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ARCHAEOGLOBITRUNCANA KEFIANA FORAMINIFERAL ZONE OF THE BASAL TETHYAN MAASTRICHTIAN

(Figs. 3, Pls. 2)

Abstract: Appearance of *Archaeoglobituncana kefiana* and *Archaeoglobituncana praekefiana* n.sp. determines the Maastrichtian base in Tunisia. In the area of El Kef they are found together with the Lower Maastrichtian ammonite species *Pseudokossmaticeras brandti*. The foraminifer association of the *Globotruncana stephensoni* Zone overlying the *Radotruncana calcarata* Zone and underlying the *Archaeoglobituncana kefiana* Zone contains a microfauna of Campanian character. Its thickness in the Tunisian trough is relatively considerable, whereas in the region of the Tunisian platform (condensed sedimentation) already belonging to the Pelagic block, thickness of this zone does not attain more than 1 m. The *Archaeoglobituncana kefiana* Zone s.s. in both these sedimentation zones corresponds to a period of distinct pelagic sedimentation, connected relatively also with greatest deepening of sea at the Campanian-Maastrichtian boundary.

Резюме: Появление *Archaeoglobituncana kefiana* и *Archaeoglobituncana praekefiana* n.sp. определяет маастрихтскую базу в Тунисе. В регионе Эл Кеф они находятся вместе с нижнемаастрихтским аммонитовым видом *Pseudokossmaticeras brandti*. Ассоциация фораминифер зоны *Globotruncana stephensoni*, залегающей над зоной *Radotruncana calcarata* и под зоной *Archaeoglobituncana kefiana*, содержит микрофауну кампанского характера. Ее мощность в тунисском трое довольно значительная, тогда как в регионе тунисской платформы (конденсированное осадконакопление), относящейся уже к пелагическому блоку, мощность этой зоны не достигает более 1 м. Зона *Archaeoglobituncana kefiana* s.s. отвечает в обеих этих осадочных зонах периоду отчетливого пелагического осадконакопления, связанного также самым большим углублением моря на кампанско-маастрихтской границе.

Introduction

As the basal Maastrichtian zone originally the *Globotruncana falsostuarti* Zone was established by Salaj—Samuel (1966), accepted later in the stratigraphical scheme of Tunisia (Salaj—Maamouri, 1971; Bellier, 1973, 1983; Solakius, 1983; Marie—Trouvé—Desforages—Dufaure, 1984), as well as in standard interregional correlation microbiostratigraphical scheme (Sigal, 1977; Robaschynski et al., 1984). This also was evident from fact that to *Globotruncana falsostuarti* SIGAL varieties were assigned with two keels but very distant from each other, which are really found in immediate overlier of the *Radotruncana calcarata* Zone (Salaj, 1980). *Globotruncana falsostuarti* SIGAL in original definition with very approached two

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keels, from which the ventral is only weakly developed (Sigal, 1952), is found much later (Salaj — Maamouri, 1982, 1984) than the Maastrichtian base. For this reason Bellier — Caron — Donze — Herm — Maamouri — Salaj (1983) described the *Globotruncanella havanensis* Zone in overlier of the *Globotruncana* (= *Radotruncana* EL NAGGAR, 1971; Salaj, 1985) *calcarata* Zone and underlier of *Globotruncana falsostuarti* Zone and assigned it to the Maastrichtian. They defined in it the *Globotruncana orientalis* Subzone (redefined as the *Globotruncana stephensoni* Zone, Salaj, 1983) and *Rugotruncana* (= *Archaeoglobitruncana* SALAJ et MAAMOURI, 1984) *kefiana*. This zone was ranged to the Campanian s.l. by Salaj (1983) and Salaj — Samuel (1984).

The fact that the *Archaeoglobitruncana kefiana* Subzone is dated by the occurrence of the ammonite *Pseudokossmaticeras brandti* (REDTENBACHER), which is Lower Maastrichtian (Thiedig — Wiedman, 1976) and associated with *Pachydiscus neubergicus* (HAUER) and *Orbitoides apiculata grunbachensis* PAPP (Kollman — Summesberger, 1982, pp. 92—93), stimulated Salaj (1985) to reassessing this subzone in function of a zone to the Maastrichtian whereas he left the *Globotruncana stephensoni* Subzone in function of a zone in the Campanian s.l. The last mentioned zone, as indicated by Salaj — Maamouri (1928) and Hercogova (in Salaj — Maamouri, 1982) contains a microfauna only of Campanian character and so far no macrofaunistic elements have been found in it, which would permit to range this zone to the Maastrichtian. The criterion that extinction of *Radonita calcarata* is necessary to take into consideration for establishing of the Lower Maastrichtian boundary cannot be held, similarly as extinction of the nannofossil *Quadrum trifidum* (STRADNER) (Verbeek, 1983; Salaj — Maamouri, 1984). *Quadrum trifidum* is proved in the Lower Maastrichtian *Archaeoglobitruncana kefiana* Zone, however, in the *Globotruncana falsostuarti* Zone in the area of El Kef it has not been possible to find this species so far (Verbeek, 1976, 1977; Verbeek in Salaj, 1980). In the stratotype area of the Maastrichtian *Quadrum trifidum* (STRADNER) is also found in the Beutenaken Chalk Member and according to Verbeek (1983) it belongs still to the Campanian. To this opinion also Salaj — Maamouri (1984, p. 555) were tending.

According to Robaszynski — Bless — Felder — Foucher — Legoux — Manivit — Meessen — Van der Tuuli (1983) the Beutenaken Chalk Member unambiguously belongs to the Lower Maastrichtian. It is lying discordantly on the Zeweg Wegen Member delimited by hard-ground at the top.

On the basis of the find of *Belemnella lanceolata* (SCHLOTHEIM) the Beutenaken Chalk Member belongs to the Lower Maastrichtian and appearance of this species, equally as from foraminifers appearance of *Bolivina australis* EDGELL and *Neoflabellina praereticulata* HILTERMANN determines the Maastrichtian base in whole NW Europe (Robaszynski et al., 1983, p. 69). On the contrary, *Neoflabellina praereticulata* HILTERMANN appears in the area of El Kef, equally as in all Tunisia, from base of the *Globotruncana falsostuarti* Zone, related as the base of the Tethyan Maastrichtian by Salaj — Maamouri (1984). As, however, in the presented work we assign also the *Archaeoglobitruncana kefiana* Zone with *Pseudokossmaticeras brandti* to the Maastrichtian s.l.

[originally the upper part of the Campanian s.l. hypostratotype (Sala j — Maamouri 1984) or the upper part of the Kefian proposed by Sala j (1980)], it is evident from the mentioned that this zone is missing in NW Europe and corresponds to a considerable part of a stratigraphical hiatus, which is between the Campanian and Maastrichtian in the Boreal region. Therefore it is quite comprehensible, why *Pseudokonssmaticaras brandti* (REDTENBACHER) has not been found in the Boreal region so far.

Regional extension of the Archaeoglobitruncana kefiana Zone

Foraminifers of this zone have been known only from Tunisia so far, from the subsidence zone of the Tunisian trough defined by Bolze — Burollet — Castany (1952), as well as from the region of the East Tunisian platform, belonging to the Pelagic block, defined by Burollet (1967). The East Tunisian platform (including Axe Nord-Sud) was characterized prevailingly by condensed sedimentation in the Senonian (Sala j, 1978), which was taking place essentially on an elevated bottom in this whole region (= S  nonien sous faci  s tunisien, Solignac, 1927; Sala j, 1978).

In the Tunisian trough foraminifers of the *Archaeoglobitruncana kefiana* Zone are mainly proved in the area of El Kef (Sala j — Maamouri, 1982, 1984; Bellier et al., 1983), from two profiles, from two segments of the Senonian separated by fault. In the profile Kat ez Zerblia (samples AM 96, AM 98, Sala j — Maamouri, 1982; and sample S 4, Sala j, 1980, Fig. 62, coupe I, p. 184) and from the profile of the VIth African Micropaleontological Colloquy (samples KPN 35 L₁, 35 L₂; Sala j, 1980, Fig. 62, II, coupe, p. 184), in which this zone is also proved by the ammonite *Pseudokonssmaticeras brandti* (REDTENBACHER) determined by Prof. Dr. J. Wiedmann (in Sala j, 1980, p. 101). On the basis of this determination the passage, similarly as also the lower part of the second limestone barre of the Abiod formation with *Stegaster altus* SEUNES, was assigned to the Campanian s.l. or Kefian (Sala j, 1980), representing the missing part between the Campanian and Maastrichtian stratotypes.

Regarding to the fact that *Pseudokonssmaticeras brandti* (REDTENBACHER) is only a Lower Maastrichtian element (Tiedig — Wiedmann, 1976), it is evident that the *Archaeoglobitruncana kefiana* Zone represents the basal Maastrichtian zone, proved just in the area where the Campanian, Maastrichtian and Paleocene were proposed as hypostratotypes (Sala j, 1973) or as stratotypes of the Tethyan realm (Sala j — Pozaryska — Szczechura, 1976; Sala j, 1980; Sala j — Maamouri, 1984). Here the *Archaeoglobitruncana kefiana* Zone s.s. is of thickness about 10 m and immediate underlier of the second limestone barre of the Abiod Formation. When the absolute age of the Maastrichtian is 7 mil. years (O  din — Kennedy, 1982), so with thickness of this stage in the area of El Kef 319 m and a rate of sedimentation 4.55714 cm in 10³ y. the age of this zone s.s. results for 220,000 years.

To the *Archaeoglobitruncana kefiana* Zone s.l. (the upper boundary of which is defined by appearance of *Globotruncana falsostuarti*) in original definition also the whole second limestone barre belongs to it and the age, of this zone s.l. with thickness 150 m is of the absolute value 3,305 m.y. Relation of this zone to other Maastrichtian as well as Campanian zones, as to their

thickness and absolute age, is expressed in Fig. 1. Their estimation of age at the profile, which is of greatest thickness in Tunisia, permits to compare these zones with other profiles not only of Tunisia but also of other regions and to draw various conclusions, concerning the rate of sedimentation or also paleogeographical changes and tectonic considerations connected with them.

This concerns also further localities, at which foraminifers of the *Archaeoglobotruncana kefiana* Zone were found. In the region of the Tunisian trough this was still found in the area of El Fahs, locality Dj. Fguira Salah (Salaj — Maamouri, 1984), also in underlier of the second limestone barre of the Abiod Formation. Here this zone is about 50 cm thick and the whole Maastrichtian about 30 m. The El Fahs area represents a moderately inclined slope zone of the Tunisian trough, which was gradually connected with the anticlinal area of Axe Nord-Sud and formed itself a raised bottom where distinct condensed sedimentation was recurrent several times throughout the Upper Cretaceous (Salaj, 1978, 1980, 1985). In this area this was finally connected with break of sedimentation, emersion and erosion in the Middle—Upper Paleocene (Salaj — Bajanik — Menčík — Stránik, 1973).

In the Tunisian platform, as well as Central Tunisia where in the Abiod Formation only one limestone barre is found, the *Archaeoglobotruncana kefiana* Zone is in its underlier. Because of its very little thickness 20—30 cm it has been proved only from the profile Ouel El Hamman in the area of Djebel Trozza so far, studied in detail by A. El Ghali for the geological map 1 : 100 000 at present.

We range also the overlying limestone barre, equally as the upper limestone barre of the Abiod Formation in the Tunisian trough to the *Archaeoglobotruncana kefiana* Zone, prevailingly on the basis of indirect evidence. In their overlier (upper alternation of marls and limestones of the Abiod Formation) *Globotruncana falsostuarti* SIGAL begins to occur, the index species of the zone of equal name. Placement of the boundary between the *Archaeoglobotruncana kefiana* and *Globotruncana falsostuarti* Zones lower or even amidst the limestone barre cannot be precise as we have no free foraminifers from the limestones. The specimens from thin sections, which could belong to *Archaeoglobotruncana kefiana*, come from samples A-11, T-7, T-10 and T-13 in the area of El Kef (Salaj — Maamouri, 1982, p. 468). In every case it will be necessary still to pay considerable attention to the study of foraminifers from this Lower Maastrichtian limestone barre as well as to other fossil groups for the purpose of further solution of discutable questions concerning Lower Maastrichtian stratigraphy in future (Fig. 1).

Paleogeographical and ecological remarks

Regarding to composition of the foraminifer association of the *Archaeoglobotruncana kefiana* Zone (Fig. 2), where besides benthic highly specialized planktonic foraminifers of all three (Bé, 1977) or forth biological depth zones are predominating (Hart — Bailey, 1979; Salaj, 1985), we conclude that in the time of its sedimentation maximum deepening of the sea was taking place in the Senonian in Tunisia. There is a uniform depth regime of the upper epibathyal 400—500 m in the Tunisian trough, what would be confirmed also by the results of studies carried out by Donze et al. (1982) on the

TIME in my	STAGE	PLANKTIC FORAMINIFERAL ZONES AND SUBZONES		THICKNESS calculated		ESTIMA- TED AGE in my	SEDIMEN- TATION RATE 10 ³ y
66.700	UPPER Maastrichtian	Kassabiana falsocalcarata T.R.Z.		15 m	15.03 m	0.300	4.55714 cm
67.030		Abathomphalus mayaroensis I.Z.		35 m	35.05 m	0.765	
67.795		Gansserina gansseri	Racemiguembellina varians I. Sb. Z.	40 m	40.10 m	0.880	
68.675			Racemiguembellina fruticosa I. Sb. Z.	15 m	14.58 m	0.320	
68.995		Globotruncana falsostuarta	Globotruncana gagnebini I. Sb. Z.	23.8 m	23.69 m	0.520	
69.515			Rugotruncana subcircumnodifer I. Sb. Z.	40 m	40.10 m	0.880	
70.395		Archaeoglobituncana kefiana s.l.	Level with Stegaster cf. heberti	12 m	12.33 m	0.270	
70.665			Level without documentation	88 m	88.38 m	1.935	
72.600			Level with Stegaster altus	40 m	40.10 m	0.880	
73.480			Archaeoglobituncana kefiana s.s.	10 m	10.02 m	0.220	
73.700	LOWER Campanian	Globotruncana stephensoni P.R.Z.		90 m	90.26 m	1.860	4.82727 cm
75.560		Radotruncana calcarata T.R.Z.		60 m	60.34 m	1.250	
76.810		Globotruncana ventricosa	Radotruncana subspinoso I. Z.	110 m	110.06 m	2.280	
79.090			Globotruncana rugosa I.Z.	113 m	113.44 m	2.350	
81.440		Rosita scutilla I.Z.		83 m	82.06 m	1.700	
83.140		Globotruncana arca I.Z.		75 m	75.30 m	1.560	
84.700							

Fig. 1. Estimated age of the Campanian–Maastrichtian planktonic foraminiferal zones in Tunisia (El Kef area).

- Ammodiscus cretaceus* (REUSS)
Heterostomella foveolata (MARSON)
Heterostomella mexicana CUSHMAN
Gaudryina cretacea (KARRER)
Gaudryina pyramidata CUSHMAN
Dorothia conula (REUSS)
Dorothia oxycoma (REUSS)
Pyramidina szajnochae (GRZYBOWSKI)
Rzehakina epigona (RZEHAK)
Gyroidina globosa HAGENOW
Gyroidina umbilicata D'ORBIGNY
Eponides haidingeri D'ORBIGNY
Pullenia quinqueloba (REUSS)
Pullenia reussi CUSHMAN et TODD
Stensioeina exsculpta (REUSS)
Stensioeina pommerana BROTZEN
Anomalina welleri laevis VASILENKO
Gavelinella costata BROTZEN
Gavelinella montelerensis (MARIE)
Cibicides beaumontianus (D'ORBIGNY)
Cibicides excavatus BROTZEN
Cibicides voltzianus (D'ORBIGNY)
Praebulimina carseyae (PLUMMER)
Bolivina incrassata incrassata (REUSS)
Bolivina plaita CARSEY
Bolivinoidea draco militaris
 HILTERMANN et KOCH
Neoflabellina efferata WEDEKIND
Neoflabellina numismalis WEDEKIND
Neoflabellina rugosa D'ORBIGNY
Globigerinelloides volutus (WHITE)
Globigerinelloides multispinus
 (LALICKER)
Hedbergella planispira (TAPPAN)
Rudoglobigerina rugosa (PLUMMER)
- Archaeoglobitruncana kefiana* (SALAJ et MAAMOURI)
Archaeoglobitruncana praekefiana n. sp.
Gansserina magdalensis (GANDOLFI)
Globotruncana aegyptiaca NAKKADY
Globotruncana arca arca (CUSHMAN)
Globotruncana arca rugosa (MARIE)
Globotruncana bulloides VOLLER
Globotruncana fundiconulosa
 SUBBOTINA
Globotruncana obliqua HERM
Globotruncana stephensoni PESSAGNO
Globotruncana ventricosa WHITE
Globotruncana trinidadensis GANDOLFI
Globotruncanella insignis (GANDOLFI)
Globotruncanella smithi (SALAJ)
Radotruncana subspinosus (PESSAGNO)
Rosita fornicata (PLUMMER)
Rosita plummerae (GANDOLFI)
Rosita scutilla (GANDOLFI)
Heterohelix globulosa (EHRENBERG)
Heterohelix moremani (CUSHMAN)
Heterohelix navarroensis LOEBLICH
Heterohelix planata (CUSHMAN)
Heterohelix pulchra (BROTZEN)
Pseudoguembelina costata (CUSHMAN)
Pseudoguembelina excolata (CUSHMAN)
Sigalia bejaouensis SALAJ et MAAMOURI
Gublerina reniformis (MARIE)
Pseudotextularia deformis (KIKOINE)
Pseudotextularia elegans (RZEHAK)
Planoglobulina brazoensis MARTIN
Planoglobulina carseyae (PLUMMER)
Ventilabrella gabrata CUSHMAN

Fig. 2. Foraminifers distribution in the *Archaeoglobitruncana kefiana* Zone of the El Kef section.

basis of ostracodes. On the contrary, in the region of the East Tunisian platform, regarding to condensed sedimentation under conditions of raised bottom, the sea could have had maximum depth of 200 m.

We put this deepening of sea into relation with general Upper Campanian—Lower Maastrichtian Transsaharan transgression (Reyment, 1980; Salaj—Maamouri, 1982; Salaj—Megerisi, 1984), which was obviously taking place after distinct tectonic processes in the Middle to Upper Campanian—Maastrichtian, distinctly manifested in the Boreal as well as Tethyan realm.

Remarks to vertical range and phylogeny of planktonic foraminifers at the Campanian—Maastrichtian boundary

In the *Globotruncana stephensoni* Zone, situated between the *Radotruncana calcarata* and *Archaeoglobitruncana kefiana* Zones, 90 m thick, the age of

which is estimated by the authors to 1960 My (Fig. 1), is rich in microfauna (Sala j — Maamouri, 1982, pp. 446—447). It is important to mention that from the base of this zone *Globotruncana aegyptiaca* NAKKADY, known in Israel already in the uppermost part of the *Radotruncana calcarata* Zone (Reiss et al., 1985), appears. Basing on this fact, we can confirm that primitive forms of this species may be found in the last 5 m of the *Radonita calcarata* Zone also at the profile of El Kef. In the *Globotruncana stephensoni* Zone *Radotruncana subspinoso* (PESSAGNO) is uncommonly abundant. In no case the occurrence of *Globotruncana falsostuarti* SIGAL has been proved in this zone or in the *Archaeoglobituncana kefiana* Zone. In both zones *Globotruncana arca rugosa* (MARIE) and *Globotruncana stephensoni* PESSAGNO, younger in phylogeny, from which *Globotruncana falsostuarti* SIGAL developed, are abundant. All forms, found here and similar on morphology to *Globotruncana falsostuarti*, differ from this in distinctly developed keels, considerably distant from each other.

As to benthic foraminifers, it is important to mention that *Neoflabellina praereticulata* HILTERMANN and *Neoflabellina reticulata* (REUSS) are not found here. The last mentioned species is neither present in the *Archaeoglobituncana kefiana* Zone, nor in the lower part of the *Globotruncana falsostuarti* Zone. *Neoflabellina reticulata* is only found in the upper part of the *Globotruncana falsostuarti* Zone together with *Racemiguembelina textulariformis* (WHITE). The *Globotruncana falsostuarti* Zone belongs to the upper part of the Lower Maastrichtian as confirmed in Libya by the presence of *Baculites anceps* LAMARCK (Sala j — Megerisi, 1984, p. 212), which is the index species for the higher part of the Lower Maastrichtian.

In the *Archaeoglobituncana kefiana* Zone (Bellier — Caron — Donze — Herm — Maamouri — Sala j, 1983), besides the index fossil, *Archaeoglobituncana praekefiana* n. sp., *Gansserina magdalensis* (GANDOLFI) and *Globotruncana fundiconulosa* SUBBOTINA appear for the first time. When in the *Globotruncana stephensoni* Zone representatives of the genus *Archaeoglobigerina* were relatively considerably represented, their explosive development was taking place in this zone and the genus with the type species *Archaeoglobituncana kefiana* originated (Sala j — Maamouri, 1984). Transitional species between the genera *Archaeoglobigerina* PESSAGNO, 1967 and *Archaeoglobituncana* Sala j — Maamouri, 1984 are also present. These are characterized by elongated chambers on the ventral side. The new species *Archaeoglobituncana praekefiana* n. sp. is concerned. From this species by appearance of a double row of tubulose spines the species *Archaeoglobituncana kefiana* originated. We observe the tendency to elongation of chambers on the ventral side and with indication of formation of tubulose spines also in varieties of *Gansserina magdalensis* (GANDOLFI). It is a group of new subspecies, which we designate preliminarily as *Gansserina magdalensis* n. subsp.₁ and *Gansserina magdalensis* n. subsp.₂ (Fig. 3). Other foraminifer species found in this zone are diachronous. Their complete list is mentioned in Fig. 2.

From nannoplankton it is necessary to mention mainly the occurrence of *Quadrum trifidum* (STRADNER), which, however, is not passing into the following *Globotruncana falsostuarti* Zone any more.

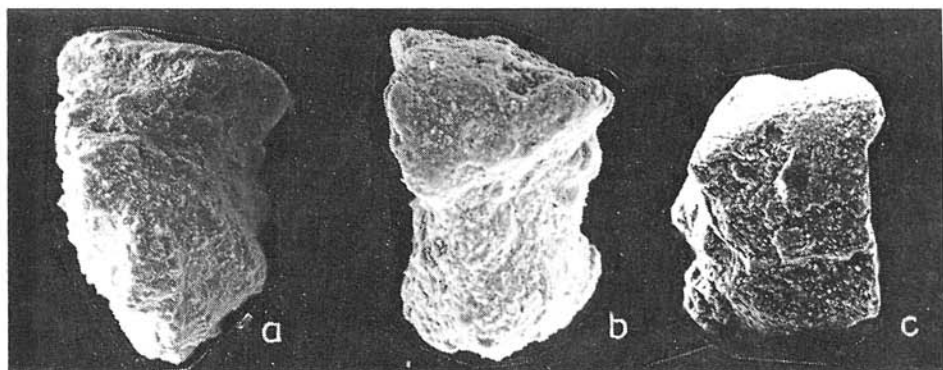


Fig. 3. a — *Globotruncana fundiconulosa* SUBBOTINA (x 70); b, c — *Gansserina magdalenensis* n. subsp. (x 230, x 200), sample KPN 85 L, loc.: El Kef, Lowermost Maastrichtian.

Conclusion

In the distinctly subsidence zone of the Tunisian trough in the area of El Kef Campanian—Maastrichtian sediments have considerable thickness (Fig. 1). Establishing of the *Globotruncana stephensoni* and *Archaeoglobitruncana keffiana* Zones at the Campanian—Maastrichtian boundary, thus in overlies of the *Radotruncana calcarata* Zone (the upper boundary of which in the Tethyan realm is considered as the upper boundary of the Campanian) and in underlies of the *Globotruncana falsostuarta* Zone (the lower boundary of which is also considered as the Maastrichtian base) is of extraordinary importance in considering of paleogeographical and tectonic development of various regions. They are mainly regions with condensed sedimentation with frequent stratigraphical hiatuses, regions where distinct tectonic processes were taking place and platform zones of North Africa and the Near East connected with regressions and formation of horizons of phosphate deposits as well as with extensive transgressions taking place just at the Campanian—Maastrichtian boundary. If we take into consideration that the absolute age of these two foraminifer zones in the Tunisian trough at the Campanian—Maastrichtian boundary is more than 5 mil. y., thus we receive a considerable time datum for these events. It was and also is difficult to establish this time extent in regions with distinct condensed sedimentation as these two zones a very minimum, often zero thickness (S a l a j — M a a m o u r i, 1984, p. 469).

Paleontological description

Family *Globotruncanidae* BROTZEN, 1942

Genus *Archaeoglobitruncana* SALAJ et MAAMOURI, 1984

Archaeoglobitruncana praekeffiana n. sp.

Pl. 1, Figs. 4—5

Type species: Figured in Pl. 1, Figs. 4—5 and deposited in the collection of the Dionýz Štúr Institute of Geology in Bratislava, No. T-14.

Denomination: From Latin prae — pre and the name kefiana.

Type level: Lower part of the *Archaeoglobittruncana kefiana* Zone (sample 85 L₁), upper part of alternation of the Abiod Formation.

Type locality: Road cut of Hammam Mellégue, El Kef, Tunisia.

Material: 4 specimens coming from sample 85 L₁.

Diagnosis: Test calcareous, finely perforate with fine pustules, dextral, with two whorls, in the last with five demi-arched chambers, in the first globose. Outline lobate. Wide peripheral band, bordered by two distinct pustulate keels. Dorsal side flat, chambers on the ventral side distinctly elongated with sutures deeply depressed, moderately bent to radial. Primary aperture umbilical — extraumbilical, slit-like, without porticus. Umbilicus deep and relatively large.

Dimensions: Diameter 0.45 mm, height 0.15 mm; at the last chamber 0.25 mm.

Remarks: We consider this species as predecessor of *Archaeoglobittruncana kefiana* (SALAJ — MAAMOURI). We observe at the second chamber of the last whorl of the described species at the elongated chamber an indication of spine, which is distinctly developed in primitive specimens of *Archaeoglobittruncana kefiana* (Pl. 1, Figs. 1—2). According to morphology of the test the newly described planktonic species was living in the second depth zone.

Translated by J. Pevný

Plate 1

Figs. 1—2. *Archaeoglobittruncana kefiana* (SALAJ et MAAMOURI) (x 190, x 229), sample 85 L₁, loc.: El Kef, Lowermost Maastrichtian.

Fig. 3. *Gansserina magdalensis* (GANDOLFI) (x 270), sample 85 L₁.

Figs. 4—6. *Archaeoglobittruncana praekefiana* n. sp. (x 170, x 200, x 170), type species, sample 85 L₁.

Figs. 7—9. *Gansserina magdalensis* n. subsp. (x 160, x 190, x 160), sample 85 L₁.

Plate 2

Fig. 1. *Gaudryina cretacea* (KARRER) (x 170), sample AM-98, loc.: El Kef, Lowermost Maastrichtian, *Archaeoglobittruncana kefiana* Zone; Fig. 2. *Neoflabellina reticulata* (REUSS) (x 60), sample 85R, loc.: El Kef, Lower Maastrichtian, *Globotruncana falsostuarti* Zone (upper part); Fig. 3. *Clavulina clavata* CUSHMAN (x 75), sample AM-93; Fig. 4. *Fronicularia* aff. *jarvisi* CUSHMAN (x 25), sample AM-98; Fig. 5. *Bandyella* sp. (x 40), sample AM-93; Figs. 6—9. *Neoflabellina efferata* (WEDEKIND) (x 95, x 125), sample AM-98; Fig. 7. *Boliviniopsis rosula* (EHRENBERG) (x 115), sample AM-98; Fig. 8. *Lenticulina* (*Planularia*) sp. (x 75), sample AM-98; Fig. 10. *Gavellinella costata* BROTZEN (x 70), sample AM-84, loc.: El Kef, Upper Campanian, *Globotruncana stephensoni* Zone; Fig. 11. *Stensioeina pommerana* BROTZEN (x 60), sample AM-93; Fig. 12. *Gavellinella monterelensis* (MARIE) (x 70), sample AM-70, loc.: El Kef, *Globotruncana stephensoni* Zone; Fig. 13. *Gavellinella pertusa* BROTZEN (x 60), sample AM-70.

Plate 1

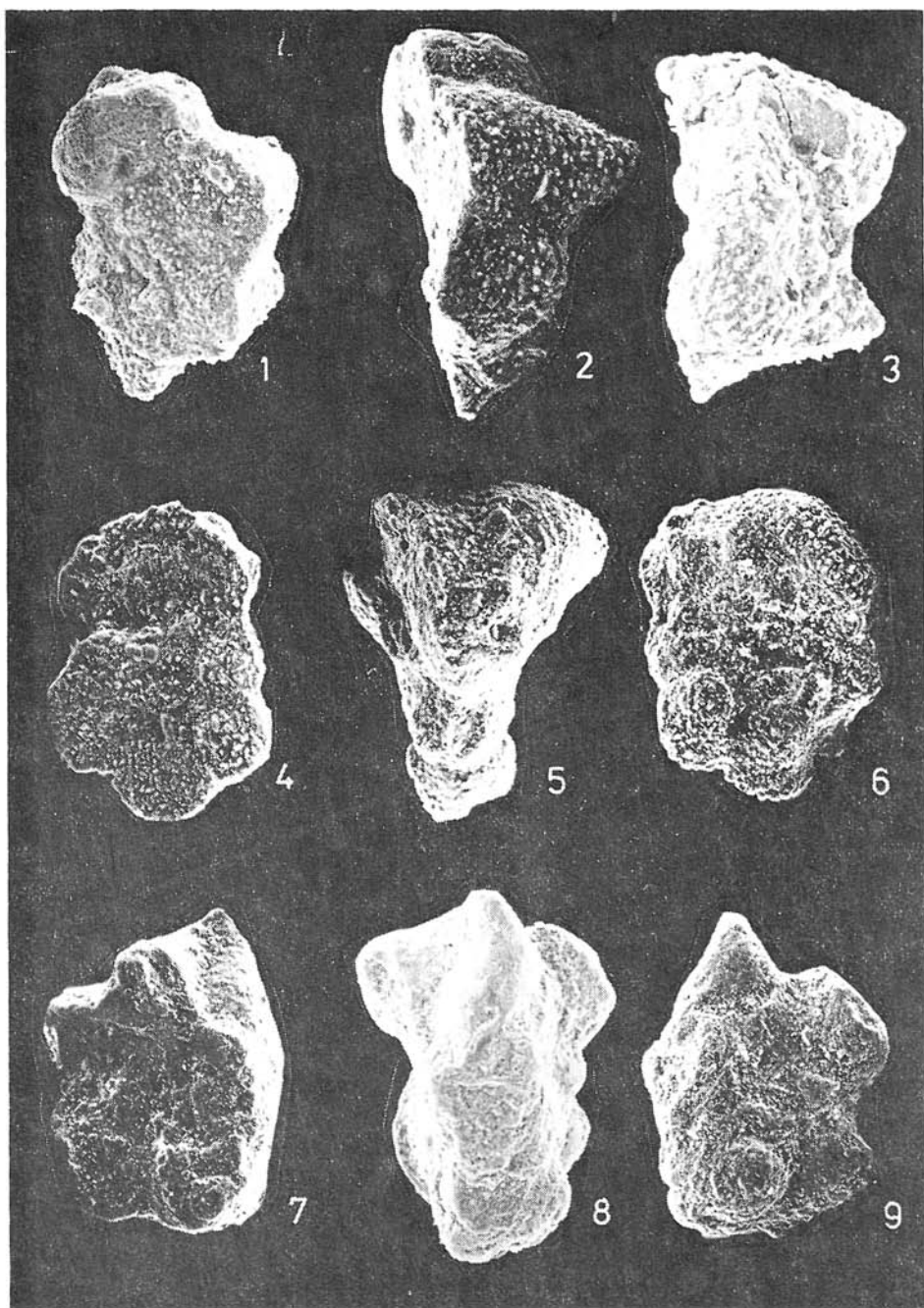
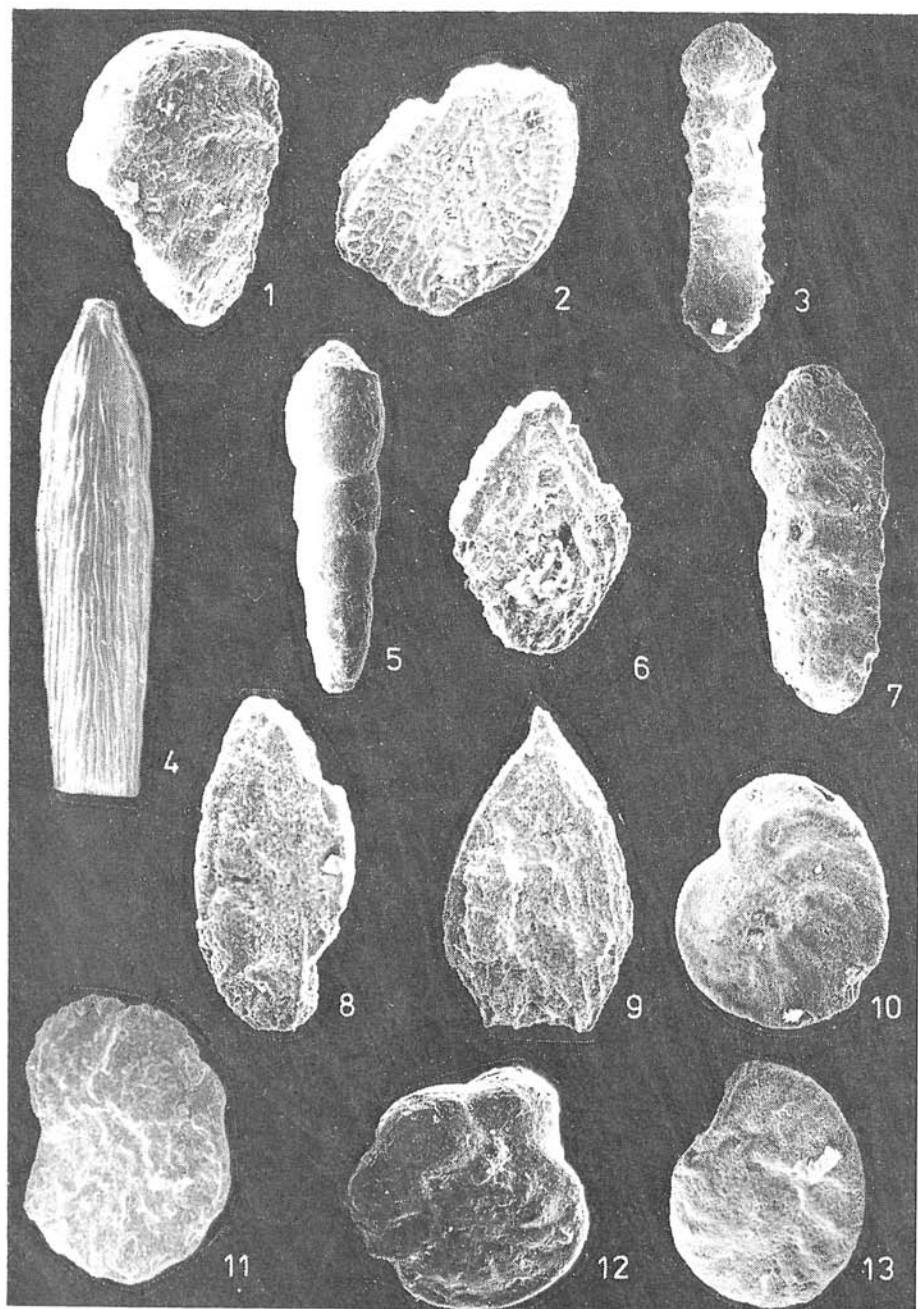


Plate 2



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