

BENTHIC CALCAREOUS FORAMINIFERA FROM THE LOWER CRETACEOUS DEPOSITS – SOUTHERN DOBROGEA – ROMANIA II - Spirillinida and Rotaliida (Placentulinidae)

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Abstract: The very rich and well-preserved material made possible a detailed study of morphology and taxonomy of some Early Cretaceous genera from Spirillinids and Rotaliids.

The paper describe the following taxa:

- from Suborder Involutinina: *Planispirillina dobrogiaca* n.sp.;
- from Suborder Spirillinina: *Spirillina polygyrata* Gumbel, *S. tenuissima* Gumbel, *S. italica* Dieni et Massari, *Turrispirillina conoidea* (Paalzow), *T. marginotruncata* n.sp., *T. subconica* Tappan, *T. sp. n.sp.*, *Patellina subcretacea* Cushman & Alexander, and
- from Order Rotaliida (Placentulinidae): *Patelinella hebetis* n.sp., *P. concinna* n.sp., *P. rumana* Neagu, *Pseudopatelinella scythica* n.sp. Also from the same family is described the new genus *Rumanolina* confounded by the previous authors with *Trocholina* or *Patellina*. To this new genus belongs the following species: *R. elevata* (Paalzow), *R. feifeli* (Paalzow), *R. sieboldi* (Lutze), *R. turris* n.sp. and *R. turriculata* (Dieni et Massari).

Keywords: Early Cretaceous, Spirillinida and Rotaliida, Calcareous foraminifera, South Dobrogea, Romania.

INTRODUCTION

In the suite of Lower Cretaceous carbonate deposits from Southern Dobrogea prevailing are the zoogenous limestones with many types of petrographic structures. Subordinate to these are thin intercalations with an argillaceous character, which are extremely rich in foraminifera and ostracods. Among the calcareous foraminifera there are abundant miliolids followed by trocholinids. With a reduced frequency are the nodosariids and rotaliids. The Planctonics are totally absent. Agglutinated foraminifera from the southern Dobrogea region have been described previously (Neagu, 1997, 1999, and 2000).

In the outcrop from the right bank of the Lake Vederoasa - Alimanu (Text-Figure1) the soft white-yellowish argillaceous intercalation's contain brachiopods (*Loriolithyris russillensis*) and a lumachelle with plates and radiols of Cidaroids (*Cidaris pustulosa*, *Cidaris muricata*). In the intercalations with *Loriolithyris*, the foraminiferal fauna is represented, by large numbers of trocholinids (*Neotrocholina burgeri burgeri*, *N. burgeri molesta*, *N. valdensis*

valdensis), together with *Charentia evoluta*, *Haplophragmium aequalis*, and rare *Lenticulina*, *Marginulina* and *Tristix polygonalis*.

SYSTEMATIC PALEONTOLOGY

- We follow the suprageneric foraminiferal classification proposed by Loeblich and Tappan in 1992.
- The type specimens of all taxa are housed in the collections of the Laboratory of Paleontology, University of Bucharest to which the catalogue numbers are apply.
- Conventions employed in the descriptions are as follows: L.P.B. = Laboratory of Paleontology, Bucharest; IV = Foraminiferal – Romania.

Class FORAMINIFERA J.J.Lee, 1990

Ord. SPIRILLINIDA Gorbachik & Mantzurova, 1980

Subord. INVOLUTININA Hohenegger & Piller, 1977

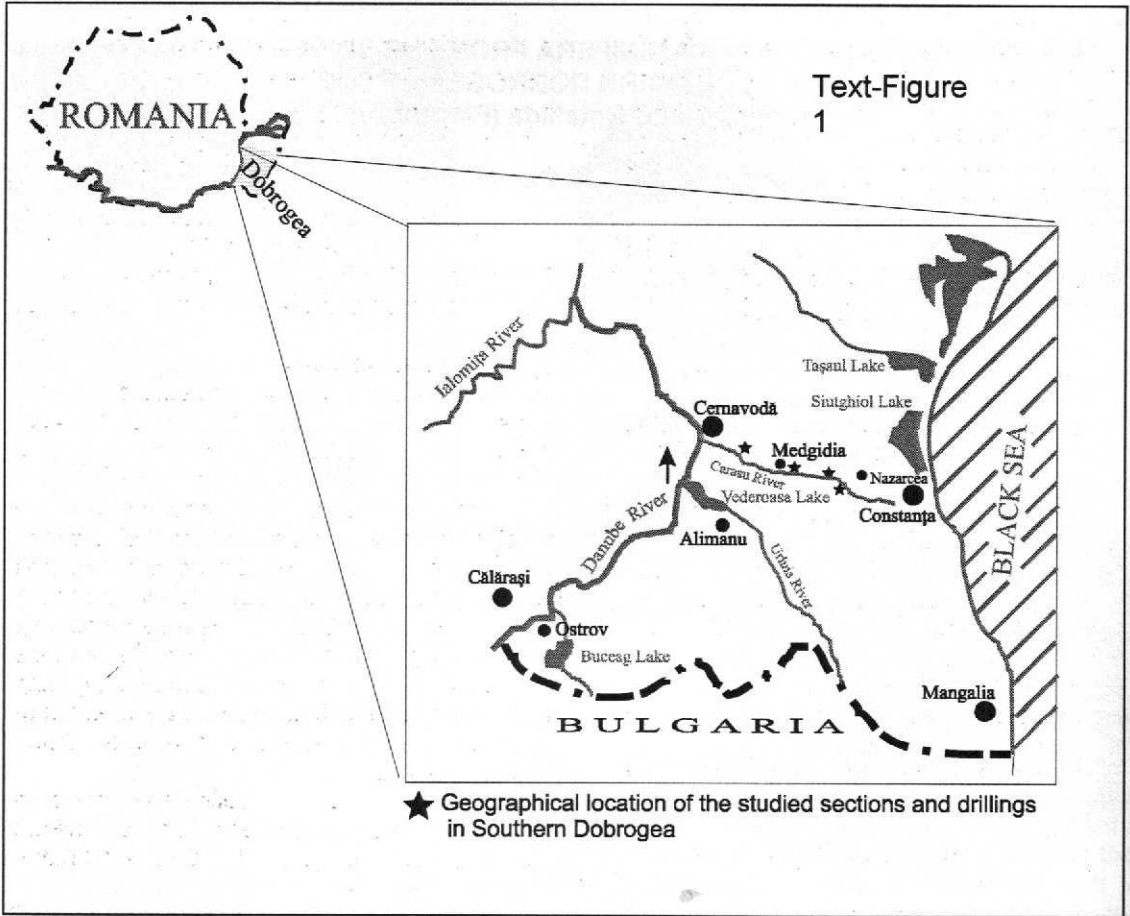
Family PLANISPIRILLINIDAE Piller, 1978

Genus *Planispirillina* Bermudez, 1952

Planispirillina dobrogiaca n. sp.

Plate 2, Figures 33-48; Plate 5, Figures 40-41

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Text-Figure
1

Derivation of name: from Dobrogea, the historical name of the territory between the Black Sea and Danube River.

Type level: Valanginian

Type locality: Alimanu, right bank of Lake Vedeoroasa (lumachelle with cidaroids fragments).

Description: Test discoidal, with a secondary tubular chamber, very weakly trochospirally coiled; all the whorls (9-12) are visible on the spiral side. The umbilical side is filled up, by ornamentation represented by nodular radial structures, which hide the whorls of the tubular chamber; only the last whorl of the tubular chamber is visible on the peripheral area of the umbilical side. Aperture corresponds to the open end of the tubular chamber.

Dimensions: (figured specimens) holotype diameter 0.39mm; thickness 0.09mm; paratypes diameter 0.36 – 0.40mm; thickness 0.09 – 0.17mm

Remarks: The species differs from *Spirillina italica* Dieni & Massari, because the ornamentation is developed only on the umbilical side and not on both sides as in the *S.italica*. From *P. granulosa* Mityanina 1957, (fide Loeblich & Tappan, 1964, Figure 475/9) it

differs by the umbilical ornamentation and the weakly convex aspect of the spiral side. Because of weakly trochospiral aspect of the spiral side our material is close to *Turrispirillina* but differs by the umbilical ornamentation.

Stratigraphical distribution: Valanginian

Suborder SPIRILLININA Hohenegger & Piller, 1075

Family SPIRILLINIDAE Reuss & Fritsch, 1861
Genus *Spirillina* Ehrenberg, 1843

Spirillina polygyrata Gumbel, 1862
Plate 1, Figures 4-9

Spirillina polygyrata GÜMBEL, 1862, p. 214, Plate 6, Figure 11a-c; BIELECKA, 1960, p.86, Plate 8, Figure 66-67; REIGRAF & LUTERBACHER, 1989, p.1028, Plate 2, Figures 36-38; Plate 3, Figure 1-2

non *Spirillina polygyrata* GÜMBEL; SIEBOLD & SIEBOLD, 1960, p.124, Plate 5, Figure f-h

Dimensions: (figured specimens) diameter 0.31 – 0.36mm; thickness 0.07 – 0.09mm

Remarks: Contrary to Gumbel's figure from 1862, in which this species clearly has a planispiral test, Siebold & Siebold (1955) restudying Gumbel's originals, gave a new

interpretation, totally different from Gumbel's one, but similar to the form that Paalzow described as *Spirillina conoidea* (1917). Describing the new genus *Turrispirillina*, Cushman (1927) selected *S. conoidea* Paalzow as the type species. Loeblich & Tappan (1987) consider *Turrispirillina* as a valid genus, with *S. conoidea* as the type species.

Type specimens: L.P.B.IV. 11394

Occurrence: Alimanu, right bank of Lake Vederoasa, (lumachelle with cidaroids fragments).

Stratigraphical distribution: Valanginian

***Spirillina tenuissima* GÜMBEL, 1862**

Plate 2, Figures 1-3

Spirillina tenuissima GÜMBEL 1862, p.214, Plate 4, Figure 12; SIEBOLD & SIEBOLD, 1955, p.125, Text-Figure 5n; 1960, p.374

Dimensions: (figured specimens) diameter 0.19mm; thickness 0.02mm

Remarks: Siebold & Siebold (1955) using the Gumbel's original, certified the matter of fact, that the original shell of this species is calcitic and not agglutinated as many subsequent authors considered, and described it as *Ammodiscus tenuissimus*.

Type specimens: L.P.B.IV.11400

Occurrence: Alimanu, right bank of Lake Vederoasa (lumachelle with cidaroids fragments)

Stratigraphical distribution: Valanginian.

***Spirillina italica* DIENI & MASSARI, 1966**

Plate 1, Figures 1-3

Spirillina italica DIENI & MASSARI, 1966, p.166, Plate 7, Figure 19-21; -Neagu, 1975, p.107, Plate 79, Figure 2-7; -Arnaud-Vanneau, 1980, p.748, Plate 7, Figure 1-5, Plate 15, Figure 10-12.

Dimensions: (figured specimen) diameter 0.31mm; thickness 0.07mm

Remarks: Ours specimens, from the Upper Barremian, corresponds to the character of the original species.

Type specimens: L.P.B.IV.11401

Occurrence: Ostrov, southern bank of Lake Ostrov

Stratigraphical distribution: Upper Barremian

Genus *Turrispirillina* CUSHMAN, 1927

***Turrispirillina conoidea* (PAALZOW, 1917)**

Plate 1, Figure 10-30, Plate 2, Figure 6-14, Plate 5, Figure 38-39

Spirillina conoidea PAALZOW, 1917, p.217, Plate 41, Figure 8

Spirillina polygyrata Gumbel, - Siebold & Siebold, 1960, p.124, Plate 5, Figures f-h.

Dimensions: (figured specimens) diameter 0.19mm; height 0.09 - 0.14mm

Remarks: Ours material corresponds very well to Paalzow species selected by Cushman as type species for the genus *Turrispirillina*.

Type specimens: L.P.B.IV. 11402

Occurrence: Alimanu, right bank of Lake Vederoasa (lumachelle with cidaroids fragments)

Stratigraphical distribution: Valanginian

***Turrispirillina marginotruncata* n.sp.**

Plate 5, Figures 7-13

Derivation of name: latin *marginare* = to make a brim; *truncatus-a-um* = truncate, to cut off.

Type level: Valanginian

Type locality: Medgidia, Kretzulescu's Valley

Type species: holotype L.P.B.IV.11403; paratypes L.P.B.IV.11404 - 11405

Description: Test conical, extremely obtuse and trochospiral, deeply concave on the umbilical side. On the smooth spiral side all the whorls (8-16) are visible. On large specimens (probably microsphaerical), the early part of the test (first 4-5 whorls) are depressed (concave). This species is characterized by the truncate aspect of the external border of the test, getting a wheel-like aspect in latero-oral view. Aperture a simple opening at the end of the tubular second chamber.

Dimensions: (figured specimens) holotype diameter 1.24mm; thickness 0.21mm; height 0.34mm; paratypes diameter 0.60 - 1.65mm; height 0.21 - 0.55mm.

Remarks: By its truncate peripheral aspect of the test, this species is very well delimited.

Occurrence: Medgidia - Kretzulescu's Valley, Cernavodă Pod, right bank of the Danube River

Stratigraphical distribution: Valanginian

***Turrispirillina subconica* TAPPAN, 1943**

Plate I, Figure 31-32

Turrispirillina subconica TAPPAN, 1943, p.510, Plate 82, Figure 2-3. -Arnaud-Vanneau, 1980, p.712, Plate 7, Figure 10-11, Plate 15, Figure 18-21.

Dimensions: (figured specimens) diameter 0.29mm; height 0.07mm

Remarks: Specimens from the Upper Barremian of the Ostrov area correspond very well to Tappan's species, described by A. Arnaud-Vanneau (1980).

Type specimens: L.P.B.IV. 11407

Occurrence: Upper Barremian, Ostrov - southern bank of Lake Bugeac.

Stratigraphical distribution: Barremian-Lower Aptian.

***Turrispirillina* sp. n.sp.**

Plate 2, Figure 4-5

Description: Small test with the secondary tubular chamber trochospiral coiled not in a conical shape, but in a particularly ogival

aspect. Sutures of the whorls have a weakly crenellate aspect because the umbilical face of the tubular chamber has an undulate aspect; deep umbilicus. Aperture corresponds to the end of the tubular secondary chamber.

Dimensions: (figured specimen) diameter 0.17mm; height 0.21mm

Remarks: Because we have no more than 5 specimens, we consider that there is insufficient material to describe a new species.

Type specimens: L.P.B.IV. 11406

Occurrence: Alimanu, right bank of Lake Vederoasa (lumachelle with cidaroids fragments)

Stratigraphical distribution: Valanginian

Family PATELLINIDAE Rhumbler, 1906

Subfamily PATELLININAE Rhynbler, 1906

Genus *Patellina* Williamson, 1858

Patellina subcretacea Cushman & Alexander, 1930

Plate 3, Figures 32-34

Patellina subcretacea Cushman & Alexander – Tappan, 1943, p.311, Plate 82, Figure 4. – Sztejn, 1957, p. 80, Plate 10, Figure 92. – Neagu, 1972, p. 215, Plate 8, Figure 20; 1975, p. 109; Plate 82, Figure 1 – 16; Plate 85, Figure 26 – 29. – Arnaud-Vanneau, 1980, p. 773; Plate 7, Figure 14 - 17; Plate 15, Figure 25 – 26.

Dimensions: (figured specimen) diameter = 0.53mm; height = 0.17mm

Type specimens: L.P.B.IV. 11408

Occurrence: Ostrov - southern bank of Lake Bugeac

Stratigraphical distribution: Upper Barremian

Order ROTALIIDA Lankester, 1885

Superfamily DISCORBACEA Ehrenberg, 1838

Family PLACENTULINIDAE Kasimirova, Poroshina & Geodokchan, 1980

Subfamily ASHBROOKIINAE Loeblich & Tappan, 1948

Genus *Patelinella* Cushman, 1928

Patelinella hebetis n. sp.

Plate 1, Figures 33-52; Plate 5, Figures 35-37

Derivation of name: (Latin) *hebes-etis* = obtuse (referring to an angle greater than 90 degrees). After the test shape.

Type level: Valanginian.

Type locality: Alimanu, right bank of Lake Vederoasa (lumachelle with plates and radiols of Cidaroids).

Type specimens: holotype L.P.B.IV. 11409, paratypes: L.P.B.IV.11410

Description: Test conical-obtuse, with an early stage weakly trochospiral with 3 - 4 chambers per whorl, followed by a biserial-textularoid stage. Rapidly growing chambers give the test

a conical-obtuse aspect. The last whorl chambers on the umbilical side have an inflated and smooth aspect and leave a depressed umbilicus. Aperture an arcuate umbilical hook-like slit; apertural face smooth.

Dimensions: (figured specimens); holotype: large diameter 0.34mm, small diameter 0.31mm; height 0.29mm; paratype: large diameter 0.34 – 0.43mm; small diameter 0.19 – 0.26mm; height 0.22 – 0.19mm.

Remarks: This species differs from *P. rumana* (NEAGU) 1975, by the globulous aspect of the umbilical side and a fairly conical-obtuse shape of the test.

Stratigraphical distribution: Valanginian.

Patelinella concinna n. sp.

Plate 2, Figures 15-30; Plate 5, Figures 32-34

Derivation of the name: (Latin) *concinna*-*um* = fine beautiful, harmonious, after the general shape of the test

Type level: Valanginian.

Type locality: Alimanu, right bank of Lake Vederoasa (lumachelle with plates and radiols of Cidaroids).

Type specimens: Holotype L.P.B.IV. 11411, paratype L.P.B.IV.11412.

Description: Test high-acute conical, higher than broad; early stage low trochospiral with 3-4 chambers per whorl followed by a biserial (textularoid) stage. Chambers grow gradually in dimensions; weakly depressed or smooth sutures. Umbilical side weakly inflated (never flat), concave with a rounded external board. Umbilical aperture as a low arcuate and hook-like slit with an apertural lip. Umbilical face presents feebly radial striae.

Dimensions: (figured specimens) holotype: large diameter 0.36mm; small diameter 0.34mm; height 0.60mm; paratype: large diameter 0.24 – 0.39mm; small diameter 0.19 – 0.29mm; height 0.29 – 0.62mm.

Remarks: This species differs from *P. cristinae* Bielecka, 1960, by its smooth test. The species is homeomorphic with *Rumanolina elevata* (Paalzow) because of its conical-acute outline of the test, but the textularoid chamber disposition and the smooth aspect makes it clearly different.

Stratigraphical distribution: Valanginian.

Patelinella rumana (NEAGU, 1975)

Plate 1, Figures 43 – 45

Pseudopatelinella rumana Neagu 1975, p.107, Plate 81, Figures 11–29; Plate 84, Figures 1-5; Plate 85, Figures 22-23; Plate 97, Figures 8-12.

Dimensions: (figured specimens) large diameter 0.39mm; small diameter 0.24mm; height 0.17mm

Remarks: *P. rumana* differs from *P. hebetis* by the low-conical aspect of the test and the flat aspect of the umbilical side.

Type specimens: L.P.B.IV. 11413

Occurrence: Ostrov, southern bank of Lake Bugeac

Stratigraphical distribution: Upper Barremian.
Genus *Pseudopatellinella* TAKAYANAGI, 1960

Pseudopatellinella scythica n. sp.

Plate 5, Figures 1-12

Derivation of the Name: latin *scythicus-a-um* - scythic derived from *Scythys-a* = Scyth, ancient inhabitants of Southern Dobrogea.

Type level: Valanginian

Type locality: Alimanu, right bank of Lake Vederoasa (lumachelle with plates and radiols of Cidaroids)

Type specimens: Holotype L.P.B.IV. 11414, paratype L.P.B.IV. 11415

Description: Conical-obtuse test with biserial helicospiral coiled chambers. Sutures arcuate and weakly depressed. On the umbilical side, the last two chambers are weakly inflated with a central depressed umbilicus. Aperture an interio-marginal hook-like slit; umbilical face completely smooth.

Dimensions: (figured specimens) holotype large diameter 0.34mm; small diameter 0.26mm; height 0.39mm; paratype large diameter 0.29 - 0.34mm; small diameter 0.24 - 0.29mm; height 0.21 - 0.31mm.

Remarks: This species is homeomorphic with *Patellinella hebetis*, but differs by its trochospiral-biserial chamber arrangement.

Stratigraphical distribution: Valanginian.

Genus *RUMANOLINA* Neagu n. gen.

Type species: *Trocholina elevata* Paalzw, 1932 = *Rumanolina elevata* (Paalzw, 1932)

Description: Test conical to highly acute. Early stage is planispiral coiled or very obtuse trochospiral with 2-4 chambers per whorl. The early stage is followed by an irregularly biserial or trochospirally biserial (not textularoid) stage. Acute to flap-like keels is developed along the arched sutures. Chambers without any internal secondary septula. The last two chambers visible on the umbilical side are flat or concave, with an acute periphery and externally keeled board. Umbilical surface is ornamented by radial striae associated with small tubercles; interiomarginal umbilical aperture with a weakly thickened lip has a hook-like aspect; wall of the test present a typical calcitic breach after the rhomboidal crystal is perforated by moderate-size pore.

Remarks: Because of the calcitic spar-cleavage of the test and the umbilical ornamentation this genus was confused by

Siebold & Siebold (1960) with *Paalzowella* Cushman, 1933. The authors did not take in consideration the trochospiral-biserial disposition of the chambers, the structure of the umbilical side and the absence of secondary internal septula.

Later, Dieni & Massari (1965), using the material offered by Lutze (*P. feifeli*, *P. sieboldi*), attempted to demonstrate that the genus *Paalzowella* Cushman 1933 is a junior synonym of *Patellina* Williamson. Unfortunately, these authors made the same mistake as that of Siebold & Siebold instead in fact their figure shows clearly the irregularly biserial arrangement of the chambers (trochospiral-biserial coiling). They did not take in consideration the early stage of the test and the total absence of inner septula (typically for *Patellina*). Loeblich & Tappan (1988) cleared up the confusion showing the validity of Cushman's *Paalzowella* with the type species *P. turbinata* (Gümbel) or/and its junior synonym *Trocholina scalaris* Paalzw 1932.

Because of high abundance and excellent preservation of our material from the Valanginian at Alimanu in Southern Dobrogea, even the macrosphaerical specimens make it possible to clear up this problem. From *Paalzowella*, *Rumanolina* n.gen. differs by the early planispiral chambers and by the irregularly biserial disposition of the adult (last) chambers. The total absence on the inner secondary elements of the chambers this genus is very well delimited from *Patellina* and *Paalzowella* to which it is homeomorphic (in the external outline).

Stratigraphical distribution: Kimmeridgian - Upper Barremian

Rumanolina elevata (Paalzw, 1932)

Plate 3, Figures 13-17; Plate 4, Figures 25-38; Plate 5, Figures 23-30

Trocholina elevata Paalzw, 1932, p.140, Plate 11, Figure 4

Paalzowella feifeli elevata (Paalzw); - SIEBOLD & SIEBOLD, 1960, p.379, Text-Figure 8, Plate 7 Figure 3; NEAGU, 1972, p.112, Plate 3, Figure 12-17.

Dimensions: (figured specimens) large diameter 0.31 - 0.43mm; small diameter 0.29 - 0.39mm; height 0.48 - 0.58mm

Remarks: The conical-acute shape of the test very clearly distinguishes this species. Macrosphaeric specimens have an early robust-planispiral stage; the test has a laterally flattened shape.

Type species: L.P.B.IV.11416

Occurrence: Alimanu, right bank of Lake Vederoasa (Lumachelle with plates and radiols of Cidaroids)

Stratigraphical distribution: Valanginian.

Rumanolina feifeli (PAALZOW, 1932)

Plate 1, Figures 52-53; Plate 3, Figures 30-31;
Plate 5, Figure 22

Trocholina feifeli Paalzow, 1932 p.140, Plate 11, Figures 6-7

Paalzowella feifeli feifeli (Paalzow). -SIEBOLD & SIEBOLD, 1960, p.378, Text-Figure 8 (l, p, q), Plate 7, Figure 2.

Patellina feifeli feifeli (Paalzow). -Dieni & Massari, 1965, p.115, Text-Figure 1a-b.

Dimensions: (figured specimens) large diameter 0.36 – 0.53mm; small diameter 0.31 – 0.46mm; height 0.26 – 0.29mm

Remarks: The conical- expanded aspect of the test and the large winged sutural keels make easy to recognize this species.

Type specimens: L.P.B.IV.11417

Occurrence: Alimanu, right bank of Lake Vederoasa (lumachelle with plates and radiols of Cidaroids)

Stratigraphical distribution: Valanginian.

Rumanolina sieboldi (Lutze, 1960)

Plate 3, Figures 25-29; Plate 4, Figures 31-43;
Plate 5, Figures 18-25

Paalzowella feifeli sieboldi Lutze, 1960, p.486, Plate 33, Figure 12, Text-Figure 19 (20-34)

Patellina feifeli sieboldi (Lutze). -Dieni & Massari 1965, p.114, Text-Figure 1a-b

Patellina feifeli (Paalzow). -Neagu 1975, p.110, Plate 84, Figures 6-8; Plate 83, Figures 1-10, 17-21.

Dimensions: (figured specimens) larger diameter 0.26 – 0.31mm; small diameter 0.26 – 0.31mm; height 0.26 – 0.31mm

Remarks: The conical-robust aspect of the test very well defines this species. (By the conical-robust aspect of the test this species is very well delimited.)

Type species: L.P.B.IV. 11418

Occurrence: Alimanu, right bank of Lake Vederoasa (Lumachelle with plates and radiols of Cidaroids).

Stratigraphical distribution: Valanginian.

Rumanolina turris n. sp.

Plate 2, Figures 32-32; Plate 3, Figure 18-20;
Plate 4, Figure 1-23; Plate 5, Figure 31

Derivation of name: *turris-is* = tower, after the general shape of the test.

Type level: Valanginian.

Type locality: Alimanu, right bank of Lake Vederoasa (lumachelle with plates and radiols of Cidaroids)

Type specimens: holotype L.P.B.IV. 11419, paratype L.P.B.IV. 11420

Description: Test gracile with a strongly elongated conical shape. The early stage short planispiral is followed by trochospiral biserial (irregularly biserial) chambers. Suture strongly carinate; umbilical side with flat to concave aspect. The last two chambers have an acute-keeled periphery. Umbilical area depressed. Aperture an arcuated slit with a peripheral rounded lip; umbilical surface ornamented by gentle radial striae and rarely small tubercles on the peripheral part. The macrosphaeric specimens are more robust and have a large early planispiral stage.

Dimensions: (figured specimens) holotype large diameter 0.43, small diameter 0.36mm, height 0.96mm; paratype large diameter 0.12 – 0.96mm, small diameter 0.17 – 0.19mm; height 0.21 – 0.55mm.

Remarks: The gracile aspect of the test clearly differentiates of this species.

Stratigraphical distribution: Valanginian.

Rumanolina turriculata (Dieni & Massari, 1965)

Plate 3, Figure 1-12

Patellina turriculata Dieni & Massari, 1966, p.174, Plate 8, Figure 15-16. -Arnaud-Vanneau, 1980, p.774, Plate 7, Figure 18-19; Plate 15, Figure 21-23.

Dimensions: (figured specimens) Diameter 0.29 – 0.31mm, height 0.21 – 0.26mm.

Remarks: This species differs from *R. feifeli* and *R. sieboldi* by its low conical robust test, small sutural keels and mostly tuberculated umbilical side.

Type specimens: L.P.B.IV. 11421

Occurrence: Ostrov, Southern bank of Lake Bugeac

Stratigraphical distribution: Upper Barremian.

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PLATES

Plate I

- Figures 1-3 *Spirillina italica* (DIENI & MASSARI), 1966. Upper Barremian, Ostrov, southern bank of the Lake Bugeac, L.P.B.IV.11401
- Figures 4-9 *Spirillina polygyrata* GÜMBEL, 1862. Valanginian, Alimanu, right bank of the Lake Vederoasa, L.P.B.IV.11399
- Figures 10-30 *Turrispirillina conoidea* (PAALZOW), 1917. Valanginian, Alimanu, right bank of the Lake Vederoasa, L.P.B.IV.11402
- Figures 31-32 *Turrispirillina subconica* TAPPAN, 1943. Upper Barremian, Ostrov, southern bank of the Lake Bugeac, L.P.B.IV.11407
- Figures 33-42, 46-51 *Patelinella hebetis* n.sp., Valanginian, Alimanu, right bank of the Lake Vederoasa, Figures 48-49 holotype L.P.B.IV.11409, Figures 33-42, 50-51, paratypes L.P.B.IV.11410
- Figures 43-45 *Patelinella rumana* (NEAGU), 1975. Upper Barremian, Ostrov, southern bank of the Lake Bugeac, L.P.B.IV.11413
- Figures 52-53 *Rumanolina feifeli* (PAALZOW), 1932. Valanginian, Alimanu, right bank of the Lake Vederoasa, L.P.B.IV.11417

L.P.B. = Laboratory of Paleontology, Bucharest, IV = Foraminiferal – Romania.

* All figures are camera lucida drawings by Theodor NEAGU.

Plate II

- Figures 1-3 *Spirillina tenuissima* GÜMBEL, 1862. Valanginian, Alimanu, right bank of the Lake Vederoasa, L.P.B.IV.11400
- Figures 4-5 *Turrispirillina* sp., n.sp. Valanginian, Alimanu right bank of the Lake Vederoasa, L.P.B.IV. 11406
- Figures 6-14 *Turrispirillina conoidea* (PAALZOW), 1917. Valanginian, Alimanu, right bank of the Lake Vederoasa, L.P.B.IV.11402
- Figures 15-30 *Patelinella concina* n.sp. Valanginian, Alimanu, right bank of the Lake Vederoasa, holotype Figures 29-30, L.P.B.IV.11411; paratypes Figures 11-28, L.P.B.IV.11412
- Figures 31-32 *Rumalolina turris* n.g., n.sp. (macrosphaerical specimen), Valanginian, Alimanu, right bank of the Lake Vederoasa, paratype L.P.B.IV.11420
- Figures 33-48 *Planispirillina dobrogiaca* n.sp. Valanginian, Alimanu, right bank of the Lake Vederoasa, holotype Figure 39-40, L.P.B.IV.11397; paratypes Figures 33-38, L.P.B.IV.11398

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Plate III

- Figures 1-12 *Rumanolina turriculata* (DIENI & MASSARI), 1966. Upper Barremian, Ostrov, southern bank of the Lake Bugeac, L.P.B.IV.11421
- Figures 13-17 *Rumanolina elevata* (PAALZOW), 1932. (macrosphaeric specimens), Valanginian, right bank of the Lake Vederoasa, L.P.B.IV.11416
- Figures 18-20 *Rumanolina turris* n.g., n.sp. (macrosphaeric specimen). Valanginian, right bank of the Lake Vederoasa, paratypes L.P.B.IV.11420
- Figures 21-22 *Rumanolina sieboldi* (LUTZE), 1960. Valanginian, right bank of the Lake Vederoasa, L.P.B.IV.11418
- Figures 23-31 *Rumanolina feifeli* (PAALZOW), 1932. Valanginian, right bank of the Lake Vederoasa, L.P.B.IV.11417
- Figures 32-34 *Patellina subcretacea* CUSHMAN & ALEXANDER, 1930. Upper Barremian, ISPH drillings Oltina –Bala I, -36m, L.P.B.IV.11408

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Plate IV

Figures 1-23 *Rumanolina turris* n.g., n.sp. Valanginian, Alimanu, right bank of the Lake Vederosa, holotype Figures 20-21, L.P.B.IV.11419, paratypes Figures 1-19, 22-23, L.P.B.IV.11420

Figures 24-38 *Rumanolina elevata* (PAALZOW), 1932. Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV.11416

Figures 39-45 *Rumanolina sieboldi* (LUTZE), 1960. Valanginian, Alimanu, right bank of the lake Vederosa, L.P.B.IV.11412

L.P.B. = Laboratory of Paleontology, Bucharest, IV = Foraminiferal – Romania.

* All figures are camera lucida drawings by Theodor NEAGU.

Plate V

Figures 1-12 *Pseudopatinella scythica* n.sp. Valanginian, Alimanu, right bank of the lake Vederosa; holotype Figures 1-3, L.P.B.IV.11414; paratypes Figures 4-12, L.P.B.IV.11415

Figures 13-17 *Turrispirillina marginotruncata* n.sp. Holotype Figures 13-14, Valanginian, Medgidia, Kretzulescu's Valley, L.P.B.IV.11403, paratypes Figures 15-17, Valanginian, Cernavodă Pod, right bank of the Danube River, L.P.B.IV.11404

Figures 18-21 *Rumanolina sieboldi* (LUTZE), 1960. Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV.11418

Figure 22 *Rumanolina feifeli* (PAALZOW), 1932. Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV.11417

Figures 23-30 *Rumanolina elevata* (PAALZOW), 1932. Valanginian, Alimanu, right bank of the Lake Vederosa; (Figures 29-30 macrosphareric specimens), L.P.B.IV.11416

Figure 31 *Rumanolina turris* n.sp. Paratype, Valanginian, Alimanu right bank of the Lake Vederosa, L.P.B.IV.11420

Figures 32-34 *Patelinella concina* n.sp. Paratypes, Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV. 11412

Figures 35-37 *Patelinella hebetis* n.sp. Paratypes, Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV.11410

Figures 38-39 *Turrispirillina conoidea* (PAALZOW), 1917. Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV 11409

Figures 40-41 *Planispirillina dobrogiaca* n.sp. Paratype, Valanginian, Alimanu, right bank of the Lake Vederosa, L.P.B.IV. 11398

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