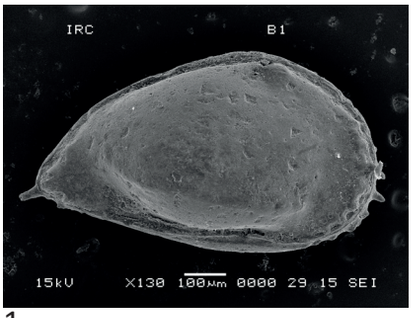
PLATE IV

Paracost a pervinquiri

Plate IV - 1 Male right carapace
Plate IV - 2 Female left carapace
Plate IV - 3 Ventral view
Plate IV - 4 Female right carapace

Protobuntonia nakkadii

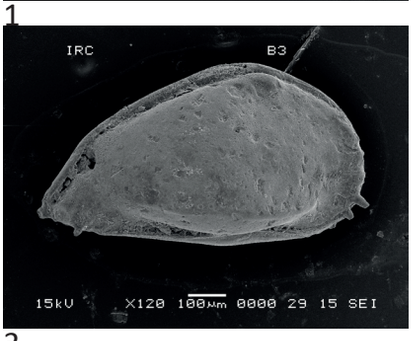
Plate IV - 5 Female left carapace
Plate IV - 6 Male right carapace
Plate IV - 7 Female right carapace
Plate IV - 8 Male right carapace



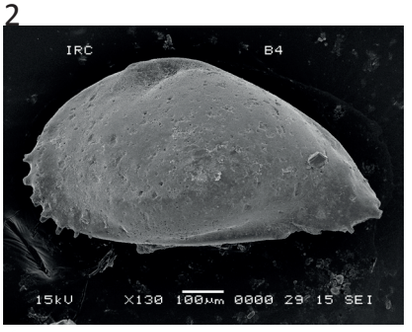
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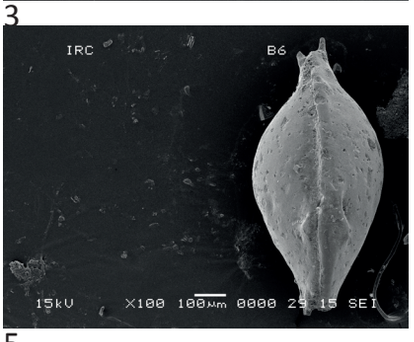
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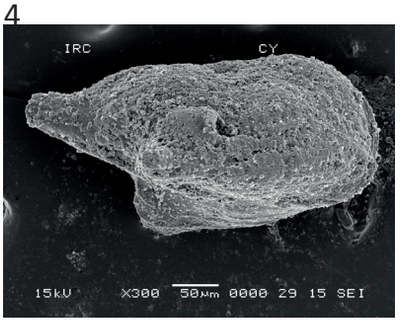
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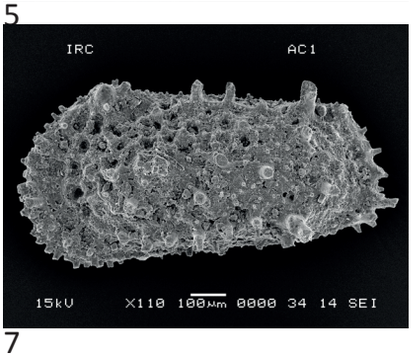
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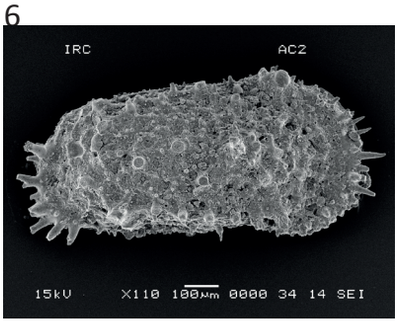
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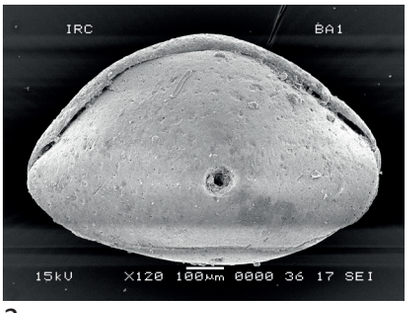
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PLATE V

Brachycythere* cf. *B.dakhlaensis
Plate V - 1 Male right carapace
Plate V - 2 Female left carapace
Plate V - 3 Female right carapace
Plate V - 4 Male left carapace
Plate V - 5 Dorsal view
Genus A.
Plate V - 6 Right carapace
Oerteliella khargensis
Plate V - 7 Male left carapace
Plate V - 8 Male right carapace



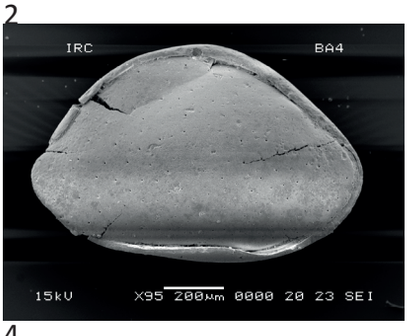
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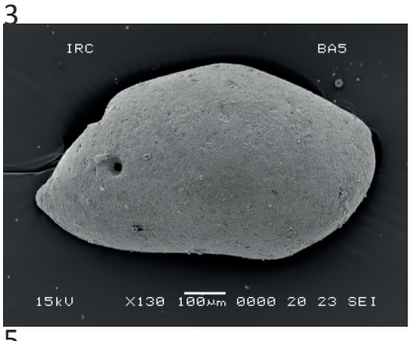
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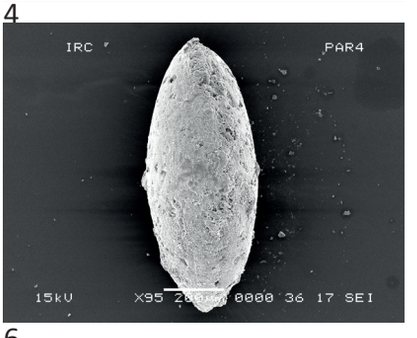
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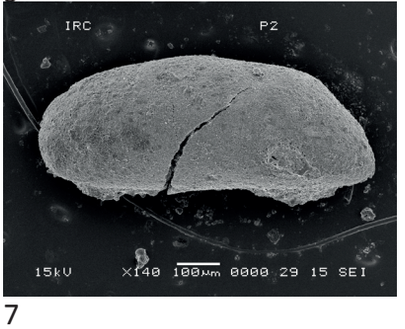
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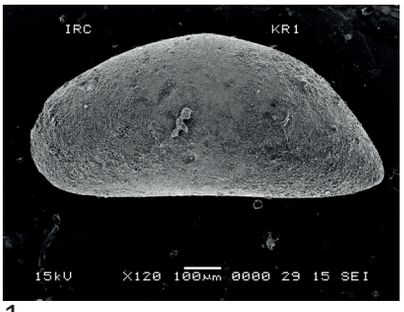
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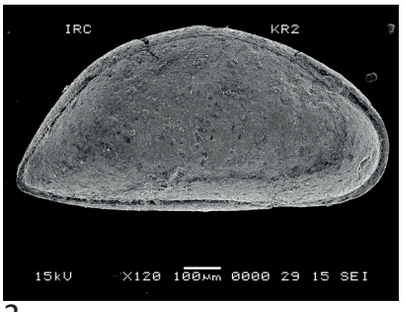
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PLATE VI

***Bairdia* sp. 1**
Plate VI - 1 Left carapace
Plate VI - 2 Right carapace
Plate VI - 3 Left carapace
***Bairdia* sp. 2**
Plate VI - 4 Right carapace
Plate VI - 5 Left carapace
Plate VI - 6 Dorsal view
Pontocyprella recurva
Plate VI - 7 Left valve
Plate VI - 8 Right carapace



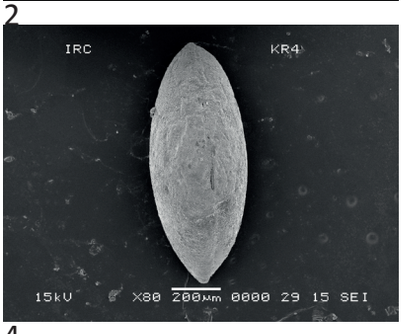
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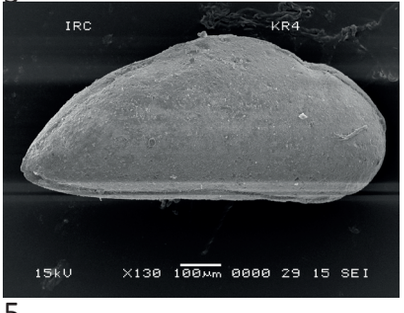
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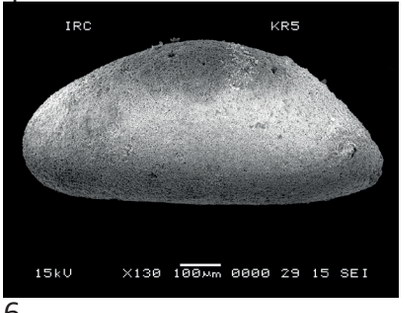
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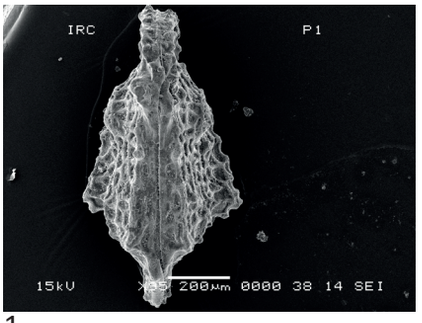


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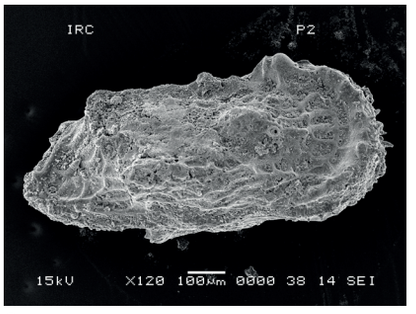
PLATE VII

***Pontocypris* sp. A**

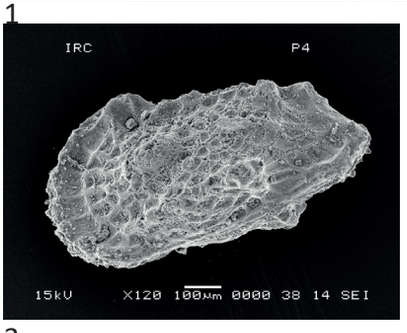
Plate VII - 1	Male left carapace
Plate VII - 2	Female right carapace
Plate VII - 3	Female left valve
Plate VII - 4	Dorsal view
Plate VII - 5	Male right carapace
Plate VII - 6	Female left carapace
Plate VII - 7	Female left carapace
Plate VII - 8	Female right carapace



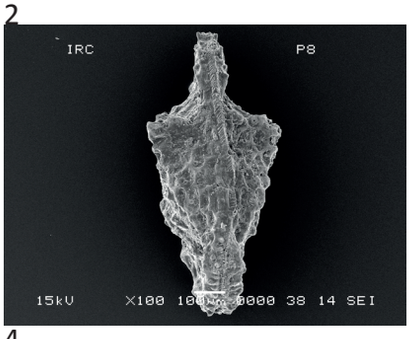
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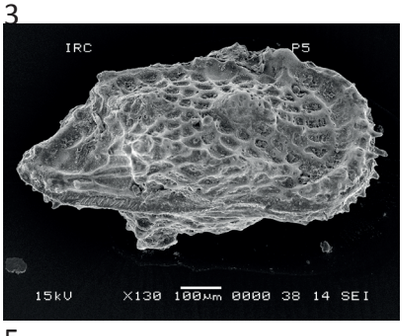
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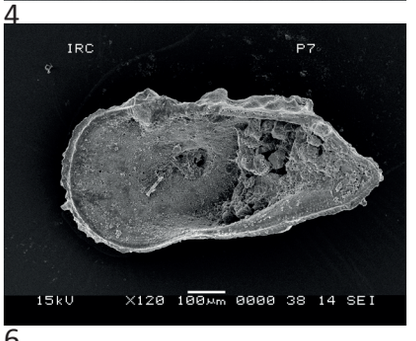
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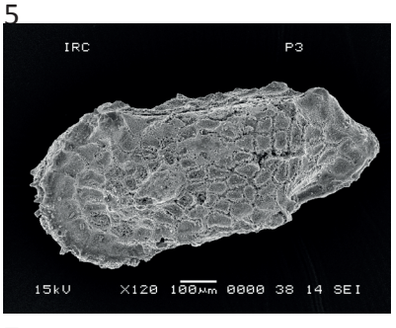
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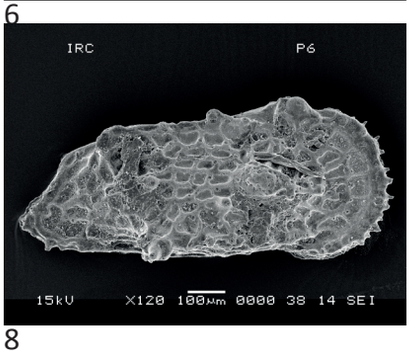
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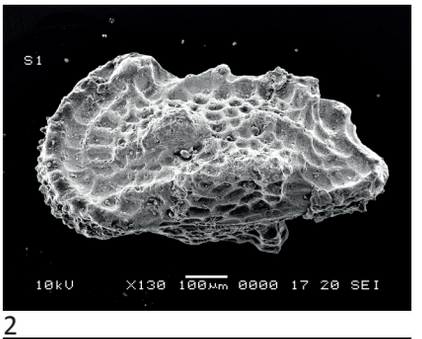
PLATE VIII

Paragrenocythere* cf. *P. gravis

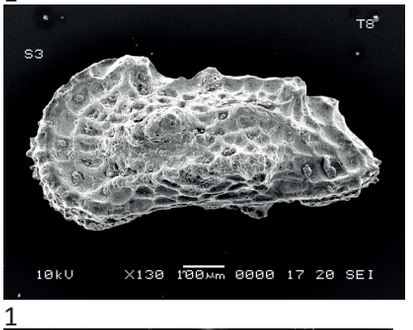
Plate VIII - 1 Dorsal view
Plate VIII - 2 Male right carapace
Plate VIII - 3 Female left carapace
Plate VIII - 4 Ventral view
Plate VIII - 5 Female right carapace
Plate VIII - 6 Male left valve
Plate VIII - 7 Male left carapace
Plate VIII - 8 Male right carapace



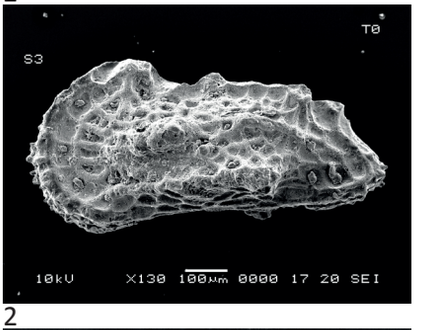
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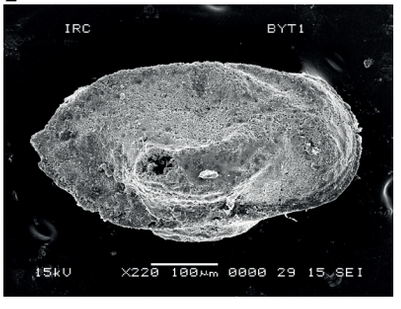
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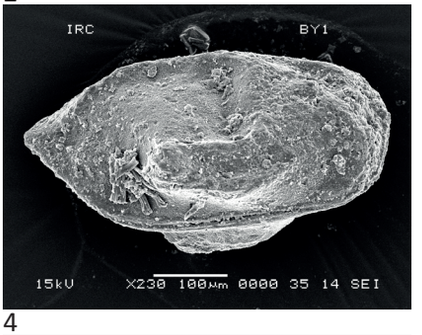
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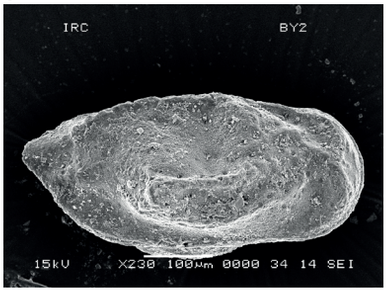
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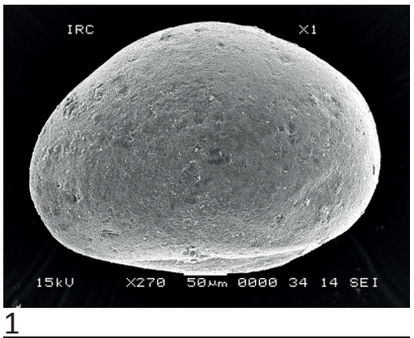
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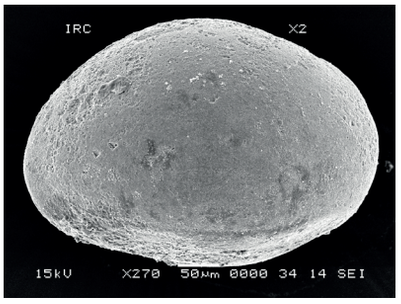
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PLATE IX

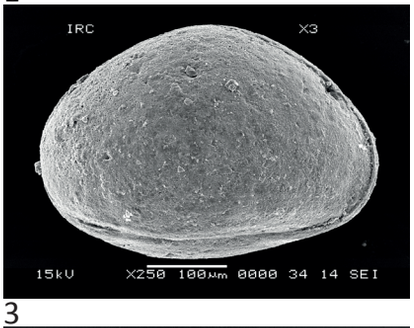
Paragrenocythere* cf. *P. gravis
Plate IX - 1 Female stereoscopic paired left carapace
Plate IX - 2 Male stereoscopic paired left carapace
Monoceratina salemi
Plate IX - 3 Female right carapace
Plate IX - 4 Female right carapace
Plate IX - 5 Male right carapace
Pontocyprella recurva
Plate IX - 6 Male right carapace



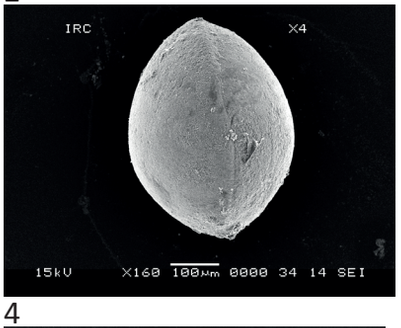
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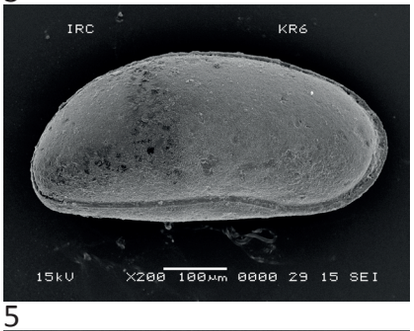
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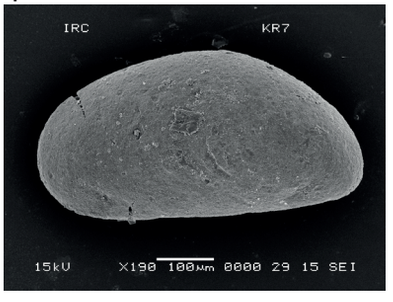
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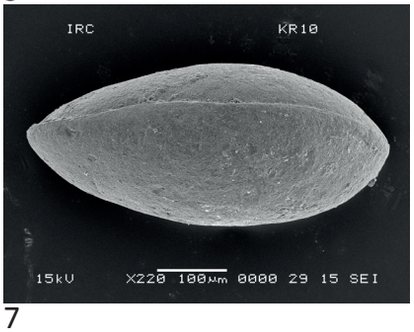
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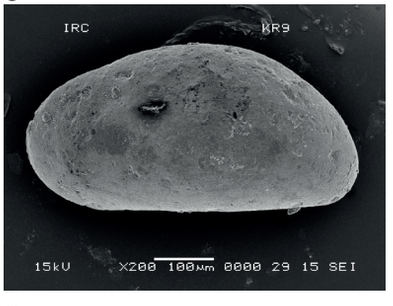
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8

PLATE X

Xestoleberis

Plate X - 1	Right carapace
Plate X - 2	Right carapace
Plate X - 3	Left carapace
Plate X - 4	Dorsal view

***Krithe* sp. A**

Plate X - 5	Right carapace
Plate X - 6	Left valve
Plate X - 7	Dorsal view
Plate X - 8	Left carapace

CONCLUSION

Oil companies usually used fossils in order to estimate age dating of sediments, their paleoenvironments and paleogeography. The ostracoda is one of the tools have been employed in all over the world due to their cosmopolitan on worldwide and they can accommodate all kinds of environments from the poles to tropical areas. In this study we recorded eighteen ostracoda species which indicate Cretaceous age in the North Africa and Middle East and they represent the environment ranges from deeper to shallow marine species. Shallow species organisms such as *Oertilela*, *Paracosta* and deeper fauna like *krithe, Xestoleberis.* Only one species proposed as new and nominated (*Cytherella Dabai*).

Authors proposed byzone on the first appearance of species Pontooprella recurra which indicates Maastrechtian age in Tunisia and northern Libyan Offshore. In the northwest offshore Libya, this species associated with Ganssri zone and Apathomallus Mayoronsis zone Middle-Late Maastrechtian).

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