

BIOSTRATIGRAPHY OF THE UPPER CRETACEOUS-LOWER TERTIARY ROCKS OF SOUTH JORDAN BASED ON PLANKTONIC FORAMINIFERA

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ABSTRACT

This paper deals with the Biostratigraphy of the Upper Cretaceous - Lower Tertiary rocks of Um Rijam area, South Jordan. The study is based on 82 identified planktonic foraminiferal species. Ten foraminiferal biozones are established and correlated with equivalent biozones from other parts of the world.

INTRODUCTION

Planktonic foraminiferal zonation of the Upper Cretaceous-Lower Tertiary rocks has been worked out by different authors in Jordan, (e.g. Henson 1938; Wetzel & Morton, 1958; Karam, 1967, 1970 & 1973 and Koch, 1968).

Two stratigraphic sections (Figures 2 and 3) were measured in the Um Rijam area, south Jordan (Location map, fig. 1). One hundred and twenty one sample were collected from these two sections to cover the Middle Maestrichtian to Lower Lutetian succession.

The biostratigraphy of this part of the stratigraphic column has been carefully studied by many paleontologists in the world (e.g. Bolli, 1957a, b, c, 1959, 1956, Loeblich & Tappan 1957; Bolli & Cita, 1960; Pessagno, 1960, 1962 & 1967; Bergren, 1960, 1962; Krasheninnikov & Ponikarov, 1964; Luterbacher, 1964; Said & Sabry, 1964; El Naggat, 1966; Ejel, 1967; Youssef & Abdelmalik, 1969 and Youssef & Abdel Aziz, 1971).

PLANKTONIC FORAMINIFERAL ZONATION

Ten planktonic foraminiferal zones were recognized from the Upper Cretaceous - Lower Tertiary succession cropping out in the Umm Rijam area. These zones are based on the stratigraphic distribution of 82 planktonic foraminiferal species which were separated from this part of the geologic column .

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Biostratigraphy of the Upper Cretaceous-Lower Tertiary Rocks of South Jordan

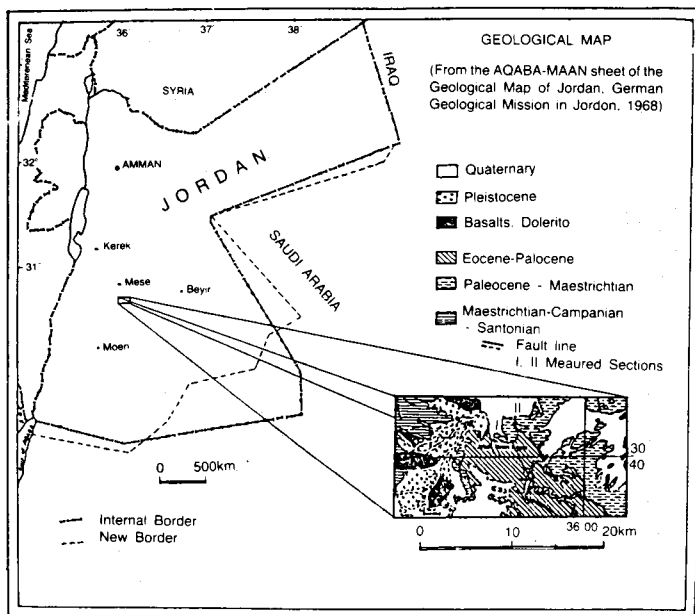


Fig. 1 Location Map

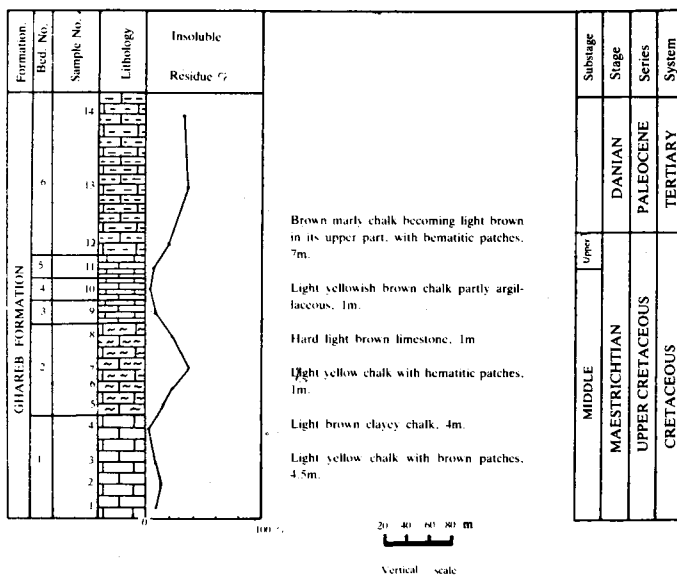
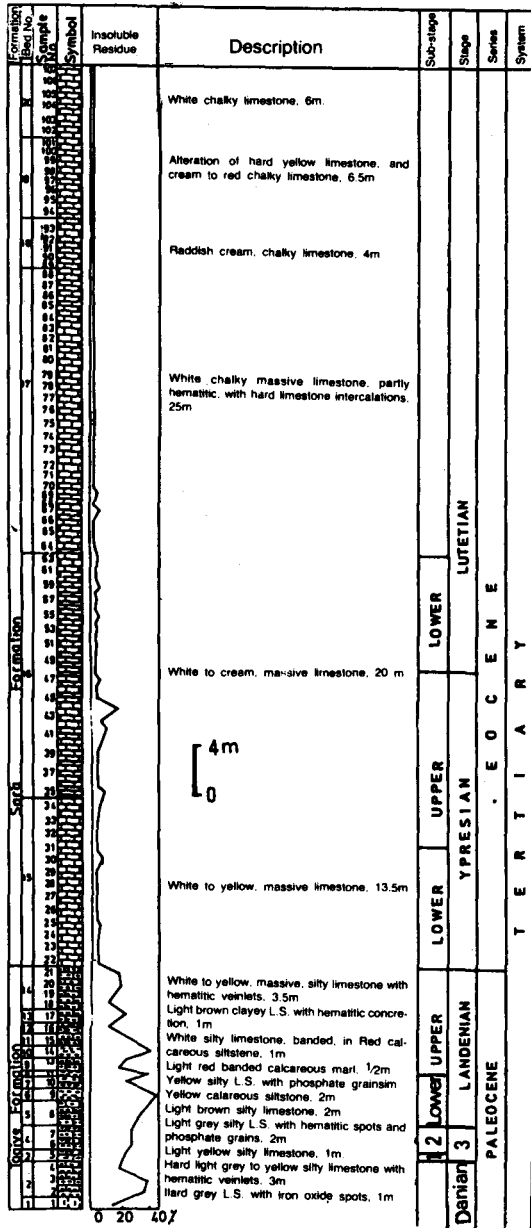


Figure 2 Columnar Section of the Upper Cretaceous Lower Tertiary rocks of the Um Rijam II



1 Lower 2 Upper
3 Heersian

Figure 3 Columnar Section of the Lower Tertiary rocks of the Um Rijam I

One zone is restricted to each of the Middle and the Upper Maestrichtian, the Lower Paleocene and the Middle Eocene. Each of the Middle Paleocene, the Upper Paleocene and the Lower Eocene includes two biozones. The names of these zones are here amended to conform with the last suggestions of the International sub-commission for Stratigraphic Nomenclature (1972). These are from top to base:

- 10 - *Globigerapsis kugleri* range-zone.
- 9 - *Globorotalia aragonensis* range-zone.
- 8 - *Globorotalia rex/Globorotalia aragonensis* Interval-zone.
- 7 - *Globorotalia pseudomenardii/Globorotalia velascoensis* Interval-zone.
- 6 - *Globorotalia pseudomenardii* range-zone.
- 5 - *Globorotalia pusilla pusilla/Globorotalia pseudomenardii* Interval-zone.
- 4 - *Globorotalia uncinata uncinata/Globorotalia pusilla pusilla* Interval-zone.
- 3 - *Globogerina daubjergensis* range-zone.
- 2 - *Rugoglobigerina hantkeninoides* range-zone.
- 1 - *Globorotalia gansseri/Rugoglobigerina hantkeninoides* Interval-zone.
- 1 - *Globorotalia gansseri/Rugoglobigerina hantkeninoides* Interval-zone.

This zone was first established by Bolli (1957a) and is applied here as the interval marked by the first appearance of *Globotruncana gansseri* and *Rugoglobigerina hantkeninoides*.

This zone is characterized by the presence of the following species, in addition to *Globotruncana gansseri*: *Globotruncana aegyptiaca* Nakkady, *G. aegyptiaca duwi* Nakkady, *G. arca* (Cushman), *G. conica* White, *G. convexa* Sandidge, *G. gagnebini* Teliv., *G. gansseri subgansseri* Gandolfi, *G. leupoldi* Bolli, *G. orientalis* El-Naggar, *G. rosetta* Gapsey, *G. stuartiformis* Dalbiez, *G. stuarti stuarti* (De Lapparent), *G. stuarti subspinosus* Pessagno, *Rugoglobigerina pustulata* Bronnimann, *R. rugosa* (Plummer), *Heterohelix globulosa* (Ehrenberg), *H. navanoesis* Loeblich, *H. pulchra* Brotzen, *H. striata* (Ehrenberg), *Racemiguembelina fruncticosa* (Egger) and *Pseudotextularia elegans* Rzehak.

This zone characterizes the lower part of the Ghareb Formation, represented by samples 1-11, Um Rijam II, and points to a Middle Maestrichtian age.

2. *Rugoglobigerina hantkeninoides* range-zone:

This zone is newly established to cover the stratigraphic range of the zonal marker.

The *Rugoglobigerina hantkeninoides* range-zone is characterized, in addition to the zonal marker by the presence of *Rugoglobigerina scotti* (Bronnimann) together with the faunal assemblage of the underlying zone. This zone coincides with the Middle part of the Ghareb Formation, represented by sample 12, Umm Rijam II, and points to a Late Maestrichtian age.

3. *Globigerina daubjergensis* range-zone

This zone is applied to represent the life span of *Globigerina daubjergensis* Bronnimann. The following species are found in this zone with floods of *Globorotalia pseudobulloides*, *Globorotalia compressa* (Plummer), *G. imitata* Subbotina, *G. quadrata* (White), and *Globigerina triloculinoides* Plummer.

The *Globigerina daubjergensis* range-zone characterizes the upper part of the Ghareb Formation, represented by samples 13, 14, Um Rijam II. and the lowermost part of the Taqiya Formation represented by samples 1-4, Um Rijam I, and points to a Late Danian age.

4. *Globorotalia uncinata uncinata/Globorotalia pusilla pusilla* Interval-zone:

This zone was first recorded by Bolli (1975b) and is applied here to the interval marked by the first appearance of *Globorotalia uncinata uncinata* Bolli and the first appearance of *Globorotalia pusilla pusilla* Bolli.

The *Globorotalia uncinata uncinata/Globorotalia pusilla pusilla* Interval-zone is characterized in addition to the marker species by the occurrence of the following planktonic species:

Globorotalia loeblichii El-Naggar, *G. quadrata* (White) *G. uncinata carinata* El-Naggar, and *Globigerina triloculinoides* Plummer.

This zone characterizes the lower part of the Taqiya Formation which is represented by sample 5, Umm Rijam I, and is considered as Lower Heersian.

5. *Globorotalia pusilla pusilla/Globorotalia pseudomenardii* Interval-zone:

This zone was first recorded by Bolli (1957b) and is considered as the interval marked by the first appearance of *Globorotalia pusilla pusilla* to the first appearance of *Globorotalia pseudomenardii* Bolli.

It is characterized, in addition to the presence of *Globorotalia pusilla pusilla*, by the following species: *Globorotalia angulata angulata* (White), *G. angulata abundocamerata* Bolli, *G. apantesma* Loeblich & Tappan, *G. quadrata* (White) and *Globigerina triloculinoides* Plummer.

The *Globorotalia pusilla pusilla/Globorotalia pseudomenardii* Interval-zone characterizes the lower middle part of the Taqiye Formation, represented by samples 6-7, Um Rijam I, and is considered to be of Upper Heersian age.

6. *Globorotalia pseudomenardii* range-zone

This zone was first delineated by Bolli (1957b) and is applied here to coincide with the stratigraphic range of the marker species.

It is characterized by the presence of *Globorotalia pseudomenardii* Bolli together with *G. imitata* Subbotina, *G. perclara* Loeblich & Tappan, *G. pusilla pusilla* Bolli, *G. quadrata* (white), *G. velascoensis velascensis* (Cushman) and *Globigerina triloculinoides* Plummer.

The *Globorotalia pseudomenardii* range-zone characterizes the upper middle part of the Taqiya Formation, represented by samples 8-9, Um Rijam I, and is considered as Lower Landenian.

7. *Globorotalia pseudomenardii*/*Globorotalia velascoensis velascoensis* - Interval-zone:

This zone was first recorded by Bolli (1957 b) and is applied here as the interval marked by the disappearance of *Globorotalia pseudomenardii* to the last occurrence of *Globorotalia velascoensis velascoensis*. It is characterized by the flooding of *Globorotalia velascoensis velascoensis* together with *Globorotalia acuta* Toulmin, *G. aequa* Cushman & Renz, *G. angulata angulata* (White), *G. emilei* El-Naggar, *G. esnaensis* (Le Roy), *G. occlusa* Loeblich & Tappan, *G. velascoensis caucasica* Glaessner, *Globigerina velascoensis* Bolli, *G. linaperta* Finlay, *G. nodosa* El-Naggar, *G. soldadoensis soldadoensis* Bronnimann, *G. stonoi* El-Naggar and *G. triloculinoidea* Plummer.

This zone characterizes the upper part of the Taqiye Formation, represented by samples 10-21, Um Rijam I. and is considered of Upper Landenian age.

8. *Globorotalia rex*/*Globorotalia aragonensis* Interval-Zone:

This zone was first delineated by Bolli (1957b) and is applied here as the interval marked by the first appearance of *Globorotalia rex* and the first appearance of *Globorotalia aragonensis* Nuttall.

This zone is characterized by the presence of *Globorotalia rex* Martin together with *G. aequa* Cushman & Renz, *G. esnaensis* (Le Roy), *G. formosa formosa* Bolli, *G. formosa gracilis* Bolli, *G. wilcoxensis* Cushman & Ponton, *Globigerina linaperta* Finlay, *G. soldadoensis soldadoensis* Bronnimann.

The *Globorotalia rex*/*Globorotalia aragonensis* Interval-zone occupies the lower most part of the Sar'a Formation, represented by samples 22-31, Um Rijam I, and belongs to the lower Ypresian.

9. *Globorotalia aragonensis* range-zone:

This zone was first recorded by Bolli (1975b) and is applied here to coincide with the stratigraphic range of the zonal marker. This zone comprises the *Globorotalia formosa*, the *G. aragonensis* and the *G. palmerae* zone of Bolli (1957b).

The *Globorotalia aragonensis* range-zone is characterized, in addition to the zonal marker, by the following species: *Globorotalia aequa* Cushman & Renz, *G. colligera* (Schwager), *G. rex* Martin, *G. wilcoxensis* Cushman & Ponton, *G. formosa formosa* Bolli, *G. formosa gracilis* Bolli, *G. pentracamerata* (Subbotina), *G. pseudotopelensis* (Subbotina), *G. cf. convexa* Sandidge, *G. broedermannii* Cushman & Bermudez, *G. renzi* Bolli, *G. marginodentata* Subbotina, *G. interposita* (Subbotina), *G. interposita* (Subbotina), *G. triplex* (Subbotina), *Globorotalia soldadoensis soldadoensis* Bronnimann, *G. linaperta* Finlay, *G. varianta* Subbotina, *G. prolata* Bolli, *G. soldadoensis angulosa* Bolli, *G. pseudoencena* Subbotina.

This zone coincides with the lower part of the Sar'a Formation which is represented by samples 32-48, Um Rijam I, and points to a late Ypressian age.

10. *Globigerapsis kugleri* range-zone:

This zone was first recorded by Bolli (1957c) and is applied here to coincide with the stratigraphic range of the zonal marker. This zone comprises the *Hantkenina aragonensis* and *Globigerapsis kugleri* zones of Bolli (1957c), and the *Globorotalia bullbrooki*, and the *Globigerapsis kugleri* zones of Beckmann *et al* (1969) and of Postuma (1971). It is characterized by the presence of : *Globorotalia cf. convexa* Sundidge, *G. broedermanni* Cushman & Bermudez, *G. interposita* (Subbotina), *G. triplex* (Subbotina), *G. bolivariana* (Petters), *Globigerina pseudoeocaena* Subbotina, *Globigerapsis kugleri* Bolli, Loeblich & Tappan, *Truncorotaloides topilensis* (Cushman).

This zone characterizes the Lower Middle part of Sar'a Formation represented by samples 49-63 (?), Um Rijam I, and is considered to belong to the Lower Lutetian.

PLANKTONIC FORAMINIFERAL LIST

The taxonomic classification used here is that of Pokorny (1963) except for a few genera which are not included in that classification.

The genus *Hedbergella* Bronnimann & Brown, 1958 and *Globigerinelloides* Cushman & Ten Dam, 1948 are classified here among the family *Globigerinidae*. The genus *Truncorotaloides* Bronnimann & Bermudez, 1953 is included in the Family *Globorotalidae*. The genus *Racemiguembelina* Gallitelli, 1957: *Pseudoguembelina* Bronnimann & Brown, 1953; *Zeauvigerina* Family, 1939, are considered to belong to the family *Heterohelicidae*.

Order Foraminifera D'Orbigny, 1826
Superfamily Ratoliidea Glassner, 1945
Family Globigerinidea Carpenter, Parker & Stones, 1982
Genus *Globigerina* D'Orbigny, 1826

Globigerina daubjergensis Bronnimann, 1953
Pl. 1, figs. 2,3.

Globigerina daubjergensis Bronnimann, 1953, p. 340, text fig. 1.-Bolli 1957, p. 70, p.1 16, figs. 13-15. - El Naggar. 1966, p. 161, p., 161, 15, fig. 3. - Postuma, 1971, pp. 148-149.

Globigerinoides daubjergensis (Bronnimann). - Loeblich & Tappan, 1957, p. 184, pl. 40, figs. 1, 8; pl. 41, fig. 9; pl. 42; figs. 6, 7; pl. 43, fig. 1; pl. 44, figs. 7, 8.

Globigerina inaequispira Subbotina, 1953
pl. 1, fig. 4.

Globigerina inaequispira Subbotina, 1953, p. 69, pl. 6, figs. 1-3 (non fig. 4). - Loeblich & Tappan, 1957, p. 181, pl. 49, fig. 2; pl. 52, figs. 1-2; pl. 56, fig. 7; pl. 61, fig. 3; pl. 62, fig. 2, - (non) El-Naggar, 1966, p. 167, pl. 15, fig. 8.

Globigerina linaperta Finlay, 1939

pl. 1, fig. 7.

Globigerina linaperta Finlay, 1939, p. 125, pl. 13, figs. 54-57. - Bronnimann, 1952, pp. 16-17, pl. 2, figs. 7-9. Bolli, 1957, p. 70, pl. 15, figs. 15-17; p. 163, pl. 36, fig. 5.

Globigerina nodosa El-Naggar, 1966

Pl. 1, fig. 8

Globigerina nodosa El-Naggar, 1966, p. 173, pl. 15, fig. 6.

Globigerina prolata Bolli, 1957

Pl. 1, fig. 9.

Globigerina prolata Bolli, 1957, p. 72, pl. 15, figs. 24-26, p. 162, pl. 35, fig. 7.

Globigerina pseudoeocaena Subbotina, 1953

Pl. 1, fig. 10.

Globigerina pseudoeocaena Subbotina, 1953, p. 79, pl. 4, fig. 9, pl. 5, figs. 1-6.

Globigerina pseudoeocaena var. *pseudoeocaena* Subbotina, 1953, p. 81, pl. 4, fig. 9, pl. 5, figs. 1, 2, 6.

Globigerina soldadoensis angulosa Bolli, 1957

pl. 1, fig. 11.

Globigerina soldadoensis angulosa Bolli, 1957, p. 71, pl. 16, figs. 4-6; p. 162, pl. 35, fig. 8.

Globigerina soldadoensis soldadoensis Bronnimann, 1952

pl. 1, fig. 12

Globigerina soldadoensis soldadoensis Bronnimann, 1952, pp. 9-11, pl. 1, figs. 1-9. - Bolli, 1957, p. 71, pl. 16, figs. 7-12; p. 162, pl. 35, fig. 9. - El-Naggar, 1966, p. 174. - Postuma, 1971, pp. 158-159.

Globigerina stonei Weiss, 1955

pl. 2, fig. 1.

Globigerina stonei Weiss, 1955, p. 18, pl. 5, figs. 16-21. - El-Naggar, 1966, p. 176, pl. 16, fig. 1.

Globigerina trilocolinoides Plummer, 1926

pl. 2, figs. 2-4.

Globigerina trilocolinoides Plummer, 1926, p. 134, p. 8, fig. 18. - Bolli 1957, p. 70, pl. 15, figs. 18-20; pl. 17, figs. 25, 26. - Loeblich & Tappan, 1957, p. 183, pl. 40, fig. 4; pl. 41, fig. 2; pl. 42, fig. 2, pl. 43, fig. 5, 8, 9, pl. 45, fig. 3; pl. 46, fig. 1, pl. 47, fig. 2; pl. 52, figs. 3-7; pl. 56, fig. 8; pl. 62, figs. 3,4. - Nakkady, 1959, p. 461, Pl. 3, figs. 5. - El-Naggar, 1966, P. 178, pl. 15, fig. 77. - Postuma, 1971, pp. 160-161.

Globigerina pseudotriloba White, 1928, p. 194, pl. 27, fig. 17. - Said & Kenawy, 1956, p. 157, pl. 7, fig. 25.

Globigerina varianta Subbotina, 1953
pl. 2, fig. 5

Globigerina varianta Subbotina 1953, p. 63, pl. 3, figs. 5-12; pl. 4, figs. 1-3; pl. 15, figs. 1-3.

Globigerina velascoensis Cushman, 1925
pl. 2, fig. 6.

Globigerina velascoensis Cushman, 1925, p. 19, pl. 3, fig. 6. - Bolli 1957, p. 71, pl. 15, figs. 9-11.
- El-Naggar 1966, p. 183, pl. 16, fig. 3.

Genus *Rugoglobigerina* Bronnimann, 1952
Subgenus *Rugoglobigerina* (*Rugoglobigerina*) Bronnimann, 1952,
(Emended El-Naggar 1971a, b).

Rugoglobigerina (*Rugoglobigerina*) *hantkeninoides* Bronnimann, 1952
pl. 2, fig. 7.

Rugoglobigerina (*plummerella*) *hantkeninoides hantkeninoides* Bronnimann, 1952, p. 37.

Rugoglobigerina hantkeninoides Bronnimann. - Bolli, Loeblich & Tappan, 1957, p. 43, pl. 11, fig. 5.

R. (Rugoglobigerina) pustulata Bronnimann,
1952, pl. 2, fig. 8.

Rugoglobigerina reicheli pustulata Bronnimann, 1952, p. 20, pl. 2, figs. 6, 7. - Olsson, 1960, p. 50, pl. 10, figs. 13-15. Said & Kerdany, 1961, p. 330, pl. 2, fig. 8.

Rugoglobigerina pustulata Bronnimann. - Olsson, 1964, p. 172, pl. 6, fig. 11; pl. 7, fig. 1. - El-Naggar, 1966, p. 148-Ansary & Tewfik, 1966, p. 59, pl. 5, fig. 6.

Rugoglobigerina (Rugoglobigerina) pustulata Bronnimann. - El-Naggar, 1971, p. 489, pl. 7, figs. 1-9.

R. (Rugoglobigerina) rugosa rugosa (Plummer, 1926)
pl. 2, fig. 9.

Globigerina rugosa Plummer, 1926, p. 38, pl. 2, fig. 10.

Rugoglobigerina rugosa rugosa (Plummer). - Bronnimann, 1952 p. 28, text figs. 11-13. - Said & Sabry, 1964, p. 386, pl. 3, fig. 18. - Ansary & Tewfik, 1966, p. 58, pl. 5, fig. 1.

Rugoglobigerina rugosa (Plummer). - Bolli, Loeblich & Tappan 1957, P. 42, pl. 11, fig. 2. - El-Naggar, 1966, p. 149-Postuma, 1971, pp. 90-91.

Rugoglobigerina (Rugoglobigerina) rugosa (Plummer) . - El-Naggar, 1971, p. 492, pl. 1, figs. 1-11; pl. 2, figs. 1-12; pl. 3, figs. 1-16; pl. 4, figs. 1-15; pl. 8, figs. 4,5.

R. (Rugoglobigerina) scotti (Bronnimann, 1952)
pl. 3, fig. 1.

Tritinella scotti Bronnimann, 1952, p. 57, pl. 4, figs. 4 - 6. - Olsson, 1964, p. 173, pl. 6, fig. 10. - El-Naggar, 1966, p. 150.

Rugoglobigerina scotti (Bronnimann). Bolli, Loeblich & Tappan 1957, p. 43, pl. 11, figs. 3-4. - Ansary & Tewfik, 1966, p. 10, pl. 5, fig. 5. - Postuma, 1971, pp. 92-93.

Rugoglobigerina (Rugoglobigerina) scotti (Bronnimann). El-Naggar, 1971, p. 494, pl. 13, fig. 3.

Subgenus *Rugoglobigerina (Archaeoglobigerina)* Pessagno, 1967,
R. (Archaeoglobigerina) cretacea (D'Orbigny)
pl. 1, fig. 1a-c.

Globigerina cretacea D'Orbigny 1840, p. 34, pl. 3. figs. 12-14.

Globotruncana globigerinoides Brotzen, 1936, p. 177, pl. 12, fig. 3; pl. 13, fig. 3.

Globotruncana cretacea (D'Orbigny). - Olsson, 1964; p. 164, pl. 2. fig. 2.

Archaeoglobigerina cretacea (D'Orbigny). - Pessagno, 1967, p. 317, pl. 70, figs. 3-8; pl. 94, figs. 4-5.

Rugoglobigerina (Archaeoglobigerina) infracretacea (Glaessner)
pl. 1, fig. 5, 6.

Globigerina infracretacea Glassner. - Subbotina, 1953, p. 58. pl. 1, figs. 5-10.

Genus *Hedbergella* Bronnimann & Brown, 1958
Hedbergella mattsoni, (Pessango, 1960)
pl. 3, fig. 2.

Praeglobotruncana mattsoni Pessagno, 1960, p. 98, pl. 2, figs. 1-3, 6-8. - Pessagno, 1962, p. 358, pl. 5, figs. 14-16.

Genus *Globigerinelloides* Cushman & Ten Dam, 1948
Globigerinelloides escheri (Kaufmann, 1952)
pl. 3. fig. 3.

Globigerinella escheri escheri (Kaufmann). - Bronnimann, 1952 p. 46, text-figs. 22, 23.

Globigerinelloides escheri (Kaufmann). - Ansary & Tewfik, 1966, p. 45, pl. 4, fig. 9.

Genus *Globotruncana* Cushman, 1927
Globotruncana aegyptiaca Nakkady, 1950
pl. 3, fig. 4.

Globotruncana aegyptiaca Nakkady, 1950, p. 690, pl. 90, figs. 20-22. - Said & Sabry, 1964, p. 386, pl. 3, fig. 1.

Globotruncana aegyptiaca aegyptiaca Nakkady. - El-Naggar, 1966. - p. 76, pl. 3, fig. 4; pl. 4, fig. 1. - Ansary & Tewfik, 1966, p. 49, pl. 6, figs. 8.

Globotruncana aegyptiaca duwi Nakkady, 1950
pl. 3, fig. 5.

Globotruncana aegyptiaca var. *duwi* Nakkady, 1950, p. 690, pl. 90, figs. 17-19. - Ansary & Fakhr, 1958, p. 133, pl. 2, fig. 13. - Said & Sabry, 1964, pl. 3, fig. 2. - El-Naggar, 1966, p. 80, pl. 3, fig. 5. - Ansary & Tewfik, 1966, p. 49, pl. 6, fig. 4.

Globotruncana arca (Cushman, 1926)
pl. 3, fig. 6.

Pulvinulina arca Cushman, 1926, p. 23, pl. 3, fig. 1.

Globotruncana arca (Cushman) - Cushman, 1946, p. 150, pl. 62, figs. 4.5. - Said & Kerdany, 1961, p. 330, pl. 2, fig. 14. - Said & Sabry, 1964, p. 387, pl. 2, fig. 5. - El-Naggar, 1966, p. 83, pl. 1, fig. 1, 2 - Ansary & Tewfik, 1966, p. 53, pl. 7, fig. 5. - Postuma, 1971, pp. 18-19.

Globotruncana conica White, 1928
pl. 3, fig. 7.

Globotruncana conica White, 1928, p. 285, pl. 38, fig. 7 - Cushman, 1946, p. 151, pl. 61, fig. 20. - Said & Kenawy, 1956, p. 150, pl. 5, fig. 16 - El-Naggar, 1966, p. 87, pl. 12, fig. 2. - Ansary & Tewfik, 1966, p. 51, pl. 6, fig. 5. - Postuma, 1971, pp. 28-29.

Globotruncana cf. *convexa* Sandidge, 1932
pl. 3, fig. 8.

Globotruncana convexa Sandidge, 1932, p. 285, p. 44, figs. 9-11.

Globotruncana cf. *convexa* Sandidge. - El-Naggar, 1966, p. 97, pl. 1, fig. 5.

Globotruncana gagnébini Tilev, 1951
pl. 3, figs. 9, 10.

Globotruncana gagnébini Tilev, 1951, p. 50, pl. 3, figs. 2-5. Tilev, 1952, p. 50, pl. 3, figs. 2-5. - Bolli, 1957, p. 59, pl. 14, fig. 5. - El-Naggar, 1966, p. 111, pl. 2, figs. 1-4, pl. 3, figs. 1, 3, 6. - Postuma 1971, pp. 40, 41.

Globotruncana gansseri gansseri Bolli, 1951

pl. 3, fig. 11.

Globotruncana gansseri Bolli, 1951, p. 196, pl. 35, figs. 1-3, Olson, 1964, p. 165, p. 3, figs. 2-5, - Said & Sabry, 1964, p. 387, pl. 3, fig. 3. - Postuma, 1971, pp. 42-43.

Globotruncana gansseri gansseri Bolli. - El-Naggar, 1966, p. 117, pl. 5, fig. 1; pl. 11, fig. 3. - Ansary & Tewfik, 1966, p. 51, pl. 6, fig. 3.

Globotruncana gansseri subgansseri Gandolfi, 1955

pl. 4, fig. 1.

Globotruncana gansseri subgansseri Gandolfi, 1955, p. 70, pl. 6, fig. 7. - El-Naggar, 1966, p. 119, pl. 5, fig. 3.

Globotruncana leopoldi Bolli, 1945

pl. 4, fig. 2.

Globotruncana leopoldi Bolli, 1945, p. 235, pl. 9, fig. 17; text-fig. 1, 25, 26. - El-Naggar, 1966, p. 121, pl. 1, fig. 4.

Globotruncana orientalis El-Naggar, 1966

pl. 4, fig. 3.

Globotruncana orientalis El-Naggar, 1966, p. 125, pl. 12, fig. 4.

Globotruncana rosetta (Carsey, 1926)

pl. 4, fig. 4.

Globigerina rosetta Carsey, 1926, p. 44, pl. 5, fig. 3.

Globotruncana (Globotruncana) rosetta (Carsey). - Pessagno, 1960, p. 100, pl. 3, figs. 4-7, pl. 5, figs. 6, 9.

Globotruncana rosetta rosetta (Carsey). - El-Naggar, 1966, p. 128, pl. 88, fig. 3.

Globotruncana rosetta (Carsey). - Olsson, 1964, p. 168, pl. 4, figs. 5, 7. - Ansary & Tewfik, 1966, p. 55, pl. 8, fig. 3.

Globotruncana stuarti stuarti (De Lapparent, 1918)

pl. 4, figs. 5, 6.

Rosalina stuarti De Lapparent, 1918, p. 11, pl. 1, figs. 3-7.

Globotruncana stuarti (De Lapparent). - Bolli, 1951, p. 196, pl. 34, figs. 10-12. - Said & Sabry, 1964, p. 387, pl. 2, fig. 3. - Postuma, 1971, pp. 60-61.

Globotruncana stuarti stuarti (De Lapparent). - El-Naggar 1966, p. 133, pl. 8, fig. 4; pl. 9, fig. 1. - Ansary & Tewfik, 1966, p. 49, pl. 7, fig. 4.

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Globotruncana stuarti stuartiformis Dalbiez, 1955

pl. 4, fig. 7.

Globotruncana (Globotruncana) elevata stuartiformis Dalbiez, 1955, p. 169, text, fig. 10.

Globotruncana (Globotruncana) stuarti stuartiformis Dalbiez. - Pessagno, 1960, p. 101, pl. 5, figs. 7, 11. - Pessagno, 1962, p. 362, pl. 2, figs. 4-6.

Globotruncana stuarti stuartiformis Dalbiez. - El-Naggar, 1966, p. 136, pl. 9, fig. 3. - Ansary & Tewfik, 1966, p. 50, pl. 6, fig. 7.

Globotruncana stuartiformis Dalbiez-Postuma, 1971, pp. 62, 63

Globotruncana stuarti subspinosa (Pessagno, 1960)

pl. 4, fig. 8.

Globotruncana (Globotruncana) subspinosa Pessagno, 1960, p. 101, pl. 1, figs. 1-9; pl. 5; fig. 5.

Globotruncana (Globotruncana) stuarti subspinosa (Pessagno) - Pessagno, 1962, p. 362, pl. 2, figs. 7-9.

Globotruncana stuarti subspinosa (Pessagno). El-Naggar 1966, p. 139, pl. 10, figs. 2, 3.

Family Globorotaliidae Cushman, 1927

Subfamily *Globorotaliinae* Cushman, 1927

Genus *Globorotalia* Cushman, 1927

Globorotalia acuta Toulmin, 1941

pl. 5, fig. 1.

Globorotalia wilcoxensis Cushman & Ponton var. *acuta* Toulmin, 1941, p. 608, pl. 82, figs. 6-8. - Cushman & Renz, 1942, P. 12, pl. 3, fig. 2.

Globorotalia acuta Toulmin. - Loeblich & Tappan, 1957, p. 185, pl. 47, figs. 5, pl. 55, figs. 4, 5; pl. 58, fig. 5. - El-Naggar, 1966, p. 188, pl. 19, fig. 5; pl. 20, fig. 1.

Globorotalia aequa Cushman & Renz, 1942

pl. 5, figs. 2, 3

Globorotalia crassata (Cushman) var. *aequa* Cushman & Renz, 1942, p. 12, pl. 3, fig. 3.

Globorotalia aequa Cushman & Renz. - Bolli, 1957, p. 74, pl. 17, figs. 1-3, pl. 18, figs. 13-15, - Loeblich & Tappan, 1957, p. 186, pl. 46, figs. 7-8; pl. 50, fig. 6; pl. 55, fig. 8; pl. 59, fig. 6, pl. 60, fig. 3, pl. 64, fig. 4. - Said & Sabry, 1964, p. 381, pl. 2, fig. 8. - El-Naggar, 1966, p. 190, pl. 21, fig. 21, fig. 4. - Postuma, 1971, pp. 168-169.

Globorotalia angulata abundocamerata Bolli, 1957

pl. 5, fig. 4.

Globorotalia angulata abundocamerata Bolli, 1957, P. 74, pl. 17, figs. 4-6. - Said & Kerdany, 1961, p. 328, pl. 1, fig. 13. El-Naggar 1966, p. 194, pl. 22, fig. 2.

Globorotalia abundocamerata Bolli. - Postuma, 1971, pp. 166 - 167.

Globorotalia angulata angulata (White, 1928)

pl. 5, fig. 5-8.

Globigerina angulata White, 1928, p. 191, pl. 27, fig. 13.

Globorotalia angulata (White). - Bolli, 1957, p. 74, pl. 17, figs. 7-9. - Said & Sabry, 1964, p. 382, pl. 1, fig. 3. - Postua, 1971, pp. 170-171.

Globorotalia angulata angulata (White). - El-Naggar, 1966, p. 197, pl. 22, fig. 1.

Globorotalia apantesma Lobblich & Tappan, 1957

pl. 6, fig. 1.

Globorotalia apantesma Lobelich & Tappan, 1957, p. 187, pl. 59, fig. 1 only; non pl. 48, fig. 1; pl. 55, fig. 1; pl. 58, fig. 4. - El-Naggar, 1966, p. 199, pl. 21, fig. 1.

Globorotalia aragonensis Nuttall, 1930

pl. 6, fig. 2.

Globorotalia aragonensis Nuttall, 1930, p. 288, pl. 24, figs. 6-8, 10, 11. - Subbotina 1953, pl. 18, figs. 6, 7. - Bolli, 1957, p. 75, pl. 18, figs. 7-9; p. 167, pl. 38, fig. 1. - Samuel & Salaj, 1968, p. 148, pl. 11, fig. 5. - Postuma; 1971, pp. 172-173.

Globorotalia bolivariana (Petters, 1954)

pl. 6, figs. 3, 4.

Globigerina wilsoni, Cole subsp. *bolivaria* Petters. 1954, pl. 39, pl. 8, fig. 9.

Globorotalia bolivariana (Peters). - Bolli, 1957, p. 169, pl. 37, figs. 14-16. - Postuma, 1971, pp. 176-177.

Globorotalia broedermanni Cushman & Bermudez, 1949,

pl. 6, fig. 5.

Globorotalia (Truncorotalia) broedermanni Cushman & Bermudez, 1949, p. 40, 7, figs. 22-24.

Globorotalia broedermanni Cushman & Bermudez. - Bolli, 1957, p. 80, pl. 19, figs. 13-15; p. 167, pl. 37, fig. 13. - Postuma, 1971, pp. 178-179.

Turborotalia (Acarinina) broedermanni (Cushman & Bermudez). - Samuel & Salaj, 1968, p. 163, pl. 18, fig. 5.

Globorotalia colligera (Schwager, 1883)

pl. 6, fig. 6.

Truncatulina colligera Schwager, 1883, p. 126, pl. 29, fig. 14.

Globorotalia colligera (Schwager). - Said & Kerdany, 1961, p. 328, pl. 1, fig. 14. - Ansary & Tawfik, 1966, p. 62, pl. 1, figs. 5.

Globorotalia compressa (Plummer, 1926)

pl. 6, figs. 7-9.

Globorotalia compressa Plummer, 1926, p. 135, pl. 8, fig. 11.

Globorotalia compressa (Plummer). - Bronnimann, 1952, p. 25, pl. 2, fig. 19-24. - Bolli, 1957, p. 77, pl. 20, figs. 21-23. Loeblich & Tappan, 1957, p. 188, pl. 40, fig. 5; pl. 41, fig. 5; pl. 42, fig. 5; pl. 44, figs. 9-10. - Said & Sabry, 1964, p. 382, pl. 3, fig. 13. - El-Naggar, 1966, p. 203, pl. 17, figs. 1-3. - Postuma, pp. 186-187.

Globorotalia cf. convexa Subbotina, 1953

pl. 7, fig. 1, 2.

cf. Globorotalia convexa Subbotina, 1953, p. 209, pl. 17, figs. 2a-3a. - Loeblich & Tappan, 1957, p. 188, pl. 48, figs. 4; pl. 50, fig. 7; pl. 53, figs. 6-8; pl. 57, figs. 5, 6; pl. 61, fig. 4. - Ansary & Tewfik, 1966, p. 63, pl. 1, fig. 9.

Globorotalia cf. convexa Subbotina. - El-Naggar, 1966, p. 205, pl. 22, fig. 3.

Globorotalia emilei El-Naggar, 1966

pl. 7, fig. 3.

Globorotalia membranaces (Ehrenberg). - Le Roy, 1953, p. 32, pl. 3, figs. 13, 14.

Globorotalia elongata Glaessner. - Bolli, 1957, p. 77, pl. 20, figs. 11-13. - Olsson, 1960, p. 45, pl. 9, figs. 4-6.

Globorotalia emilei El-Naggar, 1966, p. 208, pl. 17, fig. 9.

Globorotalia esnaensis (Le Roy, 1953)

pl. 7, fig. 4.

Globigerina esnaensis Le Roy, 1953, p. 31 pl. 6, figs. 8-10. - Nakkady 1959, p. 461, pl. 3, fig. 2.

Truncorotalia esnaensis (Le Roy). Said & Kenawy, 1956, p. 151, pl. 6, figs. 2.

Globorotalia esnaensis (Le Roy). - Loeblich & Tappan, 1957, p. 189, pl. 57, fig. 7; pl. 61, figs. 1, 2, 9. - Said & Kerdany, 1961, p. 328, pl. 1, fig. 6. - Said & Sabry, 1964, p. 383, pl. 1, fig. 5. - El-Naggar, 1966, p. 210, pl. 21, fig. 6.

Globorotalia formosa formosa Bolli, 1957

pl. 7, fig. 5.

Globorotalia formosa formosa Bolli, 1957, p. 76, pl. 18, figs. 1-3. - Luterbacher, 1964, p. 694, text-figs. 118-120.

Globorotalia formosa gracilis Bolli, 1957
pl. 7, fig. 6.

Globorotalia formosa gracilis Bolli, 1957, p. 75, pl. 18, figs. 4-6. - Said & Sabry, 1964, p. 383, pl. 2, fig. 6. - Luterbacher, 1964, p. 692, text, text-figs. 115-117.

Globorotalia gracilis Bolli. - Postuma, 1971, pp. 192-193.

Globorotalia imitata Subbotina, 1953
pl. 7, fig. 7.

Globorotalia imitata Subbotina, 1953, p. 206, pl. 16, figs. 14-16. - Loeblich & Tappan, 1957, p. 190, pl. 44, fig. 3; pl. 45, fig. 6; pl. 54, figs. 8, 9; pl. 59, fig. 5; pl. 63, fig. 3. - Olsson, 1960, p. 46, pl. 9, figs. 7-9. - Said & Kerdany, 1961, p. 329, pl. 1, fig. 1. - Said & Sabry, 1964, p. 383, pl. 3, fig. 6. - El-Naggar, 1966, p. 215, pl. 17, fig. 6.

Globorotalia interposita (Subbotina, 1953)
pl. 7, fig. 8.

Acarinina interposita Subbotina, 1953, p. 231, pl. 23, figs. 6, 7.

Globorotalia interposita (Subbotina). - Said, 1960, p. 283, pl. 1, fig. 9.

Globorotalia loeblichii El-Naggar, 1966
pl. 7, fig. 9.

Globorotalia loeblichii El-Naggar, 1966, p. 218, pl. 23, fig. 1.

Globorotalia marginodentata Subbotina, 1953
pl. 8, fig. 1.

Globorotalia marginodentata Subbotina, 1953, p. 246, pl. 17, figs. 15, 16; pl. 18, figs. 1, 2. - Luterbacher, 1964, p. 673, text-figs. 75-76, 81-84.

Globorotalia occlusa Loeblich & Tappan, 1957
pl. 8, figs. 2, 3.

Globorotalia occlusa Loeblich & Tappan, 1957, p. 191, pl. 55, fig. 3; pl. 64, fig. 3. - El-Naggar, 1966, p. 221, pl. 20, fig. 2; pl. 22, fig. 4. - Ansary & Tewfik, 1966, p. 61, pl. 1, fig. 2.

Globorotalia pentacamerata (Subbotina, 1953)
pl. 8, fig. 4.

Acarinina pentacamerata Subbotina, 1953, p. 233, pl. 23, fig. 8; pl. 24, figs. 1-9.

Globorotalia pentacamerata (Subbotina). - Said & Kerdany, 1961, p. 329, pl. 1, fig. 15. - Said & Sabry, 1964, p. 384, pl. 1, fig. 6. - Ansary & Tewfik, 1966, p. 62, pl. 1, fig. 6.

Globorotalia perclara Loeblich & Tappan, 1957
pl. 8, fig. 5.

Globorotalia perclara Loeblich & Tappan, 1957, p. 191, pl. 40, fig. 7; pl. 41, fig. 8; pl. 42, fig. 4; pl. 45, fig. 11. pl. 46, fig. 3; pl. 47, fig. 6; pl. 50, fig. 1; pl. 54, figs. 6, 7; pl. 67, figs. 3, 4; pl. 60, fig. 5. - El-Naggar, 1966, p. 223, pl. 21, fig. 2.

Globorotalia pseudobulloides (Plummer, 1926)
pl. 8, fig. 6.

Globorotalia pseudobulloides Plummer, 1926, p. 133, pl. 8, fig. 9. - Nakkady, 1959, p. 461, pl. 3, fig. 4. - Said & Sabry, 1964, p. 388, pl. 1, fig. 16.

Globorotalia pseudobulloides (Plummer). - Bolli, 1957, p. 73, pl. 17, figs. 19-21. - Loeblich & Tappan, 1957 p. 192, pl. 40, figs. 3, 9; pl. 42, fig. 3; pl. 43, fig. 3. - olsson, 1960, p. 46, pl. 9, figs. 19-21. - El-Naggar, 1966, p. 224, pl. 18, fig. 3. - Postuma, 1971, pp. 202-203.

Globorotalia pseudomenardii Bolli, 1957
pl. 8, fig. 7.

Globorotalia pseudomenardii Bolli, 1957, p. 77, pl. 20, figs. 14-17. - Nakkady, 1959, p. 462, pl. 4, fig. 3. - Said & Kerdany, 1961, p. 329, pl. 1, fig. 5. - Said & Sabry, 1964, p. 384, pl. 3, 11. - El-Naggar, 1966, p. 227, pl. 17, figs. 7, 8. - Postuma, 1971, pp. 204-205.

Globorotalia pseudotopilensis (Subbotina, 1953)
pl. 8, fig. 8.

Acarinina pseudotopilensis Subbotina, 1953, p. 227, pl. 21, figs. 8, 9; pl. 22, figs. 2, 3; non fig. 1.

Globorotalia pusilla laevigata Bolli, 1957
pl. 8, fig. 9.

Globorotalia pusilla laevigata Bolli, 1957, p. 78, pl. 20, figs. 5-7. - El-Naggar, 1966, p. 229, pl. 17, fig. 12.

Globorotalia laevigata Bolli. - Postuma, 1971, pp. 196-197.

Globorotalia pusilla pusilla Bolli, 1957
pl. 8, fig. 10.

Globorotalia pusilla pusilla Bolli, 1957, p. 78, pl. 20, fig. 8-10, - El-Naggar, 1966, p. 232, pl. 17, fig. 11.

Globorotalia pusilla Bolli. - Postuma, 1971, pp. 206-207.

Globorotalia quadrata (White, 1928)
pl. 9, fig. 1.

Globorotalia quadrata (White). - Bolli, 1957, p. 73, pl. 17, figs. 22-24. - El-Naggar, 1966, p. 233, pl. 18, fig. 4.

Globorotalia renzi Bolli, 1957

pl. 9, fig. 2.

Globorotalia renzi Bolli, 1957, p. 168, pl. 38, fig. 3. - Psotuma, 1971, pp. 208-209.

Globorotalia rex Martin, 1943

pl. 9, fig. 3.

Globorotalia rex Martin, 1943, p. 117, pl. 8, fig. 2. - Bolli, 1957, p. 75, pl. 8, figs. 10-12. - Loeblich & Tappan, 1957, p. 195, pl. 60, fig. 1. - Said & Sabry, 1964, p. 385, pl. 2, fig. 3. - Postuma, 1971, pp. 210-211.

Globorotalia triplex (Subbotina, 1953)

pl. 9, fig. 4.

Acarinina triplex Subbotina, 1953, p. 230, pl. 23, fig. 1, non fig. 2-5.

non Globorotalia triplex (Subbotina). - Said & Kerdany, 1961, p. 330, pl. 1, fig. 11.

Globorotalia uncinata carinata El-Naggar, 1966

pl. 9, fig. 5.

Globorotalia uncinata carinata El-Naggar, 1966, p. 239, pl. 19, fig. 1.

Globorotalia uncinata uncinata Bolli, 1957

pl. 9, fig. 6, 7.

Globorotalia uncinata Bolli, 1957, p. 74, pl. 17, figs. 13-15. - Said & Sabry, 1964, p. 385, pl. 1, fig. 12. - Postuma, 1971, pp. 216-217.

Globorotalia uncinata uncinata Bolli. - El-Naggar, 1966, p. 240, pl. 18, fig. 1, pl. 19, fig. 2.

Globorotalia velascoensis caucasica Glaessner, 1937

pl. 9, fig. 8.

Globorotalia aragonensis Nuttall var. *caucasica* Glaessner, 1937, p. 31, pl. 1, fig. 6.

Globorotalia velascoensis caucasica Glaessner. - El-Naggar, 1966, p. 242, pl. 19, fig. 6.

Globorotalia velascoensis velascoensis (Cushman, 1925)

pl. 9, figs. 9.

Pulvinulina velascoensis Cushman, 1925, p. 19, pl. 3, fig. 5.

Truncarotalia velascoensis (Cushman) . - Said & Kenawy, 1956, p. 152, pl. 6, fig. 4.

Globorotalia velascoensis (Cushman). - Bolli, 1957, p. 76, pl. 20, figs. 1, 2. - Nakkady, 1959, p. 462, pl. 4, fig. 4. - Said & Sabry, 1964, p. 386, pl. 2, fig. 9. - Postuma, 1971, pp. 218-219.

Globorotalia velascoensis velascoensis (Cushman). - El-Naggar, 1966, p. 246, pl. 20, fig. 3; pl. 21, fig. 3.

Globorotalia wilcoxensis Cushman & Ponton, 1932,
pl. 10, fig. 1.

Globorotalia wilcoxensis Cushman & Ponton, 1932, p. 71, pl. 9, fig. 10. - Bolli, 1957, p. 79, pl. 19, figs. 7.9. - El-Naggar, 1966, p. 250, pl. 23, fig. 5. - Postuma, 1971, pp. 220-221.

Subfamily Truncorotaloidiinae Loeblich & Tappan, 1961
Genus *Truncorotaloides* Bronnimann, Bermudez, 1953
Truncorotaloides topilensis (Cushman, 1925)
pl. 10, 2.

Globorotalia topilensis Cushman, 1925, p. 7, pl. 1, fig. 9.

Truncorotaloides topilensis (Cushman). - Bolli, 1957, p. 170, pl. 39, figs. 13-16. - Saito, 1962, p. 215, pl. 33, fig. 8.

Subfamily orbulininae Schultze, 1854
Genus *Globigerapsis* Bolli, Loeblich & Tappan, 1957
Globigerapsis kugleri Bolli, Loeblich & Tappan, 1957
pl. 10, fig. 3.

Globigerapsis kugleri Bolli, Loeblich & Tappan, 1957, p. 34, pl. 6, fig. 6. - Bolli, 1957, p. 165, pl. 35, fig. 21. - Postuma, 1971, pp. 138-139.

Family Heterohelicidae
Genus *Heterohelix* Ehrenberg, 1843
Heterohelix globulosa (Ehrenberg, 1843)
pl. 10, fig. 4, 5.

Guembelina globulosa (Ehrenberg). - Cushman, 1946, p. 105, pl. 45, figs. 9-15. - Ansary & Fakhr, 1958, p. 120, pl. 1, fig. 22.

Heterohelix globulosa (Ehrenberg). - 1957, p. 137, pl. 31, figs. 12-15. - Said & Kerdany, 1961, p. 331, pl. 2, fig. 1. - said & Sabry, 1964, p. 390, pl. 3, fig. 24. - Ansary & Tewfik, 1966, p. 39, pl. 3, fig. 4.

Heterohelix navarroensis Loeblich, 1951
pl. 10, fig. 6.

Heterohelix navarroensis Loeblich. - Gallitelli 1957, p. 137, pl. 31, fig. 5-11.

Heterohelix pulchra (Brotozen, 1936)
pl. 10, fig. 7.

Heterohelix pulchra (Brotozen). - Gallitelli, 1957, p. 137, pl. 31, fig. 20. - Ansary & Tewfik, 1966, p. 40, pl. 3, fig. 8.

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Heterohelix striata (Ehrenberg, 1843)
pl. 10, fig. 8.

Pseudoguembelina striata (Ehrenberg). - Said & Kenawy, 1956, p. 139, pl. 3, fig. 37 - Said & Sabry, 1964, p. 394, pl. 3, fig. 21.

Heterohelix striata (Ehrenberg). - Gallitelli, 1957, p. 137. - Ansary & Tewfik, 1966, p. 41, pl. 3, fig. 3.

Genus *Pseudotextularia* Rzehak, 1891
Pseudotextularia carseyae (Plummer, 1926)
pl. 10, figs. 9, 10.

Planoglobulina carseyae (Plummer). - Gallitelli, 1957, p. 141, pl. 32, fig. 13.

Pseudotextularia elegans (Rzehak, 1891)
pl. 10, figs. 11, 12.

Guembelina elegans Rzehak, 1891, p. 2.

Pseudotextularia elegans (Rzehak). Gallitelli, 1957, p. 138, pl. 33, fig. 6. - Said & Sabry, 1964, p. 392, pl. 3, fig. 29. - Ansary & Tewfik, 1966, p. 43, pl. 3, fig. 11.

Pseudotextularia glabrata (Cushman)
pl. 10, figs. 13, 14.

Planoglobulina glabrata (Cushman). - Gallitelli, 1957, p. 141, pl. 32, figs. 10-12.

Genus *Racemiguembelina* Gallitelli, 1957
Racemiguembelina fructicosa (Egger, 1901)
pl. 10, figs. 15, 16.

Racemiguembelina fructicosa (Egger). - Gallitelli, 1957, p. 142, pl. 32, figs. 14, 15. - Said & Kerdany, 1961, p. 334, pl. 2, fig. 17. - Ansary & Tewfik, 1966, p. 43, pl. 3, fig. 16.

Genus *Pseudoguembelina* Bronnimann & Brown, 1953
Pseudoguembelina excolata (Cushman, 1926)
pl. 10, fig. 17.

Guembelina excolata Cushman, 1926, p. 20, pl. 2, fig. 9. - Cushman, 1946, p. 108, pl. 46, fig. 16.

Pseudoguembelina excolata (Cushman). - Said & Kenawy, 1956, p. 139, pl. 3, fig. 36, - Gallitelli, 1957, p. 139, pl. 31, fig. 23. - Ansary & Fakhr, 1958, p. 124, pl. 1, fig. 28, - Said & Kerdany, 1961, p. 332, pl. 2, fig. 11, Said & Sabry, 1964, pl. 394, pl. 3, fig. 2. - Ansary & Tewfik, 1966, p. 42, pl. 3, fig. 10.

Genus *Zeauvigerina* Finlay, 1939

Zeauvigerina aegyptiaca Said & Kenawy, 1956
pl. 10, fig. 18.

Zeauvigerina aegyptiaca Said & Kenawy, 1956, p. 141, pl. 4, fig. 1. - Beckmann, 1957, p. 92, pl. 21, fig. 9-11. - Said & Kerdany, 1961, p. 331, pl. 2, fig. 5. - Said & Sabry, 1964, p. 390. pl. 3, fig. 33.

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PLATE 1

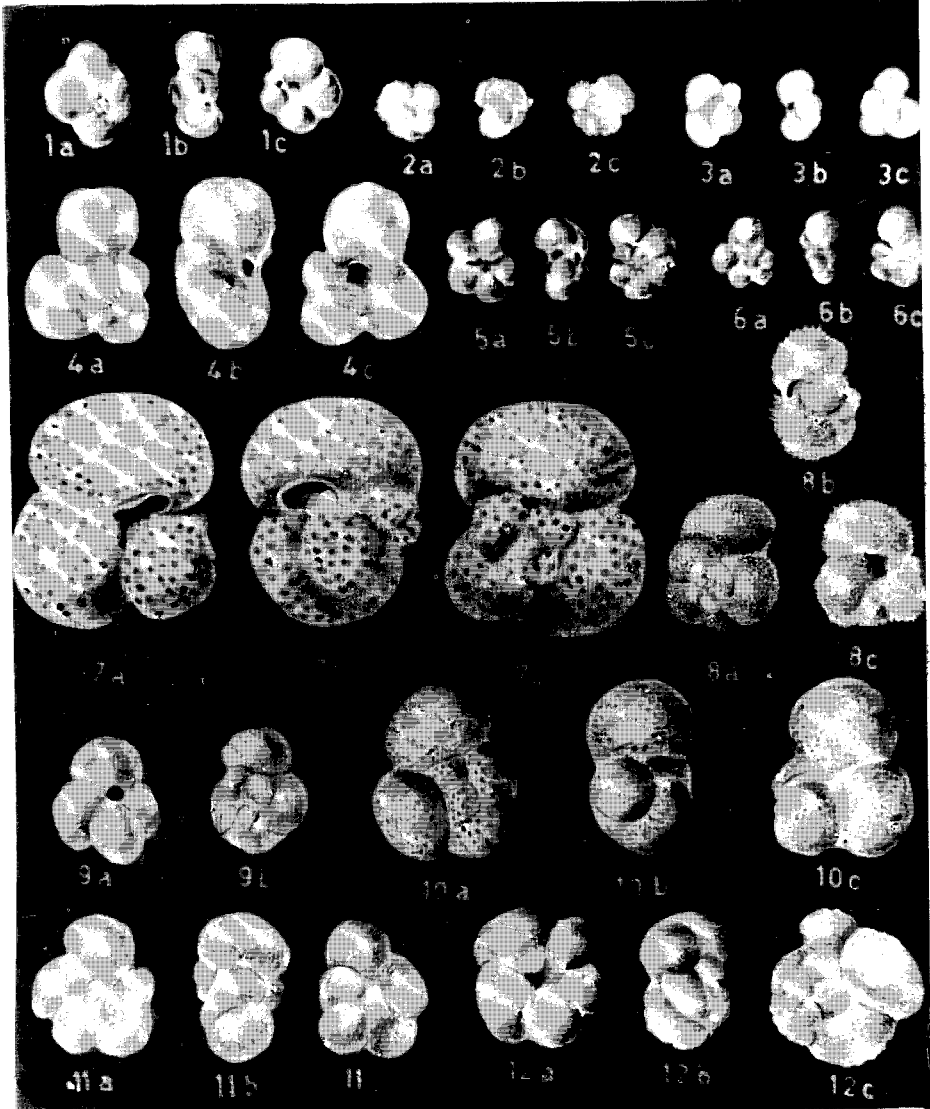


Plate 1

(All figures X 66)

- 1a-c *Rugoglobigerina (Archaeoglobigerina) cretacea* (D'Orbigny), Sample 2 Um Riham II, Middle Maestrichean.
- 2a-3c *Globigerina daubjergensis* Bronnimann, Sample 1, Um Rijam I, Ummper Danian.
- 4a-c *Globigerina inaequispira* Subbotina, Sample 5, Um Rijam I, Heersian.
- 5a-6c *Rugoglobigerina (Archaeoglobigerina) infracretacea* Glaessner, Sample 2, Um Rijam II, Middle Maestrichtian.
- 7a-c *Globigerina linaperta* Finlay, Sample 22, Um Rijam I, Upper-most Landonian.
- 8a-c *Globigerina nodosa* El-Naggar, Sample 15, Um Rijam I, Upper Landenian.
- 9a-b *Globigerina prolata* Bolli, Samples 29, Um Rijam I, Ypresian.
- 10a-c *Globergina pseudococaena* Subbotina, Samples 45, Um Rijam I, Upper Ypresian.
- 11a-c *Globigerina soldadoensis angulosa* Bolli, Sample 45, Um Rijam, Upper Ypresian.
- 12a-c *Globigerina soldadoensis soldadoensis* Bronnimann, Sample 40, Um Rijam I, Ypresian.

PLATE 2

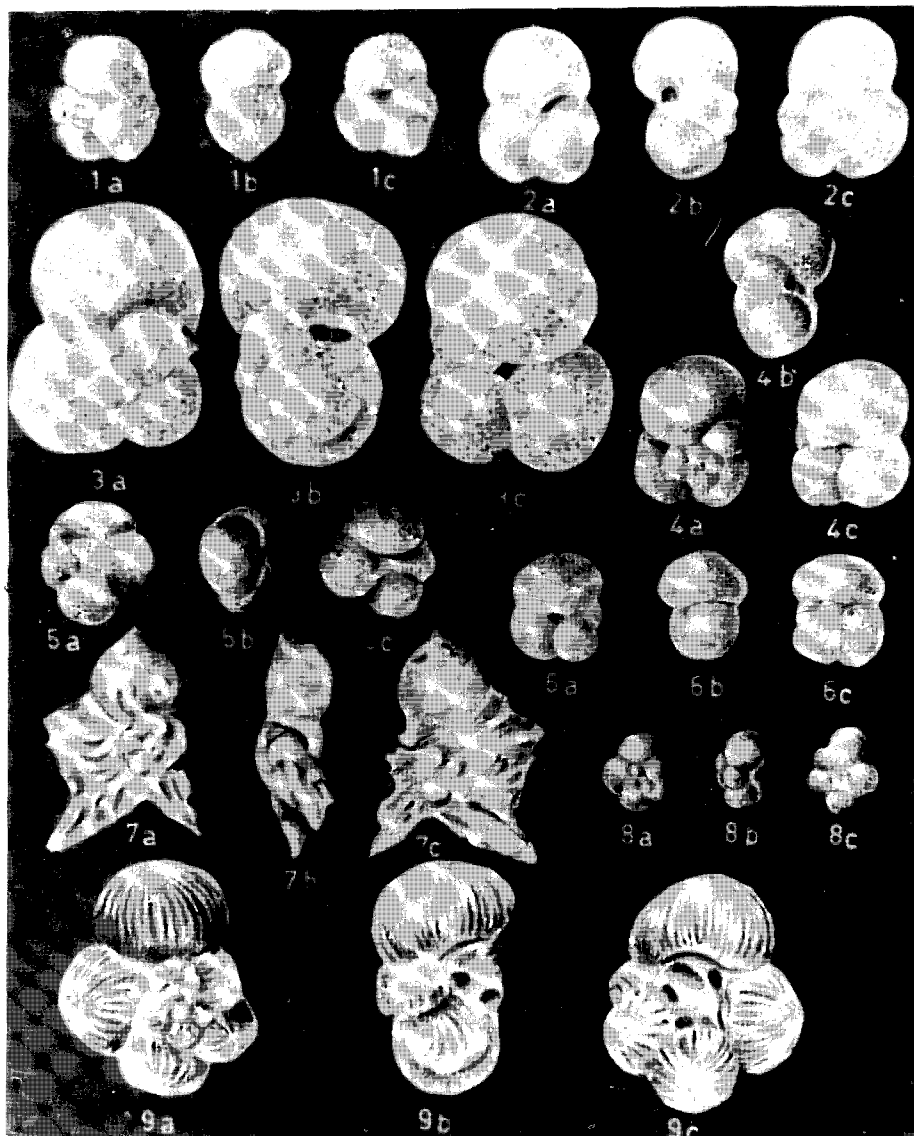


Plate 2

- 1a-c *Globigerina stenei* Weiss, Sample 30, Um Rijam I, Lower Ypresian.
- 2a-4c *Globigerina triloculinoides* Plummer, Sample 7, Um Rijam I, Heersian.
- 5a-c *Globigerina varianta* Subbotina, Sample 25, Um Rijam I, Ypresian.
- 6a-c *Globigerina velascoensis* Cushman, Sample 10, Um Rijam I, Upper Landenian.
- 7a-c *Rugoglobigerina hantkeninoides* Bronnimann, Sample 12, Um Rijam II, Upper Maestrichtian.
- 8a-c *Rugoglobigerina pustulata* Bronnimann, Sample 3, Um Rijam II, Middle Maestrichtian.
- 9a-c *Rugoglobigerina rugosa rugosa* (Plummer), Sample 2 Um Rijam II, Middle Maestrichtian.

PLATE 3

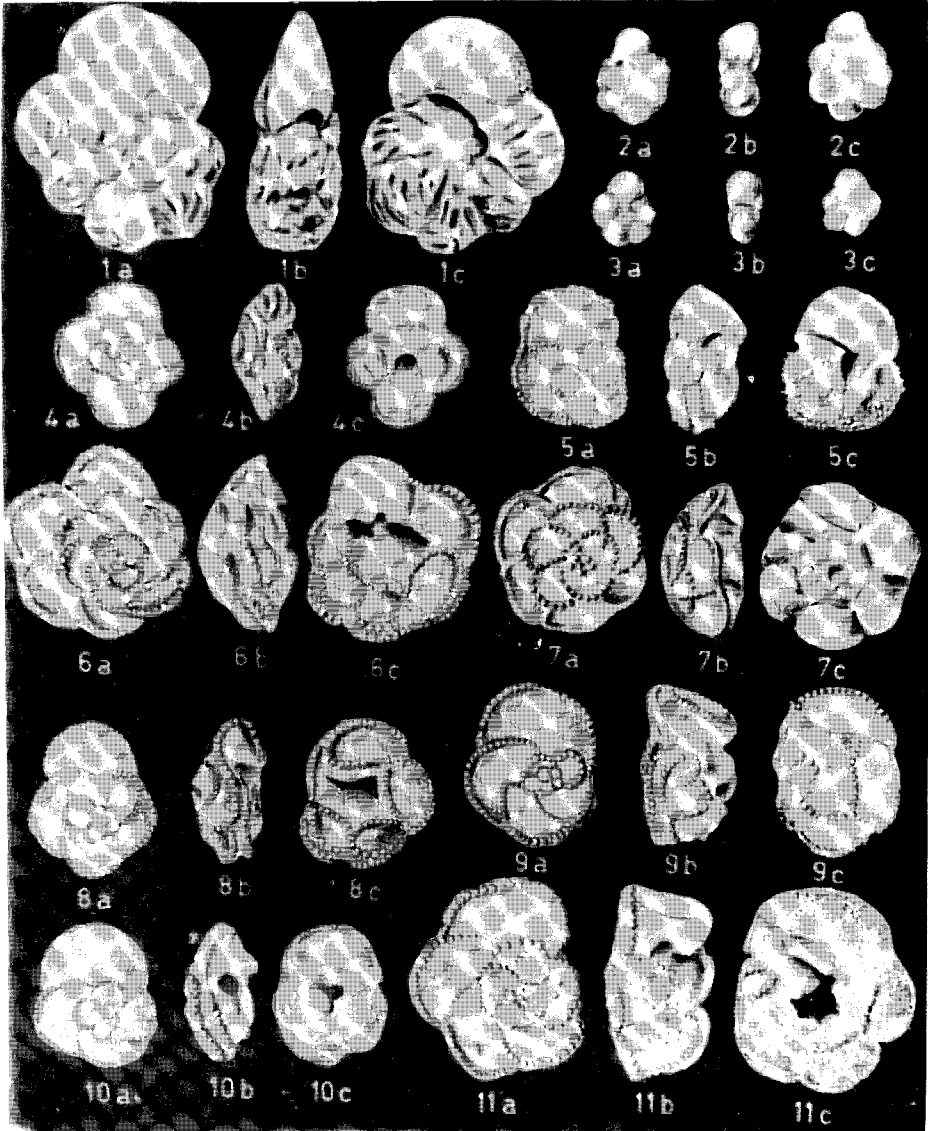


Plate 3

- 1a-c *Rugoglobigerina scotti* (Bronnimann), Sample 10, Um Rijam II, Middle Maestrichtian.
2a-c *Hedbergella mattsoni* (Pessagno), sample 3, Um Rijam II, Middle Maestrichtian.
3a-c *Globigerinelloides escheri* (Kaufmann), Sample 7, Um Rijam II, Middle Maestrichtian.
4a-c *Globotruncana aegyptiaca* Nakkady, Sample 5, Um Rijam II, Middle Maestrichtian.
5a-c *Globotruncana aegyptiaca duwi* Nakkady, Sample 7, Um Rijam II, Middle Maestrichtian.
6a-c *Globotruncana arca* (Cushman), Sample 3, Um Rijam II, Middle Maestrichtian.
7a-c *Globotruncana conica* White, Sample 9, Um Rijam II, Middle Maestrichtian.
8a-c *Globotruncana cf. convexa* Sandidge, Sample 5, Um Rijam II, Middle Maestrichtian.
9a-10c *Globotruncana gagnebini* Tilev, Sample 7, Um Rijam II, Middle Maestrichtian.
11a-c *Globotruncana gansseri gansseri* Bolli, Sample 9, Um Rijam II, Middle Maestrichtian.

PLATE 4

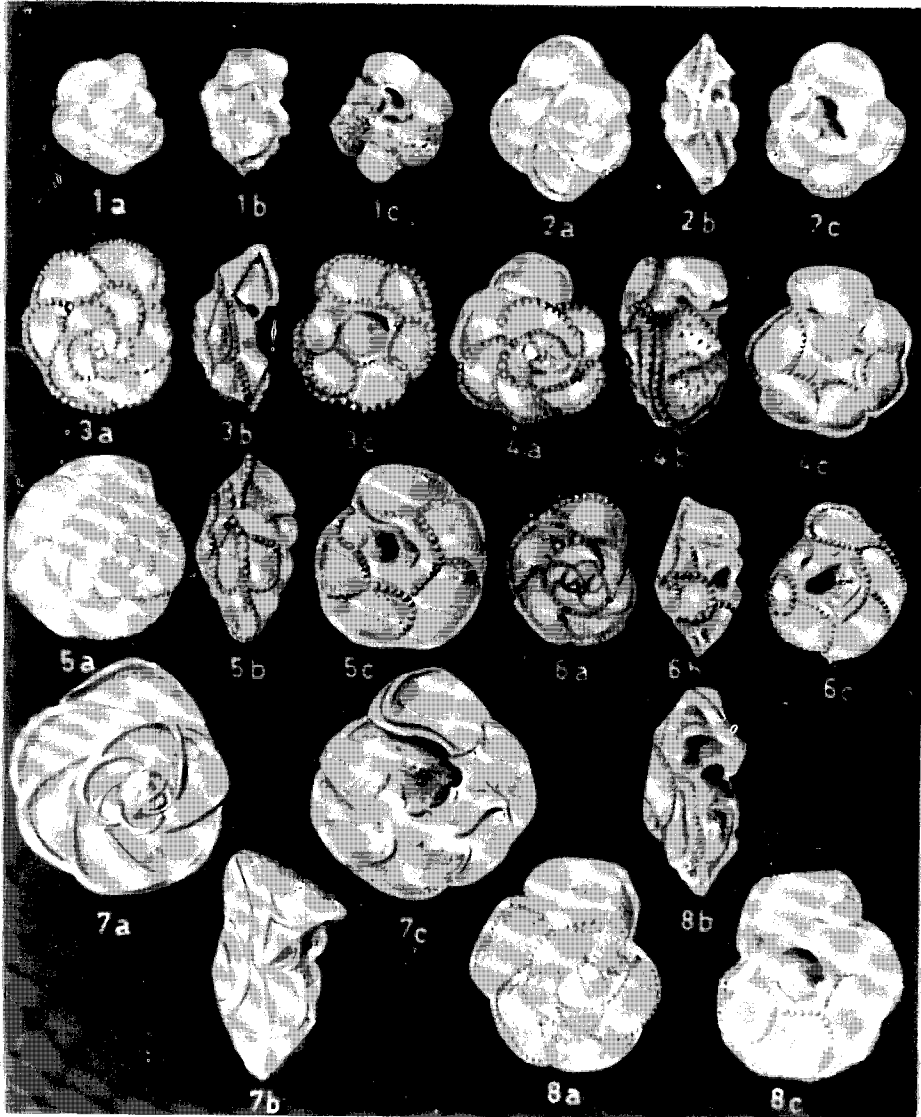


Plate 4

- 1a-c *Globotruncana gansseri subgansseri* Gandolfi Sample 8, Um Rijam II, Middle Maestrichtian.
- 2a-c *Globotruncana leupoldi* Bolli, Sample 5, Um Rijam II, Middle Maestrichtian.
- 3a-c *Globotruncana orientalis* El-Naggar, Sample 9, Um Rijam II, Middle Maestrichtian.
- 4a-c *Globotruncana rosetta* (Carsey), Sample 3, Um Rijam II, Middle Maestrichtian.
- 5a-c *Globotruncana stuarti stuarti* (De Lapparent), Sample 3, Um Rijam II, Middle Maestrichtian.
- 6a-c *Globotruncana stuarti stuarti* (De Lapparent), Sample 7, Um Rijam II, Middle Maestrichtian.
- 7a-c *Globotruncana stuarti stuartiformis* Dalbiez, Sample 5, Um Rijam II, Middle Maestrichtian.
- 8a-c *Globotruncana stuarti subspinosa* (Pessagno), Sample 7, Um Rijam II, Middle Maestrichtian.

PLATE 5

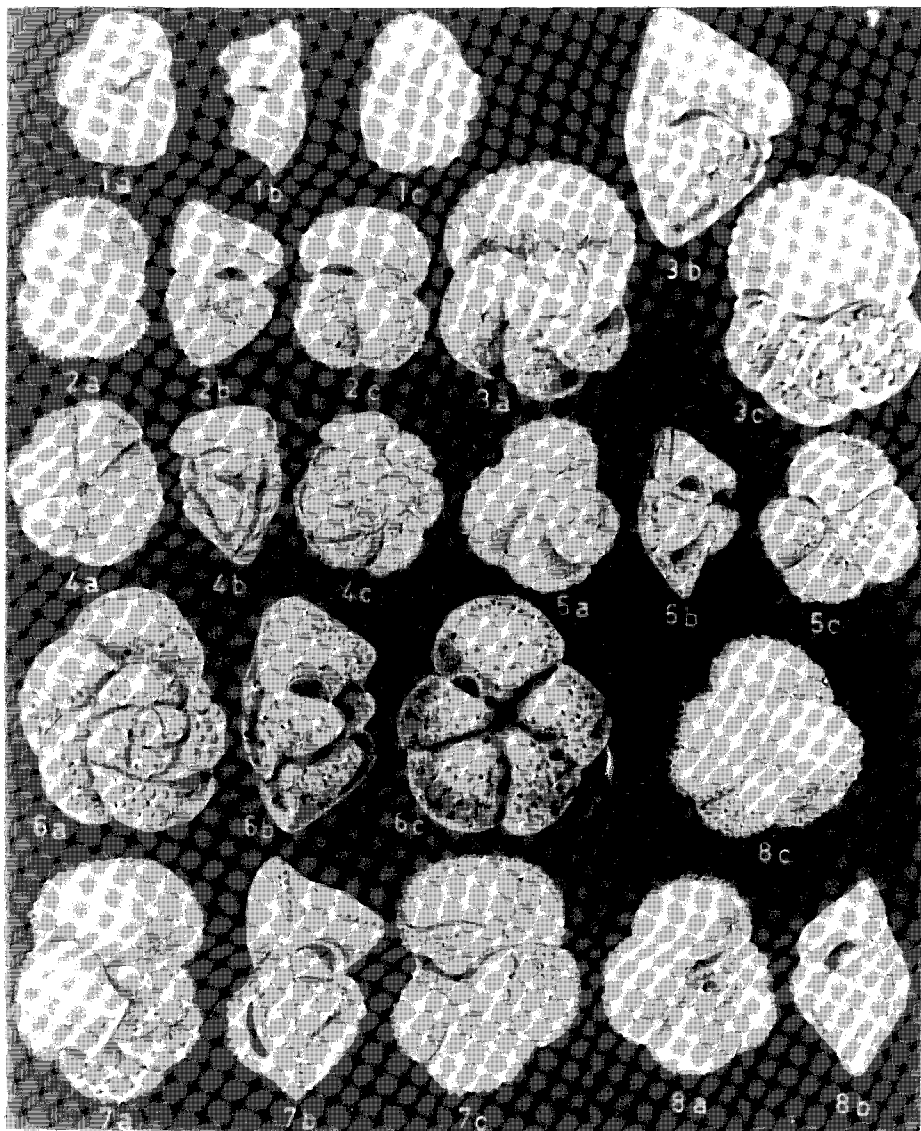


Plate 5

- 1a-c *Globorotalia acuta* Toulmin, Sample 10, Um Rijam I, Upper Landenian.
2a-c *Globorotalia aequa* Cushman & Renz, Sample 15 Um Rijam I, Upper Landenian.
3a-c *Globorotalia aequa* Cushman & Renz, Sample 40, Um Rijam I, Ypresian.
4a-c *Globorotalia angulata abundocamerata* Bolli, Sample 7, Um Rijam I, Upper Heersian.
5a-c *Globorotalia angulata angulata* (White), Sample 7, Um Rijam I, Upper Heersian.
7a-8c *Globorotalia angulata angulata* (White), Sample 20, Um Rijam I, Upper Landenian.

PLATE 6

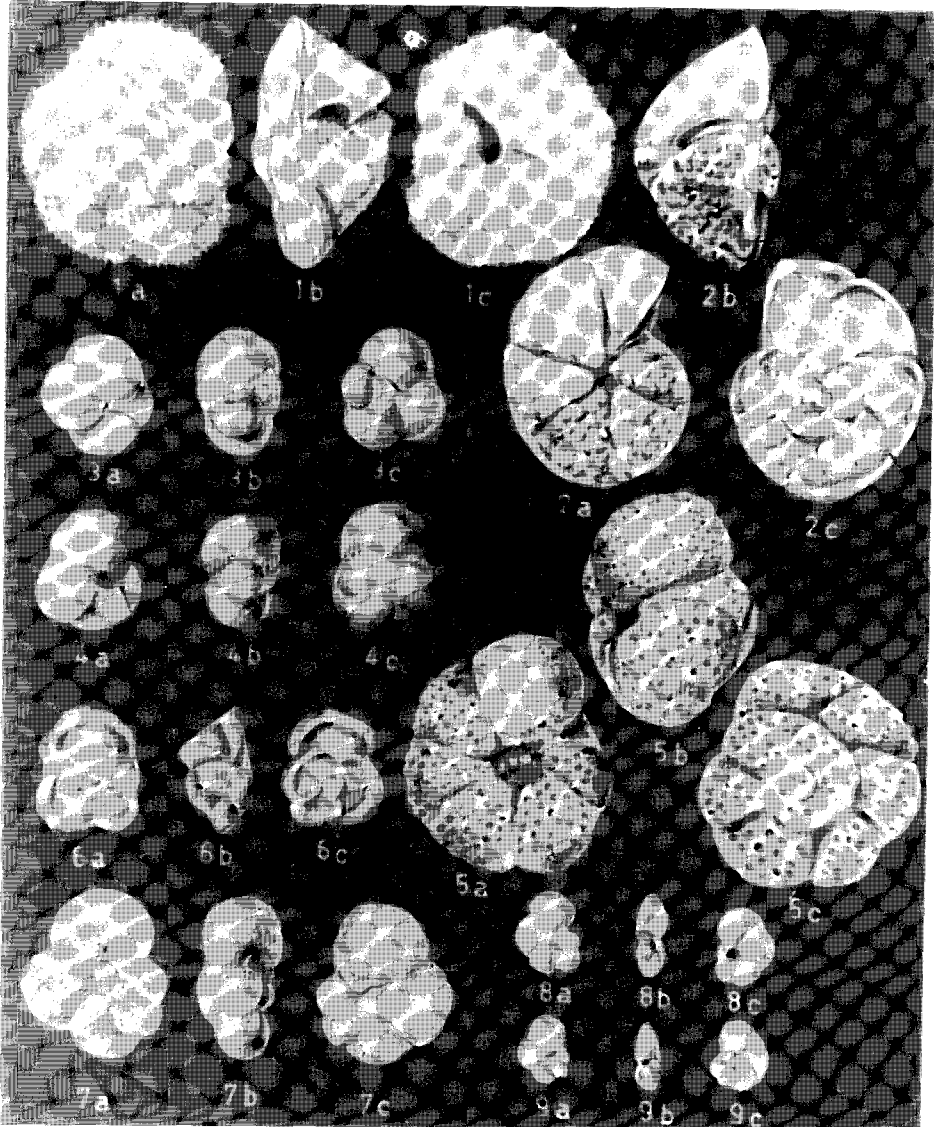


Plate 6

1a-c *Globorotalia apantesma* Loeblich & Tappan, Sample 20, Um Rijam I, Upper Landenian.

2a-c *Globorotalia aragonesis* Nuttall, Sample 35, Um Rijam I, Upper Ypresian.

3a-c *Globorotalia bolivariana* (Petters), Sample 50, Um Rijam I, Lower Lutetian.

5a-c *Globorotalia broedermanni* Cushman & Bermudez, Sample 30, Um Rijam I, Ypresian.

6a-c *Globorotalia colligera* (Schwager), Sample 14, Um Rijam I, Upper Landenian.

7a-8c *Globorotalia compressa* (Plummer), Sample 1, Um Rijam I, Danian.

9a-c *Globorotalia compressa* (Plummer), Sample 3, Um Rijam I, Danian.

PLATE 7

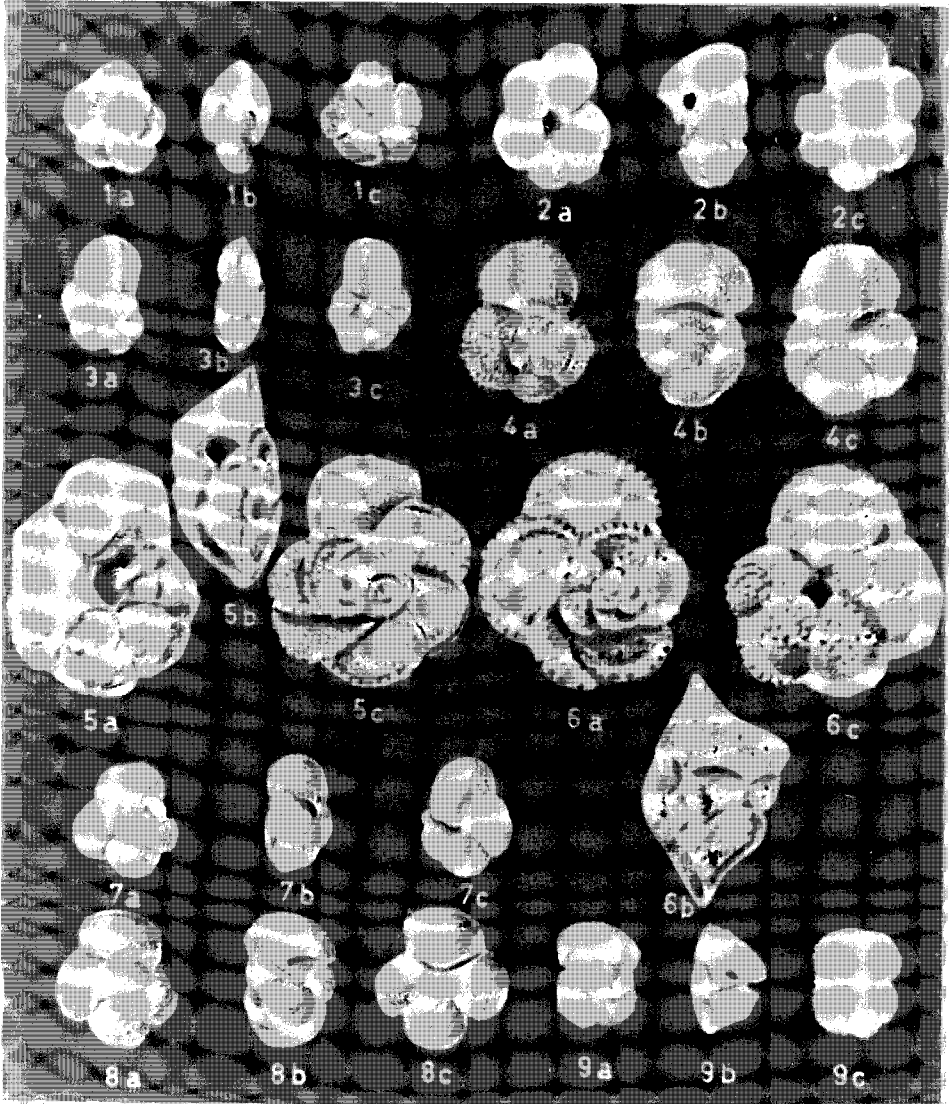


Plate 7

- 1a-2c *Globorotalia cf. convexa* Subbotina, Sample 30, Um Rijam I, Ypresian.
3a-c *Globorotalia emilei* El-Naggar, Sample 6, Um Rijam I, Heersian.
4a-c *Globorotalia esnaensis* (Le Roy), Sample 14, Um Rijam I, Upper Landenian.
5a-c *Globorotalia formosa formosa* Bolli, Sample 31, Um Rijam I, Lower Ypresian.
6a-c *Globorotalia formosa gracilis* Boli, Sample 31, Um Rijam I, Lower Ypresian.
7a-c *Globorotalia imitata* Subbotina, Sample 3, Um Rijam I, Danian.
8a-c *Globorotalia interposita* (Subbotina), Sample 0, Um Rijam I, Lower Lutetian.
9a-c *Globorotalia loeblichii* El-Naggar, Sample 9, Um Rijam I, Lower Landenian.

PLATE 8

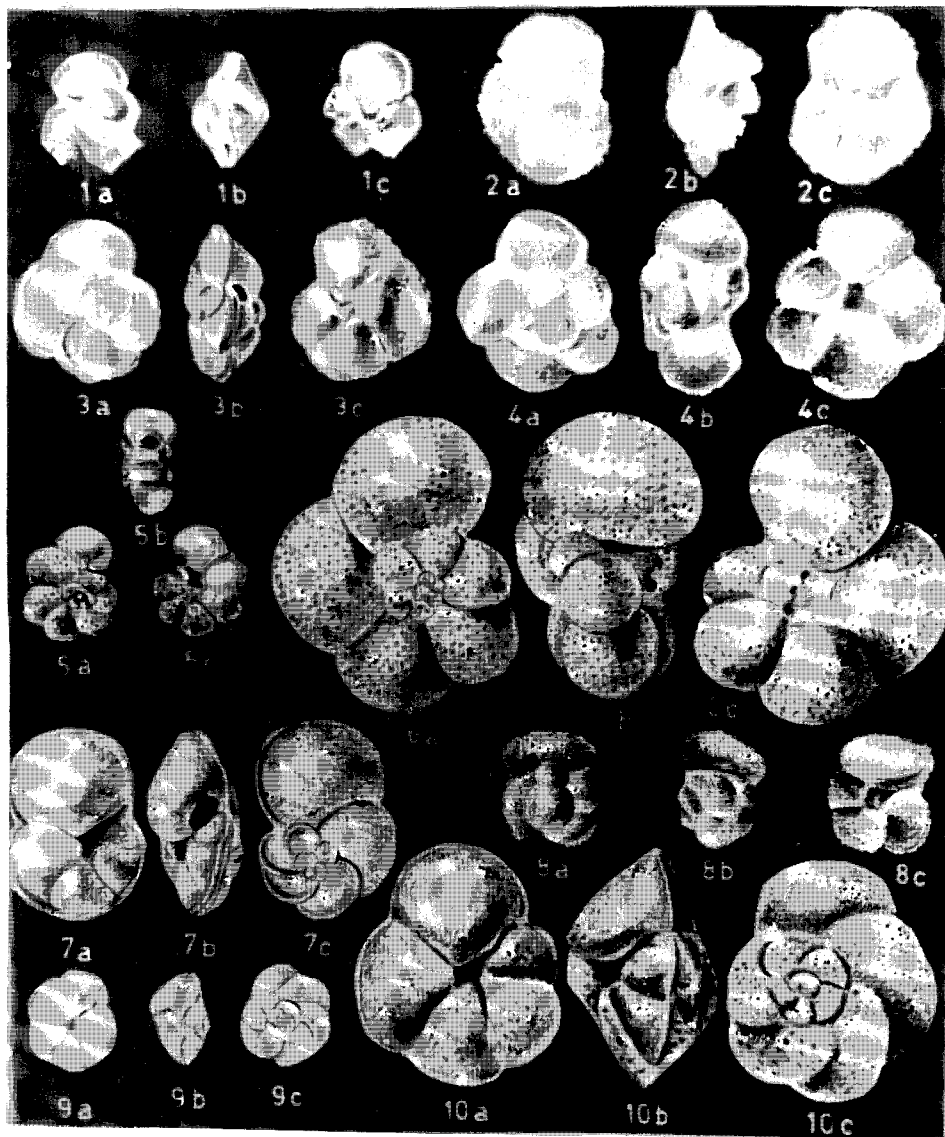


Plate 8

- 1a-c *Globorotalia marginodentata* Subbotina, Sample 31, Um Rijam I, Lower Ypresian.
2a-c *Globorotalia occlusa* Loeblich & Tappan, Sample 8, Um Rijam I, Lower Landenian.
3a-c *Globorotalia occlusa* Loeblich & Tappan, Sample 20, Um Rijam I, Upper Landenian.
4a-c *Globorotalia pentacamerata* Subbotina, Sample 30, Um Rijam I, Ypresian.
5a-c *Globorotalia perclara* Loeblich & Tappan, Sample 3, Um Rijam I, Danian.
6a-c *Globorotalia pseudobulloides* (Plummer), Sample 3, Um Rijam I, Danian.
7a-c *Globorotalia pseudomenardii* Bolli, Sample 9, Um Rijam I, Lower Landenian.
8a-c *Globorotalia pseudotopilensis* (Subbotina), Sample 50, Um Rijam I, Lower Lutetian.
9a-c *Globorotalia pusilla laevigata* Bolli, Sample 10, Um Rijam I, Upper Landenian.
10a-c *Globorotalia pusilla pusilla*, Bolli, Sample 9, Um Rijam I, Lower Landenian.

PLATE 9



Plate 9

1a-c *Globorotalia quadrata* (White), Sample 3, Um Rijam I, Danian.

2a-c *Globorotalia renzi* Bolli, Sample 32, Um Rijam I, Upper Ypresian.

3a-c *Globorotalia rex* Martin, Sample 25, Um Rijam I, Lower Ypresian.

4a-c *Globorotalia triplex* (Subbotina), Sample 50, Um Rijam I, Lower Lutetian.

5a-c *Globorotalia uncinata carinata* El-Naggar, Sample 7, Um Rijam I, Upper Heersian.

6a-7c *Globorotalia uncinata uncinata* Bolli, Sample 5, Um Rijam I, Lower Heersian.

8a-c *Globorotalia velascoensis caucasica* Glaessner, Sample 8, Um Rijam I, Lower Landenian.

9a-c *Globorotalia velascoensis velascoensis* (Cushman), Sample 10, Um Rijam I, Upper Landenian.

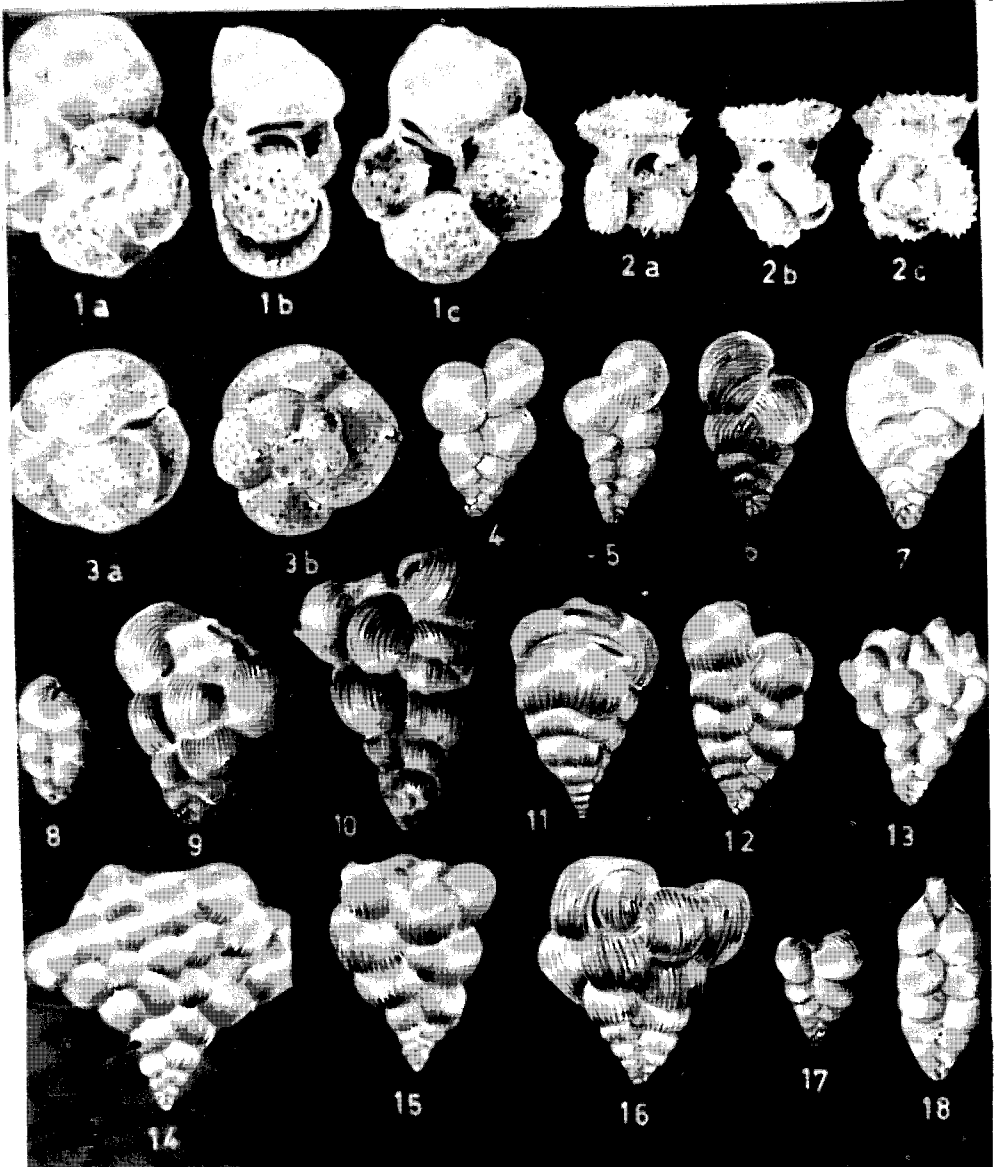


Plate 10

- 1a-c *Globorotalia wilcoxensis* Cushman & Ponton, Sample 25, Um Rijam I, Lower Ypresian.
2a-c *Truncorotaloides topilensis* (Cushman), Sample 55, Um Rijam I, Lower Lutetian.
3a-b *Globigerapsis kugleri* Bolli, Loeblich & Tappan Sample 50, Um Rijam I, Lower Lutetian.
4, 5 *Heterohelix globulosa* (Ehrenberg), Sample 3, Um Rijam II, Middle Maestrichtian.
6 *Heterohelix navarroensis* Loeblich, Sample 10, Um Rijam II, Middle Maestrichtian.
7 *Heterohelic pulchra* (Brotzen), Sample 8, Um Rijam II, Middle Maestrichtian.
8 *Heterohelix striata* (Ehrenberg), Sample 12, Um Rijam II, Upper Maestrichtian.
9, 10 *Pseudotextularia carseyae* (Plummer), Sample 8, Um Rijam II, Middle Maestrichtian.
11, 12 *Pseudotextularia elegans* (Rzehak), Sample 9, Um Rijam II, Middle Maestrichtian.
13, 14 *Pseudotextularia glabrata* (Cushman), Sample 7, Um Rijam II, Middle Maestrichtian.
15, 16 *Racominguembelina fructicosa* (Eger), Sample 8, Um Rijam II, Middle Maestrichtian.
17 *Pseudoguembelina excolata* (Cushman), Sample 8, Um Rijam II, Middle Maestrichtian.
18 *Zeauvigerina aegyptiaca* Said & Kenawy, Sample 9, Um Rijam I, Lower Landenian.

دراسة بيواستراتيجية لصخور الطباشيري العلوي - الثلاثي السفلي
الظاهرة على السطح بمنطقة أم رجام - جنوب المملكة الأردنية
باستخدام الفورامنيفرا الهائمة

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يتضمن البحث دراسة بيواستراتيجية لصخور الطباشيري العلوي - الثلاثي السفلي الظاهرة على السطح بمنطقة أم رجام جنوب المملكة الأردنية باستخدام الفورامنيفرا الهائمة ، وتعتمد الدراسة على مائة وعشرين عينة صخرية جمعت من قطاعين بالمنطقة ، وقد تم التعرف على ٨٢ نوعاً وتحت نوع من الفورامنيفرا الهائمة .

ونتيجة لهذه الدراسة أمكن التعرف على عشرة نطق للفورامنيفرا الهائمة يتميز كل منها بأنواع معينة ، وقد وصفت هذه النطق بالتفصيل بما تحتوية من أنواع الفورامنيفرا الهائمة .