

EARLY CRETACEOUS ALGAE OF ALIMAN (SOUTH DOBROGEA): A REVISION AND DESCRIPTION OF TWO NEW SPECIES FROM EAST CARPATHIANS

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Abstract. A new stratigraphic Early Cretaceous profile was studied in the Vederoasa - Aliman area (South Dobrogea). The profile included the Cernavoda Formation (Aliman Member and Vederoasa Member) - Late Valanginian - Hauterivian and the Ostrov Formation (Adâncata Member) - Early Barremian in age. The Early Cretaceous sequence provided a rich microflora of algae, especially in the Hauterivian deposits. Some of the new taxa of dasycladaceans recorded by the author in 1978 are re-described. Other taxa such as *Teutloporella filiformis* DRAGASTAN and *Permocalculus discoideus* DRAGASTAN, 1989 are transferred to the genus *Pseudopenicillus* DRAGASTAN et al., 1997. Two new Hauterivian dasycladacean algae are introduced: *Bancilaporella* n. g. and *Vederosella* n. g. from Aliman and *Rajkaella alpina* n. sp., *Hedstroemia* n. sp. (Berriasian-Valanginian) from East Carpathians.

Keywords: New taxa, calcareous algae, dasycladaceans, udoteaceans and pseudoudoteaceans.

INTRODUCTION

The calcareous succession outcropping in the old quarry from the Vederoasa Valley, near Aliman (South Dobrogea, Fig. 1), has been well studied during the last years by Neagu, Pana & Dragastan (1977), Dragastan (1978), Neagu & Dragastan (1984) and Dragastan et al. (1998).

The sequence consists of zoogenous, muddy calcarenite interbedded with coquina-limestone and clay or clay-marly limestone. The macrofauna is dominated by sponges, pelecypods, gastropods and subsequently by brachiopods. The microfauna, represented mainly by benthic foraminifers, is rich and extremely diverse, and so is the microflora, including cyanophyceans and green algae (dasycladaceans, udoteaceans and pseudo-udoteaceans).

LITHO- AND BIOSTRATIGRAPHY OF THE EARLY CRETACEOUS SECTION AT ALIMAN

The Early Cretaceous deposits in the Aliman quarry belong to the Cernavoda Formation, i.e. to the uppermost part of the Aliman Member (Late Valanginian) and to the Vederoasa Member (Hauterivian), being transgressively overlain by the Ostrov Formation, Adâncata Member, Early Barremian in age (Dragastan, Neagu, Barbulescu & Pana, 1998).

The Upper Valanginian sequence begins with oosparitic limestone followed by pelmicrite and micrite limestone interbedded sometimes with very thin layers of clay and clays with calcareous nodules 1-2 cm in diameter (Fig. 2). A breccia level formed by bioclasts, broken shells of pelecypods (mainly oysters), gastropods and rarely sponges occurs at the terminal part of the sequence. The breccia level is overlain by icrite and marly-limestone pierced by *Gastrochaenolites* pholadids pointing to a transitional facies from distal-intertidal to proximal-subtidal environment. The last sequence of the Valanginian is represented by marly-limestone and clay rich in micro - fauna and flora.

Two massive reef-limestones (R3, R4) are built by dome-colonies of Demosponges as "core" reefs of *Axiparietes tremulus*, *Granatiparietes simionescui*, *G. communis*, *Actinostromaria coacta*. Around the core-reefs gastropods (*Nerinea*, *Leviathania*, *Natica*), ostreids and pholadomyids accumulated.

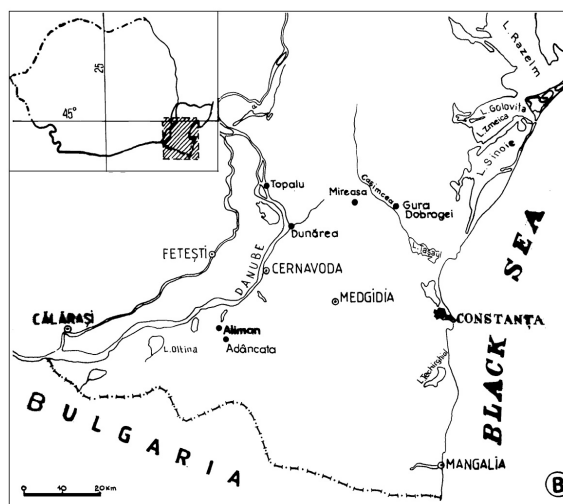


Figure 1 - Studied area and main localities with marine Early Cretaceous calcareous algae of South Dobrogea

The microfossils, *Meandrospira favrei*, *Nautiloculina cretacea*, *N. broennimanni*, *Haplophragmoides joukowskyi*, *Bancilina rumana* (Foraminifers) and *Clypeina radici*, *Salpingoporella annulata*, *Pseudopenicillus discoideus* and *Rivularia piae* (Algae), indicate a Late Valanginian age.

The *Clypeina radici* biozone, first time created for the Valanginian deposits of the Cernavoda profile, displays a maximum richness of specimens. It was also found in the Aliman section and is regarded as a regional-marker of Late Valanginian for South Dobrogea (Fig. 2).

The Hauterivian is represented by a thin, transgressive unit of 8-10 m. It overlays the Aliman Member and was recorded on both sides of the Vederoasa lake, the type section of the Vederoasa Member. Its upper boundary is erosional, being unconformably covered by the Adâncata Member (Early Barremian) of the Ostrov Formation.

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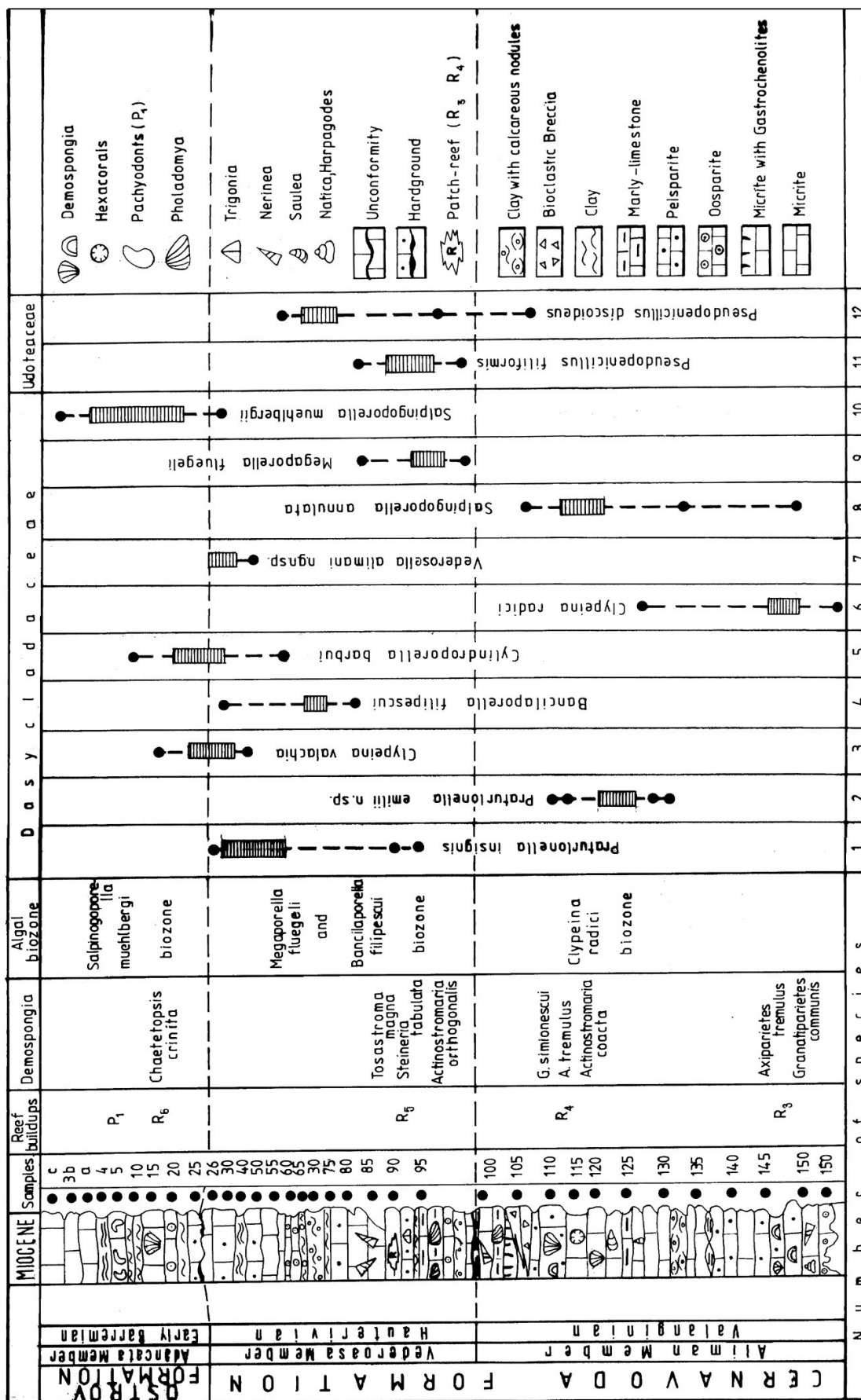


Figure 2 - Stratigraphical range of some revised and new taxa of calcareous algae from the Aliman profile (South Dobrogea)

The succession includes from bottom to top yellow-red clays with calcareous nodules, oosparite and pelsparite interbedded with marly-limestone, micrite and variegated clay levels.

Towards the basal part of the sequence, a patch-reef (R5) built by Demosponges, containing *Actinostromaria orthogonalis*, *Steineria tabulata* and *Tosastroma magna* is characteristic for the Vederöasa Member.

The Hauterivian age was established by the assemblage with *Praturlonella insignis*, *Suppiluliumaella alimani*, *S. erikfluegeli*, *Megaporella fluegeli*, *Vederosella alimani* n.g. n.sp. (Algae) and by *Meyendorffina jourdanensis*, *Scythilocolina confusa*, *S. bancilai*, *Rumanolocolina massei*, *Moesilocolina dobrogiaca*, *Pfenderina conica* and *P. globosa* (Foraminifers). *Bicaziella jurassica*, a rare pseudodoteacean alga for the Hauterivian was found.

Chronostratigraphically, the Hauterivian of Aliman is representative for algae diversity, especially dasycladaceans marked by *Megaporella fluegeli* - *Bancilaporella filipescai* biozone. The diversity of dasycladacean species is an evolutive event marked by the increase of taxa number related to the Hauterivian transgressive phase. The Early/Late Hauterivian boundary is also well marked by the dasycladacean "explosion" (Masse, 1993).

The Early Barremian Adâncata Member of the Ostrov Formation represents a transgressive and discordant sequence a few meters thick (5 m) overlying the Hauterivian. The sequence begins with yellow-red indurate clays, pelsparite with oncoids and oosparite. A small patch-reef (R6) was built by *Chaetetopsis crinita*, *Ch. zonata* and *Varioparietes lamellosus* followed by a coquina-ticket bafflestone of *Requienia ammonia* and *R. renevieri* (P1).

To the top of the profile, the sequence continues with yellow-reddish micritic and pelmicritic limestone, rich in *Cuneolina hensoni*, *Derventina filipescai*, *Rumanolocolina robusta*, *Salpingoporella carpathica*, *Clypeina valachia* and *Cylindroporella barbui*.

The biozone with *Salpingoporella muehlbergii* was separated in the sequence of Early Barremian, fact which confirming the age of this assemblage assigned before by Masse (1976) and Conrad & Peybernes (1976).

PALEOALGEOLOGICAL DESCRIPTION

Systematics adapted from Berger & Kaefer, 1992.

Phylum CHLOROPHYTA
Class CHLOROPHYCEAE
Order DASYCLADALES

Family TRIPLOPORELLACEAE (Pia, 1920)

Genus PRATURLONELLA Barattolo, 1978 emend.,
Dragastan now

Praturlonella insignis (Dragastan, 1989, non 1978)
Pl. 1, Figs. 1-6

Lectotypification in 1989 from the original paper, p. 110, fig. 1h 1978 *Likanella insignis* n. sp.; Dragastan, p. 122, fig. 1 h-i, Pl. III, fig. 10; Pl. VI, fig. 1; Pl. VIII, fig. 4; non *Radoicicella subtilis*, Pl. II, fig. 6, 12; non *Goniolina minima*, Pl. III, fig. 3.

Paratypes: Pl. 1, Figs. 3-6, Hauterivian, Samples 87, 84, 54, 26 (maximum of specimens), Coll. LPB V No. 1078; No. 1079; No. 1080; No. 1081.

Diagnosis: Thallus consisting of calcareous, discoidal-shaped "segments" (sensu Sokac, 1996) crossed by a large axial hollow bearing 3 rows of a special phloiophorous ramifications.

The ramifications present a special shape of phloiophorous, narrow to the proximal part and opened like a trumpet from the middle to the distal part (Pl. 1, fig. 1).

The ramifications disposed in verticils tightly compressed correspond to rows or rings (Sokac, 1996).

Description: Thallus composed of calcareous discoidal shaped "segments" separated by weakly calcified intervals. The discoidal "segments" are crossed by a large axial hollow, each "segment" bearing 3 rows of ramifications. The "rings" show one type of ramification, only primary phloiophorous with the proximal part, narrow and middle-distal parts very open, like a trumpet (Pl. 1, Figs. 1, 6). In the partial, longitudinal section the phloiophorous ramifications are clearly visible.

Dimension in mm.: Height of "segment" (H)=0.90-1.40; diameter of thallus "segment" (D)=1.12-1.30; diameter of central cavity (d)=0.24-0.40; length of ramifications (l)=0.14-0.30; proximal diameter of ramification (dp)=0.030-0.050; distal diameter of ramifications (dd)=0.060-0.10; number of horizontal rows per "segment" (w)=3; number of ramifications per "segment" (ws)= 12-16x3=36-48.

Remarks: *Praturlonella insignis* (Dragastan, 1989, non 1978) is comparable by the number of rows of ramifications per "segment" with *P. nerae* (Dragastan et al., 1978), but differs from it by the large size of the thallus- "segment" and by the shape of ramifications. A revision of *Praturlonella* species was presented by Sokac (1996). In this revision Sokac transferred some species to the genus *Praturlonella*, such as *P. danilovae* (Radoicic, 1968), *P. pejovicæ* (Radoicic, 1969), *P. adriatica* (Sokac & Velic, 1978), *P. jordanica* (Kuss & Conrad, 1991). *P. danilovae* and *P. pejovicæ* differs from *Praturlonella insignis* by a reduced number of rows of ramifications, (only 2) and by other dimensional parameters. As compared to *P. adriatica* and *P. jordanica*, the differences lie in number of rows of ramifications (3-4, or 4) and other dimensional data (see Table 6 from Sokac, 1996). In my opinion, the exact number of ramifications per "segment" is difficult to count in thin sections, but this is possible in detachable- "segments". If we compare the original diagnosis of genus *Draconisella* Granier & Michaud, 1989 (*D. genotii*, Portlandian of Chiapas) "pearl neck- lace thallus consisting of several large ring-shaped segments bearing at least three whorls of branches each. Primary branches thickening toward the outer ends and proximal narrowing", differs by genus *Praturlonella* Barattolo, 1978 only by shape of segments being identical by the shape of branches disposed in verticils.

Moreover, another taxon *Milanovicella* Granier & Berthou, 1994 has the same character, presence of 2 verticils per segment being identical as construction with genus *Praturlonella*.

In my opinion the genera *Draconisella* and *Milanovicella* are junior synonyms of genus *Praturlonella*.

The genus *Praturlonella* Barattolo consists of ring shaped-segments alternating with weakly calcified intervals, bearing phloiophorous ramifications disposed in verticils. *To the original descriptions of this genus we added that the number of verticils or rows is variable between 2 until 5-6 per segments. The shape of segments also variable, discoidal to pearl-neck lace, having per segment 2-6 verticils or rows.*

To describe new taxa (genera), taking into account, only the shape of segments and the shape of

ramifications which is phloiophorous for all "taxa" and the number of verticils per segment isn't sufficient for a such a rank. From this point of view the use of genus *Praturlonella* is recommended, the splitting of this is not useful.

Praturlonella emilii n. sp.

Pl. 1, Figs. 7-12.

1978 *Likanella insignis* n. sp.; Dragastan, Pl. VIII, fig. 3

Derivation nominis: Species dedicated to my geologist colleague, Prof. Emil Constantinescu from the Department of Mineralogy, University of Bucharest.

Holotype: Pl. 1, Fig. 11, Late Valanginian, Sample 122, Aliman, Coll. LPB V No. 1082.

Isotypes: Pl. 1, Figs. 7-10, 12, Late Valanginian, Samples 130, 112, 122, Aliman, Coll. LPB V No. 1083, No. 1084 and No. 1085.

Diagnosis: Thallus formed by strongly calcified discoidal "segments" crossed axially by a small cavity. The discoidal "segments" bear 5-(6) rows of phloiophorous ramifications.

Description: Thallus made up of strongly calcified discoidal "segments" crossed by a small axial cavity. In profile the discoidal "segments" are flat in their middle part and acuminate to both margins (Pl. 1, Figs. 7, 8, 11). Each discoidal "segment" has 5 (or 6) rows of ramifications; the upper and lower rows with a reduced number of ramifications (8), the intermediary rows having 10-12 ramifications and the central row the maximum number of ramifications, 14-16. The ramifications disposed regularly in rows, in an alternanting manner, are also compressed against each-other (Pl. 1, Fig. 10). The ramifications phloiophorous have a narrow proximal part and the middle and distal parts wide open, like a trumpet.

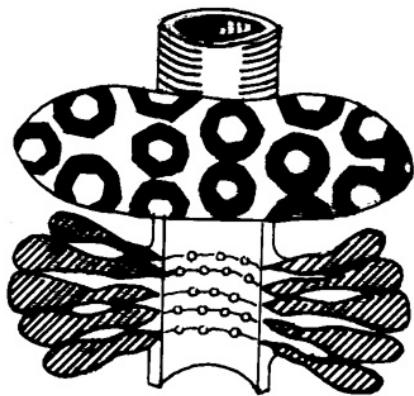


Figure 3 - *Praturlonella emilii* n. sp.. reconstruction of thallus

Dimensions in mm.: H=1.50-2.20; D=1.80-2.50; d=0.50-0.90; l=0.40-0.50; dp=0.060-0.090; dd=0.080-0.120; w=5 (or 6); ws=50-56.

Remarks: *Praturlonella emilii* n. sp., has a big thallus and discoidal "segments" different in shape and construction from all the species of genus *Praturlonella* described. The new species has a strong calcification bearing 5 (or 6) rows of ramifications.

Genus *CLYPEINA* Michelin, 1845 emend. Rezak, 1957

Clypeina valachia Dragastan, 1989, non 1978

Pl. 1, Figs. 13-18.

Lectotypification in 1989 from the original paper, p. 110, fig. 1m, Coll. LPB V No. 0045.

1978 *Clypeina valachia* n. sp.; Dragastan, p. 123, figs. 1 l-m.

Paratypes: Pl. 1, figs. 13-14, Late Hauterivian, Aliman, Coll. LPB V No. 1086, No. 1087; Early Barremian, figs.15-17, 18, Coll. LPB V No.1088, No. 1089, No. 1090, No. 1091.

Diagnosis: Calcareous discoidal-verticils formed by conical-trapezoidal to club-shaped ramifications.

Description: Thallus formed by calcareous discoidal, flat verticils; mostly found isolate, rounded in shape. The verticils have conical to trapezoidal club-shaped ramifications, opened distally (Pl. 1, fig. 17). The number of ramifications per whorls is 9-11.

Dimensions in mm.: D=1.10-1.30; d=0.26-0.35; dp of ramifications=0.072-0.12; ddr=0.17-0.31.

Remarks: *Clypeina valachia* Dragastan, 1989, is comparable with *C. marteli* Emberger (Valanginian) but differs from this species by the small diameter of verticils, which do not have a typical stellate disposition, and by a constant number of ramifications (9-11). *C. radici* Sokac (Neocomian) has also a small verticil, a variable number of ramifications (7-14) and another shape of ramifications; *C. nigra* Conrad & Peybernès (Barremian) has very small verticils and a high number of ramifications per verticil (18-20) (Conrad & Peybernès, 1978); *C. onogosti* Radoicic (Barremian) is different by the shape of ramifications and a constant number of ramifications, 15 (see Table 1, p. 55 from paper of Radoicic). *C. pastriki* Radoicic (Late Cenomanian-Turonian) (Radoicic, 1986) has a small verticil diameter and only 8-10 ramifications, unlike *C. valachia*.

BANCILAPORELLA n. gen.

Derivatio nominis: Genus dedicated to Academician Prof. Ion Bancila, a personality of Romanian Geology.

Type genus: *Bancilaporella filipescai* (Dragastan, 1989) former *Neomizzia filipescai* Dragastan, 1989.

Diagnosis: Thallus small, cylindrical having at the same intervals inflated areas separated by narrow zones. The verticils euspondyle provided small, phloiophorous salpingoporelliform ramifications wide opened distally.

Remarks: The new genus can be compared by the shape of ramifications to genus *Salpingoporella* Pia, 1918, from which it differs by the "moniliformous" shape of its thallus.

The genus *Neomizzia* Levy, 1966 (Carixian-Domerian) is an articulate, segmented dasyclad with a bead-like disposition and the ramifications arranged in verticils, the ramifications short and widely opened distally, having a different morphology from that of the genus *Bancilaporella* n. gen.

The taxon *Neomizzia elongata* considered by Granier & Deloffre (1994) as nomen nudum was validated by Bucur (in press), who introduced a lectotype and described *N. dacica* n. sp. from Barremian Blid Formation Dragastan et al., 1986, Northern Apuseni Mountains. *N. cf. elongata* Levy was described also from Late Jurassic of East Carpathians (Dragastan, 1989a).

Bancilaporella filipescai (Dragastan, 1989)

Pl. 2, Figs.1-13.

Lectotypification in 1989 from the original paper, p. 112, fig. 2h, Coll. LPB V No. 0056

1978 *Neomizzia filipescai* n. sp.; Dragastan, p. 124, figs. 2 g-k.

Paratypes: Pl.2 figs. 6-10, Hauterivian, Aliman, Samples 67, 68, 26, Coll. LPB V No. 1092; No. 1093; No. 1094; No. 1095 and No. 1096.

Diagnosis: Thallus cylindrical-moniliform crossed by a large axial-cavity. Thallus presents inflated areas separated by narrow zones. No segmentation of thallus was observed. Verticils euspondyle provided only primary, phloiophorous salpingoporelliform ramifications.

Description: Thallus small in size, long, cylindrical-moniliform with a large axial siphon. Thallus displays inflated areas at equal intervals separated by narrow zones. The verticils euspondyle are formed by phloiophorous, conical, small, short salpingoporelliform ramifications, wide opened distally (Pl. 2, figs. 11-13). In the cross section the thallus is round in outline and the verticils have a reduced number of phloiophorous and salpingoporelliform ramifications (Pl. 2, fig. 5).

Dimensions in mm.: Length of thallus (L)=1.40-1.58; diameter of inflated area (Di)=0.40-0.50; diameter of the narrow zone (Dn)=0.14-0.36; length of ramifications (lr)=0.075-0.095; diameter of ramifications proximal=0.024-0.030 and distal=0.048-0.062; w=8-(10).

Remarks: Initially it was assigned to the genus *Neomizzia*, but *N. elongata* Levy has a clearly segmented thallus, each bead being separated along the thallus, and it is different from *Bancilaporella filipescai*. Comparing with some *Salpingoporella* species such as *S. annulata*, *S. ubaiydhii*, *S. katzeri*, *S. urladanasi* (especially cross sections), *S. biokovensis*, *S. piriniae* and *S. polygonalis* (see Sokac, 1996), the only morphological feature resembling to *B. filipescai* is the phloiophorous, salpingoporelliform ramifications.

Genus CYLINDROPORELLA Johnson, 1954

Cylindroporella barbui Dragastan, 1989 non 1978

Pl. 2, Figs. 14-15.

Lectotypification in 1989 from the original paper, p. 112, fig. 2b, Coll. LPB V No. 0063 (Dragastan, 1989b).

1978 *Cylindroporella barbui* n. sp.; Dragastan, p. 126, fig. 2 a-e

Paratype: Pl. 2, fig. 15, Late Hauterivian, Aliman, Sample 26, Coll. LPB V No. 1098.

Description: Thallus cylindrical crossed by a narrow axial siphon. The euspondyle verticils disposed in alternation; the fertile ramifications sphaerical or almost sphaerical, in alternation with infertile cylindrical-tubular ramifications. The infertiles are very small and sometime have at both terminal parts (proximal and distal) a large diameter in comparison with the middle part; from this point of view they are characteristic.

Dimensions in mm.: L=2.40-2.80; D=0.55-0.91 (frequently 0.60); d=0.18-0.20; diameter of fertile ramifications (df)=0.14-0.21; diameter of infertile ramifications (din)=0.024-0.030 (0.050-0.060 diameter to the terminal parts, proximal and distal); length of infertile ramifications (li)=0.024-0.030; w=8.

Remarks: When compared to *C. arabica*, *C. sugdeni*, *C. barnesii*, *C. ellassonos*, *Cylindroporella barbui*, differs from these species by the constant number of fertile and sterile ramifications (8), disposed clearly in an alternating manner. It is very close in diameter of fertile ramifications to *C. arabica*, *C. barnesii*, *C. kochanskyae* and with *C. sp.1*, Masse & Poignant, 1972.

Comparing with genus *Bakalovella* Bucur, 1993, (*B. benzarensis* and *B. elitzae*), with a cylindrical thallus also, but which has primary and secondary ramifications alternating in the adjacent whorls; the primary presents a tubular ramifications continued on the upper side, to a big-sub-spheric, fertile ampoules and on the lower side, under ampoules, to the secondary, tubular ramifications

widening distally. The structure of species of genus *Bakalovella* differs totally from the *Cylindroporella barbui* (see description of *Bakalovella elitzae* in this paper).

In 1994 Granier et al. introduced the genus *Otternstella* as a new combination for *Cylindroporella lemmensis* Bernier and for other *Heteroporella* species. In my opinion, there is no difference between the diagnosis of the new genus and the diagnosis of genus *Cylindroporella*. Moreover, Figure 2, (p.133) is meant to clearly show the difference between the taxa, but in the axial sections, the disposition of ramifications in both genera is identical. In the tangential sections the arrangement between fertile and infertile ramifications could be different. Moreover, in thin sections and also in various figured taxa such as *Cylindroporella lemmensis*, *Heteroporella fourcadei*, *H. bifurcata* or *H. jaffrezoi* this distinctive feature can not be observed. In my opinion, recognizing the genus *Otternstella* remains a very difficult problem.

Although *Heteroporella lemoinei* Dragastan had a lectotype designated in 1989 from the original paper, but due to a printing mistake appeared as "holotype", I make now the correction for all species lectotypified in 1989 to become valid.

Genus BAKALOVELLA Bucur, 1993

Bakalovella elitzae (Bakalova, 1978)

Pl. 2, Figs. 16-17.

See synonymy in Bucur, p. 100-101, Revista Espanola de Micropaleontologia, XXV, 1, 1993.

Paratypes: Pl. 2, figs. 16-17, Aptian, Camenita Valley, Banat, Coll. LPB V No. 1120; No. 1121.

Description: Thallus cylindrical crossed by an axial cavity with slightly moniliform outline. Primary and secondary ramifications, alternating in adjacent whorls. To the terminal part, the tubular primary, ramifications give rise, on the upper side to a big subspheric fertile ampoules. The tubular secondary, ramifications widen distally.

Dimensions in mm.: D=0.51-1.10; d=0.12-0.28; df=0.18-0.26; din=0.080-0.090; l fertile=0.10-0.15; lin=0.20-0.23; w=8.

VEDEROSSELLA n. gen.

Derivatio nominis: from Vederoseasa Valley, Aliman, South Dobrogea.

Type genus: *Vederosella alimani* n. gen. n. sp.

Diagnosis: Thallus cylindrical and conical to the base crossed by a very narrow axial siphon. The ramifications disposed in verticils having an alternanting and helicoidal arrangement. The ramifications only primary, spherical in shape. They have a long proximal tubular peduncle disposed in a sharp angle against the axis (Pl. 3, fig. 10). The thallus presents a clear calcareous "sheath" or muff. The ramifications show, also in between, small connective-laterals like a "communicative siphon".

Remarks: The *Vederosella* n. gen. can be compared with genus *Cylindroporella*, having only primary spherical ramifications, but the new taxon has no infertile ones and a long peduncle of the primary ramifications. A very close structure is shown by the genus *Sarfatiella* which could be a valid taxon and is not synonymous with genus *Holosporella* Pia (opinion of Elliott, 1983).

I also believe that the genus *Sarfatiella* is a valid taxon, which presents only primary, spherical ramifications, but with a short, proximal peduncle perpendicularly disposed on the axis (see fig. 4, p. 303

and Pl. 1, fig. 2 from the original paper, Conrad & Peybernès, 1973). The genus *Holosporella* Pia, has also spherical cavities or cyst, but the insertion to the main axis is without peduncle, being in direct connexion with the main cavity; the taxon was included by Berger & Kaefer (1992) in the tribe *Aciculelleae*. All these comparable taxa have another inner morphology of thalli, *Vederosella* n. gen. being different in spite of "first sight similarities". To the Recent genus *Chalmasia* only the presence of connective-laterals is similar with the new taxon.

Vederosella alimani n. sp.

Pl. 3, Figs. 1-10.

Synonymy: 1991 *Cylindroporella* aff. *C. barnesii* Johnson, 1954; Kuss & Conrad, p. 870, fig. 2.12-2.16, Late Albian, Sinai.

Derivatio nominis: "*alimani*" from the main quarry of Aliman village, South Dobrogea.

Holotype: Pl. 3, fig. 1, Late Hauterivian, Sample 26, Aliman quarry, Coll. LPB V No. 1099.

Isotypes: Pl. 3, figs. 2-9, Late Hauterivian, Samples 30, 32, 33, Aliman quarry, Coll. LPB V No. 1100; No. 1101; No. 1102; No. 1104; No. 1105; No. 1106; No. 1107.

Diagnosis: Thallus small, cylindrical at both ends, slightly conical, crossed by a very narrow axial siphon. The verticils euspondyle made up only of primary, spherical-globulous ramifications. The ramifications have in the proximal part, a long tubular, peduncle set at an acute angle to the axial siphon (Pl. 3, fig 1- see arrow; fig.10). The distal part is spherical-globulous. The ramifications have an alternating, helicospiral disposition in quadruple manner (4=4), being visible in Pl. 3, fig. 5 (see arrows). In axial-longitudinal sections, the ramifications show clearly the long peduncle (proximal), continued distally with a large spherical-globulous part. Sometimes compressed against each-other, like in a compact structure. The ramifications are more or less covered by a "muff" of microcrystalline or coarsely crystalline calcite. (Pl. 3, figs. 6, 8).

In the cross sections, the thalli have a round outline, crossed by a very narrow axial siphon, surrounded by a thin, inner calcareous wall (Pl. 3, fig. 2). The inner calcareous wall of the siphon has a rhombic (Pl. 3, fig. 4) or a pentagonal shape (Pl. 3, fig. 2). In tangential sections, the alternating and helicospiral arrangement of ramifications can be seen (Pl. 3, fig. 3). Also in the cross section, it is possible to see the lateral connexions, like "bridge siphons" between the globulous ramifications (Pl. 3, fig. 2-see arrow).

Dimensions in mm.: L=1.40-1.50; D=0.18-0.66; d=0.070-0.12; thickness of the inner wall of the axial siphon - 0.024-0.030; diameter of spherical ramifications (pd)=0.096-0.16; diameter of the proximal peduncle (dpd)=0.025-0.030; length of the peduncle (lped)=0.12-0.15; thickness of the outer calcareous "muff" - 0.038-0.050; w=6-(8).

Remarks: At first sight *Vederosella alimani* n. sp. can be compared only by the same spherical shape of ramifications with some species of genus *Cylindroporella*, such as *C. barnesii* (Pl. 7, fig. 2 from Bassoullet et al., 1978) and with *C. elassonos* (Pl.7, fig.5 from Bassoullet et al., 1978), being homeomorphic but not identical. *C. taurica* has a large thallus with fertile and infertile ramifications (Conrad & Varol, 1990). The new species differs from them due to the lack of tubular infertile ramifications and the presence of long peduncle in the proximal part of the spherical branches. *Sarfatiella*

dubari, which I consider as a valid taxon, is comparable in respect to the shape of ramifications, spherical or subspherical, but it has a short cylindrical peduncle disposed perpendicularly to the axial siphon (see the original reconstruction, p. 303, fig. 4 from Conrad & Peybernès, 1973). To the Recent *Chalmasia antillana* the comparison included the presence of lateral connexions between ramifications. The function is to communicate laterally between ramifications by these "small bridge siphons", as in the new taxon.

Genus *RAJKAELLA* Dragastan & Bucur, 1988

Rajkaella alpina n. sp.

Pl. 2, Figs. 18-19.

Holotype: Pl. 2, fig. 18, Berriasian, Ghilcos Massif, Bicaz Gorges, East Carpathians, Coll. LPB V No. 1108.

Isotype: Pl. 2, fig. 19, Late Valanginian, Ghilcos Massif, Bicaz Gorges, East Carpathians, Coll. LPB V No. 1109.

Diagnosis:Thallus made up of verticils with primary and secondary ramifications, in many cases dismembered. The primary ramifications long, cylindrical have an ovoidal shape in the proximal part, like a swelling for the insertion to the main axial siphon. To the distal end continued with the secondary ramifications, short, ovoidal elipsoidal opened distally and disposed like in a "bush".

Description: Disarticulated thallus verticils made up by primary and secondary ramifications, the last ones disposed like in a "bush". The primary ramifications long, cylindrical having in the proximal part an ovoidal-swelling in direct connection with the main axial siphon. The secondary ramifications short, ovoidal-elongate opened distally; they form a bush with 6 ramifications. In the cross section, is possible to see the 6, ovoidal in shape, secondary ramifications. (Pl. 2, fig. 19).

Dimensions in mm.: Length of primary ramifications - 0.35-0.50; diameter of primary ramifications - 0.080-0.10; diameter of proximal, ovoidal-swelling - 0.12-0.14; Length of secondary ramifications - 0.10-0.14; diameter of secondary ramifications - 0.050-0.070; w₂ - 6.

Remarks: *Rajkaella alpina* n. sp. is a small alga, which is close to *R. subtilis* by the shape of primary ramifications. *R. subtilis* has no proximal ovoidal-swelling, but the same "petaloid" disposition of secondaries with a reduce number of ramifications, in a "bush" (Dragastan, 1999). By the shape and dimensions of primary and secondary ramifications, the new taxon differs from *R. iailensis*, *R. minima*, *R. bartheli* and also from the large species such as *R. laskarevi* and *R. banatica* (Dragastan & Bucur, 1993).

Class BRYOPSIDOPHYCEAE

Order BRYOPSIDALES

Family UDOTACEAE

Genus *PSEUDOPENICILLUS* Dragastan et al., 1997

Pseudopenicillus filiformis (Dragastan, 1989, non 1978)

Pl. 4, fig. 10.

Lectotypification in 1989 from the original paper, Pl. IV, fig. 1, Coll. LPB V No. 0050 (Dragastan, 1989a, 1995).

1978 *Teutloporella filiformis* n. sp.; Dragastan, p. 122, Pl. IV, fig. 1-2.

Paratype: Pl. 4, fig. 10, Hauterivian, Sample 2/10/95, Aliman, South Dobrogea, Coll. LPB V No. 1110.

Description: Thallus cylindrical crossed by a large medullar zone without preserving the medullar siphons. Thallus has a thick cortex, strongly calcified. The thallus presents slightly constrictions sometimes deeply inserted in the cortex. No data about the medullar siphons. The cortex system is composed of long,

tubular, primary siphons, continued by short, secondary dichotomously branched siphons and finally by tertiary very short, tubular dichotomously branched siphons (fig.

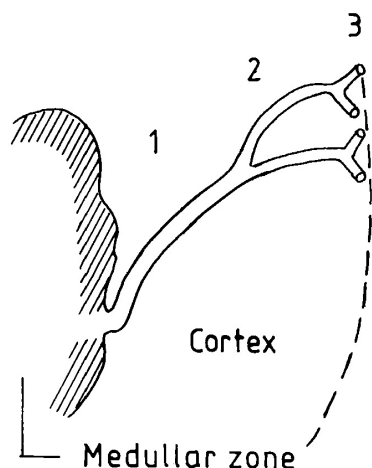


Figure 4 - *Pseudopenicillus filiformis* (Dragastan, 1989), reconstruction of cortex branched siphons system

4).

Dimensions in mm.: L=6.0-10.0; D=2.40-2.70; diameter of medullar zone (dm)=0.96-1.20; cortex system: diameter of primary siphons (dcs₁)=0.048-0.052; diameter of secondary siphons (dcs₂)=0.012-0.020; diameter of tertiary siphons (dcs₃)=0.06-0.010; length of primary siphons (lcs₁)=0.30-0.36; length of secondary siphons (lcs₂)=0.22-0.28; length of tertiary siphons (lcs₃)=0.020-0.025.

Remarks: *Teutloporella filiformis* Dragastan, 1989 was transferred to the genus *Pseudopenicillus* because the morphology of the thallus has no dasycladacean affinities. The thallus morphology corresponds to a cylindrical segment crossed by a medullar zone surrounded by a cortex. The medullar siphons are not preserved in the central area or zone, and they are from this point of view very similar as inner structure to some Recent species of the genus *Penicillus*, which did not preserve the medullar siphons in the central area. In comparison with some Jurassic-Cretaceous species of genus *Arabicodium*, the cortex system presents mainly 4 orders, branched siphons being different. The Late Triassic, *Pseudopenicillus aegaeicus* Dragastan et al., 1997 has also a cortex system with 4 orders of branched siphons.

Pseudopenicillus discoideus (Dragastan, 1989, non 1978)
Pl.4, Figs. 1-7.

Lectotypification in 1989 from the original paper, p. 112, fig. 2n. 1978 *Permocalculus discoideus* n. sp.; Dragastan, p. 127, fig. 2n-p.

Paratypes: Pl. 4, figs. 1-6; 1. Late Valanginian, Sample 105, Aliman, Coll. LPB V No. 1111; 2-6. Hauterivian, Samples 68, 67, 38, 26, Coll. LPB V No. 1112; No. 1113; No. 1114; No. 1115; No. 1116.

Description: Thallus composed of bead shaped segments, large in diameter and not so high (Pl. 4, figs. 2, 5, 6). The bead-segments are crossed by a medullar zone, like an empty hollow (Pl.4, figs. 3, 4). In the polished section, the segments show a large, empty

medullar zone and a medium thick cortex crossed by 2 orders of branched siphons (Pl. 4, fig. 7). The primary cortex siphons are simple, long, tubular, sinuous continued with secondary, short, tubular, dichotomic branched siphons.

Dimensions in mm.: Diameter of bead-segments - 1.10-1.30; high of bead-segments - 0.50-0.65; diameter of medullar zone - 0.60-0.72; thickness of cortex - 0.24-0.30; cortex system: dcs₁=0.024-0.030; dcs₂=0.010-0.012; length of cortex siphons: lcs₁=0.15-0.20; lcs₂=0.060-0.080.

Remarks: *Pseudopenicillus discoideus* is a different taxon due to its bead shaped segments. It differs from *P. filiformis* and of *P. aegaeicus*, which have cylindrical segments and a cortex system with 3 or 4 orders of branched siphons.

The taxa "*Arabicodium*" *jurassicum*, "*A.*" *elongatus*, "*A.*" *orientalis*, "*A.*" *texana*, "*Permocalculus*" *dragastani*, "*Permocalculus*" sp. in Dragastan (1989) and *Halimeda* sp. sensu Okla (1992) show an empty medullar zone, variable in size and a multibranching cortex system (until 4 orders) different from *P. discoideus*.

Family PSEUDOUDOTEACEAE

Ancestral ecorticateae

Genus *HEDESTROEMIA* Rothpletz, 1913

Hedstroemia n. sp.

Pl. 4, Fig. 9.

Specimen: Pl. 4, fig. 9, Valanginian, Sample 470, Ghilcos Massif, Bicaz Gorges, East Carpathians, Coll. LPB V No. 1118.

Description: Thallus hemispherical crossed by multibranching siphons (Pl. 4, fig. 9 - see arrows). The siphons system consists of short, main tubular siphons, which continued with a polytomic branched siphons. The polytomic siphons in number of 6, symmetrical disposed against the main siphons, growing in diameter to the distal part.

Dimension in mm.: Width of thallus - 1.56; high of thallus - 1.80; diameter of the main siphon - 0.072; diameter of the polytomic branched siphons: in the proximal - 0.032; in the distal - 0.084.

Partial Corticateae

Tribe *BICAZIELLEAE* Dragastan, in press

Genus *BICAZIELLA* Dragastan, 1988

nomen correctum

Bicaziella jurassica Dragastan, 1988

Pl. 4, Fig. 11.

1988 *Bicaziella jurassica* n. sp.: Dragastan, p. 363, Pl. III, figs. 1-5.

Paratype: Pl. 4, fig. 11, Late Hauterivian, Sample 26, Aliman, South Dobrogea, Coll. LPB V No. 1119.

Description: Thallus fan-like having small lobes disposed laterally. It is crossed by 2 kinds of siphons: V-shaped, tubular siphons (Pl. 4, fig. 11-see arrows) and trichotomic siphons branched after an angle of 90°, disposed in the different part of the thallus (Pl. 4, fig. 11-see arrows). Diameter of the tubular siphons is the same, indifferent of kind of branching.

Dimensions in mm.: Width of thallus - 4.10-4.20; high of thallus - 5.80-6.0; diameter of branched siphons - 0.048-0.060.

Remarks: This species was reported as being frequently from the Tithonian in the Carpathian carbonate platforms and rarely in the Neocomian (Hauterivian deposits) of South Dobrogea.

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PLATES**PLATE I**

Figs. 1-6. *Praturlonella insignis* (Dragastan, 1989, non 1978): 1-2. reconstruction of thallus; 3-4. discoidal groups of verticils with 3 rows of ramifications; 5. broken discoidal groups of verticils with visible upper and middle rows of ramifications; 6. partial vertical section in broken discoidal groups of verticils with 3 rows of ramifications, Hauterivian, Samples 87, 54, 26.

Figs. 7-12. *Praturlonella emilli* n. sp.: 7-8. reconstruction of discoidal groups of verticils (lateral and upper views); 11. Holotype, entire discoidal groups of verticils, Late Valanginian, Sample 122, Coll. L.P.B.V. No. 1082; 12. Isotype, Late Valanginian, Sample 130, Coll. L.P.B.V. No. 1083; 9. Isotype, partial section in a discoidal - groups of ramifications (left) and cross section through the ramifications (right), Late Valanginian, Sample 112, Coll. L.P.B.V. No. 1084; 10. Isotype, tangential section in a discoidal groups of ramifications, Late Valanginian, Sample 122, Coll. L.P.B.V. No. 1085.

Figs. 13-18. *Clypeina valachia* (Dragastan, 1989, non 1978): 13-16, 18. entire verticils, Early Barremian, Samples 22, 14, 11; 17. cross section in verticil, Late Hauterivian, Sample 30.

Fig. 19. *Salpingoporella annulata* Carozzi, vertical section in a polished thallus (see arrow for ramification), Late Valanginian, Sample 146.

All figures, x 23 (except Figs. 1-2), Aliman, South Dobrogea.

PLATE II

Figs. 1-13. *Bancilaporella filipes* (Dragastan, 1989) Dragastan, Hauterivian, Samples 68, 67, 26. 1-5. reconstruction of thallus and different oriented sections from the original paper, 1978; 6-10. entire thalli showing inflate area separated by constrictions, see the euspondyle disposition of ramifications (6, 8); 11-13. various longitudinal axial sections in the thalli; Aliman, South Dobrogea.

Figs. 14-15. *Cylindroporella barbui* Dragastan, 1989, non 1978, drawings from the original thalli, Late Hauterivian - Early Barremian, Aliman, South Dobrogea.

Figs. 16-17. *Bakalovella elitzae* (Bakalova, 1978) Bucur, oblique and cross sections, Late Aptian, Camenita Valley (Sasca), Banat.

Figs. 18-19. *Rajkaella alpina* n. sp.: 18. Holotype, Berriasian, Ghilcos, Bicaz Gorges, East Carpathians, Coll. L.P.B.V. No. 1108, section in primary and secondary ramifications; 19. Isotype, Early Valanginian, Ghilcos, Bicaz Gorges, East Carpathians, Coll. L.P.B.V. No. 1109, cross section in a rosette with secondary ramifications.

Figs. 1-5. (not to scale); Figs. 6-19., x 24.

PLATE III

Figs. 1-10. *Vederosella alimani* n. g. n. sp.: 1. Holotype, Late Hauterivian, Coll. L.P.B.V. No. 1099, Sample 26, oblique vertical section (see arrow for the peduncular ramification), Aliman, South Dobrogea; 3, 5 (see arrow on both sides for the helicospiral disposition of ramifications); 6. Isotypes, Late Hauterivian, Samples 30, 32, tangential and axial vertical sections, Coll. L.P.B.V. No. 1101; No. 1103; No. 1104; 2. (see arrow for the bridge between ramifications), 4, 7-9. Isotypes, Late Hauterivian, Samples 32, 33, 30, cross section and oblique cross sections, Coll. L.P.B.V. No. 1100; No. 1102; No. 1105; No. 1106; No. 1107; 10. Reconstruction of thallus, long peduncular ramifications with alternating and helicospiral disposition.

Figs. 1-2, 7, x 26; Figs. 3-6, 8, x 13.

Fig. 11. *Dasycladacean A*, vertical axial section, Hauterivian, Sample 35, x 20.

Fig. 12. *Chalmasia antillana* Solms - Laubach, Recent, part of a cap viewed from above see the connected area between ramifications, from Berger & Kaeffer, 1992, x 38.

PLATE IV

Figs. 1-7. *Pseudopenicillus discoideus* (Dragastan, 1989, non 1978), Paratypes: 1. cross section in a bead-segment; 2, 5-6. lateral view of the bead-segment; 3-4. view of the upper part of the bead-segments with empty medullar hollow; 7. cortex system in a polished segment; 1. Late Valanginian, Sample 105, x80; 2-6. Hauterivian, Samples 68, 67, 38, x 22; 7. drawing from the original paper, 1978.

Fig. 8. *Rivularia piae* (Frollo, 1938) Dragastan, 1985; Paratype, vertical-oblique section, Late Valanginian, Sample 122, Aliman, x 13.

Fig. 9. *Hedstroemia* n. sp., vertical axial section, Valanginian, Ghilcos Massif, Bicaz Gorges, East Carpathians, Coll. L.P.B.V. No. 1118, x 13.

Fig. 10. *Pseudopenicillus filiformis* (Dragastan, 1989, non 1978), Paratype, Coll. L.P.B.V. No. 1110, Sample 2/10/95; Hauterivian, Aliman, South Dobrogea, x 13.

Fig. 11. *Bicaziella jurassica* Dragastan, 1988, vertical axial section (see arrow for two kinds of branched siphons); Paratype, Hauterivian, Sample 26/91; L.P.B.V. No. 1119, Aliman, South Dobrogea.

Fig. 12. Hauterivian - microfacies, Aliman quarry, Sample 68, x 13.

