

Study of Planktonic Foraminifera within Shiranish Formation in Selected Wells From Middle and Southern Iraq

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Abstract

Background:

In this study, some taxa of planktonic foraminifera fossils were relied upon, to determine the biozones of the diagnosed genus and the ages based on those species and to compare those areas with the areas identified in previous studies to find out the differences between the northern and southern areas in Iraq. Twenty three species of planktonic foraminifera were identified, which belong to eight genus belonging to the families (Globotruncanidae and Heterohelcidae) within five wells distributed over the study area that included (R-698, Ru-479, Ga-198P, EB-103, EB-104). The study showed that there are three biozones: *Gansserina gansseri* zone, *Globotruncana aegyptiaca* zone, *Globotruncana stuartiformis* zone.

Materials and Methods:

After collecting the samples and bringing them to the laboratory, each sample was treated separately, where the model was cooked at a high temperature for two hours after adding the dispersant substance (NaOH) to it, and then the samples was washed with a sieve with a size of 63 microns and left to dry, and then the process of picking up the foraminifera genus and isolating those fossils in special folders to make the diagnosis process under a reflecting microscope inside the Department of Earth Sciences / College of Science / University of Basrah.

Results:

Depending on the diagnosis of these groups of planktonic foraminifera were divided into several areas.

Conclusion:

Depending on the results obtained from the current study, it was found that the age of the Shiranish formation in the wells studied extends from the upper part of the Late Campanian - Middle Maastrichtian.

Key words:

Shiranish Formation, Planktonic Foraminifera, Biozones, Upper cretaceous, Iraq.

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Introduction

Shiranish Formation is located in a large sedimentary basin that wrapped most parts of Iraq and the southwestern part of Iran, so the sedimentary formations within this basin are the same in Iraq and southwestern Iran with some slight differences and changes in nomenclature. Shiranish Formation is characterized by a wide geographical extension within Iraq and the surrounding countries, where it is exposed in the highlands [1,2]. Shiranish Formation was first described by [1,3] in the type section in Shiranish Islam area, northeast of Zakho, northern Iraq. The lower contact seam border is with the formation of Hartha according to [4] and it is a surface of unconformity, but the upper contact seam border with the formation of Tayarat is conformity. According to a recent study [5] of Shiranish Formation in the Shaqlawa region, the formation consists of sequences of marly limestone and marlstone in green, gray and yellow colors. The aim of the study was to diagnose the most important genera of the Shiranish formation from the Planktonic Foraminifera, and to determine the ages based on those genera.

The location of the study area

The study area lies within the Mesopotamian plain, which is mainly covered by Holocene deposits. The covered soil is mainly derived from the sediments of the Tigris and Euphrates rivers, which represent complex and alternating sequences of sand, silt and clay. These sediments change in the vertical and lateral directions, according to [6]. The study area is located in an overhanging basin within the Mesopotamian region of the front belt of the Arabian plate Qusiplatform foreland. As for the most recent division, the area is located within the fore deep Mesopotamian basins, according to the division [7].

The study area represents the Shiranish Formation in the southern and middle region, represented by wells that included (R-698, Ru-479, Ga-198P, EB 103, EB 104) distributed over four oil fields, namely the North and South Rumaila oil fields, Al-Gharraf oil field and East Baghdad oil field. (Table 1), (Fig. 1).

Table 1: The coordinates of the wells in this study

Wells	N	E
R-698	47° 33' 10"	30° 49' 00"
Ru-479	47° 39' 40"	30° 10' 00"
Ga-198P	46° 14' 20"	31° 74' 00"
EB 103	44° 31' 80"	33° 50' 00"
EB 104	44° 33' 40"	33° 45' 00"

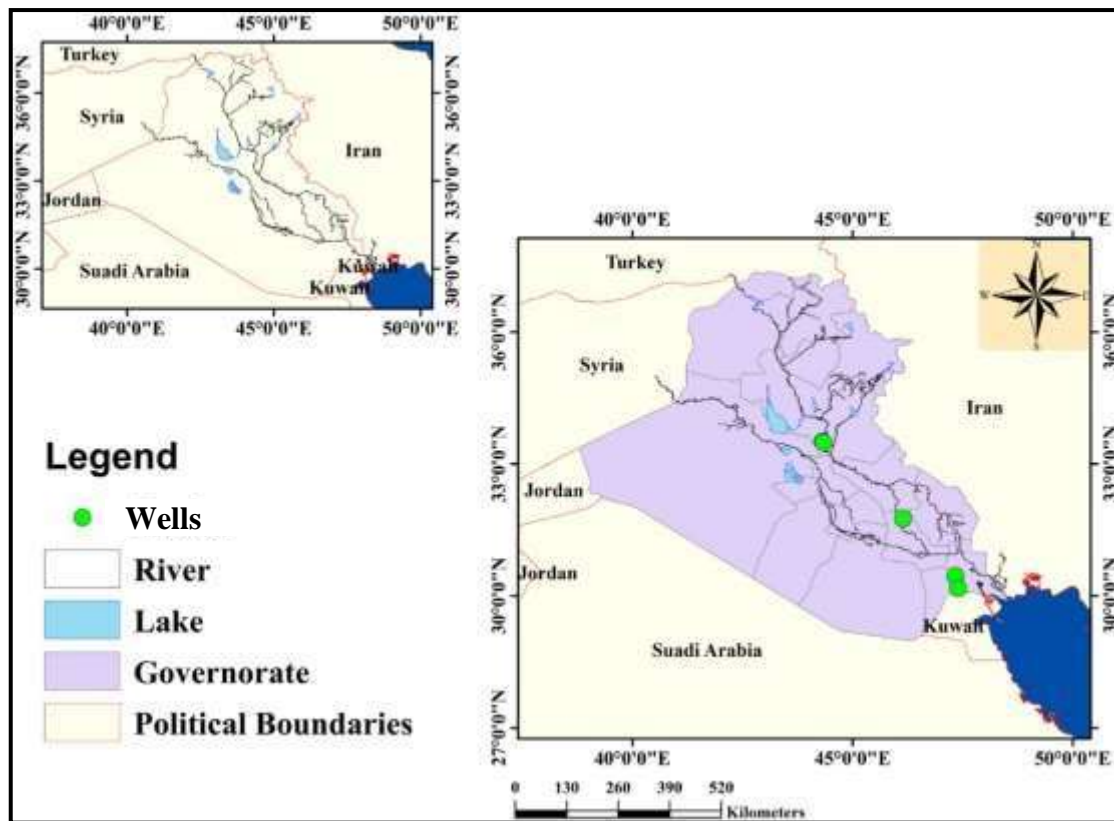


Fig.1: location map of the studied wells in the selected fields.

Data and Methods

To cover the largest area of Shiranish Formation, and due to the absence of a core for the formation due to the lack of oil gatherings, the study relied on the cutting, where a field visit was made to the fields understudy during the drilling period to follow up the correction of the depth probe taken to reduce the error rate as much as possible between the depths taken and recorded by the probe.

After collecting the samples and bringing them to the laboratory, each sample was treated separately, where the samples were cooked at a high temperature for two hours after adding the dispersant substance (NaOH) to it, and then the samples were washed by distilled water with a sieve with a size of 63 microns and left to dry, and then the process of picking up the foraminifera genus and isolating those fossils in special folders to make the diagnosis process under a reflecting microscope at the Department of Earth Sciences / College of Science / University of Basrah.

- **Classification**

The classification of foraminifera was based on the classification system established by [8] for the taxonomic units above the genus level. As for the lower taxonomic levels, it was based on [9]. The classification of genus and species was based on [10]. Where twenty three species of planktonic foraminifera belonging to eight genus belonging to families (Globotruncanidae, Heterohelcidae) were diagnosed.

Order: Foraminiferida Eichwald, 1830.

Suborder: Globigerina Delage and Herouard, 1696.

Superfamily: Globotruncanacea Brotzen, 1942.

Family: Globotruncanidae Brotzen, 1942.

Subfamily: Globotruncaninae Brotzen, 1942.

Genus: Globotruncana Cushman, 1927.

Type species: *Pulvinulina arca* Cushman, 1926.

- *Globotruncana aegyptica* Nakkady, 1950: The species shape of the shell is coiled in a low-medium spiral shape, the umbilical side is more convex than the coiling side, which has two protrusions, the periphery is slightly lobed to semi-circular, the number of chambers from 4-7 slowly increases in size and is flat to almost crescent, the joints are prominent, curved, grainy And low on the umbilical side, the location of the main aperture is the umbilical interior. fig.2 (1a-1b)
- *Globotruncana arca* Cushman, 1926: The species shape of the shell is coiled in a high spiral shape, the chambers are convex on both sides (fascial and umbilical), that is, it has two carpuses (developed and spaced). The periphery is lobed to semi-circular, the number of chambers is 5-8, slowly increasing in growth, elongated, sometimes right-angled. The joints are prominent and convex, and sometimes they are straight on the lateral side and low and curved on the umbilical side. fig.2 (2a-2b)
- *Globotruncana bulloides* Vogler, 1931 :The species shape of the shell is coiled in a low spiral, the chambers are convex on both sides (fascial and umbilical), that is, it has two carpuses. The circumference is lobed, the number of chambers is 6-7, slowly increasing in size, with coronal to semi-spherical. The joints are prominent and curved on the curved side on the fascial side, and straight and low on the umbilical side. The main opening is deep and wide and is located in the umbilical region. fig.2 (3a-3b)

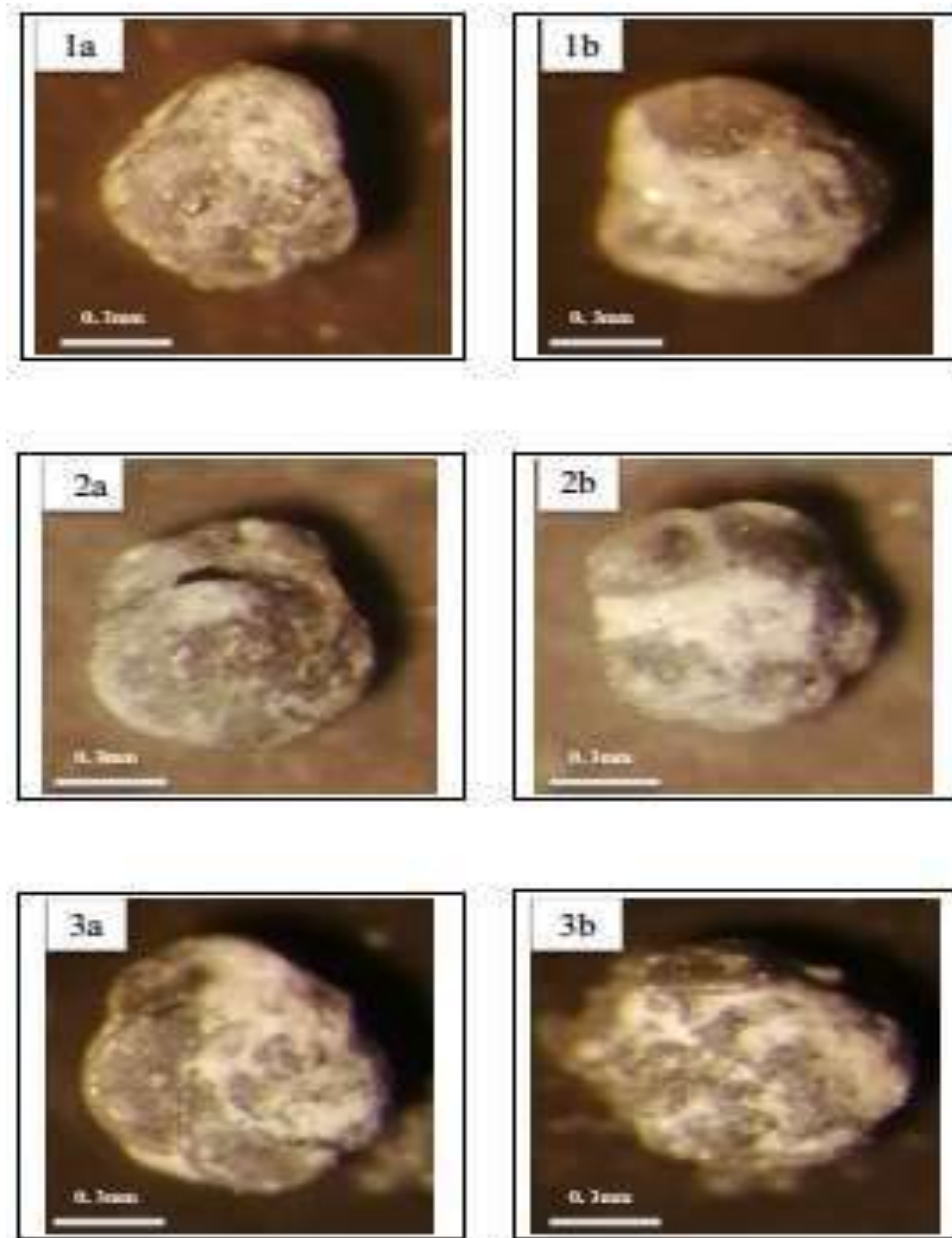


Fig.2: (1a-1b) *Globotruncana aegyptiaca* Nakkady (Spiral side-Umbilical side), (2a-2b) *Globotruncana arca* Cushman (Spiral side-Umbilical side), (3a-3b) *Globotruncana bulloides* Vogler (Spiral side-Umbilical side).

- *Globotruncana lapparenti* Brotzen, 1836 :The species shape of the Shell is coiled in a low spiral shape. The folded side is flat compared to the umbilical side, which is slightly swollen and appears rectangular in the axial section, meaning it has two bulges. The suture lines are curved on both sides and this is what differentiates it from the type (*G.linneiana* d'Orbigny) number Rooms 5-8 are slowly growing, crescent-shaped, the partitions are prominent, the main opening is wide and is located on the secret side. fig.3 (1a-1b)



- *Globo truncana linneiana* d'Orbigny, 1839 :The species shape of the Shell is coiled in a low spiral shape, the flaring side is flat or slightly convex compared to the umbilical side, which is convex, that is, it has two bulges, the periphery is lobed, the number of chambers from 5-8 slowly increasing in growth, of a crescent shape, the joints are prominent, grainy and straight On the side, low and curved on the umbilical side, the main opening is wide and located on the umbilical side. fig.3 (2a-2b)
- *Globo truncana rosetta* Carsey, 1926 :The species shape of the Shell is in a low spiral shape, the flaring side is slightly low, it has two convergent protrusions so that they merge in the last chambers to form one protrusion, the periphery is lobed and is clear in the last lap, the number of chambers 4-5 increases rapidly in size and is quadrangular to renal in shape, the surface is smooth , The joints are low and straight towards the end of the last roll, and they are prominent and grainy on the side of the roll, and curved and radial on the umbilical side. The main opening is deep and wide and is located on the umbilical side. fig.3 (3a-3b)



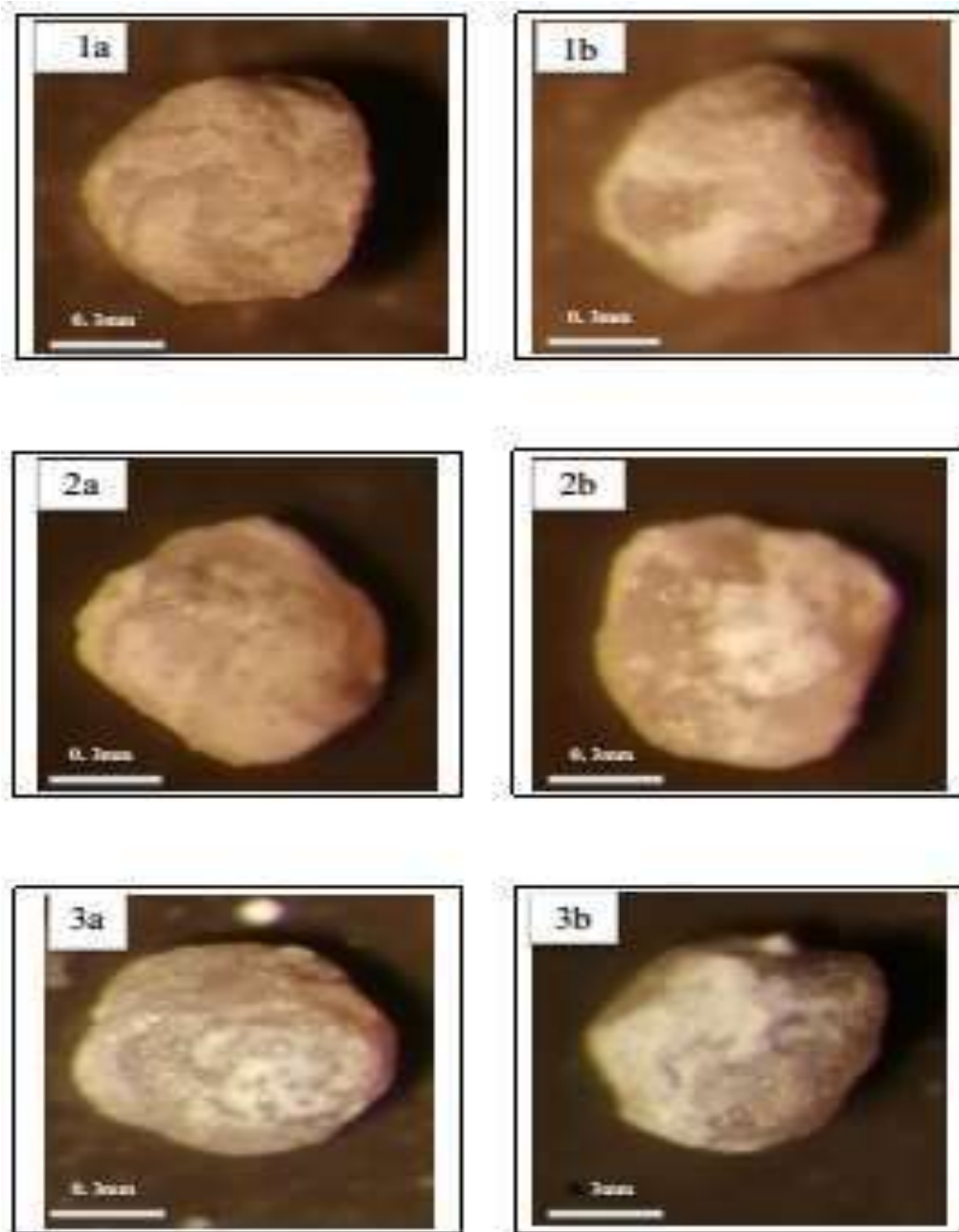


Fig.3: (1a-1b) *Globotruncana lapparenti* Brotzen (Spiral side-Umbilical side), (2a-2b) *Globotruncana linneiana* d'Orbigny (Spiral side-Umbilical side), (3a-3b) *Globotruncana rosetta* Carsey (Spiral side-Umbilical side).

Subfamily: Globotruncaninae Brotzen, 1942.

Genus: *Gansserina* Robaszynski, Gonzalez and Wonders, 1984.

Type species: *Globotruncana gansseri* Bolli, 1951.



- *Globotruncana gansseri* Bolli, 1951: The species shape of the Shell is coiled in a low spiral shape, the side is flat and sometimes concave and the umbilical side is prominent, that is, it has one carcass, the circumference is slightly lobed, the number of chambers from 4-7 rapidly increasing in size, trapezoidal and sometimes crescent The surface is covered with an ornament in the form of blisters In the last chambers, the partitions on the flank side are curved and prominent, while on the secret side they are radial and low, the main opening is almost narrow and convex and its location is on the umbilical side. fig.4 (1a-1b)

Subfamily: Globotruncaninae Brotzen, 1942.

Genus: *Contusotruncana* Kochagin, 1982.

Type species: *Globotruncana contusa* Cushman, 1926.

- *Contusatruncana fornicata* Plummer, 1931: The species shape of the Shell is well coiled in a spiral shape, the umbilical side is slightly convex, while the flank side is more convex, that is, it has two well-developed carpus, the circumference is slightly lobed, the number of chambers from 3-5 increases rapidly in size, the shape of the chambers is crescent and then becomes elongated towards the coil with the presence of the chambers The surface is smooth, the joints are curved or inclined and prominent on the side and low on the secret side, the main opening is deep and wide and is located on the secret side. fig.4 (2a-2b)

Subfamily: Globotruncaninae Brotzen, 1942.

Genus: *Globotruncanita* Reiss, 1957.

Type species: *Roslina stuarti* de Lapparent, 1918.

- *Globotruncanita stuartiformis* Dalbiez, 1955 :The species shape of the Shell is spirally coiled medium - good, the flaring side is more convex than the umbilical side, it has a single protrusion, the circumference is slightly rounded, the number of chambers is 5-7, grows in size almost quadrilateral, the surface is smooth, the joints are oblique, protruding on the flank side , Low in the secret side, the main secret hole is small and shallow and its location is in the secret side. fig.4 (3a-3b)

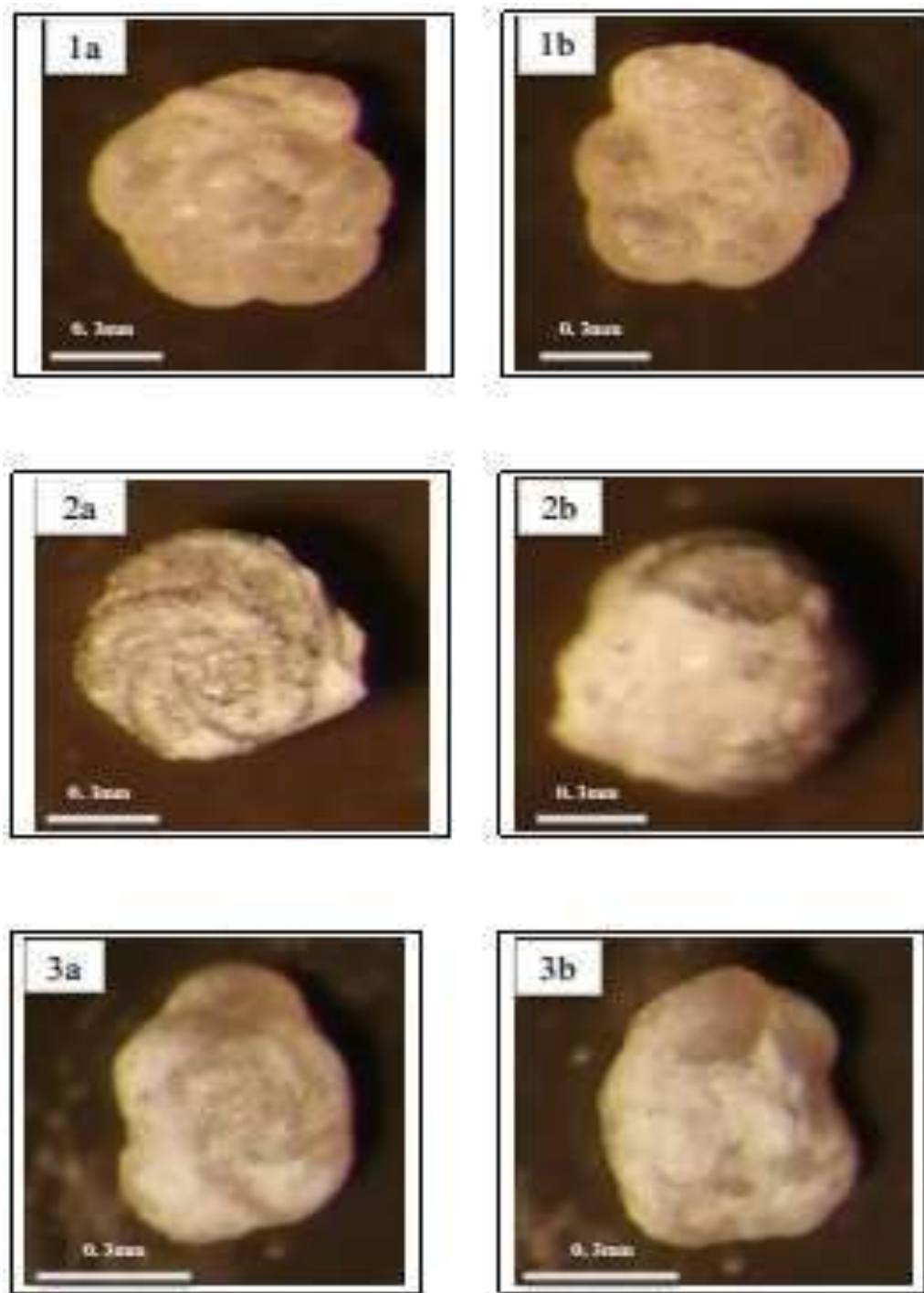
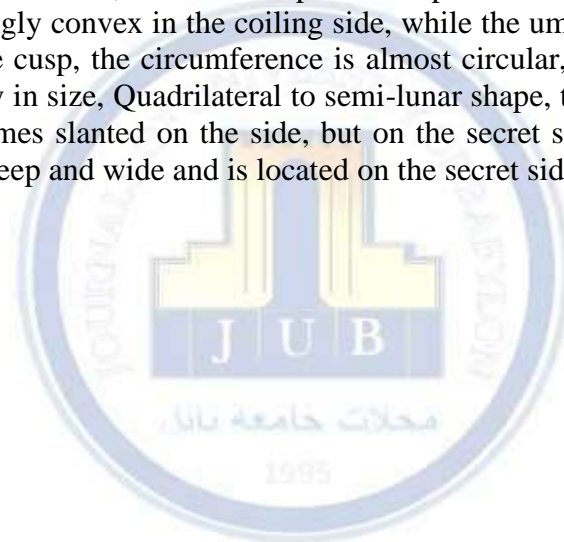


Fig.4: (1a-1b) *Globotruncana gansseri* Bolli (Spiral side-Umbilical side), (2a-2b) *Contusatruncana fornicata* Plummer (Spiral side-Umbilical side), (3a-3b) *Globotruncanita stuartiformis* Dalbiez (Spiral side-Umbilical side).



- *Globotruncanita stuarti* de Lapparent, 1918 :The species shape of the crust is high spirally coiled, the flaring side is more convex than the umbilical, it has two bulges, the circumference is round, the number of chambers is 6-7, growing in size almost quadrilateral, the surface is perforated, the joints are oblique, prominent on the fascial side, low on the side Secrecy, the main hole is a small and deep secret and its location is on the secret side. fig.5 (1a-1b)
- *Globotruncanita elevate* Brotzen, 1934 :The species shape of the Shell is coiled in a low spiral shape, the flaring side is flat and becomes concave in the last lap, has a single cusp, the circumference is roughly lobed, the number of chambers is 6-8, slowly growing in size, triangular or crescent shaped, the surface is smooth, the joints on the coiling side are oblique and grainy It is prominent and low from the secret side, and it is noted that the last room on the side is higher than the surface, the main opening is wide and deep and located on the secret side. fig.5 (2a-2b)
- *Globotruncanita conica* White, 1928 :The species shape of the Shell is coiled in a high spiral shape, it is strongly convex in the coiling side, while the umbilical side is almost flat, that is, it has only one cusp, the circumference is almost circular, the number of chambers from 6-8 grows slowly in size, Quadrilateral to semi-lunar shape, the joints are prominent It is straight and sometimes slanted on the side, but on the secret side, it is low and curved. The main opening is deep and wide and is located on the secret side. fig.5 (3a-3b)



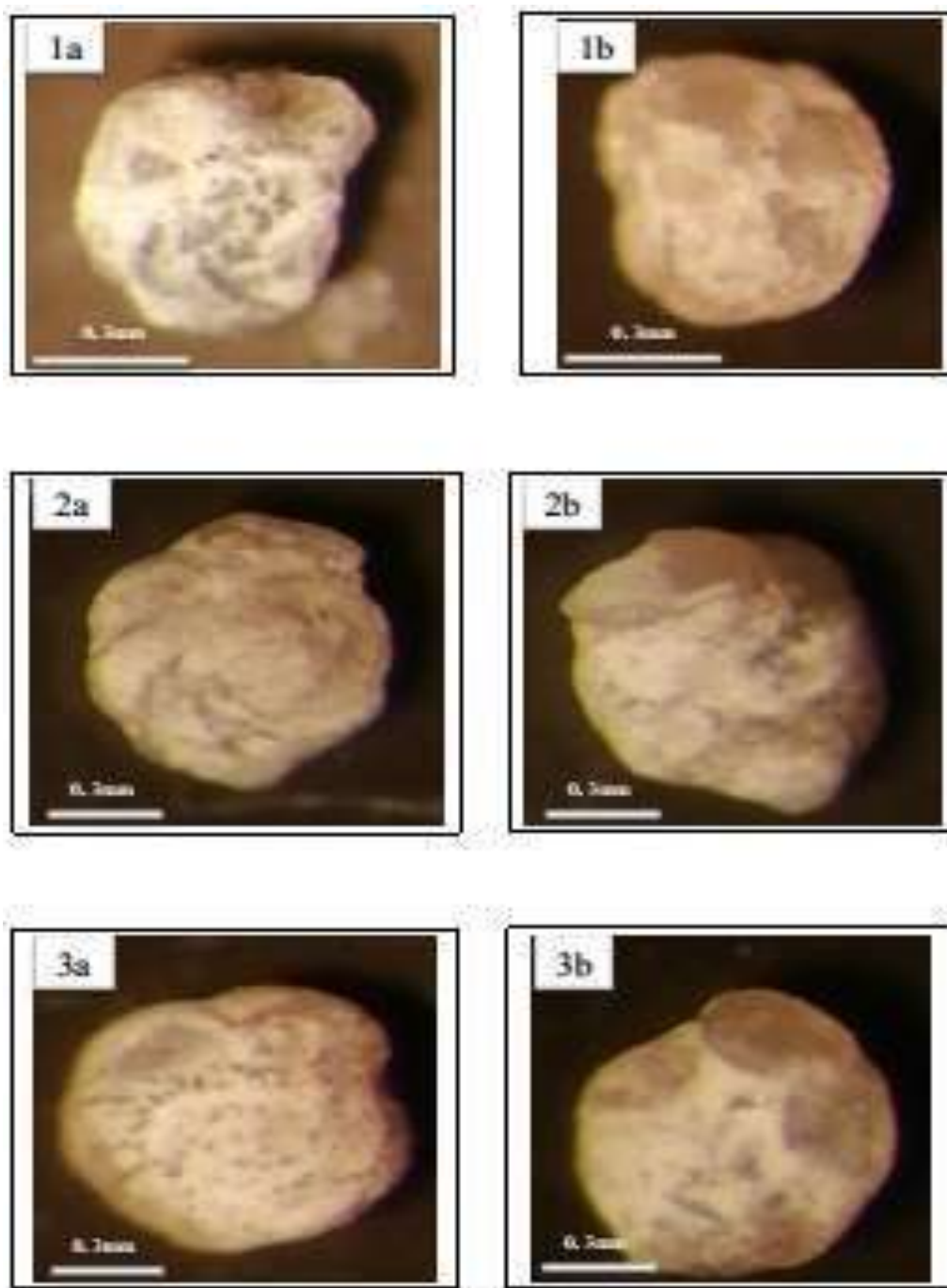


Fig.5: (1a-1b) *Globotruncanita stuarti* de Lapparent (Spiral side-Umbilical side), (2a-b) *Globotruncanita elevate* Brotzen (Spiral side-Umbilical side), (3a-3b) *Globotruncanita conica* White (Spiral side-Umbilical side).

Subfamily: Globotruncanellinae Maslakovo, 1964.

Genus: *Globotruncanella* Reiss, 1957.

Type species: *Globotruncana citae* Bolli, 1951.

- *Globotruncanella havanensis* Voorwijk, 1937 :The species shape of the Shell is coiled in a low-medium spiral shape, the coiling side is more convex than the umbilical side which is slightly convex, that is, it has one cusp which becomes an unperforated bundle on the last chamber, the number of chambers is 5-6 and it is corrugated, the axial circumference is sharp, the surface It contains few blisters, especially the first chambers, the joints are low, radial and sharp on the umbilical side, the main opening is umbilical site or close to it from the outside. fig.6 (1a-1b)
- *Globotruncanella petaloidea* Gandolfi, 1955 :The species shape of the Shell is spirally coiled medium - well, it is strongly convex on the convex side while the umbilical side is flat to concave (concavo-convex), does not have a carcinoma, the periphery is strongly lobed, the number of chambers 4 increases rapidly in growth (characterized by being more spherical than It is compressed), or petal in shape and may be quadrilateral, the surface contains a few blisters except for the last chambers, the separators on the fascial side are radial and prominent, but on the umbilical side they are curved and low, the main opening is secret or close to the navel and sometimes it is circumferential. fig.6 (2a-2b)
- *Globotruncanella citae* Bolli, 1951 :The species shape of the Shell is coiled in a low spiral shape, the flaring side is convex, while the umbilical side is flat or slightly concave, that is, it has one cusp, the number of chambers is 4-5 and they are in the shape of a petal, the circumference is clearly lobed, the surface contains very smooth spines, especially the first chambers, The suture lines are radial from the fasial side and slightly curved from the ventral side. The main opening is umbilical or close to it from the outside. fig.6 (3a-3b)

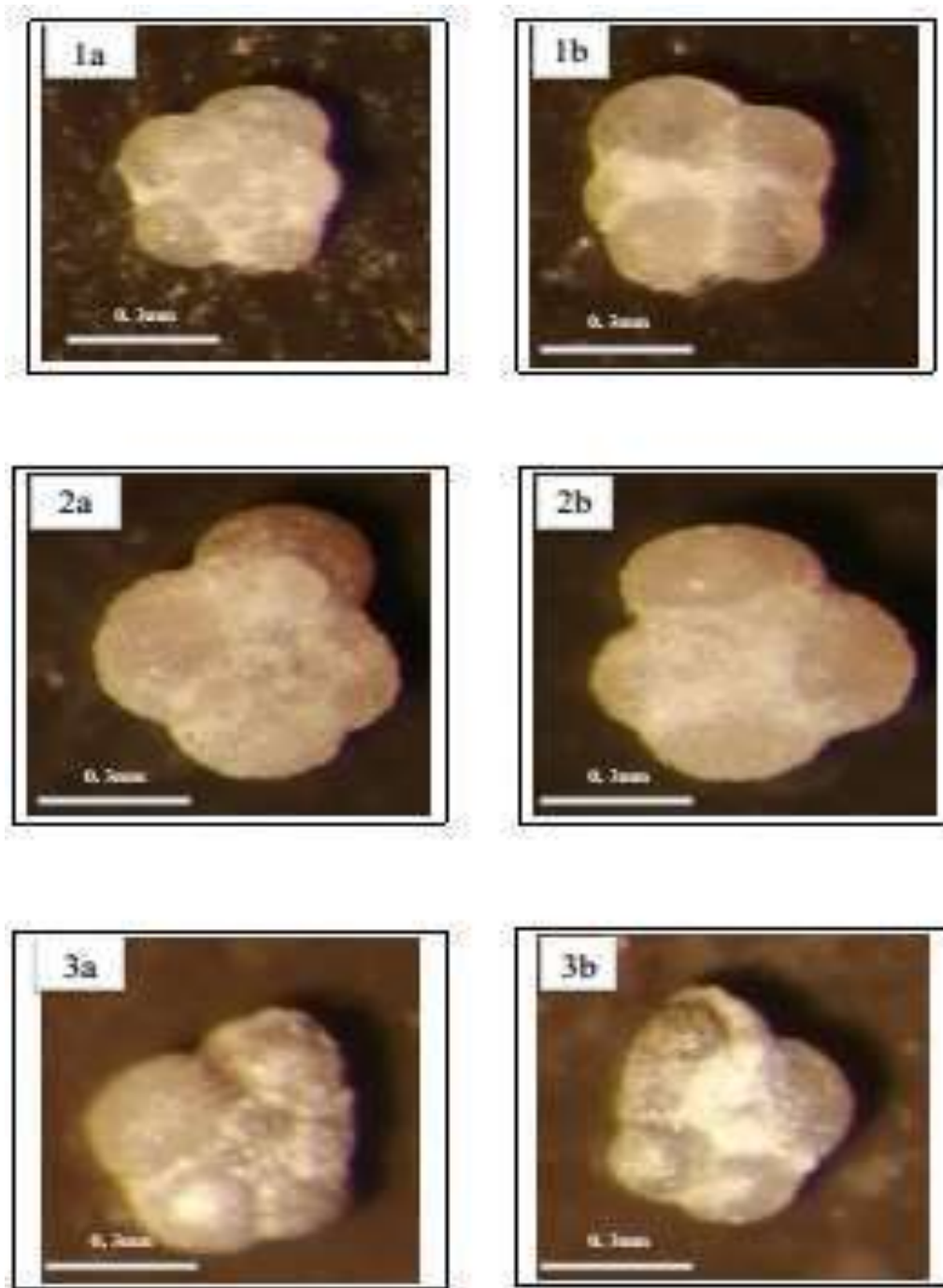


Fig.6: (1a-1b) *Globotruncanella havanensis* Voorwijk (Spiral side-Umbilical side),(2a-2b) *Globotruncanella petaloidea* Gandolfi (Spiral side-Umbilical side), (3a-3b) *Globotruncanella citae* Bolli (Spiral side-Umbilical side).

Order: Foraminiferida Eichwald, 1830.

Suborder: Globigerina Delag and Herouard, 1696.

Superfamily: Globotruncanacea Brotzen, 1942.



Family: Heterohelicidae Cushman, 1927.

Subfamily: Heterohelicinae Cushman, 1927.

Genus: *Heterohelix* Ehrenberg, 1843.

Type species: *Spiroplectamina americana* Ehrenberg, 1844.

- *Heterohelix striata* Ehrenberg, 1840 :The species shape is characterized by a medium size, and a lime wall, it has 6-8 pairs of spherical chambers, arranged in two chains, the size of the chambers increases towards the last pair, the surface contains prominent ribs and A clear, long, crescent-shaped end opening is located at the inner edge of the last chamber. fig.7 (1a-1b)
- *Heterohelix glabrans* Cushman, 1983 :The species shape is characterized by a medium-large size, compressed on both sides, the wall is limestone, it has 6-8 pairs of spherical rooms, arranged in two chains, the ratio of the width of the compartments to their length is greater, the size of the rooms increases towards the last pair, the surface is smooth and sometimes contains On smooth perforations, the final opening is long and crescent-shaped located at the inner edge of the last chamber. fig.7 (2a-2b)
- *Heterohelix globulosa* Ehrenberg, 1840 :The species shape is characterized by a medium size, the wall is limestone, it has 6-8 pairs of spherical chambers, arranged in two chains, the chambers increase in size towards the last pair, the surface contains smooth and spaced ribs, the final opening is long and crescent-shaped located at the inner edge to the last room. fig.7 (3a-3b)

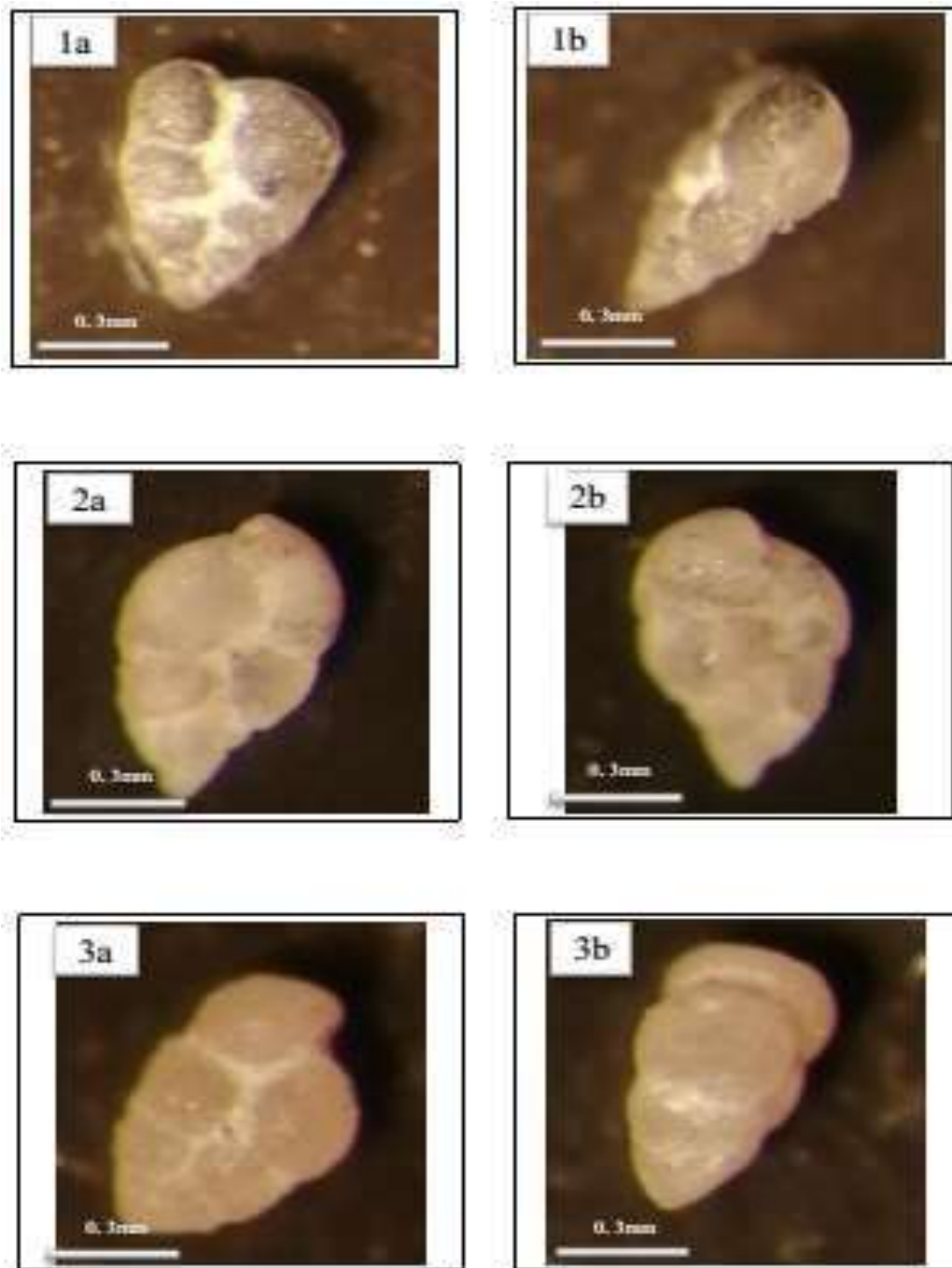


Fig.7: (1a-1b) *Heterohelix striata* Ehrenberg (Front side-Lateral side), (2a-2b) *Heterohelix glabrans* Cushman (Front side-Back side), (3a-3b) *Heterohelix globulosa* Ehrenberg (Front side-Lateral side).

Subfamily: Heterohelicinae Cushman, 1927.

Genus: *Pseudotextularia* Rzehak, 1891.

Type species: *Cuneolina elegans* Rzehak, 1891.



- *Pseudotextularia elegans* Rzehak, 1891 :The species shape is characterized by a large size, compressed in the vertical direction to the direction of the edge, the shape is elongated, the wall is limestone, it has 6-9 pairs of kidney-shaped rooms, arranged in two chains, the size of the rooms increases towards the last pair, the surface contains a prominent and clear striped decoration , the final opening in the form of a wide arc at the bottom of the last room. fig.8 (1a-1b)
- *Pseudotextularia plummerae* Loetterle, 1937 :The species shape is characterized by medium size, elongated shape, limestone wall, possessing 6-8 pairs of kidney-shaped chambers, arranged in two chains, the chambers increase in size towards the last pair, the surface contains light striped decoration and with the progress of growth the surface becomes smooth, the final opening Large and wide located in the last room. fig.8 (2a-2b)

Subfamily: Heterohelicinae Cushman, 1927.

Genus: *Pseudoguembelina* Bronnimann and Brown, 1953.

Type species: *Guembelina excolata* Cushman, 1926.

- *Pseudoguembelina costulata* Cushman, 1939 The species shape is characterized by small-medium size, elongated shape, limestone walls, slim exterior appearance and possesses 6-8 pairs of bulging chambers, the length is greater than twice the width, arranged in two chains, the size of the chambers increases towards the last pair, the surface contains longitudinal ribs , The final opening is semi-circular located in the last chamber, with openings attached. fig.8 (3a-3b)

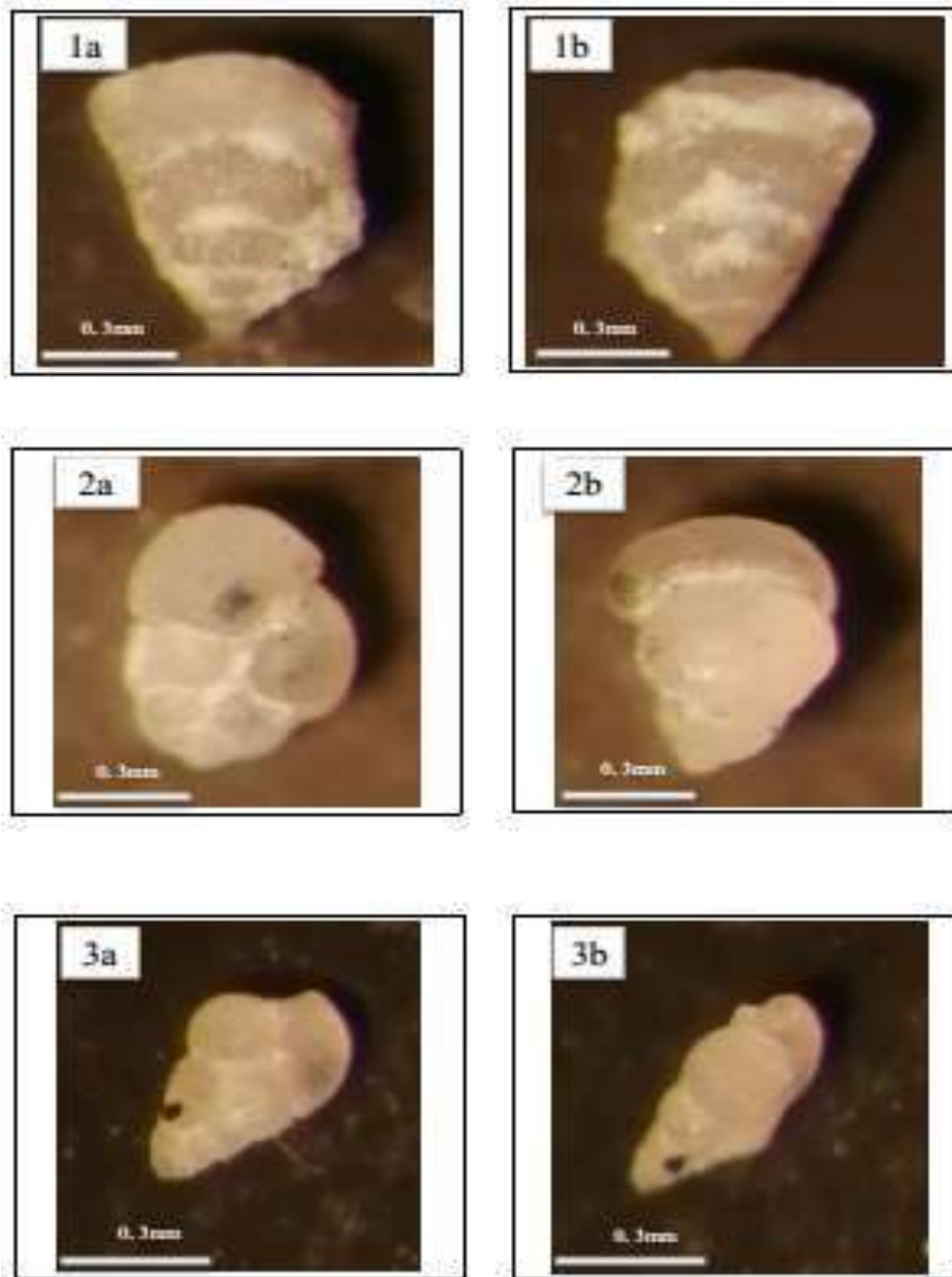


Fig.8: (1a-1b) *Pseudotextularia elegans* Rzehak (Front side-Back side), (2a-2b) *Pseudotextularia plummerae* Loetterle (Front side-Back side), (3a-3b) *Pseudoguembelina costulata* Cushman (Front side-Lateral side).

- *Pseudoguembelina excolata* Cushman, 1926 :The species shape is characterized by a small size, slightly compressed, the shape is wide, the wall is limestone, it has 4-6 pairs of broad or renal chambers. The shape is the width greater than the length, arranged in two chains, the size of the rooms increases towards the last pair, the surface contains longitudinal ribs , The final opening is long and oval, with attached openings on both sides, and is located in the last room. fig.9 (1a-1b)

- *Pseudoguembelina palpebra* Bronnimann and Brown, 1953 :The species shape is characterized by a medium size, slightly compressed, the wall is limestone, it has 8-12 pairs of flat-shaped chambers, the length is greater than the width, arranged in two chains, the chambers increase in size towards the last pair, the surface contains light ribs, the end opening is arched. fig.9 (2a-2b)

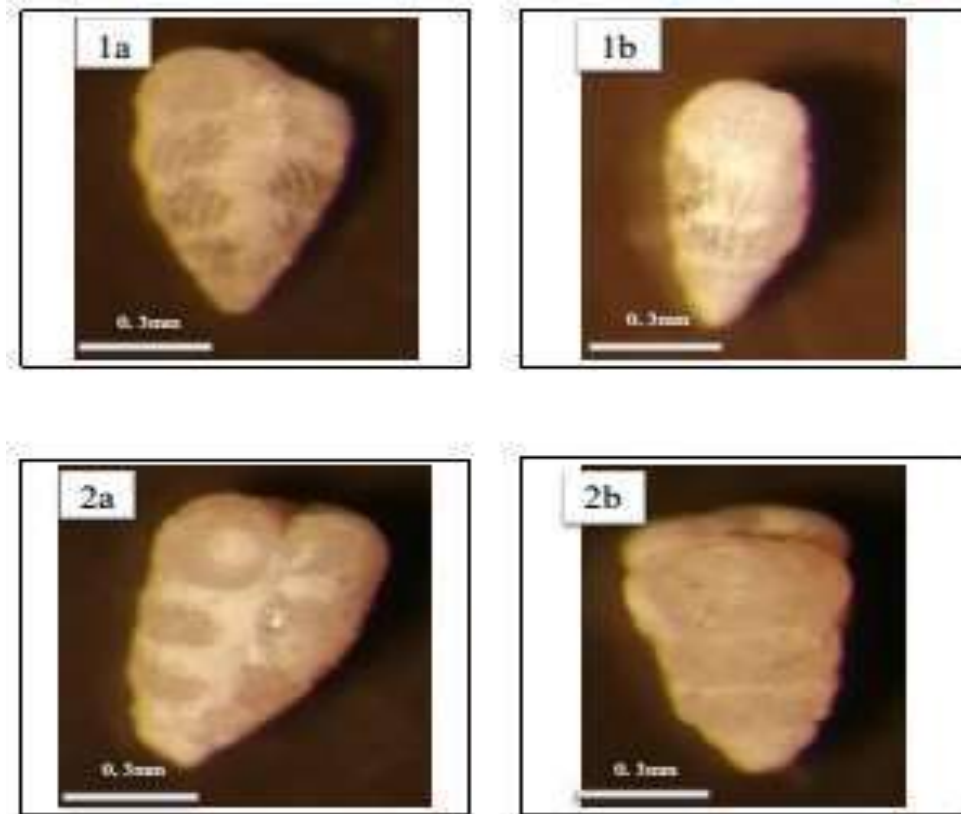


Fig.9: (1a-1b) *Pseudoguembelina excolata* Cushman (Front side-Lateral side), (2a-2b) *Pseudoguembelina palpebra* Bronnimann and Brown (Front side-Lateral side).

Results and discussion

• Biostratigraphy

Depending on the diagnosis of these groups of planktonic foraminifera, they were divided into several areas

✓ *Gansserina gansseri* total range Zone

It is considered a total range represented by the stratigraphic range of the species *Gansserina gansseri* and is considered one of the globally accepted zones.

Age Range: Middle Maastrichtian.

The limits of the range: The first appearance of the species *Gansserina gansseri* represents the lower limit of this range, while the upper limit is represented by the disappearance of the species itself and the absence of the species *Abathomphalus mayaroensis*, as it is considered a type indicative of the age of the Upper Maastrichtian, but it has not been proven to appear within the Shiranish Formation.

This zone is equivalent to the lower part of the range *Abathomphalus mayaroensis* diagnosed [11] in Turkey. It is equivalent to the upper part of the *Gansserina gansseri* identified [12] in Egypt. In Iraq, it is also equivalent to the range of *Gansserina gansseri*, which was identified by [13] in northeastern Iraq.

✓ *Globotruncana aegyptiaca* Interval zone

This range is considered an interval range for the species *Globotruncana aegyptiaca* and is represented by the geological extent of this classification, which precedes the first appearance of the species *Gansserina gansseri*.

Age range: the Upper part of the Lower Maastrichtian.

Range limits: The lower boundary of the range represents the first appearance of the species *Globotruncana aegyptiaca*, and the upper boundary is the first appearance of the species *Gansserina gansseri*.

This zone is equivalent to the upper part of the *Globotruncana falsostuarti* range of its diagnosis by [12,15]. It is equivalent to the lower part of the *Contusotruncana contusa* range diagnosed [15] in Iran. In Iraq, the top of the band *Gansserina gansseri* that characterizes it [16].

✓ *Globostruncanita stuartiformis* Interval Zone

This range is considered an interval range for *Globostruncanita stuartiformis* and is represented by the geological extent of this classifier which precedes the first appearance of the species *Globostruncana aegyptiaca*.

Age range: Upper Late Campanian - Lower Early Maastrichtian.

Range limits: The lower boundary of the range is represented by the absence of the species *Globostruncanita calcarata* and the upper boundary by the first appearance of the species *Globostruncana aegyptiaca*.

This zone is equivalent to the lower part of the *Gansserina gansseri* range that was identified by [12] in Egypt and [11] in Turkey at the Early Maastarchian age. In Iraq, its upper part is equivalent to the lower part of the range *Globostruncanella havanensis* that it identified [17]. Generally, the age of this study is nearby to the modern references that studied Shiranish Formation by several fossils such as nannofossils, Ammonite and Foraminifera [18–20]

Table 2: Represents the spread of the planktonic foraminifera of the Shiranish Formation in the R-698 well of the North Rumaila field.

Age	L. Campanian	E. Maastrichtian	M. Maastrichtian
Formation	Shiranish		
zonation	<i>Globostruncanita stuartiformis</i>	<i>Globostruncana aegyptiaca</i>	<i>Gansserina gansseri</i>
<i>Globostruncana aegyptica</i>		-----	
<i>Globostruncana arca</i>			-----
<i>Globostruncana bulloides</i>	-----		
<i>Globostruncana lapparenti</i>		-----	
<i>Globostruncana linneiana</i>		-----	----
<i>Globostruncana rosetta</i>	-----	-----	-----
<i>Gansserina gansseri</i>			-----
<i>Contusatruncana fornicata</i>	----	-----	
<i>Globostruncanita stuartiformis</i>	-----		
<i>Globostruncanita stuarti</i>		-----	
<i>Globostruncanita elevate</i>		- - - - -	
<i>Globostruncanita conica</i>		- - - - -	
<i>Globostruncanella havanensis</i>		-----	
<i>Globostruncanella petaloidea</i>		- - - - -	
<i>Globostruncanella citae</i>	- - - - -	- - - - -	
<i>Heterohelix striata</i>	- - - - -	-----	
<i>Heterohelix glabrans</i>		- - - - -	
<i>Heterohelix globulosa</i>			-----
<i>Pseudotextularia elegans</i>		-----	
<i>Pseudotextularia plummerae</i>	- - - - -	- - - - -	
<i>Pseudoguembelina costulata</i>	--	-----	
<i>Pseudoguembelina excolata</i>	- - - - -	-----	
<i>Pseudoguembelina palpebra</i>	--	- - - - -	

Table 3: Represents the spread of the planktonic foraminifera of the Shiranish Formation in the Ru-479 well of the South Rumaila field

Age	E. Maastrichtian	M. Maastrichtian
Formation	Shiranish	
zonation	<i>Globotruncana aegyptiaca</i>	<i>Gansserina gansseri</i>
<i>Globotruncana aegyptiaca</i>	-----	
<i>Globotruncana arca</i>		-----
<i>Globotruncana bulloides</i>		- - - - -
<i>Globotruncana lapparenti</i>		- - - - -
<i>Globotruncana linneiana</i>		-----
<i>Globotruncana rosetta</i>		-----
<i>Gansserina gansseri</i>		-----
<i>Contusatruncana fornicata</i>		-----
<i>Globotruncanita stuartiformis</i>	- - - - -	-----
<i>Globotruncanita stuarti</i>		-----
<i>Globotruncanita elevate</i>		- - - - -
<i>Globotruncanita conica</i>		- - - - -
<i>Globotruncanella havanensis</i>		- - - - -
<i>Globotruncanella petaloidea</i>		-----
<i>Globotruncanella citae</i>		- - - - -
<i>Heterohelix striata</i>		-----
<i>Heterohelix glabrans</i>		- - - - -
<i>Heterohelix globulosa</i>		- - - - -
<i>Pseudotextularia elegans</i>		-----
<i>Pseudotextularia plummerae</i>		- - - - -
<i>Pseudoguembelina costulata</i>		-----
<i>Pseudoguembelina excolata</i>		-----
<i>Pseudoguembelina palpebra</i>		- - - - -



Table 4: Represents the spread of the planktonic foraminifera of the Shiranish Formation in the Ga-198P well of the Gharraf field

Age	L. Campanian	E. Maastrichtian	M. Maastrichtian
Formation	Shiranish		
zonation	<i>Globotruncanita stuartiformis</i>	<i>Globotruncana aegyptiaca</i>	<i>Gansserina gansseri</i>
<i>Globotruncana aegyptica</i>	-----	-----	-----
<i>Globotruncana arca</i>	-----	-----	-----
<i>Globotruncana bulloides</i>	-----	-----	-----
<i>Globotruncana lapparenti</i>	-----	-----	-----
<i>Globotruncana linneiana</i>	-----	-----	-----
<i>Globotruncana rosetta</i>	-----	-----	-----
<i>Gansserina gansseri</i>	-----	-----	-----
<i>Contusatruncana fornicata</i>	-----	-----	-----
<i>Globotruncanita stuartiformis</i>	-----	-----	-----
<i>Globotruncanita stuarti</i>	-----	-----	-----
<i>Globotruncanita elevate</i>	-----	-----	-----
<i>Globotruncanita conica</i>	-----	-----	-----
<i>Globotruncanella havanensis</i>	-----	-----	-----
<i>Globotruncanella petaloidea</i>	-----	-----	-----
<i>Globotruncanella citae</i>	-----	-----	-----
<i>Heterohelix striata</i>	-----	-----	-----
<i>Heterohelix glabrans</i>	-----	-----	-----
<i>Heterohelix globulosa</i>	-----	-----	-----
<i>Pseudotextularia elegans</i>	-----	-----	-----
<i>Pseudotextularia plummerae</i>	-----	-----	-----
<i>Pseudoguembelina costulata</i>	-----	-----	-----
<i>Pseudoguembelina excolata</i>	-----	-----	-----
<i>Pseudoguembelina palpebra</i>	-----	-----	-----

Table 5: Represents the spread of the planktonic foraminifera of the Shiranish Formation in the EB-103 well of the East Baghdad Field

Age	E. Maastrichtian	M. Maastrichtian
Formation	Shiranish	
zonation	<i>Globotruncana aegyptiaca</i>	<i>Gansserina gansseri</i>
<i>Globotruncana aegyptica</i>	-----	
<i>Globotruncana arca</i>	-----	
<i>Globotruncana bulloides</i>	-----	
<i>Globotruncana lapparenti</i>	-----	
<i>Globotruncana linneiana</i>		-----
<i>Globotruncana rosetta</i>		-----
<i>Gansserina gansseri</i>		-----
<i>Contusatruncana fornicata</i>		-----
<i>Globotruncanita stuartiformis</i>	-----	
<i>Globotruncanita stuarti</i>		-----
<i>Globotruncanita elevate</i>	-----	
<i>Globotruncanita conica</i>	-----	
<i>Globotruncanella havanensis</i>	-----	
<i>Globotruncanella petaloidea</i>		-----
<i>Globotruncanella citae</i>	-----	
<i>Heterohelix striata</i>		-----
<i>Heterohelix glabrans</i>		-----
<i>Heterohelix globulosa</i>		-----
<i>Pseudotextularia elegans</i>		-----
<i>Pseudotextularia plummerae</i>	-----	
<i>Pseudoguembelina costulata</i>	-----	
<i>Pseudoguembelina excolata</i>		-----
<i>Pseudoguembelina palpebra</i>		-----

Table 6: Represents the spread of the planktonic foraminifera of the Shiranish Formation in the EB-104 well of the East Baghdad Field

Age	E. Maastrichtian	M. Maastrichtian						
Formation	Shiranish							
zonation	<i>Globotruncana aegyptiaca</i>	<i>Gansserina gansseri</i>						
species \ depth		1650	1640	1630	1620	1610	1590	1580
<i>Globotruncana aegyptiaca</i>	-----							
<i>Globotruncana arca</i>	-----							
<i>Globotruncana bulloides</i>	-----							
<i>Globotruncana lapparenti</i>	-----							
<i>Globotruncana linneiana</i>	-----							
<i>Globotruncana rosetta</i>	-----							
<i>Gansserina gansseri</i>	-----							
<i>Contusatruncana fornicata</i>	-----							
<i>Globotruncanita stuartiformis</i>	-----							
<i>Globotruncanita stuarti</i>	-----							
<i>Globotruncanita elevate</i>	-----							
<i>Globotruncanita conica</i>	-----							
<i>Globotruncanella havanensis</i>	-----							
<i>Globotruncanella petaloidea</i>	-----							
<i>Globotruncanella citae</i>	-----							
<i>Heterohelix striata</i>	-----							
<i>Heterohelix glabrans</i>	-----							
<i>Heterohelix globulosa</i>	-----							
<i>Pseudotextularia elegans</i>	-----							
<i>Pseudotextularia plummerae</i>	-----							
<i>Pseudoguembelina costulata</i>	-----							
<i>Pseudoguembelina excolata</i>	-----							
<i>Pseudoguembelina palpebra</i>	-----							

Conclusions

- Depending on the results obtained from the current study, several points were identified.
- Identification of twenty-three planktonic foraminifera species belonging to eight genera (*Globotruncana*, *Gansserina*, *Globotruncanita*, *Globotruncanella*, *Contusotruncana*, *Heterohelix*, *Pseudotextularia*, *Pseudogumbelina*) belonging to families (*Globotruncanidae* and *Heteroheliceidae*).
 - the age of the Shiranish Formation in the wells studied extends from the upper part of the Late Campanian - Middle Maastrichtian.
 - The study also revealed the presence of several biozones belonging to the planktonic Foraminifera within the Shiranish Formation, namely:

Gansserina gansseri total rang Zone

Globotruncana aegyptiaca Interval zone

Globotruncanita stuartiformis Interval Zone

Conflict of interests.

There are non-conflicts of interest.

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