

## **Jurassic deposits in well sections of Aleppo plateau (n. Syria): Correlation with type formations**

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### **ABSTRACT**

The micropaleontological study of hole sections in Aleppo Plateau, allow the dating of Jurassic deposits in this area: Bajocian – Bathonian age for the upper part, Liassic age probably for the lower. The correlation of hole sections, and the section of Kurd Dag mountain in the north, show that Jurassic deposits are present only on the border of Aleppo Plateau, which had been emerged during all the Jurassic period.

The correlation with the Mesozoic formations in their type localities in Iraq gave important modifications to the data adapted by the petroleum geologists: the Jurassic deposits in Aleppo Plateau are equivalent to “Sergelu Formation” in Iraq, not to “Qamchuka Formation” which is of lower Cretaceous age.

**Key words:** Jurassic, Triassic, Aleppo Plateau, Syria.

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## توضعات الجوراسي في آبار هضبة حلب (شمال سورية): ترابط مع التشكيلات الأنموذج

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### الملخص

سمحت الدراسة المكروبيالينوتولوجية لمقاطع الآبار المحفورة في هضبة حلب، بتحديد عمر الجوراسي للتوضعات في هذه المنطقة: عمر الباجوسيان-باتونيان للقسم العلوي، وعمر اللياس على الأغلب للقسم السفلي. ويبين ترابط مقاطع الآبار مع مقاطع جبل الكرد (جبال عفرين) في الشمال، أن التوضعات الجوراسية موجودة فقط على حافتي هضبة حلب التي كان القسم المركزي منها طافياً خلال حقبة الجوراسي كلها.

قدّم ترابط الوحدات الليتوستراتغرافية في آبار هضبة حلب مع التشكيلات الأنموذج للميزوزوي في العراق، تعديلات مهمة للمعطيات المعتمدة من قبل جيولوجيي النفط: فالتوضعات الجوراسية في أطراف هضبة حلب ومحيطها هي مقابلة "لتشكيلة سرجيلو" في العراق، وليس "لتشكيلة كمشوكا" التي هي من عمر الكريتاسي الأسفل.

الكلمات المفتاحية: جوراسي، ترياسي، هضبة حلب، سورية.

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## Introduction

Aleppo Plateau occupies the central part of northern Syria. It is bounded to the west by Jabal AzZawiyeh and the Rouj trough which is the extension of the large Ghab trough to the north, to the east by the Euphrates, to the north by the Kurd Dag mountain chain, to the South by the chain of Palmyrides (Fig. 1).

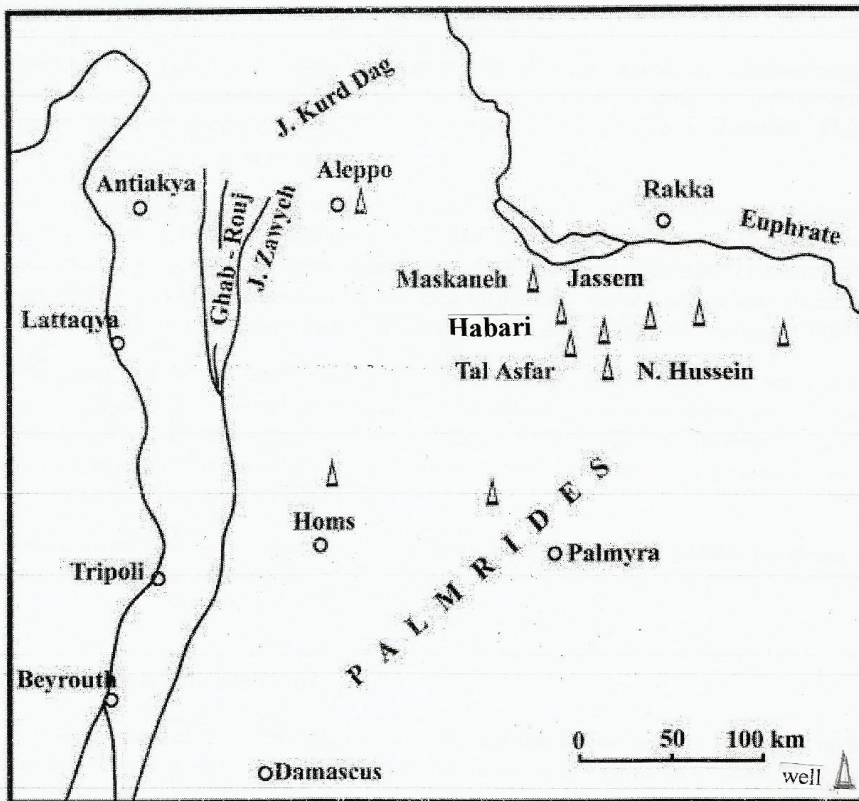


Fig. 1. Location map

Land outcropping in the Aleppo region are essentially of the Tertiary (Dubertret, 1966; Ponikarov, 1967). Wells drilled out by the Syrian Petroleum Company (SPC) have variously penetrated the Mesozoic deposits. These wells have revealed a series of lithological units, designated by petroleum geologists under formation names, whose names were "borrowed" from Iraq (Daniel, 1963).

The purpose of this paper is to study the sedimentary series of the Mesozoic, especially the Jurassic in the Aleppo plateau and its neighboring areas, through the wells drilled by SPC in this region devoid of outcrops of these deposits.

Using some of the cores from these wells, we could study the lithological characters and micropaleontologic content of the Jurassic series through thin sections carried out carefully by the laboratory of Syrian Petroleum Company and the laboratory of the Department of Geology at the University of Damascus.

### **Stratigraphy:**

Below the big unconformity of Lower Cretaceous, the Jurassic series that is the subject of our study, is easily recognizable by its essentially carbonate lithology, and its distinct frame: at its base, by a series which is more or less lagoonal, evaporitic and dolomitic (Unit -A), and at the top, by a detrital clayey sandstone series (Unit -C) which is attributed to Lower Cretaceous, according to the lithological correlation with Palmyrides series in the South (Mouty and Al Maleh, Unigeoconsult, 1983).

Jurassic series (Unit-B) consists, more or less, of dolomitic limestone, dolosparites and dolomicrosparites, intercalated by marly limestone levels and micritic or pelbiomicritic limestone, whose texture is wackstone type in general, sometimes going to mudstone. Facies indicate a shallow intertidal environment.

Micropaleontological analysis revealed the presence of the following forms: *Timidonella sarda* BASSOULLET, CHABRIES and FOURCADE, *Amijella amiji* (HENSON), *Haurania deserta* HENSON, *Paleopfenderina salernitana* (SARTONI and CRESCENTI), *Redmondoites lugeoni* (SEPTFONTAINE), *Praekurnubia crusei* REDMOND, *Nautiloculina oolithica* MOHLER, *N. circularis* (SAID and BARAKAT), *Verneuilina* sp., Dacycladaceae. These forms indicate a Bajocian–Bathonian age (Bassoulet *et al.*, 1974, 1979; Hottinger, 1967).

The lower part of this unit, is invaded by a fairly strong dolomitization, but do not provide characteristic forms. By regional correlation, and its position over a series dated Upper Triassic in well

Habari -1-, SE of Aleppo Plateau (Bach Imam and Sigal, 1985), we attribute this unit to the lower Jurassic. The presence of the characteristic foraminifera *Orbitopsella praecursor* in N. Hussein well confirms this attribution..

Thus only the Lias and Dogger are present, while the Upper Jurassic (Malm) is absent due to a major gap caused by emergence.

### Correlation of formations

Petroleum geologists in Syria (SPC) considered that Unit -B- is equivalent to the Qamchuka Formation in northern Iraq and they adopted this terminology for a long time (SPC, 1976-1988). Later, SPC geologists replaced this term by Hermon Formation (SPC, 1976-1988; Alsdorf *et al.*, 1995), by comparison with the "Calcaire de l'Hermon" Unit in Hermon Mountain in southern part of the Anti-Lebanon Chain (Dubertret, 1963). This comparison was recently criticized (Mouty and Gout, 2010).

The correlation of the Jurassic Unit -B- with that of northern Iraq, where from the names of the major formations were "borrowed", shows that this unit is the equivalent of Sergelu Formation which is outcropping in the district of Suleimaniya (Northern Iraq) has been defined by Wetzel (1950) as follows:

Lithology: Thin-bedded, black, bituminous limestone, dolomitic limestone and black, papery shales, with streaks of thin black chert in the upper parts.

Fossils: *Posidonia ornate*, ? *Posidonia somaliensis*, *Posidonia opalina*, Oppelids, *Parkinsonia* sp., *Stephanoceras* sp., *Rhynchonella curviceps*, *Rhynchonella de lottoi*, *Rhynchonella* cf. *rosembuschi*.

Age – Bathonian at top, uppermost Liassic at base.

The Jurassic Unit -B- in different wells in Interior Syria is therefore correlative with Sergelu Formation not with the Cretaceous Qamchuka Formation as adopted by petroleum geologists in Syria (SPC, 1976-1988). The later which is outcropping in the district of Suleimaniya (Northern Iraq) has been also defined by Wetzel (1950) as follows:

Lithology: Dolomite, neritic organic limestone.

Fossils: *Cuneolina* sp., ? *Munieria bacanoca*, ? *Salpingoporella muhlbergii*, *Orbitolina* cf. *discoidea*, *Pseudochrysalidina conica*, *Choffatella decipiens*, *Trocholina* cf. *lenticularis*, *Acicularia* cf. *antica*.

Age – Albian to intra-Barremian. This age was confirmed later by Buday (1980).

The underlying Sergelu Formation in its type locality in Iraq, which is in concordance with it, is probably Alan Formation, which has been defined by Dunnington (1953, 1959) near Mosul, but has not yet been dated.

The lithology and the stratigraphic position allow to conclude that the underlying Jurassic series in the Aleppo Plateau equivalent to Alan Formation in Iraq, not to Sergelu Formation (Bach Imam and Sigal , 1985).

Correlation with Palmyrides in the south is easier, and it would be more significant for the subsurface geology, to appeal to the formations set in this chain (Mouty, 1997, 2000).

Figure 2. Summarizes the changes we made to the correlation of Mesozoic formations of Syria with the formations of Iraq in their type localities.

Age	N. Iraq	N & NE of Syria			Palmyrides
	Type locality	Correl. before (1985)	Correl. of (Bach Imam & Sigal) (1985)	Correl. after the present work	Correl. proposed with Palmyrides
Lower Cretaceous	Qamchuka	Qamchuka	Gouna	Qamchuka	Palmyra
Dogger	Sergelu Alan Muss Hadayah	Sergelu Alan Muss Hadayah	Qamchuka	Sergelu	Satih
Lias	Butma	Butma			
Trias	Kurachina	Kurachina	Sergelu	Alan	Safa Hayyan

Fig. 2. Correlation of formations in N-NE of Syria and of Palmyrides with type-formation in Northern Iraq.

### Paleogeography

The correlation of well sections and those of Jabal Kurd Dag in the north (Fig. 3) shows a decrease in thickness of the Jurassic series towards the central part of the Aleppo Plateau, where it eventually completely disappeared. Jurassic is therefore represented on the edge of the Aleppo Plateau. This was emerged well before the Jurassic

transgression, which could not reach its suburbs to retire at the end of the Bathonian.

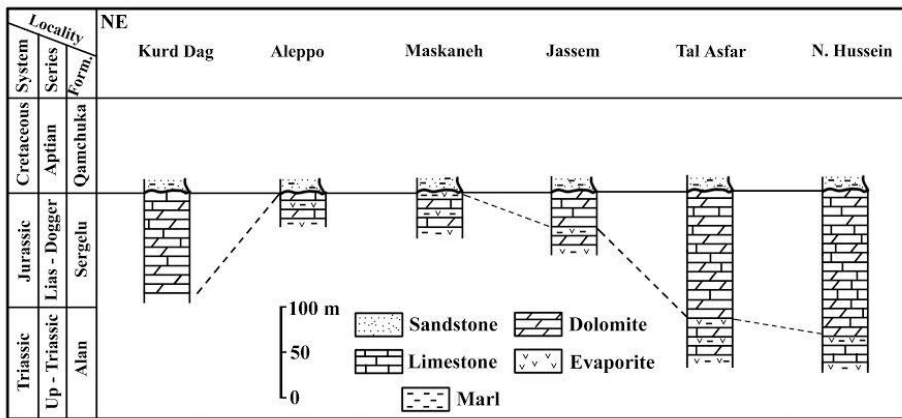


Fig. 3. Correlation of sections

### Conclusion

Based on deep wells data, We can conclude that the central part of Aleppo Plateau was uplifted during the Jurassic time. It represent a part of an elongate SW–NE Aleppo- Mardine paleo- high, between Palmyridian basin in the south east and Ifrine basin in the north west (Mouty, 2000).

The lithological and micropaleontological results indicate that the Mesozoic units in Aleppo Plateau are correlated, with those of their type localities in north Iraq, successively: Alain Formation (Unit C, Upper Triassic), Sargelu Formation (Unit B, Lower and Middle Jurassic) and Qamchouka Formation (Unit A, Lower Cretaceous), contrarily to the correlation results of the SPC geologists.

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