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PLANKTIC FORAMINIFERA AND BIOSTRATIGRAPHY OF THE SHIRANISH FORMATION, JAMBOUR WELL NO.61 KIRKUK AREA, NORTHEASTERN IRAQ

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ABSTRACT

Biostratigraphy of the Shiranish Formation is investigated in Jambour Well No.61, Kirkuk area, Northeastern Iraq, which is located about 150 Km Southeast of Kirkuk city. The lithology of the Shiranish Formation in the studied well is composed of an alternation of marl, marly limestone, and limestone. The purpose of this paper is to record the planktic foraminiferal species in the studied section and establish the biostratigraphy zones of planktic foraminiferal and correlated them with their equivalent biozones in and outside Iraq in order to determine the age of the studied section. Eighteen species of planktic foraminifera are described in eighteen samples collected from the studded well. Both suggest the Late Campanian to Early Maastrichtian age. Based on the recognized planktic foraminifera, it is subdivided into three biozones these are from base to top: (*Globotruncanita elevata – Rosita fornicata* biozone, *Globotruncana aegyptiaca* biozone, and *Gansserina gansseri* biozone).

الطباقية الحياتية للفورامنيفرا الطافية لتكوين شيرانش في بئر جمبور 61 منطقة كركوك، شمال شرقي العراق

عبد الله سلطان شهاب الحديدي وياسين حسين حسن

المستخلص

تم دراسة الطباقية الحياتية لتكوين شيرانش في بئر جمبور 61 في منطقة كركوك، شمال شرقي العراق، ويقع البئر المدروس على بعد 150 كم جنوب شرق مدينة كركوك. يتكون تكوين شيرانش في البئر المدروس من تعاقبات حجر الصلصال والحجر الجيري الصلصالي والحجر الجيري. الهدف من البحث هو تسجيل انواع الفورامنيفرا الطافية في البئر المدروس وتحديد الانطقة الحياتية ومضاهاتها مع ما يكافئها من دراسات داخل وخارج العراق لغرض تحديد عمر التكوين. تم تشخيص 18 نوع من الفورامنيفرا الطافية من خلال 18 عينة تم جمعها من البئر المدروس، استناداً الى ذلك حدد عمر تكوين شيرانش في فترة الكامبانيان المتأخر –المسترخيتان المبكر. بناءا على انواع الفورامنيفرا الطافية المشخصة تقسيمها الى ثلاثة انطقة حياتية وهي من الاقدم الى الاحدث :

(*Globotruncanita elevata – Rosita fornicata* biozone, *Globotruncana aegyptiaca* biozone, and *Gansserina gansseri* biozone).

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INTRODUCTION

The study is based on material from the Shiranish Formation in Jambour Well No.61. Located about 150 Km Southeast of Kirkuk city (Fig.1), the thickness of the Shiranish Formation in the studied section is (37) m thick from (657 – 620) m depth. Eighteen cores and cuttings samples were obtained from intervals and were studied with regard to their planktic foraminifera.

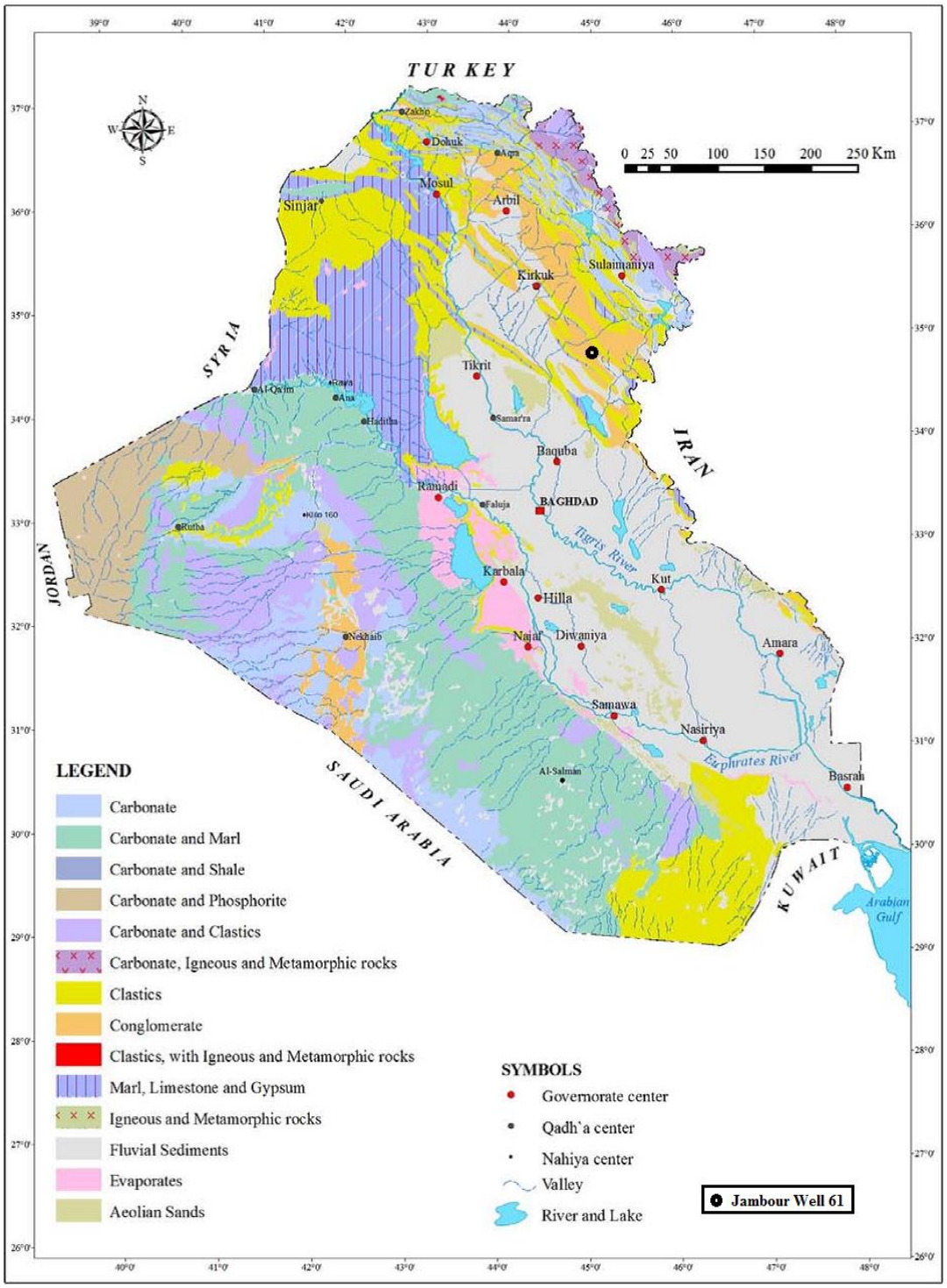

Fig.1: Lithological map showing the location of the studied Well (after Sissakian and Al-Khalidi, 2012)

The lithology of the Shiranish Formation in the studied Well is composed of an alternation of, marly limestone and limestone, with some recrystallized. The Shiranish Formation is conformably overland by the Eocene Jaddala Formation and conformably underlined by the Early Campanian – Hartha Formation (Fig.2).

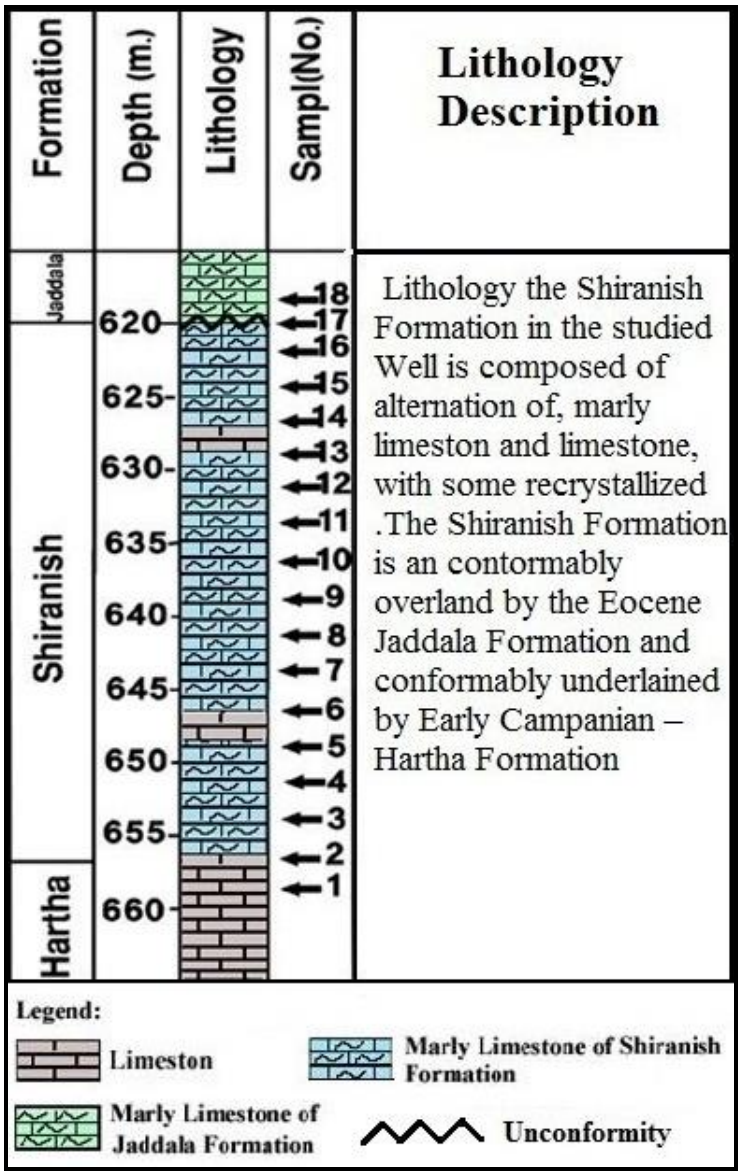

Fig.2: Lithostratigraphic column of the studied Well

The Shiranish Formation was first defined by Henson (1940) in Van Bellen *et al*. (1959) from the high folded zone of northern Iraq. Near the village of Shiranish Islam – Zakho North Iraq. The formation consists of marl and marly limestone representing offshore, Open Sea sediments of the Late Campanian – Maastrichtian age (Buday, 1980), Kassab (1973 and 1979), The present work represents a detailed study of the Planktic foraminifera and biostratigraphy of the Shiranish Formation at Jambour Well No.61, Kirkuk area northeastern Iraq (Fig.1).

The planktic foraminiferal biostratigraphy of the type locality of Shiranish formation has been studied by Kassab (1973), who suggested a Maastrichtian age for the formation, Abawi

et al. (1982) studied the planktic foraminifera biostratigraphy of Shiranish Formation at Sulaymaniyah/ Dokan region, indicating a Campanian to early Maastrichtian age. Kassab *et al*. (1986) studied the Shiranish Formation at Sasan well No. (1) in Northwest Iraq, indicating an early middle Maastrichtian age, Ghafor, 1988 studied the biostratigraphy of the Shiranish Formation in the well Tel Hajar No.1, Sinjar area, Bakkal *et al*., 1993, gives Middle – Late Maastrichtian age to the Shiranish Formation in Higran area, NE Iraq. Al-Mutwali (1996) studied the planktic foraminifera biostratigraphy of the Shiranish Formation in Kassab Well No. (1), Hamren area northeastern Iraq, indicating a late Campanian to lower Maastrichtian Hammoudi (2000) studied the Shiranish Formation in Jambour Well No. (13), indicated a Late Campanion – Middle Maastrichtian, Ahmed and Abdullah (2020), studied the Shiranish Formation in Piramgroon anticline, area Sulaymaniyah, Northeastern Iraq, Indicated a Late Campanian to Early Maastrichtian, Al Nuaimy *et al*., 2020, studied Cretaceous/ Paleogene boundary analysis by Planktic Foraminiferal Biozonation in the Western Zagros Fold-Thrust Belt (Smaquli valley), Sulaymaniyah Governorate, Northeastern Iraq, Abdullah and Yassen (2022), studied the Shiranish Formation in Sara anticline-Dokan area, Northeastern Iraq, Indicated a Middle Campanian to Late Early Maastrichtian.

METHODOLOGY

Eighteen rock samples were collected from the Shiranish Formation in Jambour well No.61. The samples were prepared by the usual washing method, and uniform weights were taken for all samples (20) g. The samples were carefully crushed and then boiled with distilled water for a period of time ranging from (3 – 8) hours, depending on the degree of hardness of the samples. The samples were passed through a series of sieves of different sizes (40, 60, 80, and 100 mesh) using a continuous water stream (wet sieving). The samples were dried at a temperature ranging between 100 – 90 degrees Celsius, and the samples were inserted into an (Ultrasonic) device for the purpose of cleaning the fossil shells from the sediments stuck to them. Foraminifera fossils were taken from the samples and were classified into genera and species using a microscope There are other methods used to study microfossils such as the chemical method, Appropriate acids are used to separate fossils from calcareous rocks, such as acetic acid and citric acid at a concentration of 10 – 20 %. Also, the thin slides method where thin slides are prepared in the case of hard rocks, thin slides are also used to study large foraminifera.

STUDIED OBJECTIVES

The purpose of this paper is to record the planktic foraminiferal species in the studied section and establish the biostratigraphic zones and correlate them with their equivalent biozones in and outside Iraq in order to determine the age of the studied section.

RESULTS AND DISCUSSION

- **Biostratigraphy**

The sample from the Shiranish Formation yielded rich and diversified planktic foraminiferal assemblages, twenty planktic foraminiferal species belonging to (7) genera were recorded from the Shiranish Formation (Fig.3). The fauna is dominated by the Globotruncanidae among which the genus *Globotruncana* is well represented with (8) species while the *Genus Rosita* is represented by (3) species and the Genera *Globotruncanita* and *Rugoglobigerina* each represented two species and Genus *gasserina* each represented by two species and the genera *Archaeoglobigerina* and *Globigerinelloids* are represented by one species.

The planktic foraminifera assemblage from the Shiranish Formation of Jambour Well No.61 is typical Tethyan in character. The faunal composition of the proposed system of zonation and stratigraphic distribution of the different foraminiferal species is shown in (Fig.4). The stratigraphic distribution of the upper Cretaceous planktic foraminifera recorded from the Shiranish Formation the recognition of three biozones these are from base to top are:

1- *Globotruncanita elevata – Rosita fornicate* Zone;
2- *Globotruncana aegyptiaca* Zone;
3- *Gansserina gansseri* Zone;

The present zones are correlated with similar ones established by Bolli (1966) in Trinidad, Caron (1985) and Robaszynski *et al*. (1984); Bakkal *et al*., (1993) NE Iraq, Al-Mutawili and Al-Jubouri (2005), NW Iraq, Sharbazheri (2008), N Iraq.

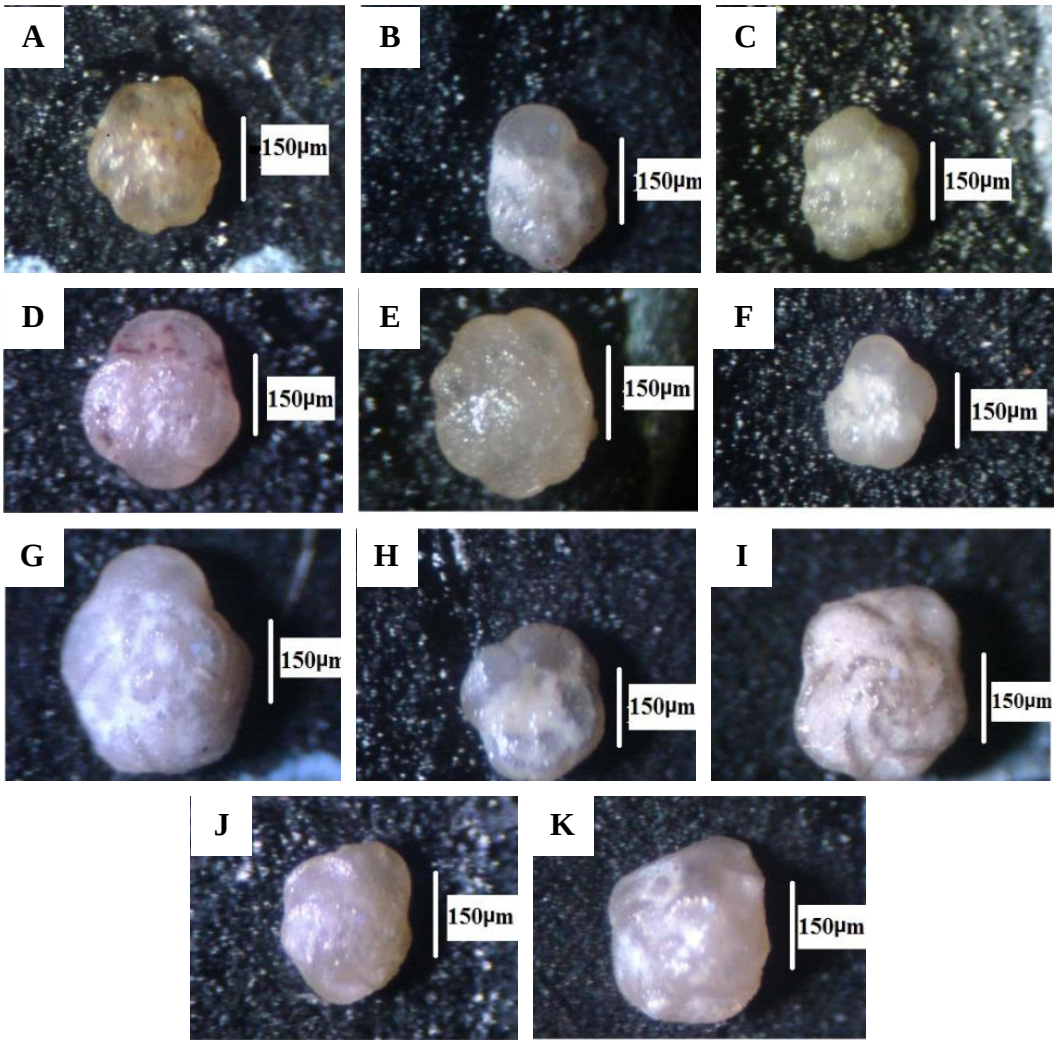

Fig.3: **A)** *Gansssrina gansseri*. Spiral side, **B)** *Gansssrina gansseri*. Umbilical side, **C)** *Rosita fornicata*. Umbilical side, **D)** *Globotruncana mariri*. Spiral side, **E)** *Globotruncana orientalis*. Spiral side, **F)** *Globotruncana aegyptiaca*. Umbilical side, **G)** *Globotruncana lapparenti*. Spiral side, **H)** *Globotruncana contusa*. Umbilical side, **I)** *Globotruncana bulloides*. Spiral side, **J)** *Globotruncana elevata*. Spiral side; and **K)** *Rosita patelliformis*. Spiral side

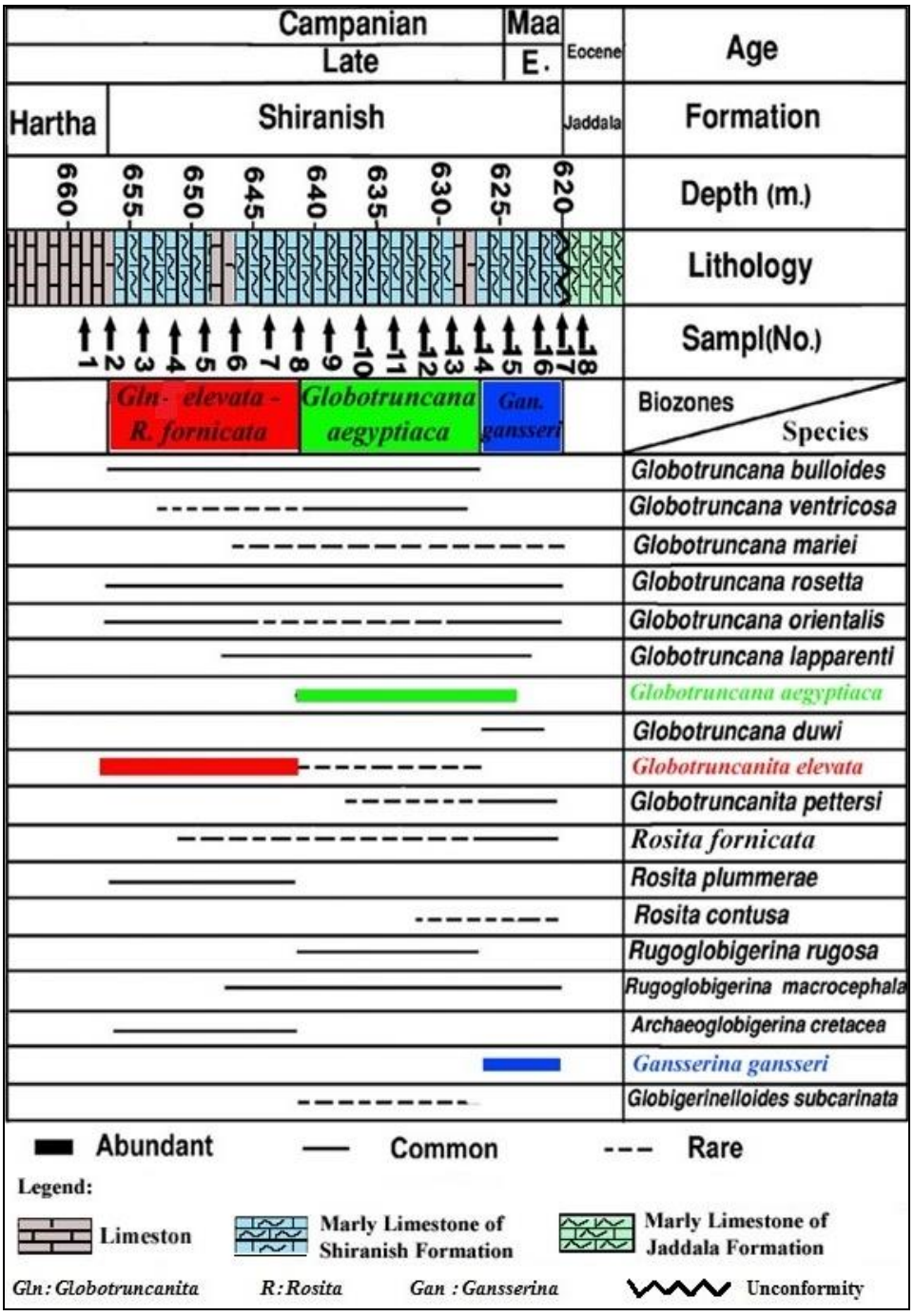

Fig.4: The geological range and biozones of Planktic Foraminifera of Shiranish Formation in Jambour Well No.61

1- *Globotruncanita elevata – Rosita fornicata* Interval zone

Base: The base of the zone represents the lower contact of the Shiranish Formation with the Late Campanian in the Jambor Formation and is placed at the First Appearance Datum (FAD) of *Globotruncatita elevata.*

Top: the top of the zone is placed at the horizon of the FAD of *Globotruncana aegyptiaca*.

Age: Late Campanian.

Thickness: the recorded thickness of this zone is (15) m from the depth (657 – 642) m.

Characteristics: the diagnostic species present abundantly in this zone are *Globotruncana bulloides* (Voger), *Glt. ventricosa* White, *Glt. mariei* Bannerol and Bloai, *Glt. rossetta* (Carsey) *Glt. orientalis* El-Nagger. *Glt. lapparenti* Bolli, *Rosita patelliformis* (Gandolfi), *R. plummerae* (Candolfi), *Rugoglobigcrina macrocephala* d. Orbigny, *Archaeoglobigerina cretacea, Rosita plummerae, Rosita fornicate*.

Correlation: the present zones correlative to the *Glt. calcarata* zone (Bolli, 1966) and the thus zone of Late Campanian. The zone is also equivalent to the *Glt. calcarata* zone by Caron (1985) and Robyzunski *et al*. (1984) of the Late Campanian age. In Iraq, the zone is also equivalent to their zones established by Al-Mutwali (1996); and Al-Mutwali and Al-Jubouri (2005) as shown in (Fig.5).

2- *Globotruncana aegyptiaca* Interval Zone

Base: the base of the zone is placed at the horizon of the FAD *Globotruncana aegyptiaca* Nakkady.

Top: the top of this zone is placed at the horizon of FAD of *Gansserina gansseri* (Bolli).

Age: Late Campanian

Thickness: the recorded zone is (15) m from the depth (642 – 627) m.

Characteristics: The zone is defined as that part of the range of *Globotruncana bulloides* (Vogler), *Globigerinelloides subcarinata* Bronnimann, *Rugog – lobigerina macrocephala* (Plummer), *Rug. rugosa* (Plummer), *Rosita fornicata* (Plummer), *Globotruncanita pettersi* (Gandolfi) *Glt. orientalis* El-Nagger, *Glt. rossetta* (Carsey), *Glt. marrei* Banner and Blow, *Glt.ventricosa* White *Gtr. Lapparenti*.

Correlation: the present zone is correlative to the *Glt. lapparenti* bolli (1966), Late Campanian age. The zone is also equivalent to *Glt.aegyptiaca* zone and *Gln. havanenis* zone by Caron, 1985 and Robaszynski *et al*. (1984), Late Campanian age. In Iraq, the zone is correlative, *Glt. aegyptaca* zone by Al-Mutwali (1996), Late Companian age. The zone is also correlative to the *Glt. aegyptiaca – Rosita fornicata* zone of Al-Mutwali and Al-Jobouri (2005), the Late Campanian, the zone is also correlative to *Glt. aegypliaca* by Sharbazheri (2008) the Late Campanian age. It is equivalent to the study of Al Nuaimy *et al*., 2020 shown in (Fig.5).

3- *Gansserina gansseri* Total Range Zone (part)

Base: The base of this zone is placed at the horizon of the FAD of *Gansserina gansseri* (Bolli).

Top: The top of this is placed in the present study corresponding to the FAD of *Gansserina gansseri* (Bolli).

Age: Early Maastrichtian age.

Thickness: The recorded thickness of this zone is (7.0) m from in depth (627 – 620 m).

Characteristics: The zone is based on the total stratigraphy range of *Gansserina gansseri* (Bolli), Other common planktic species in this zone are *Rugoglobigerina macrocephala* Bronnimann. *Rosita. contosa* (Cushman), *R. fornicata* (plammer), *Globotruncanta pettersi* (Gundolfi), *Globotruncana duwi* Nakkay, *Glt. aegyptica* Nakky, *Glt. lopparen*t Bolli, *Glt. orientalis* E1 Nagger. *Glt. rosetta* (Carsey), *Glt. mariei* Banner and Blow *Glt. orientalis*.

Correlation: The *Gansserina gansseri* zone was defined by Bolli (1966) as *Glt. gansser*, zone from Early Maastrichtian of Trinidad. The zone is correlative to the *Gansserina gansseri*

zone, by Caron, 1985; and Robaszynski *et al.*, 1984, Early Maastrichtian age. in Iraq the zone is correlative to the subzone *Gansserina gansseri* by the Bakkal *et al*., 1993, the Early Maastrichtian age, the zone is also correlative the *Gansserina gansseri*, by the Al-Matwali, 1996; and Al-Matwali and Al-Jubouri, 2005, Early Maastrichtian age. the zone is also correlative to the *Gansserina gansseri* zone, *Pseudotextularia interedia* zone, and *Contusotruncana contusa* zone by Sharbazheri, 2007 and 2008. The Biozones of the Early Maastrichtian age are shown in (Fig.5).

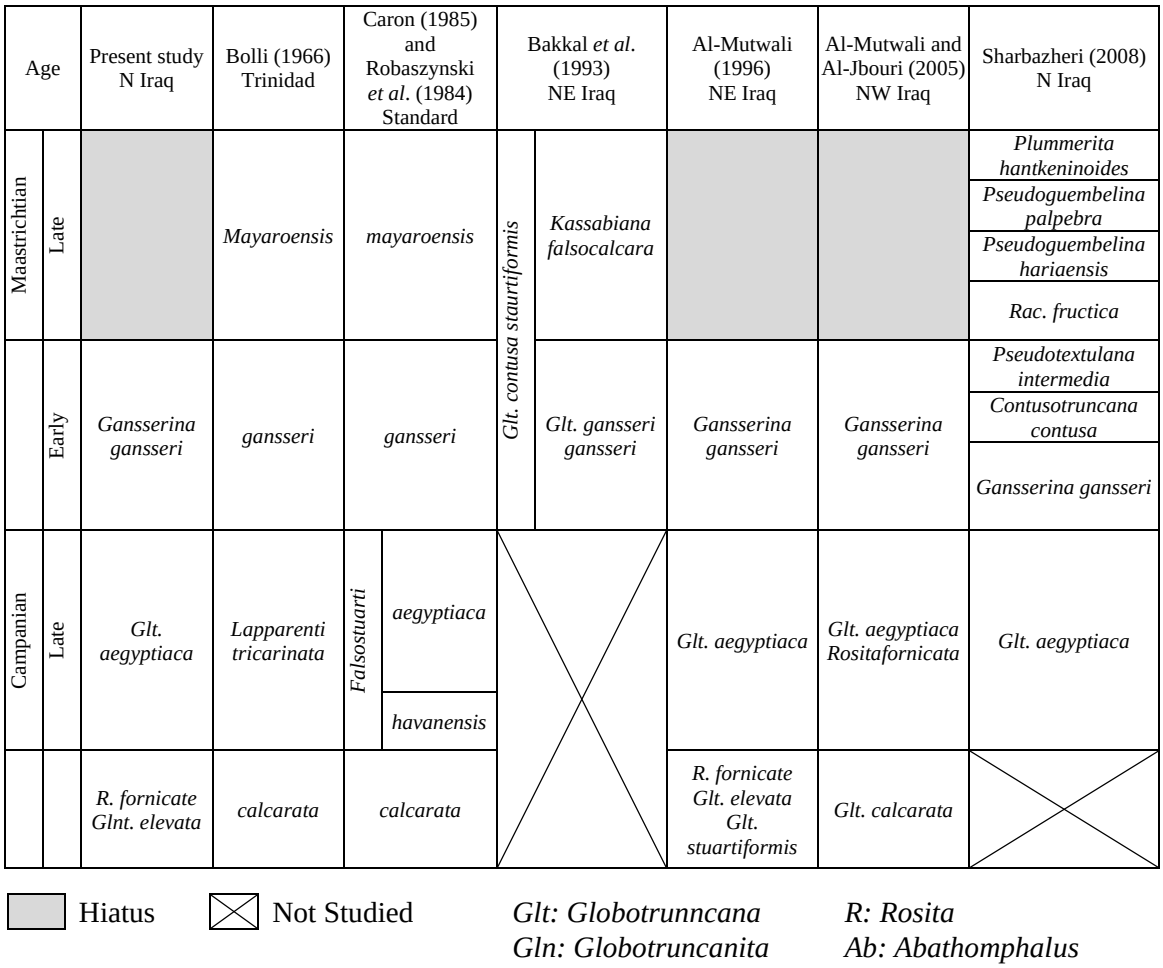

Fig.5: Correlation of the Biozones of Planktic Foraminifera for Shiranish Formation in the studied section with a number of studies inside and outside Iraq

CONCLUSIONS

Planktic foraminifera investigation of the Shiranish Formation in Jambour Well No.61 yielded 18 species that belong to 7 genera. The Shiranish Formation in the study Well has been biostratigraphically divided depending on the ranges of planktic foraminiferal species into three zones *Globotruncanita elevata-Rosita fornicata*, *Globotruncana aegyptiaca*, *Gansserina gansseri* zones. The distribution of faunal sequence and the correlation between these zones with other zonal schemes in and outside Iraq reveals the age of the Shiranish Formation in the study Well a Late Campanian – Early Maastrichtian.

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