



Sedimentological study of Tanuma formation east of Baghdad

Sadi K. Jan

Iraq National History Research Center and Museum, University of Baghdad, Baghdad, Iraq.

Abstract

Tanuma formation was subsurface studied in the east of Baghdad city through checking (90) thin sections. The formation is checked in terms of mineral aspect and some fossils are recognized. The formation consists of dolomite in the form of rhomboid crystals within micrite ground mass. The most significant fossils are planktonic and benthic foraminifera, this study indicated that Tanuma formation is depositional environment .

Key words: Tanuma, Sediment, Fossils, Dolomite, Baghdad.

Introduction

Tanuma formation in an area located east of Baghdad city contains a lot of limestone of the Cretaceous period, the formation is studied for the first time by (Van Bellen, 1959) in Zb- Well (AL-Khayat and Razoyan, 1979) and re-described by (Owen and Naser 1958) in both areas (Baghdad & Kut). The formation is described as consisting of black shelly limestone, whereas AL-Khayat and Razoyan (1979) divided the formation into several facies units. Buday (1980) has a detailed description of Tanuma formation and mentions that it forms with Al-Sadi formation one secondary depositional cycle. The formation has been described also as a deposited in a quiet marine environment far from the coast. AL-Sadooni (1981) studied Tanuma formation and concluded that this formation is depositional in a sub-basinal environment of the open sea whereas the formation facies is deposited within a quiet marine shelf environment.

The French oil company (Total, 1981) has studied Tanuma formation in terms of sedimentary and the study reached to a conclusion that Tanuma formation is deposited in the shallow middle shelf with a medium depths and low depositional energy.

Al-Hamadani (1986) conducted a regional study of Tanuma and Abu-Khasib formation and indicates that minerals clay represented by Illite and Kaolinite in Tanuma formation is higher than those exists in Al-Khasib formation.

The ratios were concentrated in both the upper and lower parts of Tanuma formation. Stratigraphic sequence method is used for the depositional cycle of late Turonian-early Campanian (Al-Shaoush, 2002) in a field west of Al-Qurna in the south of Iraq to determine both depositional formations forming Tanuma and Abu-Khasib.

This study attempted to description the formation of Tanuma in an area located east of Baghdad city.

Materials and Methods

The study area is located in the east of Baghdad (figure 1), formation of Tanuma is studied in an area of (90 m) thickness according to the mineral and fossils.

Results and Discussion

Through the study, it is found that the study area rocks consists of limestone grains such as planktonic foraminifera and the most important type is (heterohelix) figure (1-1). The rocks, often, include chambers filled with micrite and benthonic foraminifera, in most cases, retains its forms including milliolid which exists in the upper part of the formation figure (1-2). In addition to that, there is the rotalid, another kind of planktonic foraminifera figure (1-3) and exists, greatly, in the upper part of the formation and fewer in the lower part.

Echinoderms figure (1-4) has its radial form and spreads along the section. Its existence refers to water of normal saline (Fluegel, 2010). The most important types of algae are the red and green types figure (2-1) and specifically, spread in the middle part of the formation.

Another type of skeletal grains is the ostracoda in which fewer spreads in the middle part of the formation. The most significant type of non-skeletal grains in the formation of Tanuma is 'peloids' which spreads in the upper parts of the formation figure (2-2) and does not include any internal structures. Peloids have black edges which makes it easier to be distinguished from neighboring structures. The non-concentrated structure is due to fixed deposit conditions. Another type of non-skeletal grains is oolites that exists in shallow water of depth less than (4 m) in the lower part of the formation. As for minerals in the formation of Tanuma, they comprise dolomite that increases in the upper part of the section in the form of rhomboid crystals within the micrite groundmass figure (2-3). The most prominent type of diagenetic process is melting that occurs due to passage of unsaturated solutions or as a result of instability of metals and high solubility of carbonate rocks in acidic solutions. Melting phenomena plays a significant role in the creation of secondary porosity in rocks. Another diagenetic processes is a cementation figure (2-4) which is one of the early diagenetic occurring on the sedimentary rocks after deposition that leads to hardening. Cement may deposits through late diagenetic deposits after exposure of rocks to tectonic lifting through depositing in fractures and rocks formed in the rocks.

Dolomitisation is another diagenetic process that largely effects the porosity of limestone where dolomite replaces calcite and leads to increasing in porosity due to the smallness of manganese ion (0,78 Å) in proportion to calcium ion (1,06 Å). Dolomitisation could lead to forming structure that reduces the rigid effect of layers pressure.

Conclusion

Limestone rocks of tanuma formation consists of micrite and skelet grains of planktonic and bentonic foraminifera, in addition to echinoderms and non-skelet grains. Tanuma formation exposed to diagenetic processes such as dolomitisation, dissolved, micritation, recrystallization and cementation. The formation of Tanuma is deposited and due to the existence of planktonic and benothic foraminifera the environment is changed from sub-basinal environment into deep shelf environment.



Figure (1): Location of the studied area

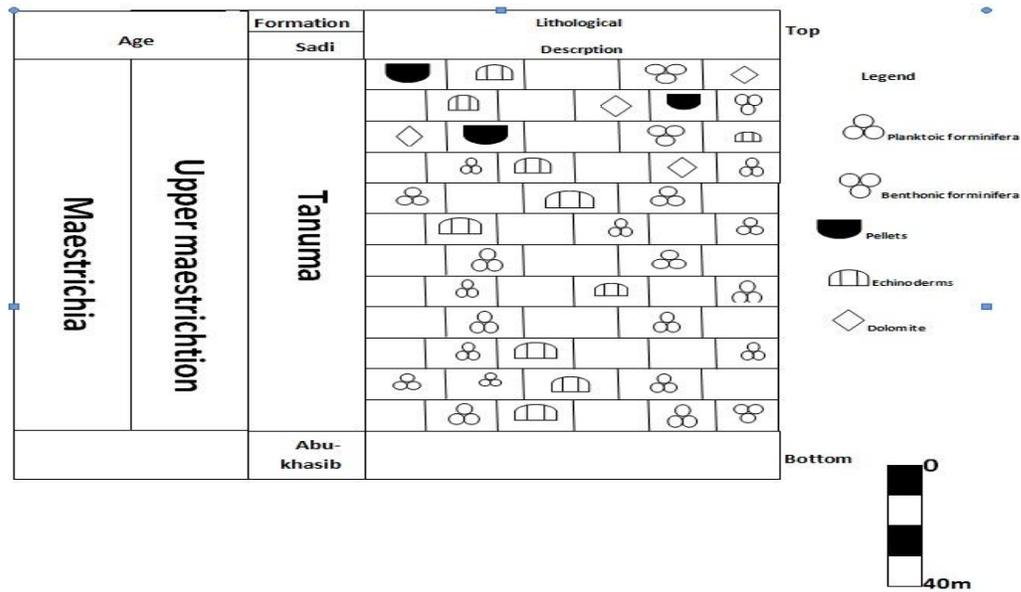


Figure (2): General stratigraphical section

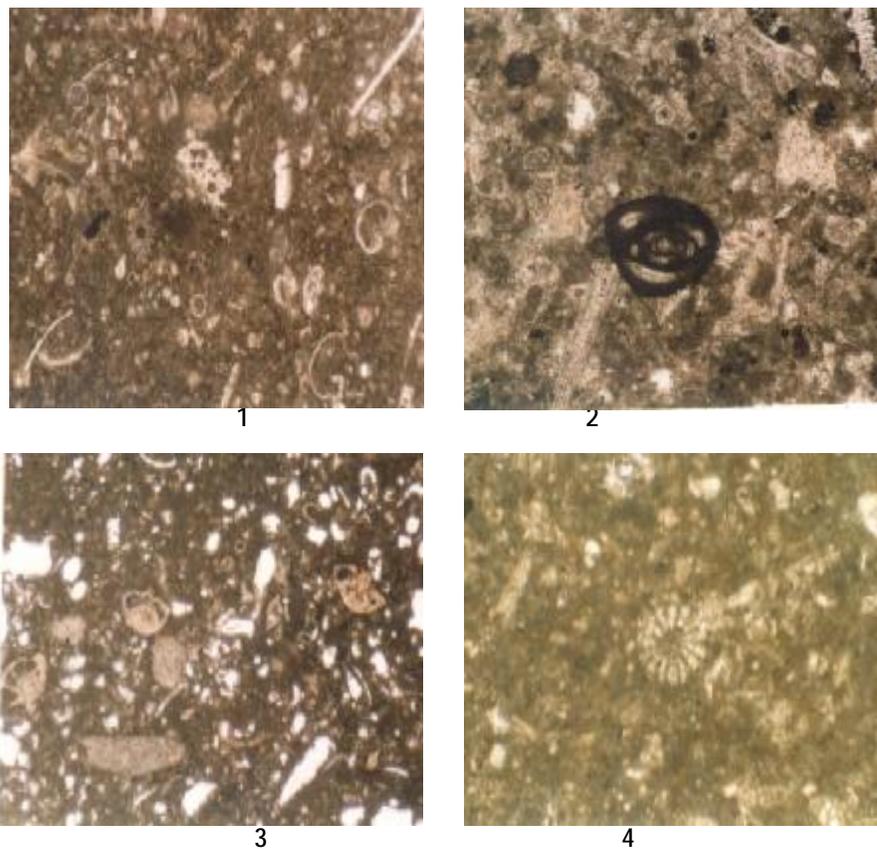


Figure (3): Microscopic section (10x) planktonic foraminifera in micrit-matrix (1), some species of milliolids(2), benthonic foraminifera (Rotalid) (3) and echinoderms in micrit-matrix (4).

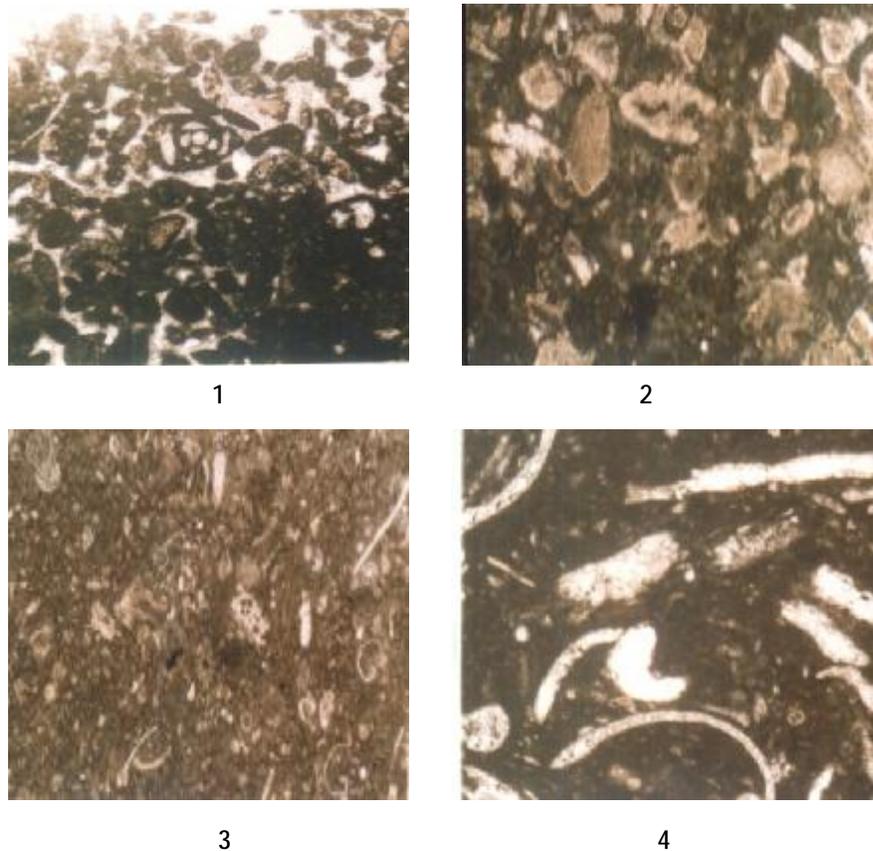


Figure (4): Microscopic section (10x) algae in Tanuma formation (1), peloids and milliolid in sparite-matrix (2), dolomite crystals in micrite matrix (3) and some fossils chambers filled with calcite-cement (4).

References

- Al-Hamadani, A.m., 1986. Sedimentological and geochemical formation of khasib, tanuma and sadi. Ph. D. thesis, College of Science, University of Baghdad.
- AL-Khayat, A. and Razoyan A.M., 1979. The geology of sadi, tanuma, khasib and mishriff formations in halfya Field. INOC, Basrah, 23p.
- Al-Shaoush, M.A., 2002. Accumulation faces and sediment systems, formation of khasib, tanuma and sadi west of Qurna field, south of Iraq. MSc. thesis, College of Science, University of Basrah.
- AL-Sadooni, F.N., 1981. Sedimentological study of khasib formation in well EB-16 and tanuma formation in Well EB-17: INOC, Baghdad, 11p.
- Buday, T., 1980. The regional geology of Iraq, V.1: Stratigraphy and paleogeography, state organization for minerals, Mosul, Dar Al-Kutub publication house, 445.
- Fluegel, E., 2010. Microfacies of carbonate rocks 2nd ed.,. Sp. Verlag, 984.
- Owen, B. and Naser S.N., 1958. The Stratigraphy of Kuwait – Basra area in: habitat of oil, A symposium. Amer. Assoc. Petrol Geol. Bull.,: 1252-1278.
- Van Bellen, R.C., Dunnigton H.V. Wetzel R. and Morton D.M., 1959. Lexique international Asie, Vol.3, Fasc. 10a, Iraq, Paris 333p.
- Total, C.F.P., 1981. East Baghdad field sedimentological study of Hartha, Tanuma and Khasib formations (R1, Ri, R2, R3, R4 Reservoirs): Unpublished report, INOC, Baghdad, 49p.