

MICROFACIES ANALYSIS OF GHAR FORMATION (WESTERN DESERT OF IRAQ)

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ABSTRACT

Ghar Formation outcrop at the Iraqi western desert was studied by microfacies analysis of (13) thin sections collected from wadi Al-Ratgha (west of Qaim). According to petrographic composition and organisms content ,rocks were subdivided into (4) microfacies units :bioclastic wackestone , mudstone , miliolids wackestone , and grainstone with aggregate grains microfacies .Microfacies units reflect shallow marine environment of low circulation of very warm water at the middle part . The lower and middle part interbedded with quite open marine environment below the wave base . The upper part was deposited at shallow marine environment of low circulation . The main diagenetic processes were the transformation (type of neomorphism) and precipitation of calcite in the fractures and fossil chambers .

INTRODUCTION

Ghar Formation consist of sand and gravels , rare sandy limestone ,clay and anhydrite deposited in the littoral or party deltaic environment that was first described by owen and Naser (1958) at the well Zubair No. 3 (van bellen et al., 1958) . Ghar Formation cropped out at the Iraqi western , represented by Quartz sandstone and sands interbedded with sandy limestones (AL- jumaily, 1974) . AL- Hashimi and Amer (1985) concluded that the formation was deposited at fluviomarine environment , AL- Zubaidi et al.(in press) observations led to near shore high energy , off shore low energy environment and transitional environment using grain size , sorting and winnowing as an indicator to the environment .

The age of the formation was Miocene (Van Bellen et al ., 1959) or Late Lower Miocene (Budy 1980) .

The aim of this study is to show the environment of deposition by using microfacies analysis of (13) thinned section from (13,5)m thickness of Ghar Formation exposed in wadi AL- Ratgha (west AL- Qaim) Iraqi western desert , Fig. 1

MICROFACIES ANALYSIS

Petrographic studied of (13) thinned section , using a polarized microscope led to the recognition of the following microfacies according to (Wilson 1975) and (Fluegel 1982) Fig.2 .

1- Bioclastic Wackestone Facies : the thickness of this facies is (5,3) m which have (40,7%) of the total thickness . It contains broken shell, gastropoda and less than (1%) of miliolids and limestone component (interclast and pellets) in addition to quartz grains of moderately sorted. The matrix composed of microsparite –micrite . The main diagenesis processes were calcite–cement precipitation in fractures and fossil chambers plate(1-1), along within situ transformation of aragonite to calcite such as primary broken shell of

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aragonite transformed to secondary broken shell of calcite (Schmidt 1956). The transformation of aragonite to calcite happens at the shallow marine water of high ratio of Mg:Ca (Fuechtbauer and Goldschmidt 1964). This facies is similar to the SMF (9) zone (7) which is zone of shallow marine water with open circulation.

- 2- Mudstone Facies: The thickness of this facies (2.8) m which have 21.5% of the total thickness. This facies plate(1-2) contains broken shell with rare amount of gastropoda and also contains detrital quartz grains 1-5 % which refer to eolian transporation in quiet marine environment without relation to high energy water (plumley et al., 1962). The main diagenesis process were the precipitation of spary calcite inside the broken shell. This facies similar to the SMF (3) zone(3) which indicated to quiet open marine environment below the wave base
- 3- Miliolids wackestone Facies : The thickness of this is (1.2)m wich have 9.2% of total thickness. This facies recognized by Miliolids of quinqueloculina 40% plate (1-4) and presence of gastropoda broken shell and very rare Ostracods and less than 1% quartz grains. The main diageneses processes were the precipitation of calcite cement during late diagenesis processes due to tectonic uplift (Chilinger et al., 1967) and also precipitated within fossils chambers. This facies similar to the SMF(19) Zone(8) which indicated to the lakes and lagoons of restricted water.
- 4- Grainstone with aggregate grains facies : The thickness of this facies is (3.7)m which have 28.4 % of the total thickness. This facies recognized by aggregate grains plate (1-3) within coarse sparite crystals wich precipitated at intertidal shallow marine environment more than (10)m depth. The aggregate grains coposed insitu from lime component which found at the micrite ,this facies indicated agitated water of low water circulation (Winland and Mattews 1974). Quartz grains ,rounded to well rounded and well sorted of 40% were present at this facies which refer to near shore sediments (fluegel 1982) and high energy environment wich caused the complete washing of limemud and precipitated the spary calcite. The rounded cherty gravel (10) cm at the upper part of the outcrop of studied area refer to fluvial abundance of near shore marine environment .The diagenesis process was mixing of cement (A) and (B) This facies similar to the SMF (17) Zone(8) which refered to very warm shallow marine of restricted circulation . Microfacies distribution of Ghar Formation arranged in Wilson model as show in fig.3 .

ENVIRONMENT OF DEPOSITION

Microfacies study of ghar Formation showed that the lower part composed of bioclastic wackestone facies (1) which reflect shallow marine environment (open circulation) followed by mudstone facies(2) .

Which deposited in open marine environment below the wave base i.e. transgression of sea level . After that the miliolids bioclastic wackestone facies (3) which deposited in lagoons of restricted water . The upper part of the Ghar Formation composed of grainstone with aggregate grains facies (4) refered to shallow marine environment of warm water with low circulation .

CONCLUSIONS

1- Four microfacies were typified from lower to upper contact : bioclastic wackestone facies ,mudstone facies , miliolids wackestone facies and grainstone with aggregate grains facies .

2- High percent of fossils were presence such as miliolids (40% of fossils) while rare amount of gastropoda, broken shell and ostracods also presence in wackestone facies .

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3- The main diagenesis processes were calcite-cement precipitation in the fractures and fossil chambers besides the transporation which are type of neomorphism.

4- The succession of the identifiend microfacies and their zones of deposition reflects the dominance of shallow marine environment beside the quiet open sea below the wave base

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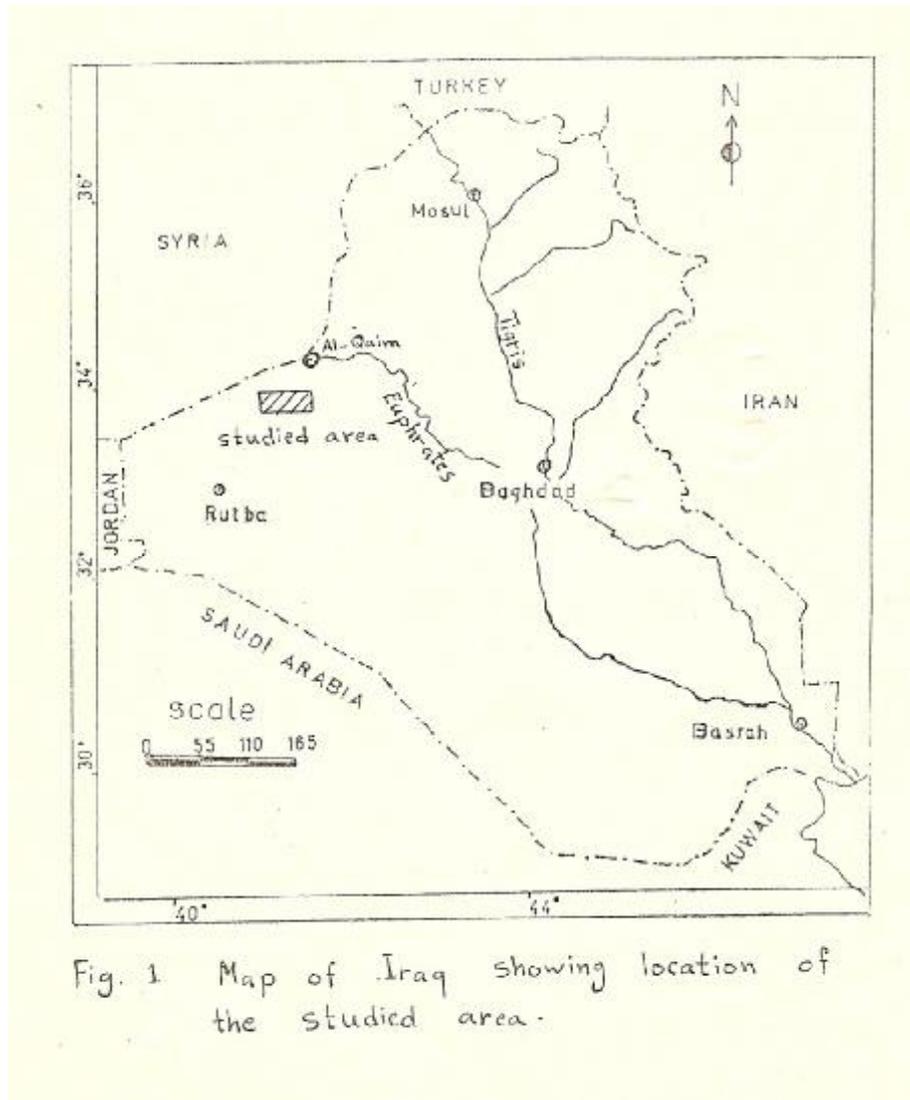


Fig. 1 Map of Iraq showing location of the studied area.

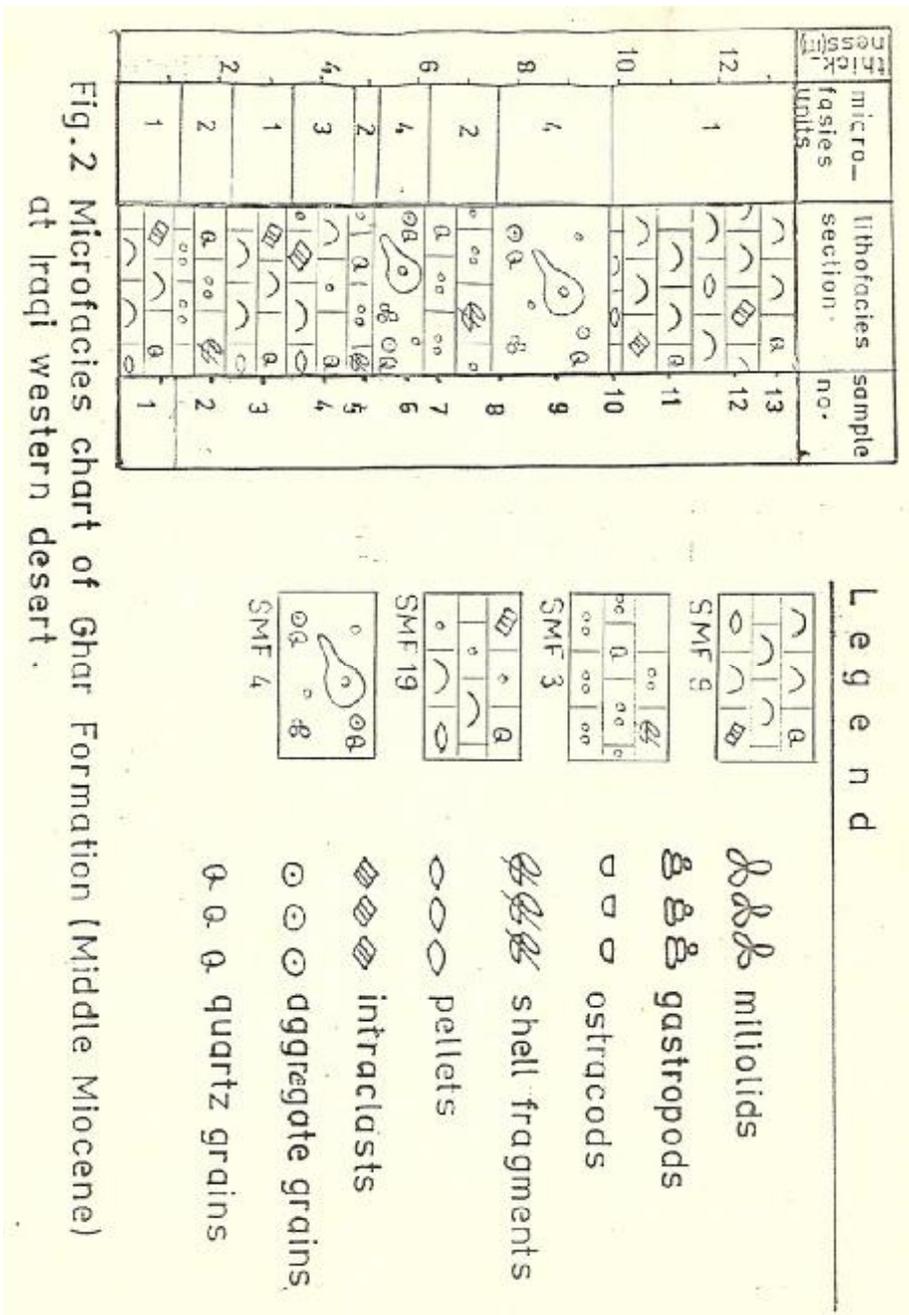


Fig. 2 Microfacies chart of Ghar Formation (Middle Miocene) at Iraqi western desert.

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Microfacies Analysis of Ghar Formation

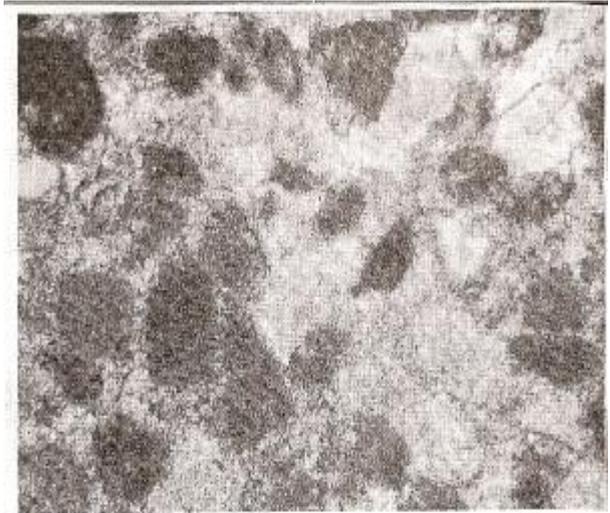
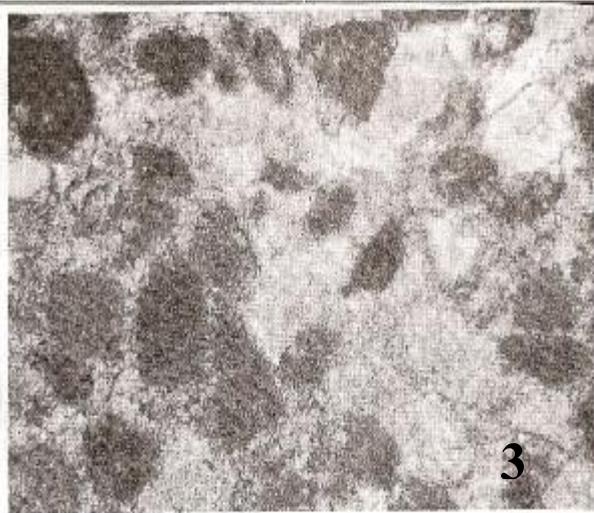
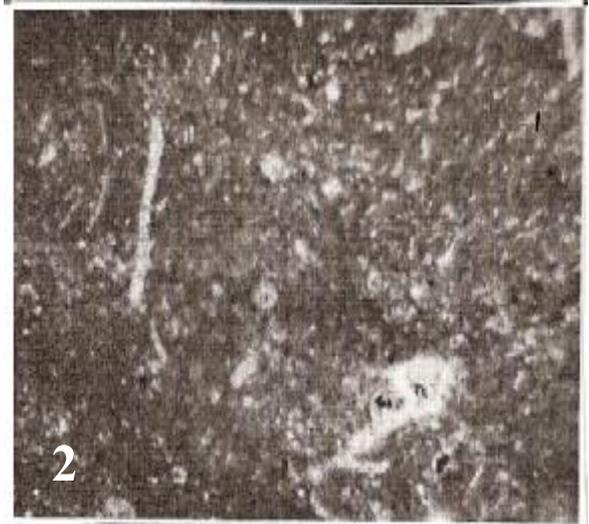
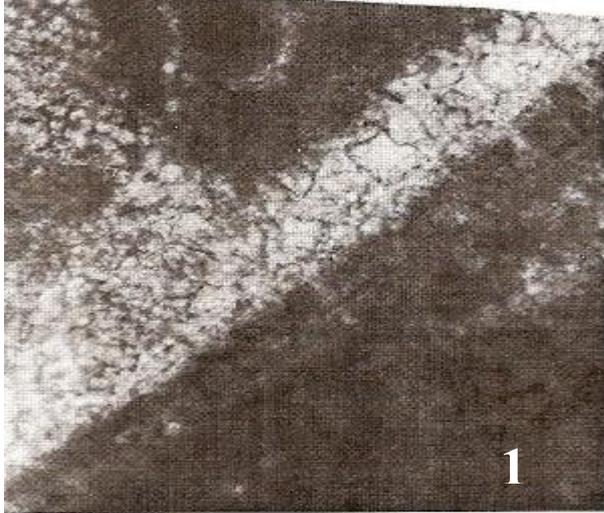


Plate-1

- | | |
|-----------------------------|------|
| 1. secondary broken shell | 40x |
| 2. Mudstone facies | 40x |
| 3. Aggregate grains facies | 40x |
| 4. Some species of Miliolid | 100x |

رملان ديوكندا قيقدا انجسد اليلدة (تي برغذا ايرصدا)
ييدي بذا حداس بععل تقم ون ماج بلخيدوم
ي ي ي ي الخ و ما الفحة م
دلغ بة م ماج

قبلاخ لدا

ة ي قرعلا يبرغدا ايرصدا في فكنه يعل رانغا يكتردة قيقدا تان لدا لمة قيقط؛
ل (١٣) لة يوخ يوخ، تم جمعها من وادي الردكة (غرب القائم) . لقد قسم الصخور التكوين
الى اربعة سحنات دقيقة اعتمادا على المحتوى الصخري والعضوى وهى:
الحجر الجيري الواكى الوحلى الحياتى والحجر الجيري الوحلى والحجر الجيري الواكى
المليوليدى والحجر الجيري الحبيبي الحاوى على الركام . ان السحنات الدقيقة للتكوين تعكس
بيئة بحرية ضحلة ذات دوران مفتوح فى الجزء الاسفل من التكوين وبيئة بحرية ضحلة ذات دوران
قليل لمياة دافئة جدا فى الجزء الاوسط. واما الجزء الاسفل والاوسط يتدخل مع رواسب بيئة بحرية
مفتوحة هادئة تحت مستوى الموجة. اما الجزء الاعلى من التكوين فقد ترسب فى بيئة بحرية
ضحلة ذات دوران قليل . العمليات التحويرية الرئيسية هى : الانتقالية (نوع النيومورفزم)
بالاضافة الى ترسيب الكالسايت فى الكسور وغرف المتحجرات .