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(2003/2/6 2002/11/13 )

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## **Diagnostic Reef Pattern Within Sediments of Sinjar Formation (Paleocene-Early Eocene) of Sinjar Anticline**

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### **ABSTRACT**

Carbonates of Sinjar Formation (Paleocene-Early Eocene) have been studied along two exposed sections situated at both limbs of Sinjar anticline. Facies analysis shows the presence of twenty microfacies, including four facies of boundstone type. The delineated microfacies indicate that the succession of Sinjar Formation represents a complete reef system zone. The succession of Sinjar Formation consists of two sedimentary subcycles.

The lower one represented by sandy lime facies of reef slope facies. This reef system is characterized by a very narrow lagoon and reef zones and limited reef slope zones. This refers to remnant facies of previous regressive phase, which occurred at the end of Danian period. The second subcycle represented by the rest of the succession of the formation. This subcycle is believed to be deposited through regional transgressive phase during Paleocene to Early Eocene period. This led to the development of reef system with all reefal environmental zones.

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(Keller, 1941 in Buday, 1980)

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(41° 39' 00" – 42° 07' 00")

(1 ) (36° 26' 00" – 36° 15' 00")

(1463)

(70)

( - )

(Buday and Jassim, 1987)

(Buday, 1980)

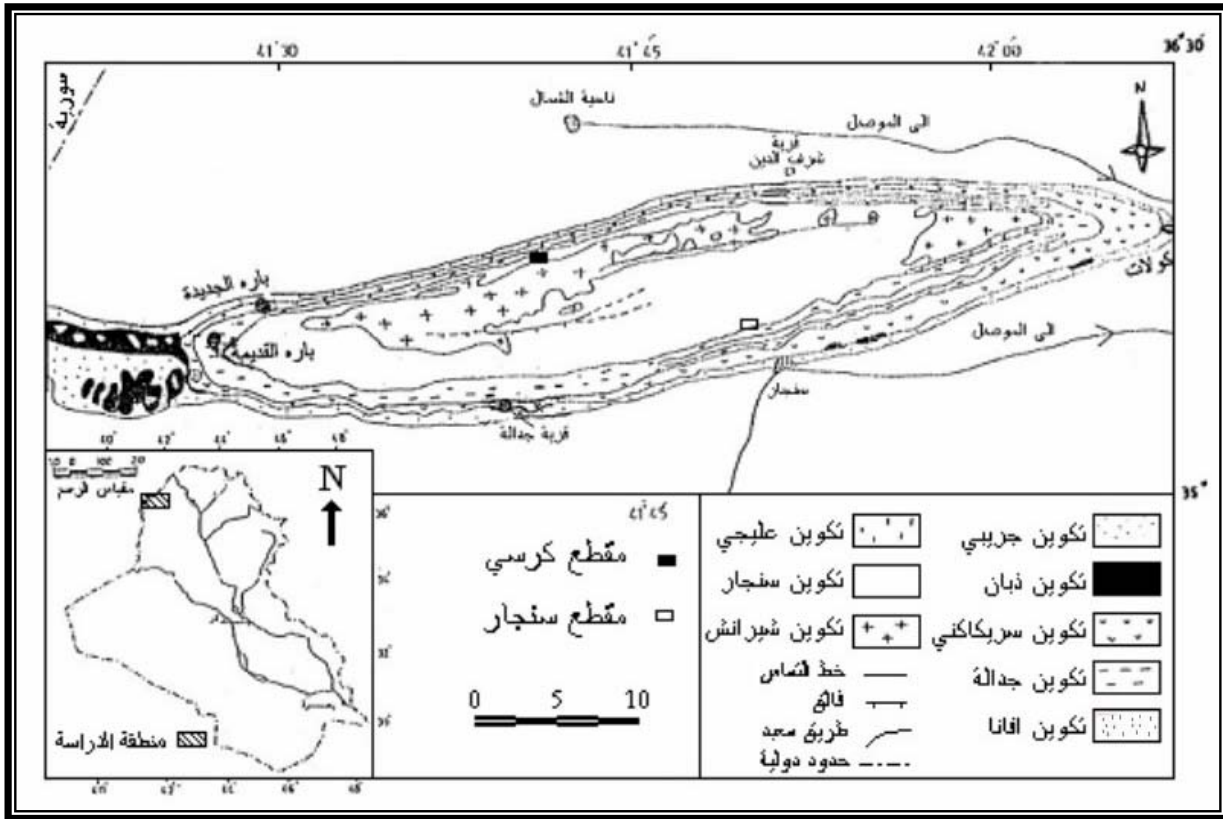
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(176)

(2005 ) (2001 )

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( )



(Ma'ala, 1977 )

:1

(200)

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(1 )

(

(In situ)

(Mollusca)

(Foraminifera)

(Bryozoa)

(Coralline)

(Lithoclasts) (Peloids)

(Flugel, 1982)

Embry and Klovan, ) (Dunham, 1962)

(1972 In; Flugel, 1982

(3 2 )

( )

(Bioclast) (Miliolid)

(Rotalid)

(Discocycline) (Nummulite) (Nummulite)

(Peloids) (Lithoclast)

(Fecal pellets) (Pelletoids)

(Alveolina) (Pelletoid) (Alveolina-Milliolid)

(Nummulite) (Algae)

)

(2001

:

(Discocycline- (Nummulite) :

:

Nummulite)

(Nummulite)

(Fore reef shoal)

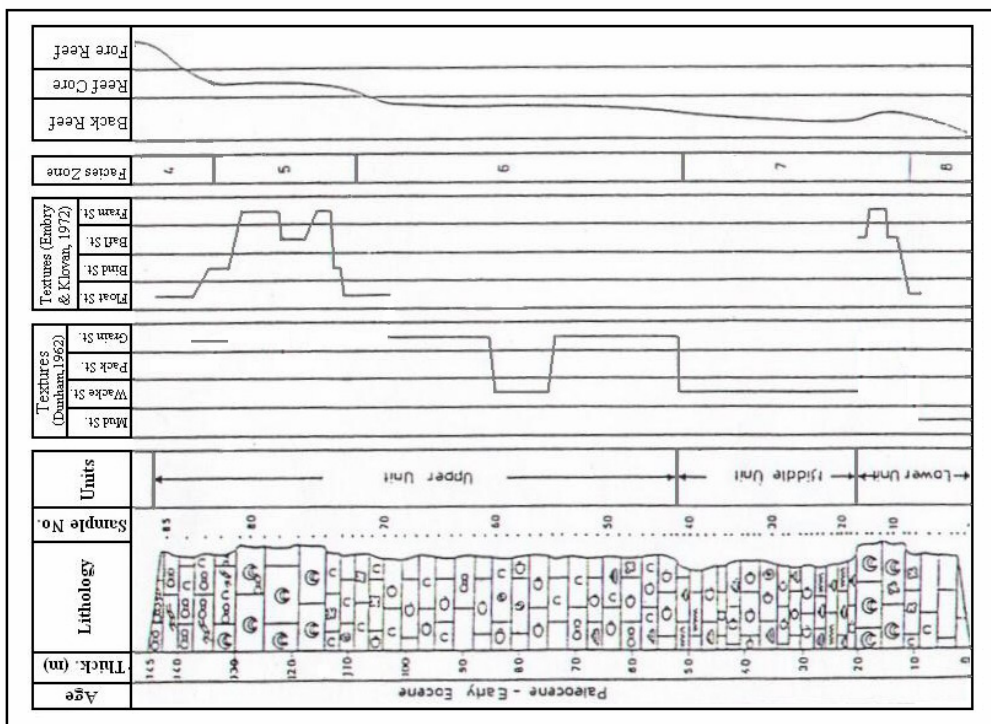
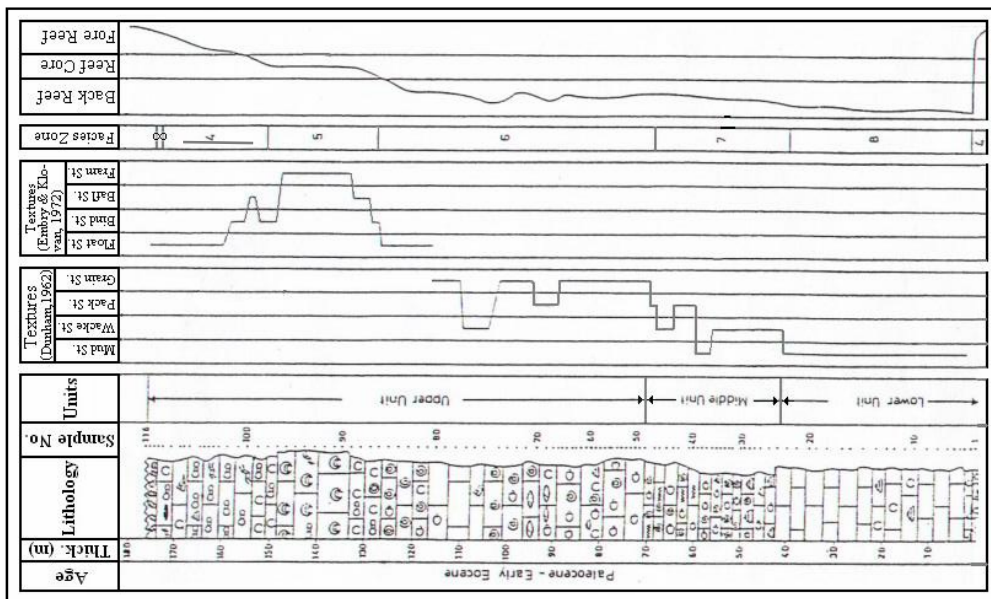
(Lagoon) :

(Flugel, 1982) (Wilson, 1975) (Winnowed platform edge)

(Hallock and Clenn, 1986)

(Boundstone)

:



**:Boundstone Microfacies**

(Dunham, 1962) (Reef and Bioherms)  
 .(Folk, 1959) (Biolithite)  
 . (%95-90)  
 . (Coralline) (In situ Organism)  
 (Echinoderms)  
 . (Worm tubes)  
 .  
 . (Embry and Klovan, 1972, In: Flugel, 1982)  
 .

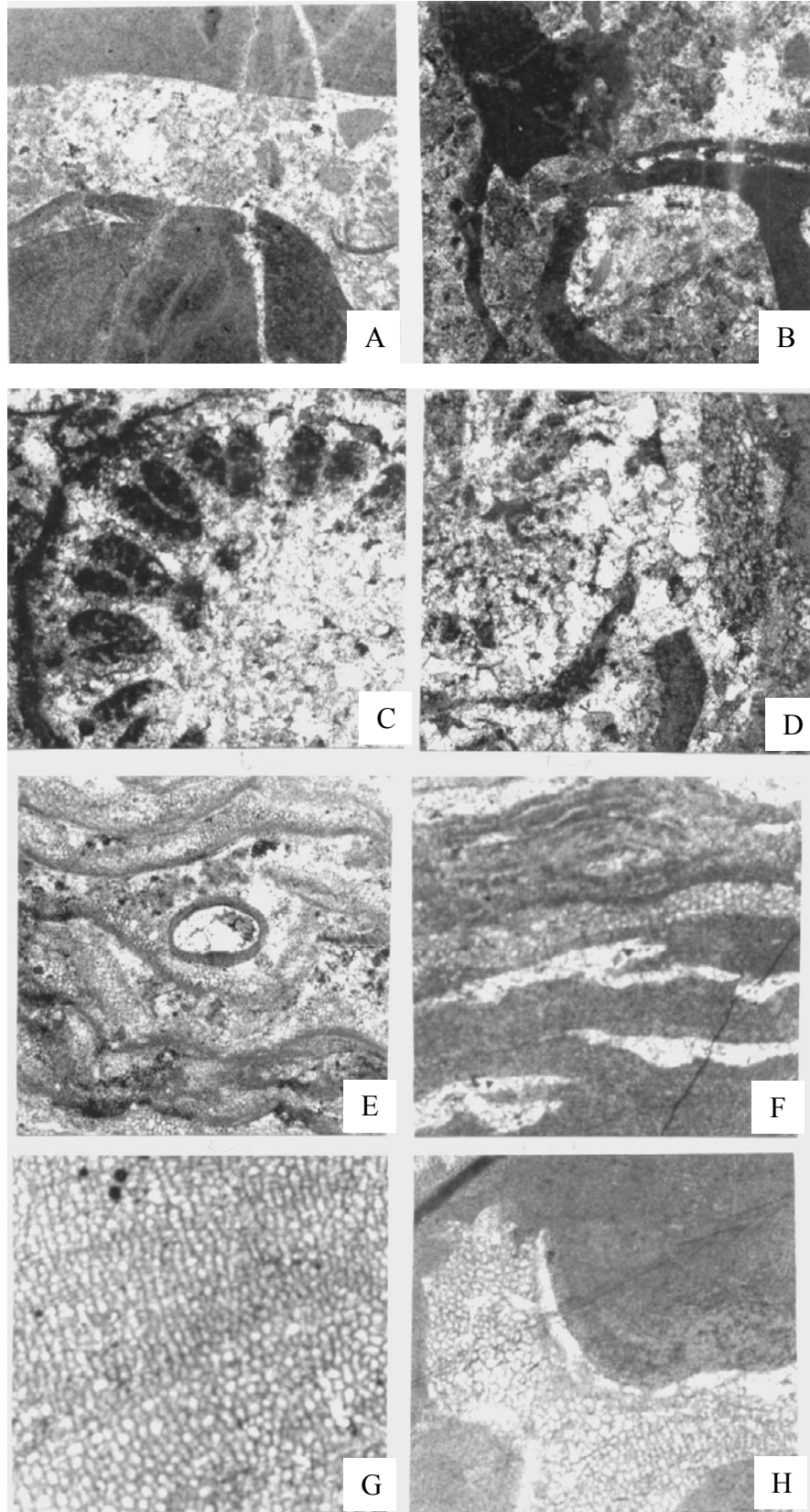
**:Floatstone Submicrofacies****-1**

(2)  
 . (%70)  
 .(Matrix Supported) (Allochthonous)  
 .  
 . (Coralline)  
 .(A, B - )  
 .  
 .(Flugel, 1982; Wilson, 1975)  
 .(Buildups) (FZ-4) (SMF-5)

**:Bafflstone Submicrofacies****-2**

(Autochthonous)  
 .  
 .(C, D - )  
 .  
 .(SMF-7)  
 .(Flugel, 1982: Wilson, 1975) (FZ-5)

.....



(C, D)  
. (G, H)

(A, B)  
(E, F)

**:Bindstone Submicrofacies**

**-3**

(Tabular)

(James, 1979)

(Encrusting)

(Coralline)

(E, F )

(Flugel, 1982; Wilson, 1975)

(FZ-5)

(SMF-7)

**:Framstone Submicrofacies**

**-4**

(Coralline)

%100-

(Mollusca)

(G, H- )

(Worm tubes)

(90

(FZ-5)

(SMF-7)

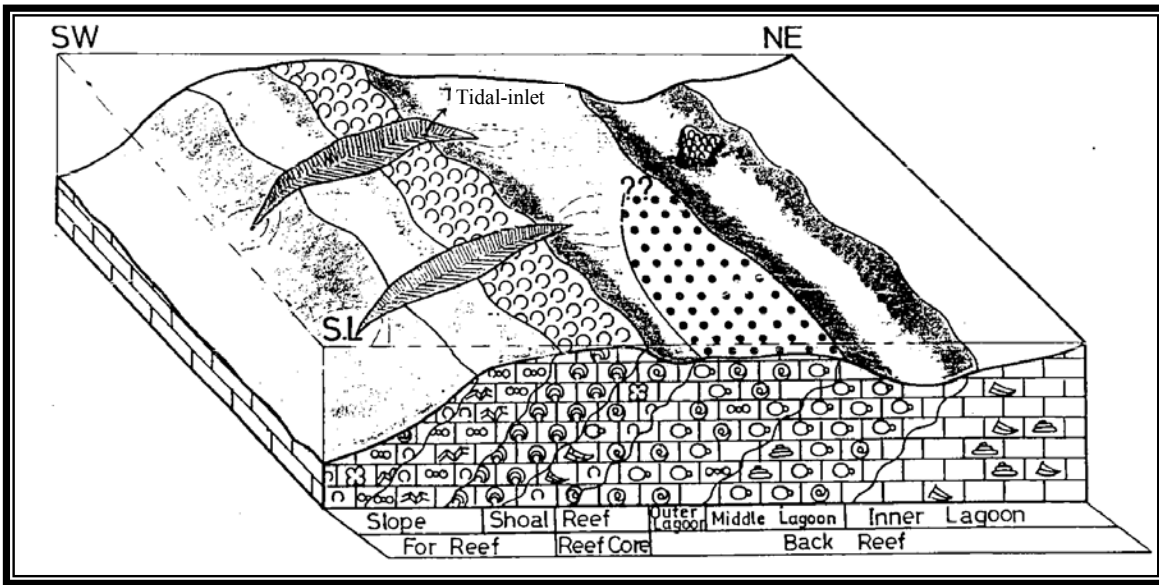
(Flugel, 1982; Wilson, 1975)

(4- )

(2005 )



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:4 -

:Back Reef

.(Barrier Reef)

(Pomar, 1991)

(Pomar, 1991; Pomar et al., 1996)

:

:(Inner Lagoon)

-1

(Patch reef)

.(3 - )

:

**:(Middle Lagoon)**

**-2**

**:(Outer Lagoon)**

**-3**

**:Reef Environment (Reef Core)**

.(Sarg, 1988; In; Pomar, 1991)

**:Forereef Environment**

.(Longman, 1981)

.(Stromatolites)

.....

(Shoal)

.(30°-10°)

Proximal )

:

.(Distal Slope)

(Slope

-

.(Pomar, 1993)

.(Reef Slope)

.(Pomar, 1991)

(Off lapping reef)

(Pomar, 1991)

.(Swains, 1949; In Pomar, 1991)

(Condense Section)

(Pomar and Ward, 1995)

(Shallow platform)

(Longman, 1981)

:(Danian)

-1

-2

(Pomar, 1993)

-3

-4

(Aggrading Reef)

(Read, 1985)

.....

.(Pomar et al., 1996)

Rajulu and ) (Suppratidal and Intertidal)

.(Gowda, 1968; Cherns, 1982

(Walther, 1893; in Hubbar and Swart, 1982)

(Vecsei and Moussavian, 1997)

.(Haq et al., 1987)

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Pomar et al., 1996; Pomar and Ward, 1994; )

,(Pomar, 1991

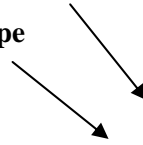
.(5 - )



- B

- C

Reef slope



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.2005

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Buday, T., 1980. The regional geology of Iraq, stratigraphy and paleogeography, Dar Al-Ktub Pub. House, Mosul, Iraq, 445p.

Buday, T. and Jassim, S.Z., 1987. The regional geology of Iraq, V.2, Tectonism, Magmatism and Metamorphism. Dept. S.E. Geol. Surv. And Mineral Invest., Baghdad, 352p.

Cherns, L., 1982. Palaeokarst, tidal erosion surfaces stromatolites in the Silurian Eke Formation of Gotland, Sweden. *Sedimentology*, 29, pp.819-833.

Dunham, R.I., 1962. Classification of carbonate rocks according to depositional texture; In: Ham, W.E., (ed.), A Symposium. AAPG Publ., Memoir-1, Tulsa, Oklahoma, pp.108-121.

Flugel, E., 1982. *Microfacies of limestone*, Christenson, K. (Translator), Springer-Verlag, Berlin, 633p.

Folk, R.L., 1959. Partial Petrographic classification of limestone. *AAPG Bull.*, 43, pp.1-38.

Haq, B.V., Hordenbol, J. and Vial, P.V., 1987. Mesozoic and Cenozoic Chronostratigraphy and Cycles of Sea-level change. *SEPM, Special Publication*, 2, pp.71-108.

Hubbard, J.A. and Swart, P.K., 1982. Sequence and style in sclerratinion paleoclimatology. *Paleoecology*, 37, pp.165-219.

James, N.P., 1979. Facies models 11, Reefs; In: Walker, R.G. (ed.), *Facies models*. Geosciences Canada Reprint Series-1, pp.121-132.

Longman, M.W., 1981. A process approach to recognizing facies reef complexes; In: Toomey, D.F., (ed.), *European fossils reef models*. *SEPM, Special Publication*, 30, pp.9-40.

- Maala, K., 1977. Report on the regional geology of Sinjar area. SOM, Baghdad, Iraq, Unpublished Report, 41p.
- Pomar, 1991. Reef geometries, erosion surfaces and high frequency sea-level changes, Upper Miocene reef complex, Mallorca, Spain. *Sedimentology*, 38, pp.243-269.
- Pomar, L., 1993. High-resolution sequence stratigraphy in prograding carbonate application to seismic interpretation; In: Loucks, R. and Sarg, R., (eds.), Recent advance and applications of carbonate sequence stratigraphy. AAPG, Memoir-1, pp.389-407.
- Pomar, L. and Ward, W.C., 1994. Response of a late Miocene Mediterranean reef platform to high frequency eustasy. *Geology*, 22, pp.131-134.
- Pomar, L. and Ward, W.C., 1995. Sea-level changes, carbonate production and platform architecture: The Liucmajor platform, Mallorca, Spain; In: Haq, B.U., (ed.), Sequence stratigraphy and depositional response to eustatic, tectonic and climatic forcing. Kluwer Academic Publishers, pp.87-112.
- Pomar, L., Ward, W.C. and Green, D.G., 1996. Upper Miocene reef complex of the Liucmajor area, Mallorca, Spain; In: Franseen, E.K., Eteban, M., Ward, W.C. and Rouchy, J.M., (eds.), Models of Mediterranean regions. SEPM, Concepts in Sedimentology and Paleontology, pp.191-225.
- Rajulu, B.V. and Gowda, M.J., 1968. Algal stromatolites from the southwestern part of the Kalagd Basin, Lokapur, Mysore State, India. *Jour. Sed. Petr.*, 38 (4): 1059-1064.
- Read, J.F., 1985. Carbonate platform facies models. AAPG Bull., 1, pp.1-21.
- Vecsi, A. and Moussavian, E., 1997. Paleocene reefs on the Maiella platform margin, Italy: An example of the effects of the Cretaceous/Tertiary boundary events on reef platforms Facies, pp.123-140.
- Wilson, J.L., 1975. Carbonate facies in geologic history, New York, Springer-Verlag, 469p.