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REVIEW ARTICLE

A REVIEW, TWO EVOLUTIONARY LINEAGES AND THREE NEW TETHYAN FORAMINIFERAL SPECIES

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ABSTRACT

This study has focused on the systematic paleontology are presented with more emphasis on their modern nomenclatural aspects of 30 benthic and planktic foraminiferal species belonging to 16 genera, were identified from four countries in the southwestern part of Asia (Palestine, Jordan, Iraq and Iran). 15 species of them (~50%) are recorded from the Ypresian-Lutetian of Iran, 10 species (~33%) from the Campanian-Maastrichtian of Iraq, 3 species (~10%) from the Danian-Lutetian of Jordan, only 2 species (~7%) from Maastrichtian of Palestine. Eighteen species of them are belonging to the Suborder Textulariina, 5 to Lagenina, 3 species to Rotaliina, and 4 to Globigerinina. Three species of them are believed here as new: *Pseudoclavulina iraqensis, Ramulina irregularis* and *Ramulina radiata.* Two benthic foraminiferal lineages are presented: *Verneuilina* lineage (*Verneuilina iraqensis> V. jordanica> V. luxorensis* lineage), which explained also the evolutionary phenomena "Proterogenesis", and *Pseudoclavulina* lineage (*Pseudoclavulina. iraqensis > P. futyani > P. iranica* lineage).

KEYWORDS

Paleontology, Foraminifera, Campanian, Paleogene, Lineages, Middle East, Southern Tethys

1. INTRODUCTION

Thirty diagnostic species of benthic and planktic foraminiferal species were recorded and described from four localities in the southwest Asia in the Southern Tethys: Palestine, Jordan, Iraq and Iran (Figure 1). Fifteen species of the assemblage were recorded from Iran, ten from Iraq, three from Jordan and two from Palestine.

Figure 1: Location map of the study area, southwest Asia (P=Palestine, Jo=Jordan), as well as Iraq and Iran.

2. MATERIAL OF STUDY

Well preserved thirteen benthic (agglutinated and calcareous walls) and planktic foraminiferal species ranged from Campanian-Lutetian time are described its morphological features from four countries of the southwest Asia in the Southern Tethys. The main objective of this study is to propose to emphasis on their modern nomenclatural aspects, following the Code of Zoological Nomenclature. Three benthic species of the assemblage are treated here as new.

3. TAXONOMY

The morphology and evolutionary patterns of the species depend mainly on the concept of taxonomy and stratigraphy. The relatively rapid or slow observable morphological changes in the foraminiferal tests, number, size, shape and arrangement of the chambers, ornamentation, position of aperture, periphery throughout the Campanian-Lutetian species over a time of some 43 m. y. (~83-40 Ma) from the ancestors to the descendants, offer an opportunity to observe many evolutionary changes in two trends in this study. The taxonomy followed here is that of (Loeblich and Tappan, 1988). With modern taxonomic consideration, thirty species of the assemblage are presented and illustrated in Plate 1.

Plate 1 (scale bar= 100 µm)

Fig. 1. *Haplophragmoides iranica* Anan, 2022a; **2.** *Gaudryina acuta* Anan, 2023a, 2023a; **3.** *Gaudryina jaffi* Anan, 2023a; **4.** *Gaudryina lawai* Anan, 2023a; **5.** *Pseudogaudryinella iraqensis* Anan, 2022a; **6.** *Pseudogaudryinella iranensis* Anan, 2022a; **7.** *Verneuilina iraqensis* Anan, 2023a; **8.** *Verneuilina jordanica* Anan, 2022c; **9**. *Tritaxia longa* Anan, 2023; **10.** *Arenobulimina beitjebrinensis* Anan, 2022a; **11.** *Arenobulimina jerusalemensis* Anan, 2022a; **12.** *Dorothia iranica* Anan, 2022a; **13.** *Textularia salahii* Anan, 2022a; **14.** *Clavulinoides iranica* Anan, 2022a; **15.** *Pseudoclavulina farisi* Anan, 2023a; **16.** *Pseudoclavulina futyani* Anan, 2021; **17.** *Pseudoclavulina iranica* Anan, 2022b; **18.** *Pseudoclavulina iraqensis* Anan, n. sp.; **19.** *Neoflabellina iraqensis* Anan, 2024a; **20.** *Ramulina irregularis* Anan, n. sp.; **21.** *Ramulina plummerae* Anan, 2022d; **22.** *Ramulina radiata* Anan, n. sp.; **23.** *Ramulina salahii* Anan, 2022d; **24.**

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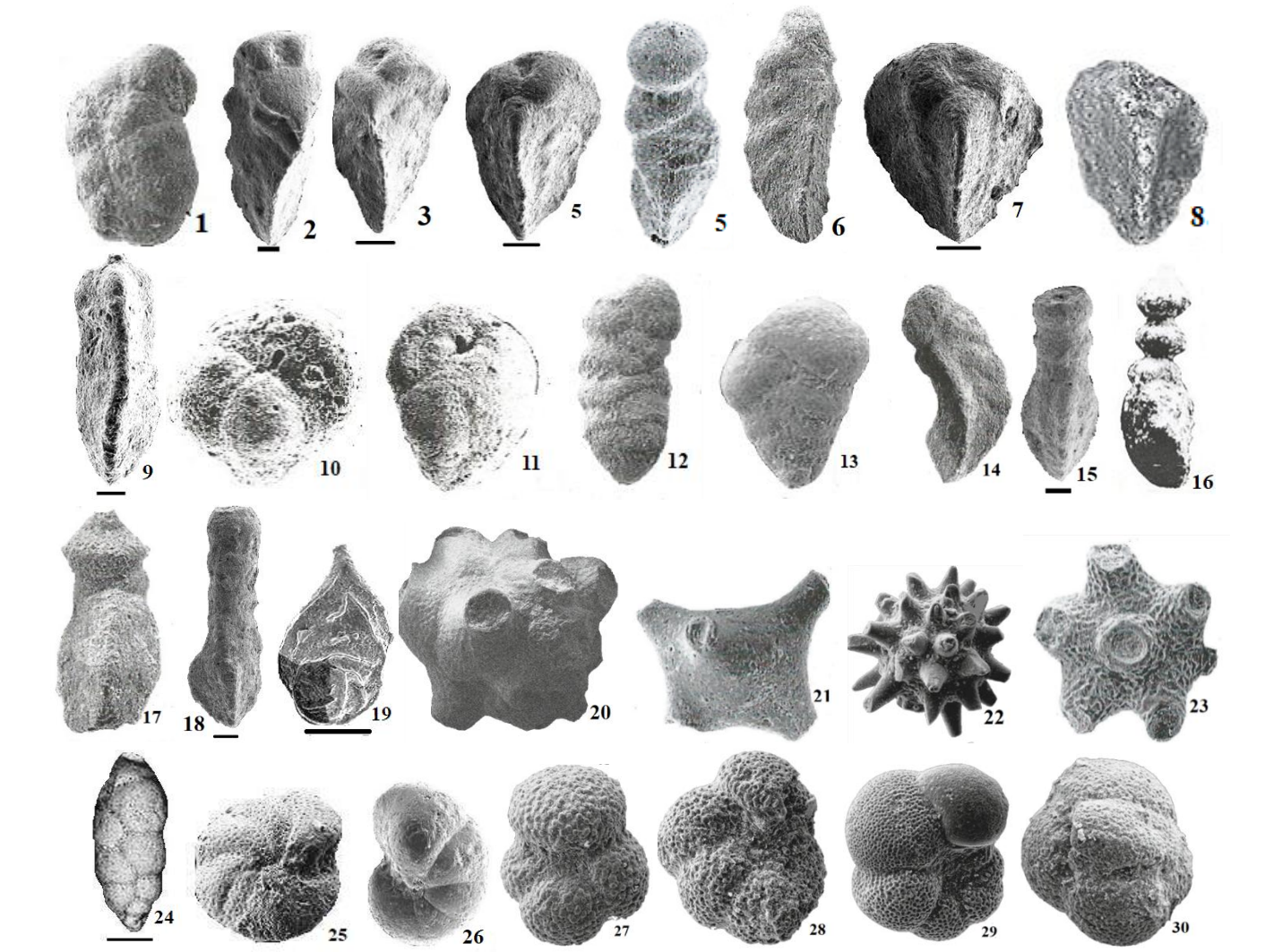
Uvigerinella jordanica Anan, 2024b; **25.** *Valvulineria iranica* Anan, 2023c; **26.** *Valvulineria iraqensis* Anan, 2023c, **27.** *Acarinina bullbrooki* (Bolli, 1957), **28.** *Acarinina collactea* (Finlay, 1939); **29.** *Acarinina praecursoria* (Morozova, 1957); **30.** *Catapsydrax africanus* Blow and Banner (1962).



Order Foraminiferida Eichwald, 1830

I. Suborder Textulariina Delage and Hérouard, 1896

(1) *Haplophragmoides iranica* Anan, 2022a, p. 24, pl. 1, fig. 18 (= *Haplophragmoides* sp., Salahi, 2021, p. 316, pl. 5, fig. 13). Lutetian. Iran.

Remarks: This species differs from *H. desertorum* LeRoy (1953) in its three coiled whorls than one, tight than wide umbilicus, and higher diameter test.

(2) *Gaudryina acuta* Anan, 2023a, p. 38, pl. 1, fig. 3(=*Gaudryina austinana* Cushman - Jaff and Lawa, 2019, p. 14, pl. 2, fig. 4 (*non* fig. 3). Campanian. Iraq.

Remarks: The new species *Gaudryina acuta* resembles the Paleocene *G. limbata,* but differs by its lesser length and width, more truncated test, more deeply sutures, smaller last biserial chamber, and semicircular larger opening aperture, and older stratigraphic level.

(3) *Gaudryina jaffi* Anan, 2023a, p. 38, pl. 1, fig. 5 (=*Gaudryina pyramidata* Cushman - Jaff and Lawa, 2019, p. 14, plate. 2, fig. 6 (*non* figs. 5, 7). Campanian. Iraq.

Remarks: The new species *G. jaffi* resembles the Early Eocene *G. ameeri* Anan (2012), but differs from it by its more elongated test, more elongated aperture in the apertural face, lesser front carinate rib, and older stratigraphic level.

(4) *Gaudryina lawai* Anan, 2023a, p. 39, pl. 1, fig. 7 (=*Gaudryina pyramidata* Cushman - Jaff and Lawa, 2019, p. 14, pl. 2, fig. 7 (*non* fig. 5). Campanian. Iraq.

Remarks: The new species *Gaudryina lawai* resembles the Early Eocene *G. speijeri* Anan (2012), but differs from it by the position of the carinate rib which extends only on the chambers of the triserial stage, than on both triserial and biserial stages, the semi-circular aperture than circular aperture in the *G. speijeri*.

(5) *Pseudogaudryinella iraqensis* Anan, 2022a, p. 45, pl. 1, fig. 45 (=*Tritaxia whitei*) - Jaff and Lawa, 2019, p. 11, pl. 2, figs. 14, 15). Campanian. Iraq.

Remarks: This species belongs to the genus *Pseudogaudryinella* and differs from the genus *Tritaxia* in having a biserial stage between the triserial and uniserial ones, and differs from the genus *Gaudryina* in becoming uniserial in adult.

Remarks: This species is characterized by its fine-grained agglutinated test, pointed end base of the biserial stage.

(6) *Pseudogaudryinella iranensis* Anan, 2022a, p. 16, pl. 1, fig. 5 **(=***Gaudryina* sp. Salahi, 2021, p. 314, pl. 4, fig. 23, *non* fig. 28) Ypresian. Iran.

Remarks: This species differs from *P. iraqensis* by its longer and irregular triserial portion, and lesser size of the uniserial final chamber.

(7) *Verneuilina iraqensis* Anan, 2023a, p. 39, pl. 1, fig. 9 (=*Verneuilina muensteri* Reuss - Jaff and Lawa, 2019, p. 14, pl. 2, fig. 10 (*non* fig. 9). Campanian. Iraq.

Remarks: This new species resembles the Early Eocene species *V. luxorensis* Nakkady (1950), but differs by its larger test size, more acute periphery, and thicker front carinate rib.

(8) *Verneuilina jordanica* Anan, 2022c, p. 78, pl. 1, fig. 4 (=*Gaudryina pyramidata*; Alhejoj et al., 2020, p. 5, figure 2. 1). Thanetian-Ypresian. Jordan.

Remarks: *Verneuilina jordanica* differs from the holotype of the late Cretaceous *V. tricarinata* d'Orbigny in its lesser acute margins and more coarse-grained test.

Verneuilina lineage (*Verneuilina iraqensis*> *V. jordanica*> *V. luxorensis* lineage).

According to the morphological variations of the three tests of *Verneuilina* lineage through time, with triangular transverse section: sharply acute edges of the Campanian *Verneuilina iraqensis* as a juvenile stage, followed by the more rounded periphery of the Thanetian-Ypresian *V. jordanica*, to the sharply acute edges of the Ypresian *V. luxorensis* as an adult stage. This also explained the evolutionary phenomena called "Proterogenesis". This theory explains the demonstration of the existing evolutionary relationships through the revision to ancestral features in adult stages, which can be applying on the three species of the *Verneuilina* lineage.

(9) ***Tritaxia longa*** **Anan, 2023,** p. 39, pl. 1, fig. 11. (=*Clavulinoides trilaterus* (Cushman) - Jaff and Lawa, 2019, p. 12, pl. 1, fig. 10.). Campanian. Iraq.

Remarks: This species resembles the Early Eocene species *Tritaxia elongata* (Haque, 1956), but differs from it in its more elongate test less parallel test sides, thicker front carinate edge, and older stratigraphic level.

(10) ***Arenobulimina beitjebrinensis*** **Anan, 2022a,** p. 25, pl. 1, fig. 58 (=*Arenobulimina* sp. A. Almogi-Labin et al., 1990, p. 578, pl. 2, fig. 5). Maastrichtian. Palestine.

Remarks: This species differs from usually four making up at last whorl, tapering initial part, distinct loop-shaped aperture, older stratigraphic level.

(11) ***Arenobulimina jerusalemensis*** **Anan, 2022a,** p. 26, pl. 1, fig. 59 (=*Arenobulimina* sp. B. Almogi-Labin et al., 1990, p. 578, pl. 2, fig. 4). Maastrichtian. Palestine.

Remarks: It differs from *A. beitjebrinensis* in its shorter length test, and younger stratigraphic level.

(12) ***Dorothia iranica*** **Anan, 2022a,** p. 26, pl. 1, fig. 61 (=*Tritaxilina* sp., Salahi, 2021, p. 316, pl. 5, fig. 7). Ypresian. Iran.

Remarks: This species differs from *Dorothia bulletta* (Carsey) by its more elongated test, more depressed sutures and more large numbers of the inflated biserial chambers.

(13) ***Textularia salahii*** **Anan, 2022a,** p. 28, pl. 1, fig. 96 (=*Textularia* sp. Salahi, 2021, p. 316, pl. 5, figs. 9, 10). Lutetian. Iran.

Remarks: It differs from the other species of *Textularia* by smaller size and three additional biserial chambers.

(14) ***Clavulinoides iranica*** **Anan, 2022a,** p. 26, pl. 1, fig. 68 (=*Heterostomella austinana* - Salah, 2021, p. 314, pl. 4, fig. 25). Lutetian. Iran.

Remarks: The genus *Clavulinoides* has triserially early chambers arranged and later abruptly becoming uniserial, while the genus *Heterostomella* has triserial early stage followed by biserial chamber arranged. The species *C. iranica* has curved triangle test in cross section and discoidal last chamber.

(15) ***Pseudoclavulina farisi*** **Anan, 2023a,** p. 37, pl. 1, fig. 1 (=*Clavulinoides asper* (Cushman) - Jaff and Lawa, 2019, p. 12, pl. 1, figs. 8, 9). Campanian. Iraq.

Remarks: The Campanian *P. farisi* Anan resemble the Paleocene *P. hewaidyi* Anan, but differs from it by its longer triserial early stage, limbate sutures in the uniserial stage. It also differs from the Paleocene *P. futyani* by discoidal uniserial chambers and lesser depressed sutures.

(16) ***Pseudoclavulina futyani*** **Anan, 2021**, p. 87, pl. 1, fig. 16 (=*Clavulina barnardi* Futyan, 1976, p. 522, pl. 81, fig. 4 (*non* fig. 3). Danian. Jordan.

Remarks: The Jordanian *P. futyani* n. sp. differs from *P. barnardi* (Futyan) in its larger triserial portion of *futyani* to be one-half of the entire test instead of one-fifth in *barnardi*, and three uniserial chambers in the former instead of five to eight chambers in the latter.

(17) ***Pseudoclavulina iranica*** **Anan, 2022b,** p. 16, pl. 1, fig. 6 (=*Gaudryina* sp. Salahi, 2021, p. 314, pl. 4, fig. 28, *non* figs. 14, 23). Eocene. Iran.

Remarks: This Iranian *P. iranica* differs from the Jordanian *P. futyani* Anan in its larger tri-serial part and lesser numbers of the uniserial part.

(18) ***Pseudoclavulina iraqensis*** **Anan, n. sp.** (=*Tritaxia eggeri* - Jaff and Lawa, 2019, p. 14, pl. 2, figs. 11-13). Campanian. Iraq.

Etymology**:** after the Republic of Iraq (Figure 2).

Diagnosis: This Campanian species has a large triserial initial part and comprise about ½-⅓ of the fine-grained agglutinated test, followed by two-five parallel discoidal-shaped chambers uniserial portion, rounded periphery, rounded terminal aperture without neck, sutures depressed.

Remarks: The Iraqi species differs from the Iranian *P. iranica* species by smaller triserial portion, discoidal uniserial chambers than flask-shaped uniserial portion, and differs from the Jordanian species *P. futyani* Anan in its lesser depressed sutures, and more numbers of the uniserial part.

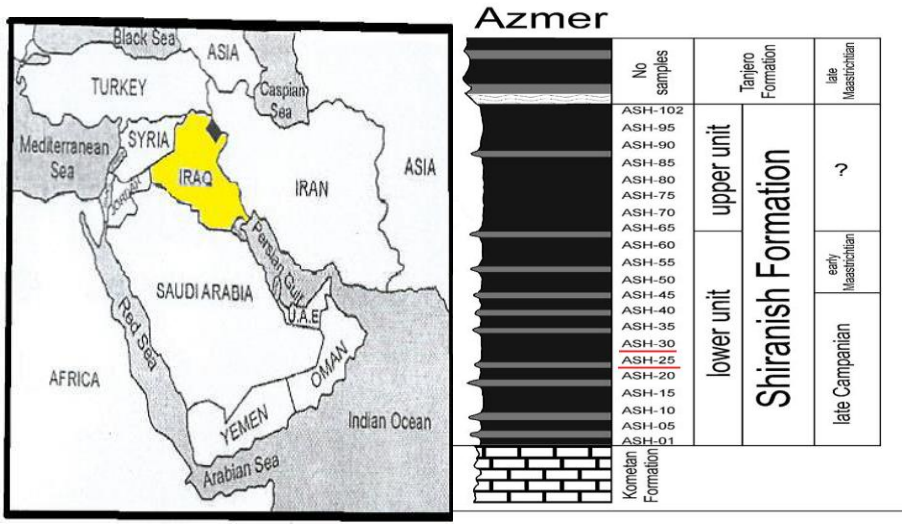


Figure 2: The stratigraphic section and location map of Azmer section, NE Iraq (Jaff and Lawa, 2019).

Pseudoclavulina **lineage** (*P. iraqensis* > *P. futyani* > *P. iranica* lineage)

According to the morphological variations of the three tests of *Pseudoclavulina* lineage (triserial to uniserial arrangement of the test) through time. The triserial portion in the three species of the lineage becomes larger in time, which comprise ⅓ > ½ > ¾ main size of the test. The numbers of the uniserial portion of them are reduced from 5 >3 > 2 gradually, and the shape of the uniserial chambers translated from discoidal to flask-shape. The periphery becomes more acut, the sutures become more depressed, and the apertures have a neck, gradually. The Campanian *P. iraqensis* considered here the ancestor of the two subsequent Paleocene *P. futyani* and Eocene *P. iranica* lineage.

II. Suborder Lagenina Delage and Hérouard, 1896

(19) ***Neoflabellina iraqensis*** **Anan, 2024a,** p. 55, pl. 1, fig. 71a (=*Neoflabellina* sp., Jaff, 2021, p. 8, fig. 4D). Campanian, Iraq.

Remarks: This species differs from *N. numismalis* (Wedekind) by its less number and height uniserial portion, less regular rounded periphery, and break up sutures into nodes.

(20) ***Ramulina irregularis*** **Anan, n. sp.** (=Diamond ascidian spicule-Salahi, 2021, p. 316, pl. 5, fig. 22). Lutetian. Iran

Etymology: after the irregular arms of the chamber.

Stratigraphic level: Lutetian of the study section Khangiran Formation (Kh), Kopet-Dagh Basin, NE Iran (Figure 3).

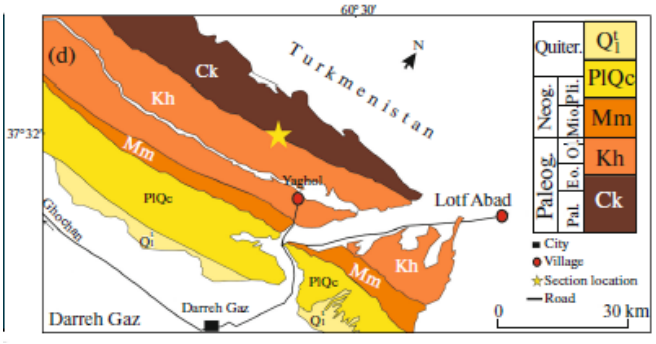


Figure 3: Location of the studied section in the geological map of Dareh Gaz in Razavi Khorasan Province, Iran (after Salahi, 2021).

(21) ***Ramulina plummerae*** **Anan, 2022d,** p. 5, fig. 3.3c. (=Diamond ascidian spicule - Salahi, 2021, p. 316, pl. 5, fig. 21). Maastrichtian-Lutetian. USA, Egypt, Iran.

Remarks: This species has a globular chamber, somewhat hispid, and bears four branch stoloniferous tubes around the

Periphery and also another two central arms of the chamber.

(22) ***Ramulina radiata*** **Anan, n. sp.** (=Diamond ascidian spicule - Salahi, 2021, p. 316, pl. 5, fig. 24). Lutetian. Iran.

Etymology: after the multiradiate arms of the chamber (=Diamond ascidian spicule-Salahi, 2021, p. 316, pl. 5, fig. 24).

Stratigraphic level: Lutetian (Fig. 3).

Diagnosis: This species has globular chambers with multi elongate radiate arms of the chamber.

Remarks: This species differs from all members of the genus *Ramulina* by multiradiate elongated arms.

(23) ***Ramulina salahii*** **Anan, 2022d,** p. 5, fig. 3.5 (=Diamond ascidian spicule, p. 316, fig. 5.23 (*non* figs. 21, 22, 14). Lutetian. Iran.

Remarks: This species differs from *Ramulina ornata* in its eight rounded tubular isolated arms, and reticulate ornamented surface, and younger stratigraphic level.

III. Suborder Rotaliina Delage and Hérouard, 1896

(24) ***Uvigerinella jordanica*** **Anan, 2024b,** p. 111, pl. 1, fig. 31 (=*Stainforthia* cf. *farafraensis* - Alhejoj et al., 2020, p. 3, fig. 2 E). Lutetian, Jordan.

Remarks: This species *Uvigerinella jordanica* differs from the main characters of the genus *Stainforthia* in having regular increasing in height as added chambers, with slightly depressed sutures, and without initial long spine of the Egyptian Ypresian *Uvigerinella nakkadyi* (Anan 1994).

(25) ***Valvulineria iranica*** **Anan, 2023c,** p. 70, pl. 1, fig. 5 (=*Cibicidoides* sp. Salahi, 2021, p. 319, pl. 6, fig. 15a, b). Ypresian. Iran.

Remarks: *Valvulineria iranica* differs from other members of the genus by its tighter coiling, more convex dorsally than ventrally, and smaller-size umbilical region. This species may be evolved from the Egyptian *V. critchetti* (LeRoy, 1953) due its tight coil of the two species, nearly the same number chambers in the last whorl, but differs from its biconvex test from the former than planoconvex test of the latter.

(26) ***Valvulineria iraqensis*** **Anan, 2023c,** p. 71, pl. 1, fig. 6 (=*Gyroidinoides globosus* (Hagenow) – Jaff and Lawa, 2019). p. 16, pl. 2, figure. 17, 18). Campanian, Iraq.

Remarks: *Valvulineria iraqensis* may evolve from the Pakistanian *V. hillsi* due to its morphological relationships between them, but the former differs from the latter in its greater number of chambers in the last whorl, smaller final chamber. It was recorded, so far, in Kurdistan of Iraq.

IV. Suborder Globigerinina Delage and Hérouard, 1896

(27) ***Acarinina bullbrooki*** **(Bolli)** (=*Acarinina collactea* – Salahi, 2021, p. 306, pl. 1, fig. 9, *non* fig. 8).

Remarks: This species has quadrate, low-trochospiral; 4 inflated, moderately embracing, hemispherical chambers in last whorl and narrow umbilicus, not 5 subangular equal sized chambers and deep aperture in *A. collactea.*

(28) ***Acarinina collactea*** **(Finlay)** (=*Acarinina aspensis* – Salahi, 2021, p. 306, pl. 1, fig. 6, *non* fig. 5).

Remarks: This species has 5 subangular equal sized chambers and deep aperture, not to *Acarinina aspensis* with low trochospiral test with 6-8 subglobular chambers and wide-open deep umbilicus.

(29) ***Acarinina praecursoria*** **(Morozova)** (=*Pseudohasigerina micra* - Salahi, 2021, p. 310, pl. 3, fig. 4, *non* figs.3, 5,6).

Remarks: This species belongs to the genus *Acarinina* due to its quadrate trochospiral test with an interiomarginal, extraumbilical arch aperture, not to genus *Pseudohastigerina* with planispirally coiled test with an equatorial aperture.

(30) ***Catapsydrax africanus*** **Blow and Banner** (=*Subbotina corpulenta* – Salahi, 2021, p. 308, pl. 3, fig. 10). Lutetian Iran.

Remarks: This species belongs to the genus *Catapsydrax* with an umbilical bulla with one infralaminal apertures in the adult stage. It is characterized by low trochospiral test with 4 inflated globular chambers in the final whorl increasing gradually in size as added with a large inflated bulla covering the umbilicus.

4. PALEOGEOGRAPHY

The Paleogene paleogeographic maps of many authors (i.e., Salahi, 2021) show that the Tethyan realm had been connected with the Indo-Pacific Ocean from east to Atlantic Ocean to the west (Figure 4). The distribution of the Campanian-Lutetian benthic foraminiferal species in the Middle East of the Southern Tethys: 1. Palestine, 2. Jordan, 3. Iraq, 4. Iran is shown in Table 1. The comparative fauna of the Campanian-Lutetian benthic foraminiferal species in the Middle East of the Southern Tethys: 1. Palestine, 2. Jordan, 3. Iraq, 4. Iran is shown in Table 2.

Figure 4: Paleogene paleogeography of the Tethys Ocean (Salahi, 2021)

Table 1: The distribution of the Campanian-Lutetian benthic foraminiferal species in the Middle East of the Southern Tethys: 1. Palestine, 2. Jordan, 3. Iraq, 4. Iran.

Sp. No.	Benthic foraminiferal species of Anan	Campanian	Maastrichtian	Paleocene	Ypresian	Lutetian	1	2	3	4
1	*Haplophragmoides iranica*					x				x
2	*Gaudryina acuta*	x							x	
3	*Gaudryina jaffi*	x							x	
4	*Gaudryina lawai*	x							x	
5	*Pseudogaudryinella iraqensis*	x							x	
6	*Pseudogaudryinella iranensis*				x					x
7	*Verneuilina iraqensis*	x							x	
8	*Verneuilina jordanica*			x	x			x		
9	*Tritaxia longa*	x							x	
10	*Arenobulimina beitjebrinensis*		x				x			
11	*Arenobulimina jerusalemensis*		x				x			
12	*Dorothia iranica*				x					x
13	*Textularia salahii*					x				x
14	*Clavulinoides iranica*					x				x
15	*Pseudoclavulina farisi*	x							x	
16	*Pseudoclavulina futyani*			x				x		
17	*Pseudoclavulina iranica*				x					x
18	*Pseudoclavulina iraqensis*	x							x	
19	*Neoflabellina iraqensis*	x							x	
20	*Ramulina irregularis*					x				x
21	*Ramulina plummerae*		x	x	x	x				x
22	*Ramulina radiata*					x				x
23	*Ramulina salahii*					x				x
24	*Uvigerinella jordanica*					x		x		
25	*Valvulineria iranica*				x					x
26	*Valvulineria iraqensis*	x							x	

Table 2: The comparative fauna of the Campanian-Lutetian benthic foraminiferal species in the Middle East of the Southern Tethys: **1**. Palestine, **2**. Jordan, **3**. Iraq, **4.** Iran.

Palestine Maastrichtian benthic foraminifera of Anan		Jordan Danian-Lutetian benthic foraminifera of Anan		Iraq Campanian benthic foraminifera of Anan		Iran Ypresian-Lutetian benthic foraminifera of Anan	
1	*Arenobulimina beitjebrinensis*	1	*Verneuilina jordanica*	1	*Gaudryina acuta*	1	*Haplophragmoides iranica*
2	*Arenobulimina jerusalemensis*	2	*Pseudoclavulina futyani*	2	*Gaudryina jaffi*	2	*Pseudogaudryinella iranensis*
3		3	*Uvigerinella jordanica*	3	*Gaudryina lawai*	3	*Dorothia iranica*
4				4	*Pseudogaudryinella iraqensis*	4	*Textularia salahii*
5				5	*Verneuilina iraqensis*	5	*Clavulinoides iranica*
6				6	*Tritaxia longa*	6	*Pseudoclavulina iranica*

Table 2 (cont): The comparative fauna of the Campanian-Lutetian benthic foraminiferal species in the Middle East of the Southern Tethys: **1**. Palestine, **2**. Jordan, **3**. Iraq, **4.** Iran.							
7				7	*Pseudoclavulina farisi*	7	*Ramulina irregularis*
8				8	*Pseudoclavulina iraqensis*	8	*Ramulina plummerae*
9				9	*Neoflabellina iraqensis*	9	*Ramulina radiata*
10				10	*Valvulineria iraqensis*	10	*Ramulina salahii*
11				11		11	*Valvulineria iranica*

5. Environments and Ecology

The faunal benthic and planktic foraminiferal assemblage of the study area is not completely recorded and distributed in the most different localities, which controlled by a combination of food availability and oxygenation, temperature, salinity, the amount of organic flux to the sea floor mainly governs the occurrence of benthic species in the sediments, and to the different water depths (the paleorelief highs and lows of the Syrian Arc System at the end of Maastrichtian), and other environmental parameters in all parts in the Southern Tethys, as well misidentification of some species by different authors.

Due to their small size and abundance, they are the most widely used fossil organisms for environmental interpretation, as organisms whose living members provide ecological data and as composition of the wall shells that are an indicator of temperatures and other geographic features. Additional remarks can be presented:

1. The studied area represents a classical example of a mixed silicate-carbonate ramp system.
2. Agglutinated foraminifera tend to increase in cooler environment, which means that increase in shallow-water environments and also in deeper environment.
3. The favor construction of calcareous material for the Lagenid and Rotaliid tests that thriving in moderate and warm environment.
4. The existing of planktic foraminiferal assemblage indicates an open connection of the study area which supports the open flow of the surface current in all directions (Figure 5).

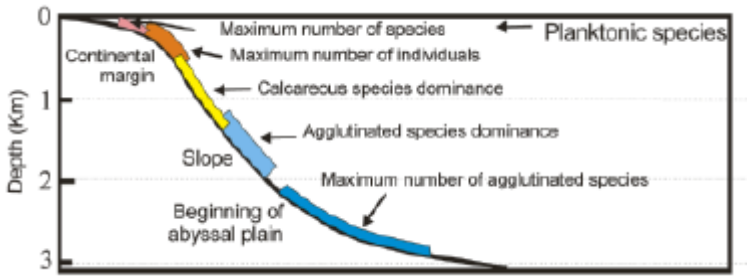


Figure 5: Depth distribution of planktic and benthic foraminifera.

6. Conclusions

The analysis of the Campanian-Lutetian benthic and planktic foraminiferal species in the southwest western Asia, Southern Tethys led to the following conclusions:

1. The redescription of the morphological features for thirty benthic and planktic foraminiferal specie from four countries in the southwest Asia, Southern Tethys, are treated, explained and illustrated.
2. Most of the studied species (~50%) are recorded from Iran, followed by Iraq (~33%), and the others from Jordan and Palestine.
3. Two phylogenetic lineages are observed in some agglutinated benthic foraminiferal species throughout Campanian to Lutetian in the study area: *Verneuilina* lineage (*Verneuilina iraqensis*> *V. jordanica*> *V. luxorensis* lineage), and *Pseudoclavulina* lineage (*Pseudoclavulina. iraqensis* > *P. futyani* > *P. iranica* lineage). These lineages help, not only to define the major faunal changes throughout the time boundaries, but also to emphasize the stratigraphic importance of them in different localities in the Tethys.
4. The *Verneuilina* lineage explained also the evolutionary phenomena "Proterogenesis".
5. Eighteen species of them are belonging to the Suborder Textulariina (~60%), 5 to Lagenina (17%), 4 to Globigerinina (13%), and 3 species to Rotaliina (10%).

Three out of the identified species from the recoded assemblage are treated here to be new: *Pseudoclavulina iraqensis* (from Iraq), *Ramulina irregularis* and *Ramulina radiata* (from Iran).

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