Biostratigraphy of Ghanema Section (Lower Miocene Al Khums Formation)

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Abstract
Ghanema section have been Logging and nine rock samples have been collected with a total thickness about 15m of carbonate, these samples processed used normal technique in order to obtain microfossil ostracoda to be used in delimit age of the Ghanema section We obtained twenty eight genera and species. Twenty four of them previously recorded from North Africa and Middle East four Genus left in open nomenclature such as *Quadracythere* sp, *Costa* sp, *Semicytherura* sp and *Uroleberis* sp. The fauna assemblages in the study section indicate lower Miocene Age (Burdigalian) by the presence of diagnostic fossil (*Aurila soummamensis*) which is widely distributed in Egypt, Algeria and Libya.

Key Words: Miocene, Ostracoda, Ghanema and Al Khums Formation

Purpose of study
The aims of this study to delimit age of Ghanemah section using microfossil (ostracodas).

Location of the study section

The study section located North west Libya west of Al khums city approximitly30 with coordinate Km Away. Lat.32 33 00 N and long 13 30 15 00 E, see Figure .1

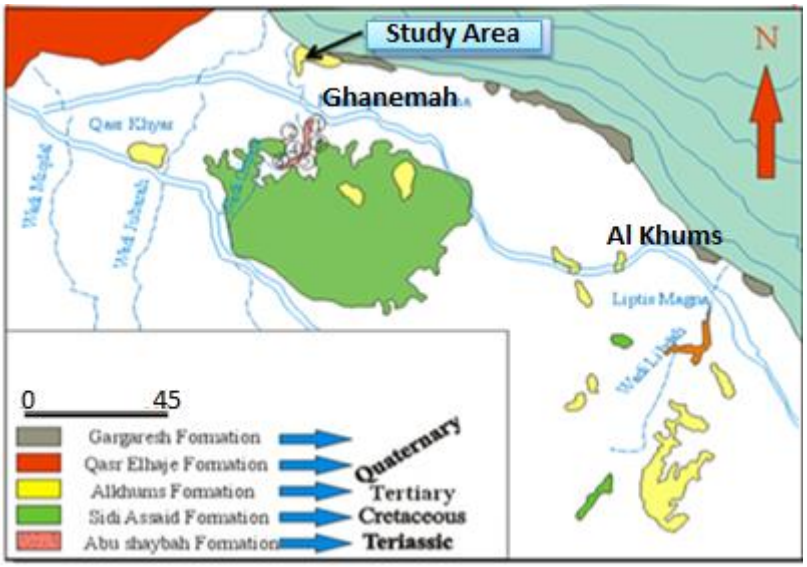

Fig 1. Location of the study Area Al Khums province , Ghanema village modified after (Mann,1975)

Introduction

The Miocene sediments outcrops al mostly along the coastline from Alkhums to Cyrenaica nominated by different names. also exposed in the Marada Oasis with thickness 85-150m and comprise upper part AR- Rahlah lithological mainly carbonate while lower part called Garat Jahanam lithologically mainly sandstone with some Leges of carbonate ,these are usually disconformably overlies varies Oligocene rocks while in the subsurface overlies Oligocene (Dibia Formation) . The Miocene sediment widely distributed in Sirt Basin and Cyrenaica platform with small areas of Al Khums to Misratah city this sediment usually parallel coastline. The thickest sediment located in the Sirt Basin Around 853m in the subsurface (Wright and Benfield ,1980), lithologically composed of shale, clastic and carbonate with total Thickness. The Miocene in Cyrenaica platform Called by Al Ragma formation (Desio 1928). Lithological Composed mainly carbonat with thickness about 65 (Pietersz,1968).this Formation ucconformable some older rocks such as Eocene and Oligocene of Derna Limestone..

Al Khums Formation (MIOCENE)

This rock unit was first described by Floridia, (1939). Mann, (1975) established the Al Khums Formation for the Middle Miocene carbonet- clay marl sequence. In the studied section, this formation overlies unconformable . The Late Cretaceous Sidi as Sid Formation (Ain Tobi Member). Salem and Spreng, (1980) locally subdivided Al Khums Formation in Al Khums area into two informal members, from base to top: 1- An Naggazah Member and 2- Ras Al Mannubiyah Member, the An Naggazah Member recognized in this study.

1 - An Naggazah Member:

First introduced informally by Salem and Spreng, (1980) to define the lower part of Al Khums Formation in Al Khums area, NW Libya. It overlies unconformable the Late Cretaceous Sidi As Sid Formation (Ain Tobi Member) in the Ghanema section.

The lower part of this member characterized by polymictic conglomerates (clasts are composed predominantly of carbonate with chert in sandy carbonate matrix), also contains pebbly to coarse sandstones grading upwards into medium to fine grained, poorly sorted calcareous sandstones, fossiliferous with gastropodes and pelecypods shell fragments. The sandstone is forming, porous to hard, sandy, algal reefal limestone highly fossiliferous with corals, coralline algae, oyster bivalves, echinoide gastropods and pelecypods, (Hamad, 2013).

2 - Ras Al Mannubiyah Member:

This rock unit was first described by Salem and Spreng,(1980) to define the upper part of Al Khums Formation in Al Khums area, in the eastern side of Ras Al Mannubiyah village, about 8 km west – southeast of Al Khums, NW Libya.This member not exposed in the Ghanema section,This member overlies conformably An Naggazah Member and underlies unconformably the Quaternary clastic

sediments.This member composed of highly fossiliferous algal reefal limestone separated by white cream - coloured chalky limestone bed. algal reefal limestone, highly fossiliferous with coralline red algae, gastropods and other bivalved shell fragments, The environment of deposition variety from neritic to littoral and lagoonal(Hamad,2013).

Lithological section of Ghanemah

The total measured thickness about 18 meter mostly from Al Nagazah member, the top 3meter belong to Quaternary sediments covered top section study make unconformable surface. We collected nine samples begins from upper part Sid As side Formation upward the position of sample marked in the lithological log from S1-S9, see figure(2). The samples(1,2) were located in upper part Sid As Sid Formation contact between Sidi AS Sid Formation the lithology was dolomite very hard, while the sample (3) consist of limestone with slightly sand ,the sample (4) contains sand limestone friable to hard, while sample (5) sandstone grey to white , the sample (6) consist of sandy limestone very hard, the sample (7) contains sandstone moderately hard , while sample (8) consist of sandstone with crystal quartz moderately hard , the sample (9) consist shell fragments moderately hard, while the Quaternary deposits which overlain the Al Nagazh member consist of conglomerate of gravel –boulder size moderately hard with shell fragments.

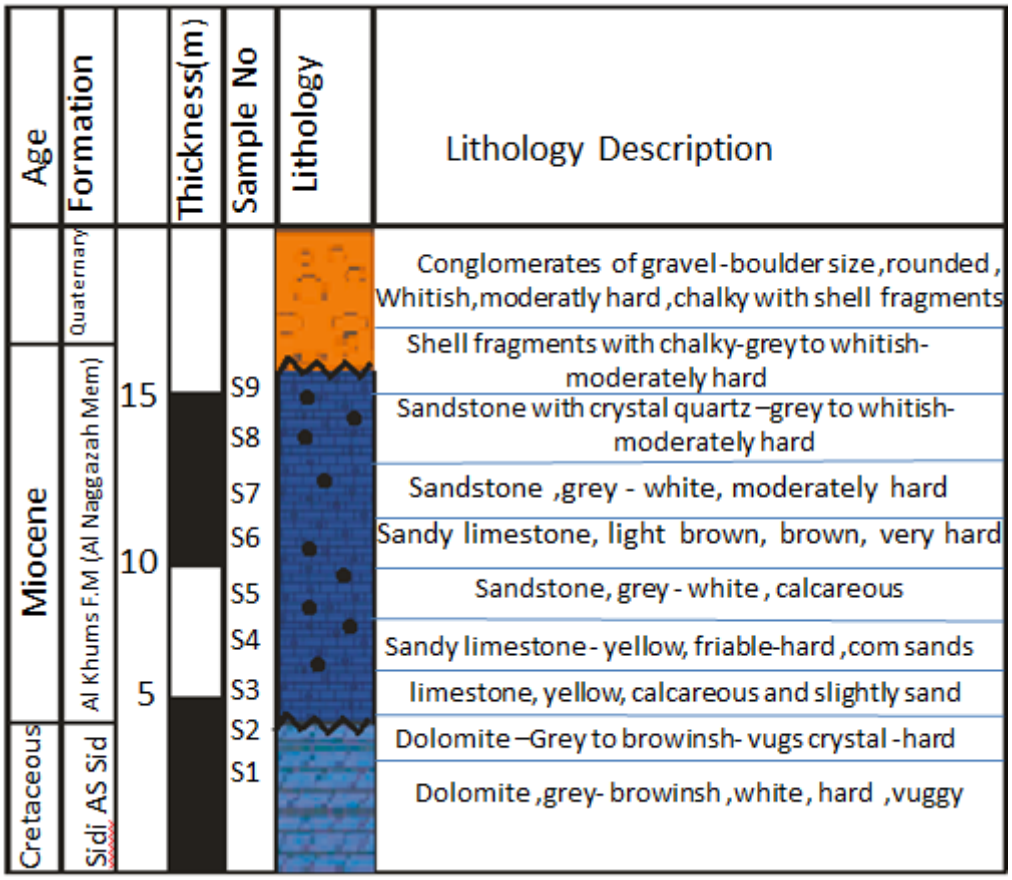

Fig.2 Stratigraphic column of the Al Khums Formation in the study area and location samples in the section

Biozone of the Al Khums Formation Ghanema Section:-

Previous Biozone study using ostracodas

Many Biozone find out around Mediterranean such as Carbonnel (1969) on the Aquitaian Tortonian of the Rhone basin in France , Sissingh (1972) on the Late Cenozoic of the south Aegean Islands , and Gammudi(1990) study subsurface of the Marada Formation and he recognize four Biozone from Aquitnian to upper Regarding the age of Al Khums Formation, assigned this rock unit as Miocene. Middle Miocene (Langhian). But on the contrary, Innocenti and Pertusai, (1984) and El Waer (1991) assigned it as Late Miocene (Tortonian to Early Messinian) on the basis of the ostracod content, Mann, (1975) recorded species and Genera ostracoda indicating a Langhian –Tortonian age. In the present study, ostracoda species recorded from the Ghanema section indicate the age Based on the following index species *Aurila soummamensis* which is considered index fossil for Burdigalian age, *Carinovalva Carinata* which is reported by Gammudi and Keen,(1993) as Langhain –

Serravalian age while *Ruggieria tetraptera tetraptera* Tortonian age. In this study one Biostratigraphic zone was Propsed *Aurila soummamensis* (Burdigalian). We cannot depends *Carinovalva Carinata, Ruggieria tetraptera tetraptera* due to not well preserved species (corroded) and partially distorted and rare species so that I will consider as reworked species.i.e not in Situ. see Table (1) present study

Miocene	Series	Stage	Biozone	Al Khums formation Present study	Sirt Basin,Libya Gammudi,1996	Turkey Gokcen,1985
	Early	Burdigalian		*Aurila soummamensis*	*Aurila soummamensis*	*Aurila soummamensis*
		Aquitanian		/	*Pokornyella deforms minor*	/

Table.1 Correlation chart showing *Aurila soummamensis* Biozone in different Location

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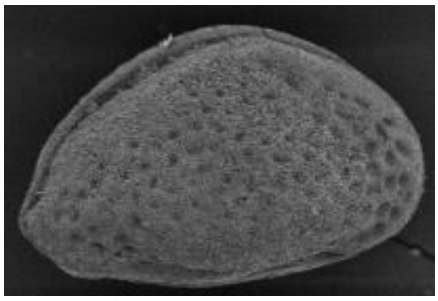

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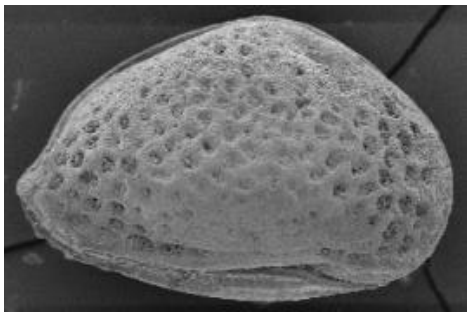

Material: Two carapaces

Horizon: Al Khums Formation, sample no.4, 7 at Ghanema studied section

Dimensions of figured specimen (in µm)

Left carapace Male	Length	Height	L/H
	630	385	1.63
Right carapace Female	Length	Height	L/H
	546	464	1.17

Conclusion:

Microfossils (ostracodas) very important tool in oil companies exploration , they used to Age dating of rock sediments as well as Paleoenvironments and Paleogeography because of their worldwide distribution and can survive into different kinds of environments from fresh water – hyper saline water . In this study we recorded twenty eight species; these are previously recorded along Medetraian region and Middle East. The authors proposed one Biozone on the first appearance index fossil (*Aurilla soummamensis*) which indicate Miocene Age (Burdigalin).

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