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INTEGRATED MICROBIOSTRATIGRAPHY OF THE ALBIAN TO BASAL SANTONIAN AND ITS PROBLEMS

(Figs. 4, Pls. 2)

Abstract: The description of *Favusella fahsensis* n. sp., developed from *Ticinella roberti* and found in the Lower Albian *Douvilleiceras mammillatum* Zone from Tunisia. At the section of Dj. Fguira Salah with the situated proposed stratotype Albian—Cenomanian boundary is documented by appearance of *Mantelliceras martinpreyi*, *M. saxbyi*, *Neostlingoceras carcitanense* and *Thalmanninella brotzeni*, here is confirmed too that in the upper part of the Lower Cenomanian, with *Ostlingoceras rorayensis*, *Rotalipora montsalvensis* is absent. For the Cenomanian—Turonian boundary the appearance of *Dicarinella imbricata* is proposed for acceptance, corresponding probably to the appearance of *Vascoceras cauvini;* the proposed stratotype Turonian—Coniacian boundary (Dj. Fguira Salah) is documented by appearance of *Dicarinella concavata* and at the same locality the proposed Coniacian—Santonian stratotype boundary is documented by appearance of I. (*Cataceramus*) *siccensis* and *Sigalia carpathica; Texanites olivetti* appears a few metres higher.

Резюме: В статье описывается *Favusella fahsensis* n. sp. развитый из *Ticinella roberti* и найденный в нижнеальбской зоне *Douvilleiceras mammillatum* в Тунисе. В профиле Дж. Фгуира Салах с расположенным предложенным стратотипом альбско-сеноманская граница документирована появлением *Mantelliceras martinpreyi*, *M. saxbyi*, *Neostlingoceras carcitanense* и *Thalmanninella brotzeni*, здесь также подтверждено, что в верхней части нижнего сеномана с *Ostlingoceras rorayensis* отсутствует *Rotalipora montsalvensis*. Для сеноманско-туронской границы появление *Dicarinella imbricata* отвечающее вероятно появлению *Vascoceras cauvini*; предложено для принятия; предложенный стратотип туронско-коньякской границы (Дж. Фгуира Салах) документируется появлением *Dicarinella concavata* и в той же самой местности предложенная граница коньяк-сантонского стратотипа документируется появлением *I. (Cataceramus) siccensis* и *Sigalia carpathica*. *Texanites olivetti* появляется несколько метров выше.

Introduction

The latest results of microbiostratigraphic division of the Albian—Lower Santonian as well as the question of solution of the boundaries between these stages on the basis of planktic foraminifers are summarized in the works by Marks (1984a, b) and Robaszynski—Caron (1979). Detailed microbiostratigraphic division is also carried out in Tunisia (Salaj, 1969, 1980; Salaj—Bellier, 1978; Salaj—Gašpariková, 1983; Hojjatzadeh, 1981) where the hypostratotypes of Upper Cretaceous stages has been proposed (Salaj, 1973, 1980). Moreover, also establishing of some possibility of proposal of stratotype boundaries can be taken into consideration here (Bir-

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kelund et al., 1984; Salaj 1984). The division of the Albian—Lower Santonian is also carried out in the West Carpathians (Began et al., 1978; Salaj—Gašpariková, 1979, 1983; Gašpariková—Salaj, 1984). The West Carpathians, which represent the northern branch of the Tethys (Salaj—Gašpariková, 1979) are an antipole to the South Tethyan regions. From the region of Tunisia its ideal profiles from Central Tunisia represented by platform, shallow-water types, from the Tunisian Trough (of deep-water type) as well as from Eastern Tunisian Platform represented by condensed sequences on raised bottom are suitable to establishing of standard macro-and microbiostratigraphic schemes of the Tethyan realm.

Albian

On the basis of planktic foraminifers in Tunisia standard profiles for microbiostratigraphical division of the Albian in carbonate facies are the profile of Dj. Douamess (Salaj, 1980) and the profile in the area of Dj. Fguira Salah — Thuburbo Majus (Salaj — Bellier, 1978), whereas in the West Carpathians in the Klippen Belt near Žilina it is the Albian of the Vreteno klippe (Began et al., 1978).

Index species, characteristic of the individual Albian interval zones, are as follows: *Ticinella roberti* (GANDOLFI) and *Hedbergella globigerinellinoides* (SUBBOTINA) (from the base of the *Leymeriella tardefurcata* Zone); *Tricinella bejaouensis* SIGAL and *Favusella fahsensis* n. sp. (appearing in the time of the *Douvilleiceras mammilatum* Zone, from which the former appears in the Boreal region from the base of the *Callihoplites auritus* Zone; Kennedy — Hancock 1978; or *Otohoplites auritus Zone* see Marks, 1984, p. 18 = corrected *Otohoplites auritiformis;* see Robaszynski 1984, p. 193); *Ticinella primula* LUTERBACHER (above the base of the Middle Albian, Marks, 1984); *Ticinella breggiensis* (GANDOLFI) (from the base of the *Diploceras cristatum* Subzone); *Thalmanninella subticinensis* GANDOLFI (uppermost Middle Albian, upper part of the *Diploceras cristatum* Subzone, MARKS 1984); *Thalmanninella ticinensis* (GANDOLFI) (from the base of the Upper Albian with *Mortoniceras inflatum*). The base of the Upper Albian Zone with *Stoliczkaia dispar* is determined by *Planomalina buxtorfi* (GANDOLFI) and *Whiteinella gandolfii* GAŠPARIKOVÁ—SALAJ, 1984 (previously *R. stephani* (GANDOLFI) sensu Salaj — Samuel, 1966; Salaj — Bellier, 1973, 1978). At the same time *Thalmanninella appenninica balernaensis* GANDOLFI appears, which cannot be considered as a synonym of the species *Thalmanninella appenninica appenninica* (RENZ) (cf. toxonomic problems in Gašpariková — Salaj, 1984, pp. 46—47).

As to data from literature on the occurrence of the species *Thalmanninella brotzeni* SIGAL and *Thalmanninella globotruncanoides* SIGAL from the Albian, so these species are not found, so far as profiles from Tunisia are concerned, below the boundary of appearance of *Hypoturrilites schneegansi* DUBORDIEU. In the West Carpathians this information on their occurrence in the Upper Albian we cannot verify, but so far these species have always been mentioned from the Cenomanian only (Salaj — Samuel, 1984).

In the West Carpathians, in flysch turbidite sediments of the Klape unit (their sedimentation was distinctly influenced by the Klape or "Ultrapieninic" ridge supplying material into the partial Klape sedimentation area from the south and into the Drietoma partial sedimentation area; Salaj — Began 1983) benthic calcareous and agglutinated foraminifers were distinctly manifested in composition of microfauna. In the Lower Albian in the *Leymeriella tardefurcata* Zone the species *Haplophragmoides nonioninoides* (REUSS) predominates whereas in the Middle and Upper Albian in the *Thalmanninella subticinensis*, *Thalmanninella ticinensis* and *Whiteinella gandolfii* zones representatives of the genera *Ammodiscus* REUSS, 1861; *Glomospira* RZEHAK, 1888; *Glomospirella* PLUMMER, 1945; *Hyperammina* BRADY, 1878; *Rhabdammina* SARS, 1869 and *Dendrophrya* WRIGHT, 1861 are prevailing from agglutinated foraminifers.

We remark that distinct deep-water associations of agglutinated foraminifers (*Plectorecurvoides* NOTH, 1952; *Recurvoides* EARLAND, 1934 and others), known, for instance, from the Albian of the Bašské beds of the Flysch Belt in Moravia (Hanzlíková, 1972), have neither been proved in the Klape zone, nor in the Albian of other tectonic units of the West Carpathians. Remarkable is the presence of relatively abundant representatives of the genus *Arenobulimina* CUSHMAN, 1927 in the Albian of the Klape zone, unknown in the Flysch Belt of the West Carpathians. These are, however, generally known from many areas of the Boreal region (Price, 1977). We explain their presence by penetration from the Boreal region into the North Tethyan Carpathian branch. It is necessary to call attention to the fact that also redeposited Epistominas are taking part in composition of Albian foraminifer associations, showing features to transportation from shallower-water slope zones of the Albian of the Klape ridge.

Cenomanian

For zonal subdivision of the Cenomanian in Tunisia as well as the West Carpathians of Slovakia planktic foraminifers of the subfamily *Rotaliporinae* were used. In these regions their phyllogeny was studied by Began et al. (1978); Salaj — Bellier (1978); Salaj — Samuel (1984). From taxonomic viewpoint the revision of the type species of the genus *Rotalipora*, *Rotalipora turonica* BROTZEN 1942, is important, carried out by Solakius — Salaj 1(987) and shows justification of the validity of the genus *Thalmanninella* SIGAL, 1949. The validity of this genus was indicated previously by Maslakova (1961, 1978); Salaj — Samuel (1966) and Longoria — Gamper (1975).

At the profile Dj. Fguira Salah (Fig. 1) the Basal Cenomanian (sample No. 1194) with *Sciponoceras baculoides* (MANTELL) and *Mantelliceras* aff. *couloni* (d'ORBIGNY) (Salaj — Bellier, 1978) has a rich association of ammonites, described by Solignac (1927, p. 170) with *Mantelliceras martinpreyi* (COQUAND). This species is easily confused with the flattened form of the *Mentelliceras couloni* (d'ORBIGNY) (Kennedy — Hancock, 1978, p. V. 13)

Fig. 1. Dj. Fguira Salah near El Fahs.
Explanations: 1 — Upper Albian Zone with *Stoliczkaia dispar* (d'ORBIGNY); 2 — base of the Cenomanian with *Neostlingoceras carcitanense* (MATHERON); 3 — Lower Cenomanian level (child) with *Kingena wacoensis* (ROEMER).

and as is noted by Kennedy—Hancock (l. c.) Pervinquière identified with it some Tunisian form which mentioned authors (l. c.) referred to *Mantelliceras batheri* and *Eucalycouras lymense*.

The author must mention that the *Mantelliceras martinpreyi* (COQUAND) and *Mantelliceras saxbyi* (SHARPE) (determination of Thomel, 1969 from the material of Bajanik—Biely—Menčík—Salaj—Stráník in the unpublished rapport No. 175 of Lemmi, 1969, Geological Survey of Tunisia) were found too at the base of the Cenomanian (sample No. 1451 — with *Thalmanninella brotzeni* SIGAL) not very far from the same level as is the sample No. 1194.

The Cenomanian base is determined too by appearance of *Thalmanninella brotzeni* SIGAL, proved together with appearance of *Neostlingoceras carcitanense* (MATHERON), at the locality Dj. Fguira Salah. This locality together with Monts Mellègues (Dj. Hameina, Hanckock, 1984), can be taken into consideration as the stratotype boundary for the Albian—Cenomanian (Birkelund et al., 1984; Kennedy, 1984; Salaj, 1984). Subdivision of the Cenomanian on the basis of planktic foraminifers in Tunisia as well as the West Carpathian was carried out by Salaj (1969, 1980); Salaj—Samuel (1966, 1984); Gašpariková—Salaj (1984); Bellier—Salaj (1978) and Bellier (1978, 1983).

In the Lower Cenomanian, in the upper part of the *Mantelliceras mantelli* Zone, *Thalmanninella reicheli* (MORNOD) and *Rotalipora montsalvensis* (MORNOD) appear according to Marks (1984b). It is, however, necessary to remark that at profiles in Tunisia (area of Zaghouan, Salaj, 1980) in no case these species have been found in the *Mantelliceras mantelli* Zone.

The same situation is in the upper part of the Lower Cenomanian at the section of the Djebel Fguira Salah where the author found *Ostlingoceras rorayensis* (COLIGNON) (Fig. 2). *Rotalipora montsalvensis* (MORNOD) is neither present there.

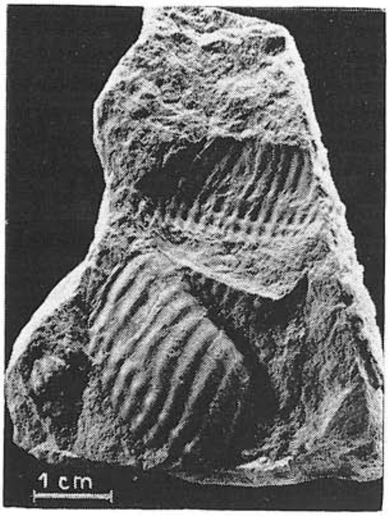

Fig. 2. *Ostlingoceras rorayensis* (COLLIGNON). Upper part of the Lower Cenomanian. Loc.: Dj. Fguira Salah.

Moreover, the species designated as *Rotalipora montsalvensis* (MORNOD) by Bellier (1983) from Tunisia corresponds to the species *Thalmanninella evoluta* SIGAL and the Lower Cenomanian species assigned to the species *Thalmanninella reicheli* (MORNOD) belong to *Thalmanninella deeckei* (FRANKE). *Rotalipora montsalvensis* (MORNOD) begins to appear, as proved, in the Middle Cenomanian (Salaj—Samuel, 1966; Porthault, 1969) and *Thalmanninella reicheli* (MORNOD) appears from the base of the *Rotalipora cushmani* Zone.

Turonian

After a distinct world-wide oceanic faunistic crisis in the *Metoicoceras geslinianum* Zone (its base appears to be one of the proposed possibilities for establishing of the Lower Turonian boundary, Birkelund et al., 1984), after sudden extinction of rotalipores, explosive development of representatives of the genera *Whiteinella* PESSAGNO, 1967 and *Dicarinella* PORTHAULT, 1970, was taking place.

This boundary would also be in agreement with the "traditional" Cenomanian—Turonian boundary (Ernst et al., 1984, p. 105).

Further alternative proposals (Birkelund et al., 1984; Hancock, 1984) for definition of the base of the stratotype boundary of the Turonian, i. e. also of the basal Turonian zone (base of the *Waticoceras coloradoensis* Zone; also Robaszynski, 1984, or the base of the *Pseudospidoceras flexuosum* Zone, Cobban, 1984) are connected with some difficulties and problems (Hancock, 1984, p. 127), from which the serious problem is that the mentioned ammonite zones do not contain a characteristic planktic microfauna or are very poor in microfauna at the proposed localities.

For complementation of the problem it is still necessary to mention that in case of accepting of this second alternative (= corresponding also to the entry of the genus *Mytiloides;* see Ernst et al., 1984, pp. 110—111) it is evident that from the Turonian base already highly specialized Turonian species as *Helvetoglobotruncana helvetica* (BOLLI) would begin to appear (Ernst, p. 111) together with *Dicarinella trigona* (SCHEIBNEROVÁ) and on the other hand typical Turonian associations of foraminifers with *Dicarinella imbricata* (MORNOD) and *Dicarinella hagni* (SCHEIBNEROVÁ) would so get to the Cenomanian from where they have not been described so far.

It is evident from the above mentioned that when we take into consideration all views of the proposal of the Cenomanian—Turonian boundary, these alternatives are suitable:

a) The Cenomanian—Turonian boundary would de defined essentially in original "traditional" conception, i. e. at the base of the ammonite *Metoicoceras geslinianum* Zone. This would also be in agreement with the opinion of this boundary accepted so far in the West Carpathians (Salaj—Samuel, 1966) and in Tunisia (Salaj—Bellier, 1978), i. e. that the foraminifer association with *Rotalipora cushmani* (MORROW) and *Rotalipora turonica* BROTZEN would reach the basal Turonian.

b) The Cenomanian—Turonian boundary would take its course amidst the *Metoicoceras geslinianum* Zone, i. e. from appearance of *Vascoceras cauvini* CHUDEAU. This species, as proved by Lewy et al. (1984) is found together with *Metoicoceras geslinianum* (d'ORBIGNY) and their Lower Turonian *Vascoceras cauvini* Zone may be correlated with the Upper Cenomanian *Neocardioceras juddii* Zone in Texas (Cobban, 1984) indirectly, on the basis of the occurrence of *Pseudospidoceras pseudonodosoides* (CHOFFAT) in both zones. Therefore the author proposes (Salaj, 1986a) to understand the Upper Cenomanian *Metoicoceras geslinianum* Zone as a zone s. s. defined at the top by appearance of the species *Vascoceras cauvini* CHUDEAU. On the contrary, the Lower Turonian *Vascoceras cauvini* Zone known from Israel (Lewy et al., 1984) would be understood as a zone s. l., the lower boundary of which would be determined by appearance of the species *Vascoceras cauvini* CHUDEAU a so would also include the upper part of the *Metoicoceras geslinianum* Zone s. 1. and the whole *Neocardioceras juddii* Zone. The base of the *Vascoceras cauvini* Zone would so also correspond more or less to extinction of rotalipores as well as to the base of the West Carpathian foraminifer *Dicarinella imbricata* Zone or throughout Tethyan *Whiteinella gigantea* (= syn. *W. archeocretacea,* see Salaj — Gašpariková, 1983) — *Dicarinella imbricata* Zone. The so proposed Cenomanian—Turonian boundary would be also in full agreement with proposal of Marks (1984b).

Turonian planktic foraminifers are extraordinarily important for detailed division of the Turonian. This division is also based on their detailed phylogeny, studied in the West Carpathians by Salaj — Samuel (1966) and Began et al. (1978) and in Tunisia by Salaj (1970) and Salaj — Bellier (1978).

In phylogenetic considerations and in the first place in stratigraphic division of Turonian and Coniacian—Santonian sediments in various palaeographical regions it is necessary to take into account, besides geographic factors, also the depth factor, which is very important in considering not only of the stratigraphy, but also of individual foraminifer associations (Salaj, 1986b). Their composition is distinctly changing, not only depending on the environment (as to benthic foraminifers) but also on depth. We may clear up these factors in relation to facies of individual microfaunistic paleoecosystems by detailed analysis only.

We mention several examples:

a) as a consequence of isolation if the North Tethyan branch representatives of the genera *Hedbergella* BROENNIMANN et BROWN, 1958, *Clavihedbergella* BANNER et BLOW, 1959 and *Whiteinella* PESSAGNO, 1967 are missing in the Turonian of the West Carpathians.

b) In shallow-water Turonian sediments of the Boreal region of NW and northern Europe as well as a consequence of regression and transgressions prevailingly representatives of the IV. depth biological zone as *Helvetoglobotruncana helvetica* are very rare or missing (Hart — Bailey, 1979).

c) *Helvetoglobotruncana helvetica* (BOLLI) is missing, e. g. also in shallow-water South Tethyan Turonian sediments of central Tunisia. Gradual sedimentation in the Turonian is proved by representatives of planktic foraminifers of the II.—III. depth biological zone.

d) Unfavourable depth conditions in the Boreal region of NW Europe in the Upper Turonian — Coniacian as well as frequent transgressions, regressions had unfavourable effect on development of planktic foraminifers. Their favourable development by K-selection was taking place in the Tethyan realm only (see also Caron — Homewood, 1983).

Coniacian

Therefore also the proposed stratotype Turonian—Coniacian boundary, mentioned in the last example, defined by appearance of *Foresteria (H.) petrocoriensis* (COQUAND) from the Březno Formation (= Priesener Schichten) of Bohemia (Ohře river basin, Czechoslovakia) and the North German outcrops (see Kennedy, 1984, p. 155), is not just most suitable (the boreal type of planktic foraminifers).

On the contrary, in Tunisia (area of El Kef or El Fahs — Dj. Fguira Salah), which is taken into consideration for establishing of the stratotype Turonian—Coniacian boundary, just planktic Tethyan foraminifers, reachly differeniated in species, could be a criterion for establishing of the Cenonian base (*Dicarinella concavata* (BROTZEN), *Helvetoglobotruncana cachensis* (DOUGLAS) and *Marginotruncana augusticarinata* (GANDOLFI)). In the West Carpathians these planktic foraminifers were also taken into consideration already for a longer time for establishing of this boundary (Salaj—Samuel, 1966, 1984). On the contrary, *Dicarinella primitiva* (DALBIEZ), similarly as *Marthasterites furcatus* (DEFLANDRE) from nannoplankton (Birkelund et al., 1984) coming into consideration for determination of the Coniacian base appear already in the Uppermost Turonian of Tunisia (Salaj—Gašpariková, 1983; Salaj, 1985). *Marthasterites furcatus* (DEFLANDRE) is also proved from the Upper Turonian of England (Bailey et al., 1984) and northwestern Germany (Wood et al., 1984).

Santonian

As the Coniacian—Santonian stratotype boundary in Tunisia the locality Dj. Fguira Salah is proposed, which is also the boundary of Coniacian and Santonian hypostratotypes. This boundary may be defined on the basis of appearance of the species *Inoceramus (Platyceramus) siccensis* (PERVINQUIÈRE) (Fig. 3) or *Texanites olivetti* (BLANCKENHORN) (Birkelund et al. 1984; Salaj 1973, 1980, 1984) and from foraminifers this boundary would also be determined by *Sigalia carpathica* SALAJ et SAMUEL, which unambiguously determined this boundary already for a longer time in the West Carpathians (Salaj—Samuel, 1966, 1984). So far we have no known species from planktic foraminifers of the family *Globotruncanidae* in the Tethyan or Boreal realm, which could serve as a criterion of establishing of the Coniacian—Santonian boundary.

Fig. 3. *Inoceramus (Platyceramus) siccensis* PERVINQUIÈRE. Base of the Santonian. Loc.: Dj. Fguira Salah.

To the species *Texanites olivetti* (BLANCKENHORN) it is necessary to remark that it was found at this locality by J. Salaj—J. Wiedmann in the year 1974 during the VIth African Micropaleontological Colloquium 5 m higher than the first appearance of the species *Inoceramus (Platyceramus) siccensis* (PERVINQUIÈRE) and determined by J. Wiedmann and W. J. Kennedy. This results was not published but officially mentioned on the Symposium on the Cretaceous stage boundaries (see Birkelund et al., 1984; Bailey et al., 1984; Salaj, 1984).

Paleontological description

Superfamily *Hedbergelloidea* LONGORIA—GAMPER, 1975
Family *Globotruncanidae* BROTZEN, 1942, sensu Salaj 1986 nom. transl.
Subfamily *Hedbergellinae* LOEBLICH—TAPPAN, 1961, nom. transl.
Favusella MICHAL, 1972
Favusella fahsensis n. sp.
Fig. 4a, b, c

Type species: Figured in Fig. 1a, b, c, deposited in the collections of the Dionýz Štúr Institute of Geology in Bratislava, under no T-20.

Derivation of name: After the locality El Fahs in Tunisia.

Type horizon: The Lower Albian *Ticinella roberti – Haplophragmoides nonioninoides* Zone, dated by ammonites too (Stráník—Menčík—Memmi—Salaj, 1972, p. 539).

Type locality Thuburbo Majus, 400 m S of the elev. 215 m (The El Fahs area, Tunisia).

Material: Approximatily 10 specimes from sample Z — 1206.

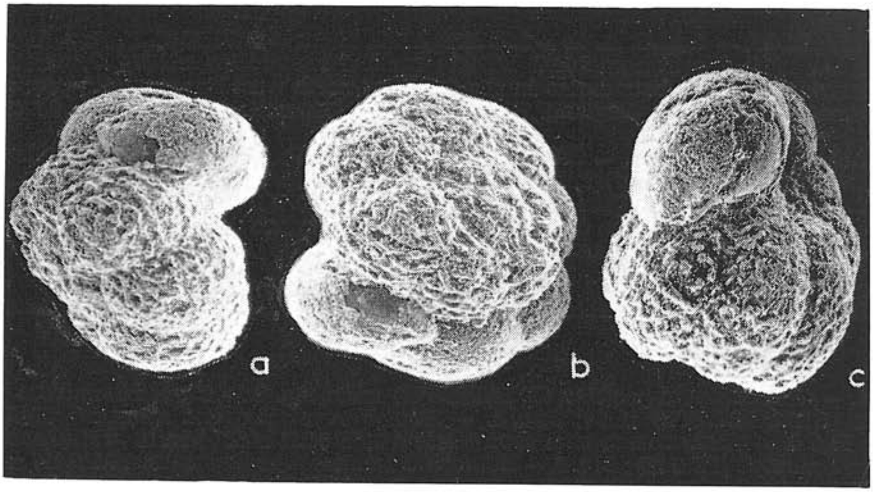

Fig. 4. *Favusella fahsensis* n. sp. Type-species. Upper part of the Lower Albian. Loc.: Thuburbo Majus.

Description: Test free in a high trochospiral coil with three to three and half volutions with seven to eight chambers in the last one. Chambers globular and inflated, increasing in size as added, all chambers visible on the spiral side, only the six or seven chambers of the final whorl visible on the opposite side around the very deep and relatively narrow umbilicus. Sutures distinct, depressed and radial. Wall calcareous, perforated, surface with numerous small or large pustules, only the three or four chambers of the last volution and part of the chambers on the umbilical side of the test are smouth.

The pustules on the dorsal side are coalesced into distinct or less distinct variously situated ridges irregularly connected and giving an indisctive honey-comb pattern to the test. The aperture is low arched at the base of the last chamber with a small and very narrow not well preserved reaching the umbilical areas. No accessory or supplementary apertures were observed in the described species.

Dimensions: Diameter 0.34 mm; height 0.2 mm.

Remarks: *Favusella fahsensis* n. sp. is very abundant in the Lower Albian assemblage of foraminifers (see Pls. 1—2) associated with *Ticinella roberti* (GANDOLFI), which represented its ancestral form. Between both the mentioned species many transitional forms exist. They have first no ornamented smoth tests, then pustulate test developing to test with numerous ridges of irregularly orientation and finally connected and giving a most primitive honey-comb pattern to the test of the phylogenetically oldest species of the genus *Favusella*. In the future it will probably be most correct to place this genus to the subfamily *Rotaliporinae* for the reason that the umbilical supplementary apertures got lost in the evolution of the genus.

Translated by J. Pevný

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Plate 1

Fig. 1. — *Glomospirella gaultina* (BERTHELIN) x 50; Fig. 2. — *Trochamminoides contortus* (GRZYBOWSKI) x 60; Fig. 3. — *Haplophragmoides nonioninoides* (REUSS) x 90; Fig. 4. — *Thalmannammina neocomiensis* GEROCH x 50; Fig. 5. — *Haplophragmoides concavus* (REUSS); Fig. 6. — *Haplophragmoides topagorukensis* TAPPAN x 110; Fig. 7. — *Dorothia pupa* (REUSS) x 70; Fig. 8. — *Tritaxia pyramidata* REUSS x 40; Fig. 9. — *Reophax pepperensis* LOEBLICH x 130; Fig. 10. — *Tritaxia tricarinata* REUSS x 100; Fig. 11. — *Bigenerina* aff. *clavelata* LOEBLICH et TAPPAN x 50; Fig. 12. — *Textularia foeda* REUSS x 90.
Sample Z-1206, loc.: Thuburbo Majus. Lower Albian.

Plate 2

Fig. 1. — *Vaginulina recta* REUSS x 50; Figs. 2—3 — *Anomalina (Gavelinella) berthelini* (KELLER) x 150; Figs. 4—5. — *Valvulineria gracillima* TEN DAM x 150; Fig. 6. — *Dentalina soluta* REUSS x 40; Fig. 7. — *Lenticulina (Astacolus) schloenbachi* (REUSS) x 50; Fig. 8. — *Eocytheropteron libanensis* DAMOTTE et SAINT-MARC x 50; Fig. 9. — *Cythereis* ex gr. *phoenissa* BISCHOFF x 60; Fig. 10. — *Ticinella roberti* (GANDOLFI) x 130; Fig. 11. — *Ticinella raynaudi* SIGAL x 150; Fig. 12. — *Favusella fahsensis* n. sp. x 110.
Sample Z-1206, loc.: Thuburbo Majus. Lower Albian.

Plate 1

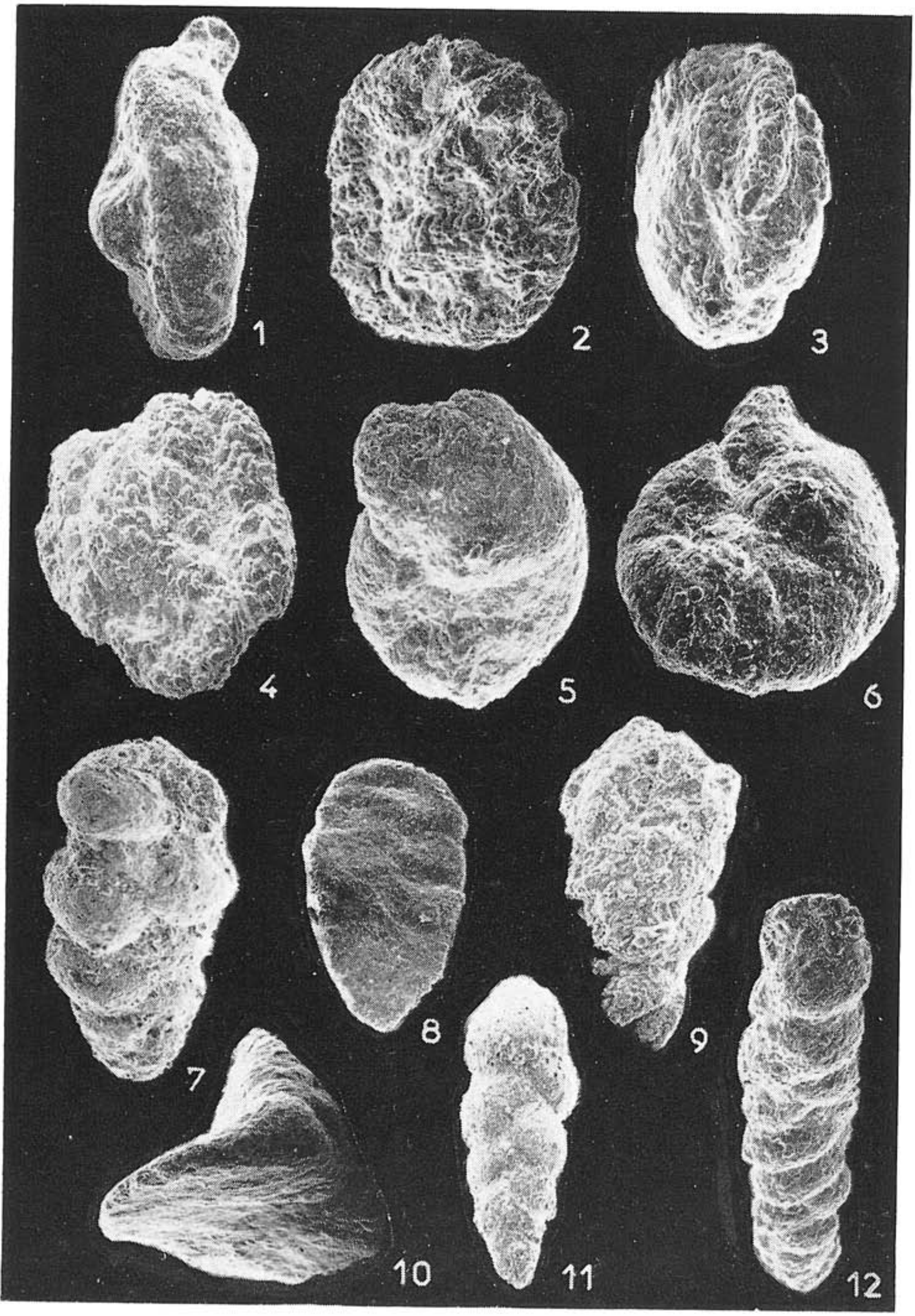
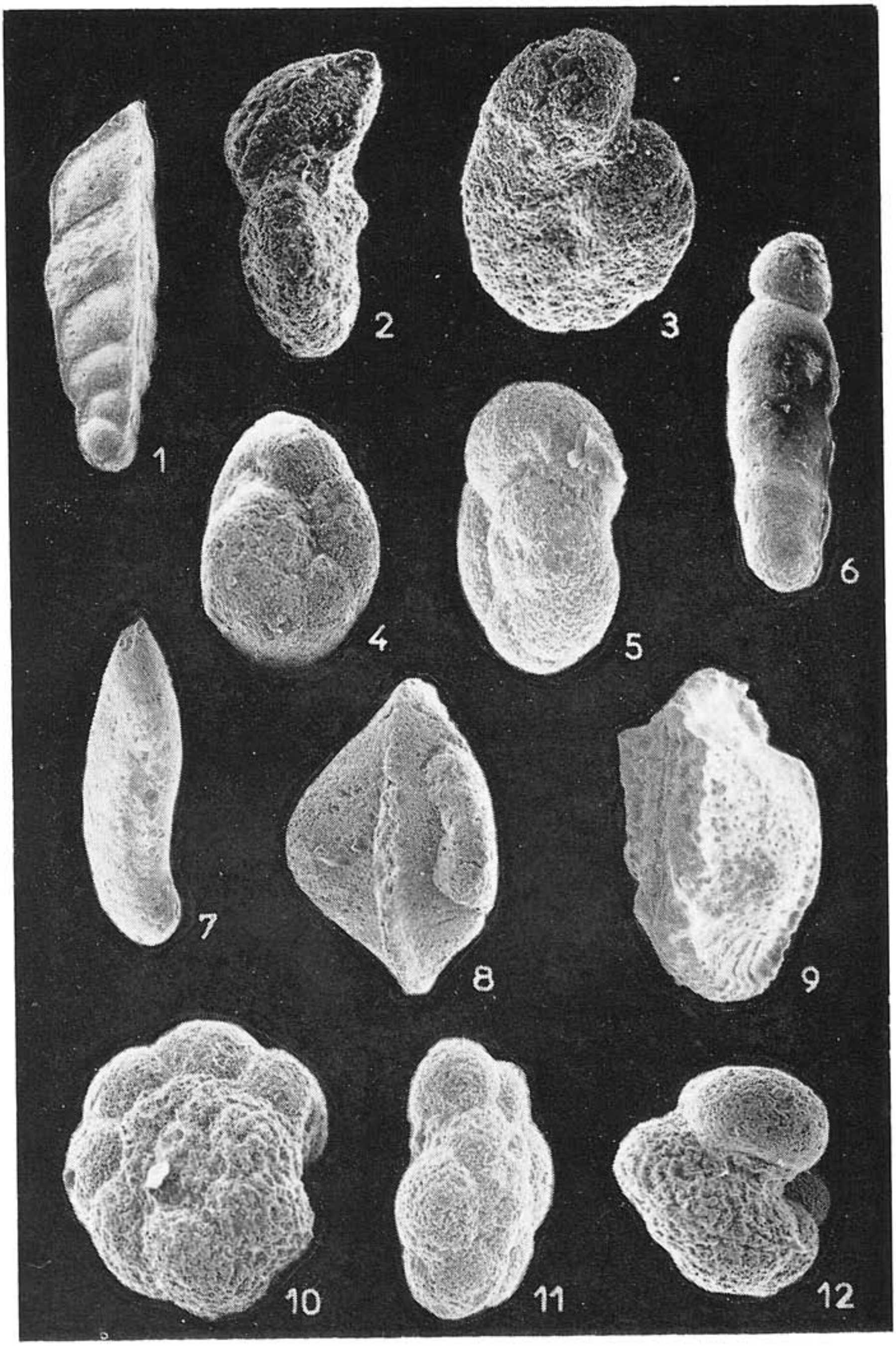


Plate 2



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