RAZPRAVE IV. RAZREDA SAZU	XXXV	8	129-149	Pls. 1-4	LJUBLJANA 1994

FLEURYANA ADRIATICA N. GEN., N. SP. (FORAMINIFERIDA) FROM THE UPPERMOST MAASTRICHTIAN OF THE BRAČ ISLAND (CROATIA) AND SOME OTHER LOCALITIES ON THE ADRIATIC CARBONATE PLATFORM

FLEURYANA ADRIATICA N. GEN., N. SP. (FORAMINIFERIDA) IZ ZGORNJEGA MAASTRICHTIJA Z OTOKA BRAČA (HRVAŠKA) IN IZ NEKATERIH DRUGIH NAHAJALIŠČ NA JADRANSKI KARBONATNI PLATFORMI

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ABSTRACT UDC 563.12 (497.13 Brač)

***Fleuryana adriatica* n. gen., n. sp. (Foraminiferida) from the Uppermost Maastrichtian of the Brač Island (Croatia) and some other localities on the Adriatic carbonate platform**

Fleuryana adriatica n. gen., n. sp. is a multilocular, planispirally coiled, microgranular foraminifer which is most closely similar to *Moncharmontia* De Castro, but differs from the latter in the type of the aperture: an arched slit in *Fleuryana*, in contrast to multiple openings (cribrate) in *Moncharmontia*. However the two genera are thought to be closely related and to belong to one family. The stratigraphic position of the new form is the Uppermost Maastrichtian.

IZVLEČEK UDK 563.12 (497.13 Brač)

***Fleuryana adriatica* n. gen., n. sp. (Foraminiferida) iz zgornjega maastrichtija z otoka Brača (Hrvaška) in iz nekaterih drugih nahajališč na Jadranski karbonatni platformi**

Fleuryana adriatica n. gen., n. sp. je multilokularna, planispiralna foraminifera z mikrogranularno zgradbo stene in je zelo podobna rodu *Moncharmontia* De Castro. Razlikuje se predvsem po tipu ustja, ki je pri novem rodu enotno, elipsoidalne ali polkrožne oblike in ga obdaja naprej obrnjena ustnica (vrat), pri rodu *Moncharmontia* pa je ustje sitasto, sestavljeno iz številnih odprtin. Oba rodova sta si sorodna in sodita v isto družino. Stratigrafska starost nove oblike je zgornji maastrichtij.

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INTRODUCTION

Upper Cretaceous and Paleogene deposits on the Brač Island have been subject of interest for several research groups. Most recent and most complete stratigraphic reviews of the island are by Pejović & Radoičić (1987) and Gušić & Jelaska (1990). In the Pejović & Radoičić paper, the

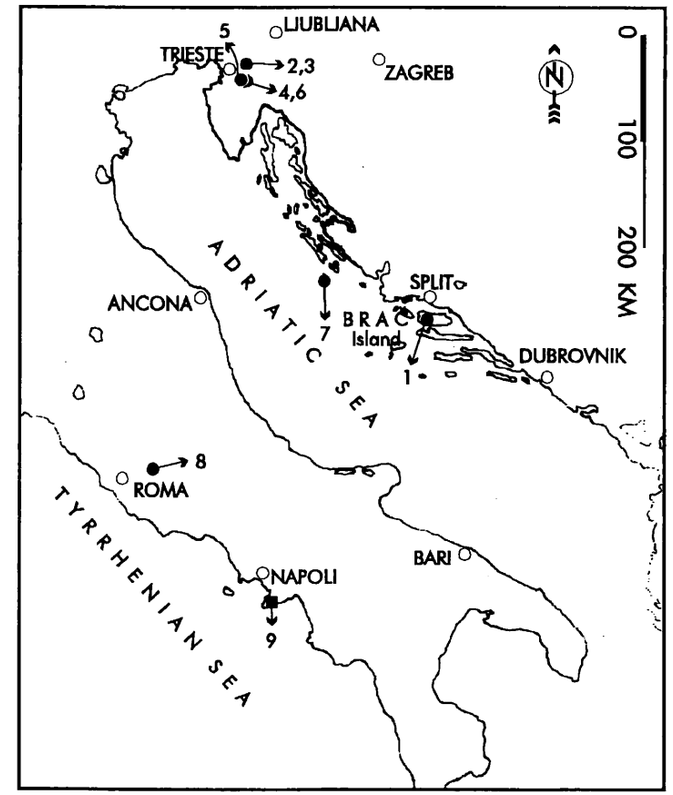


Fig. 1. Position of the localities with the *Fleuryana adriatica* n. gen. n. sp. (1-8) and *Fleuryana* sp. (9). 1 = Island of Brač; 2 = Dolenja vas E part; 3 = Dolenja vas W part; 4 = Sopada; 5 = Padriciano; 6 = Vremski Britof; 7 = Borehole Kate 1, 8 = Monte Filaro; 9 = Monte Tobenna.

new form which is the subject of the present paper, was occasionally mentioned as "*Moncharmontia*" sp. In the Gušić & Jelaska paper, the type-locality (Likva Cove) of the new form is figured as the locality Nr. 1 in Fig. 15. Besides that, the Uppermost Cretaceous (Maastrichtian) and Paleogene sediments in the Likva Cove were investigated by V. Jelaska (Zagreb) and B. Ogorelec (Ljubljana), who prepared a detailed stratigraphic column of that locality for the 4th IAS Regional Meeting held in Split in April 1983 (Jelaska & Ogorelec 1983), which remains the most detailed stratigraphic description of that locality until the present day. Rajka Radoičić delivered the

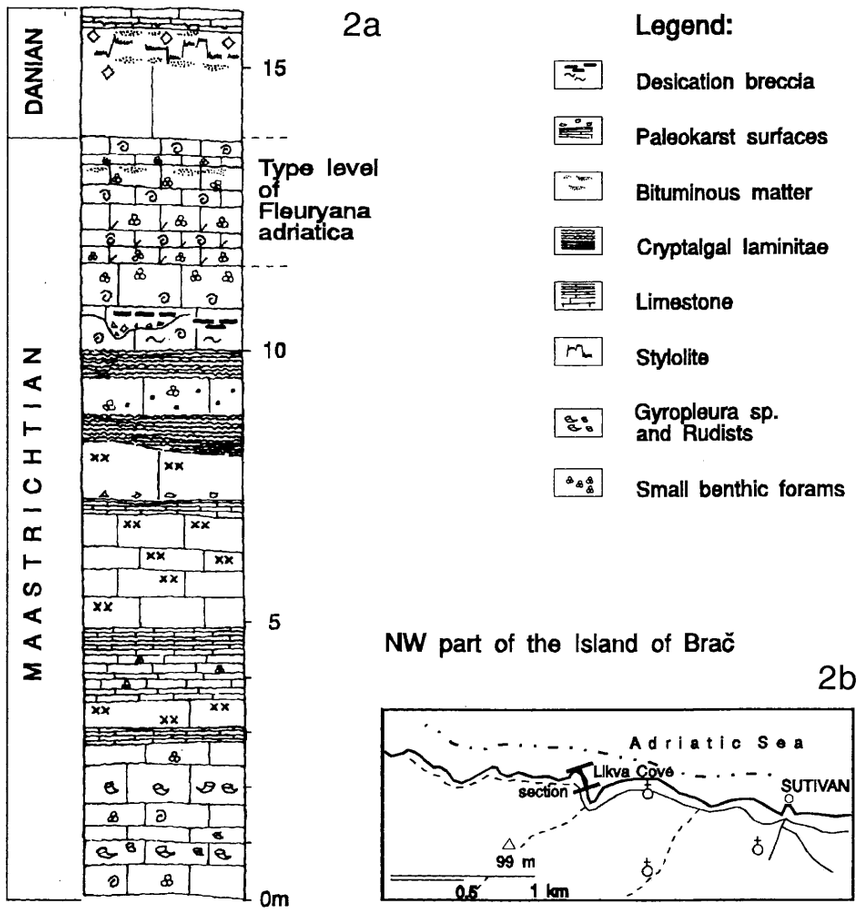


Fig. 2. a. Position of the *Fleuryana* - bearing level in the section of the Likva Cove on the Island of Brač (after Jelaska and Ogorelec 1983). b. Position of the section.

samples with the new genus to P. De Castro for further paleontologic study. Katica Drobne from Ljubljana, in collaboration with M. Trutin from Zagreb, also studied the section and took the stratigraphic log of the Cretaceous-Paleocene transition and Eocene limestone for INA-Naftaplin, Zagreb.

All workers noticed the easily noticeable bed with abundant miliolids and similar foraminifera (Fig. 2), which was accordingly profusely sampled.

Owing to such circumstances, the samples with the new form were dispersed at three institutions (Zagreb, Ljubljana, and Napoli), to be eventually reunited in the present study.

Genus *Fleuryana* n. gen.

Type species: *Fleuryana adriatica* n. gen., n. sp.
Origin of the name: after the renowned French Tethyan geologist and micropaleontologist Jean-Jacques Fleury of the University of Lille.

Diagnosis: Test free, lenticular, multilocular, planispiral, varying from partly involute and widely umbilicate to involute, not umbilicate or faintly umbilicate. Wall calcareous, microgranular, very finely perforate. Aperture single, central, rimmed by a more or less projecting lip; subcircular to roughly elliptical in early stage; an arched slit, more or less laterally extended "downward", i. e. toward the axis, in adult stage.

Comparison: *Fleuryana* n. gen. is most similar to *Moncharmontia* De Castro 1967 but differs from the latter, primarily, in the type of aperture. While *Moncharmontia* shows a multiple, cribrate aperture starting from the first chambers and with each small opening being rimmed by its own lip (or "neck"), *Fleuryana* n. gen. presents a single, more or less central, aperture rimmed by a single, continuous lip.

Fleuryana adriatica n. sp.
Pls. 1-4, Figs. 3-5, 7-8

1972 *Moncharmontia apenninica compressa* De Castro - Bignot, Pl. 16, figs. 6, 7, 8.
1988 *Moncharmontia apenninica* (De Castro) - Drobne et al., Pl. 24, figs. 6, 7.
1988 *Moncharmontia* - Sartorio and Venturini, p.130
1989 *Moncharmontia apenninica* (De Castro) - Drobne et al., Pl.3, figs. 10, 11, 12.
1989 *Moncharmontia apenninica* (De Castro) - Molinari- Paganelli and Tilia Zuccari, Fig. 15.
1992 *Moncharmontia* sp. 1 - Pleničar et al., p. 234.
1993 ex *Moncharmontia* - Lučić, Pl. 2, figs.1-3.

Origin of the name: after the Adriatic Sea
Holotype: Pl. 1, fig. 2, Br+1/7090
Cotypes: all figured specimens
Type locality: Brač Island, Likva Cove (Fig. 2)
Type level: Uppermost Maastrichtian
Depository: Holotype and thin sections Br+1 at ZRC SAZU, Ljubljana, Slovenia; other

material (thin sections B-14 to B-18) in Department of Geology and Paleontology, Faculty of Sciences, University of Zagreb, Croatia, and thin sections A-8026 at Dipartimento di Paleontologia, Universita degli Studi Federico II, Napoli, Italy.

Diagnosis: as for the genus.

Description: Test free, lenticular, medium-sized, planispirally coiled, consisting - in fully developed specimens - of 2.5-3.5 whorls. The majority of tests have about 2 whorls and the diameter averaging 0.30 mm; in the tests with 3 whorls the diameter is, on the average, 0.51 mm (see Table 1 - descriptive statistics - for detailed measurements). The flattening index, i. e. the ratio radius/axial width, is about 0.87 by the first whorl, 1.00 by the second, 0.83 by the third, and 1.12 by the 3.5 whorls (Fig. 5). The coiling is involute to partly involute, with a more or less pronounced umbilicus (Pl. 1, figs. 8, 15). The spiral wall is usually the least involute in the first whorl, producing a triangular shape of the chamber lumen in equatorial sections (Pl. 2, figs. 2, 10, 11); then it progressively tends to cover more and more of the underlying earlier portions of the test and eventually to reach the test axis (Pl. 1, fig. 3, Pl. 3, fig. 1) as a consequence of this, the umbilicus becomes smaller and smaller until it eventually disappears and the shape of the chamber lumen in axial sections becomes more crescent-shaped (lunular), with more extended alar prolongations (Pl. 1, figs. 1-3, 9, 15). The degree of involution of the spiral wall may somewhat differ on the two opposite sides of the test. In some specimens with the maximum number of whorls, the last whorl may depart from the planispiral coiling (Pl. 1, fig. 1, Pl. 3, fig. 6)

The proloculus is globular, sometimes a little flattened laterally; its inner diameter is from 0.03 to 0.09 mm, most frequently about 0.06 mm (Fig. 3, Tab. 1). No correlation between the size

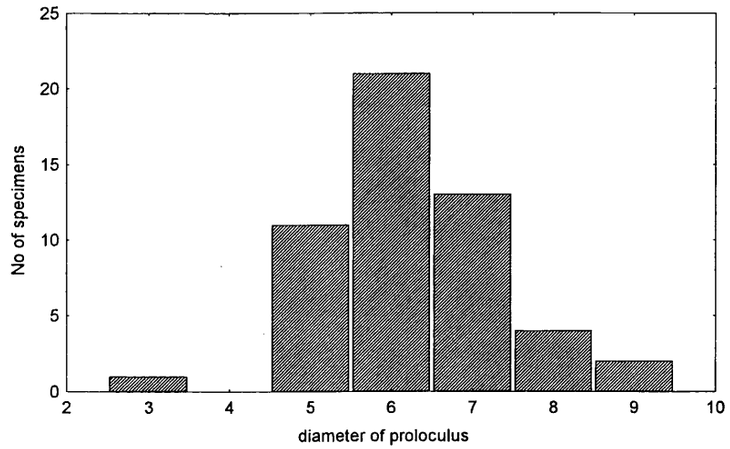


Fig. 3. Histogram of the diameter of proloculus. Measurements in µm x10.

of the proloculus and the number of whorls exists and hence megalospheric and microspheric generations cannot be distinguished. Though small tests invariably have comparatively large proloculi (averaging about 0.05-0.07 mm), large tests, consisting of 2.5-3.5 whorls, also frequently show equally large proloculi.

Chambers slowly increase in size and became, during ontogeny, slightly higher than long. They appear subquadrate to slightly rhombic in equatorial section, with the septa being in early stages perpendicular to the wall and later being very slightly bent forward, making an angle of about 65-80° with the test wall. The number of chambers in the first whorl is 10.5-11, in the second about 13, and in the third whorl 14-16. The pace of growth is slightly accelerated from the second to the third whorl, as can be seen in Fig. 4, Pl. 2, figs. 1, 5.

The aperture is single, rimmed by a protruding lip (neck)(Pl. 1, figs. 5, 14, Pl. 2, figs. 1, 12), subcircular to roughly elliptical in the first chambers (Pl. 1, fig. 6; Pl. 3, fig.3), becoming crescent-shaped (lunular), or an arched slit, more or less symmetrically extended on both sides, in the adult stage (Pl. 1, figs. 8, 14, 15). Sometimes, in the adult stage, the aperture may be subdivided by thin pillars into a few roughly elliptical openings, but preserving the continuity of the surrounding lip (Pl. 1, fig. 8). In early whorls, the aperture lies closer to the base of the septum, but not interiomarginal; during the ontogeny, it gradually moves from the base toward the centre of the septum (Pl. 1, figs. 2, 3; Pl. 2, figs. 5, 12).

The wall structure is microgranular, finely perforate. The wall thickness around the proloculus is about 0.004 mm and increases very slowly during the ontogeny: from about 0.007 mm in the first whorl to about 0.012 mm in the third. The perforations, if visible at all, can be seen

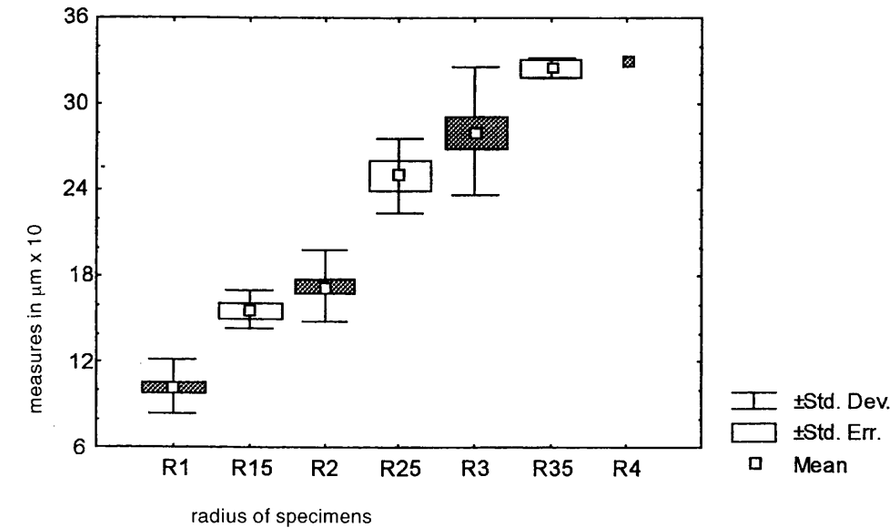


Fig. 4. Diagram of spiral growth for the *Fleuryana adriatica*. Increase of the values of radius through the ontogenetic stages.

only in the last whorls of the fully grown specimens (Pl. 1, figs. 6, 11; Pl. 3, fig. 16). They are difficult to measure but appear to have the diameter of approximately 0.003-0.005 mm; the intervening space between the pores is almost equal to the pore diameter or slightly larger. In the majority of tests, however, the perforations are hardly discernible, if at all; in some tests the reason for that lies in the diameter of perforations being smaller than the thickness of the thin sections; in some other tests, however, even when thickness of the thin section was reduced to the minimum, the test wall appears to have been diagenetically altered to such an extent that the perforations are completely obliterated.

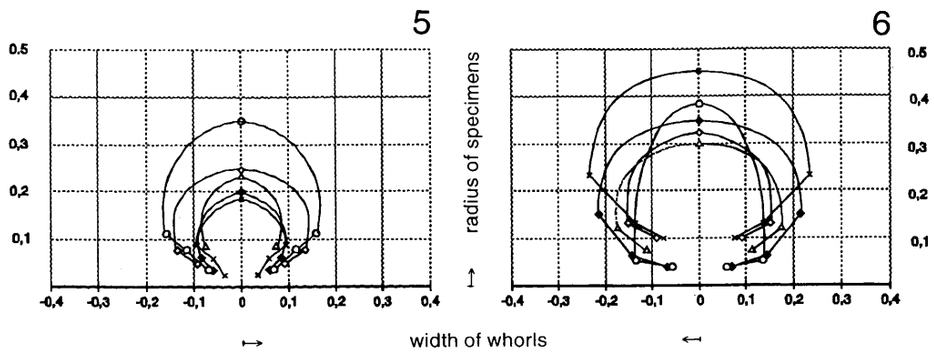
Comparison: As mentioned in the diagnos. of the genus, on the generic level *Fleuryana* n. gen. is most similar to *Moncharmontia* De Castro 1967, from which it differs in the type of the aperture. Besides the difference in the general appearance of the aperture - cribrate in *Moncharmontia*, slit-like in *Fleuryana* - the lip surrounding the aperture in *Fleuryana* is much more forward projecting than the small "necks" which surround the individual openings in *Moncharmontia* (comp. Pl. 2, figs. 1, 2, 5, 11, 12). The difference in the type of aperture being of generic rank, some additional difference with regard to *Moncharmontia apenninica* will be enumerated as follows:

Fleuryana adriatica, though being smaller in size than *Moncharmontia apenninica* (compare the values in Table 1 with those in De Castro 1966) has, on the average, a larger number of whorls than *M. apenninica* (Pl. 4, figs. 8a,b, 12, 13a);the latter rarely exceeds 2-2.5 whorls. Also, *Fleuryana adriatica* has more chambers per whorl than *Moncharmontia apenninica*:

	1st whorl	2nd whorl	3rd whorl
Moncharmontia apenninica	7-8	9-10.5	13 (rarely present)
Fleuryana adriatica	10.5-11	13	14-16

Being smaller in size, *Fleuryana adriatica* has 3 whorls in the same diameter in which *M. apenninica* has only 2 whorls.

The test of *Fleuryana adriatica* is less inflated, being more of a lenticular, rather than thickly

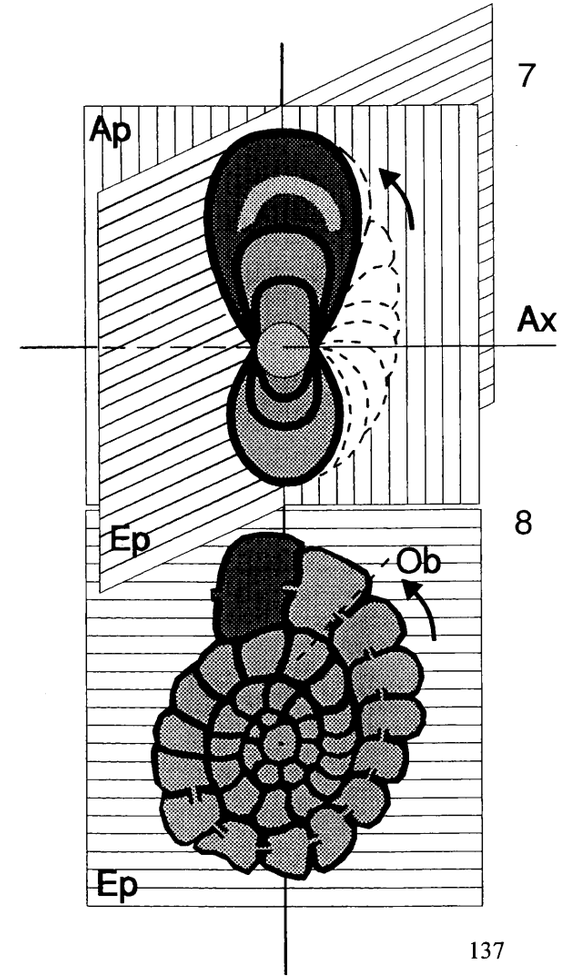


Figs. 5. 6. Relationship between the radius and the width of whorl. Note a more flattened shape of *Fleuryana adriatica* (Fig. 5) and a more inflated one of *Moncharmontia apenninica* (in Fig. 6, the measurements were taken in mm on the specimens from the Plates I, III, De Castro 1966).

lenticular to subglobular shape. This difference is best brought out in axial sections and in Figs. 5 and 6, respectively (which are drawn on the basis of measurements taken in axial sections). As a consequence of this, the majority of the tests of *Fleuryana adriatica* have a more acute peripheral margin ("keel"), in contrast to more gently rounded median margin in *Moncharmontia apenninica*.

Also, *Fleuryana adriatica* has a comparatively much thinner test wall, with much finer perforations, than *Moncharmontia apenninica*. This feature probably leads to frequent *post mortem* deformations in *F. adriatica*, which are described below.

Remarks: In equatorial sections, chambers of the last whorl frequently appear deformed, their outer wall in the median region being thrust inward and thus assuming an inwardly convex shape protruding into the chamber lumen, with the septa projecting outward (Pl. 2, figs. 4, 12, Pl. 3, fig. 10). Because of its frequent occurrence, we were at first inclined to regard this as a manifestation of gerontic stage, resulting from diminished "vital strength". However, eventually we concluded that this sort of deformation probably occurred *post mortem*, being due to the



Figs. 7, 8. Model of the test in axial section with the axial plane (Fig. 7) and the equatorial section with the equatorial plane (Fig. 8).
Ax = axis; Ap = axial plane; Ep = equatorial plane; Ob = oblique section just cutting the projecting lip of the aperture; arrow = direction of growth; dark field = last chamber.

pressure of neighbouring grains or calcite cement. This is supported by the fact that deformed chambers are not necessarily the last ones; while always occurring in the last whorl, they may be followed by normal, undeformed, and fully developed chambers which terminate the last whorl (e. g., Pl. 3, fig. 10). Such deformations, or at least not pronounced to such an extent, were not observed in *Moncharmontia apenninica*, which has a comparatively thicker and more robust test wall. Nevertheless, the last whorl in fully grown specimens of *Fleuryana adriatica* n. gen., n. sp.

Table 1. Descriptive statistics of the maesurements of differents structural elements by *Fleuryana adriatica*.

Var.	Valid N	Mean	Min	Max	Std.Dev.
R1	53	10.2	6.0	14.0	1.91
R1.5	6	15.7	14.0	18.0	1.37
R2	41	17.3	13.0	24.0	2.49
R2.5	6	25.0	23.0	30.0	2.61
R3	17	28.1	22.0	38.0	4.48
R3.5	2	32.5	32.0	33.0	0.71
R4	1	33.0	33.0	33.0	
D1	54	17.7	11.0	22.0	2.80
D1.5	9	26.4	22.0	30.0	2.83
D2	41	30.7	24.0	41.0	4.29
D2.5	12	42.3	35.0	55.0	5.10
D3	18	51.0	40.0	65.0	7.19
D3.5	5	58.8	53.0	64.0	4.09
N1	28	11.1	10.0	22.0	2.26
N1.5	6	7.5	7.0	9.0	0.84
N2	19	13.4	11.0	15.0	1.01
N2.5	6	7.8	7.0	10.0	1.17
N3	7	14.6	13.0	16.0	0.98
N3.5	1	8.0	8.0	8.0	
L1	21	10.2	7.0	13.0	1.37
L1.5	3	13.0	12.0	14.0	1.00
L2	19	16.9	12.0	24.0	3.00
L2.5	4	21.0	16.0	25.0	3.92
L3	9	25.3	20.0	33.0	4.47
L3.5	2	30.0	28.0	32.0	2.83
P	52	6.3	3.0	9.0	1.12

Legend: R = radius; D = diameter; N = N⁰ of chambers per whorls; L = width of whorls; P = proloculus measured in μm x10.

may show minor growth irregularities, such as irregularities in the cyclic shape, departure from the equatorial plane, etc. which most likely do represent gerontic manifestations and which, too, were not observed in *Moncharmontia apenninica*.

As regards the suprageneric classification of this new genus, we, for the time being, deliberately refrain from placing it into any of the existing families. What can be said for sure, however, is that it is most closely related to *Moncharmontia*. In fact, it is almost homeomorphous with it (notwithstanding the differences of the species-specific rank), except for the aperture type. Therefore, in any attempt of a suprageneric classification, these two genera should probably be placed together and assigned to the same family.

REMARKS ON THE POSSIBLE PHYLOGENY

On the basis of what is observed in some sequences of southern Apennines, the first specimens of *Fleuryana* (Pl. 4, figs. 9-11),characterized by small size and slightly involute tests, with not much evident wall perforations, appear in the Early Turonian, little after the extinction of *Cisalveolina fraasi* Gümbel (Reichel) (see De Castro 1981). Later, starting already from the Turonian their characters tend to approach those observed in *Fleuryana adriatica* and *Moncharmontia apenninica* respectively, that are to be considered the most highly evolved species of the two genera. In the thanatocoenoses, more or less phylogenetically evolved specimens of *Fleuryana* and *Moncharmontia* may coexist with those originated in earlier times. In the Late Maastrichtian, only *Fleuryana adriatica* is known till now.

STRATIGRAPHIC POSITION AND GEOGRAPHIC DISTRIBUTION

The type-locality is situated in the Likva Cove, at the northwestern tip of the Brač Island, near the small town of Sutivan (Fig. 2b) and locality Nr. 1 in Gušić & Jelaska, (1990, Fig. 15). The most detailed stratigraphic column of the locality is given by Jelaska & Ogorelec (1983, Fig. 14), in which the *Fleuryana*-bearing beds are situated between the boxes 4 and 5. Our own Fig. 2a is redrawn and slightly simplified after Jelaska & Ogorelec (1983) stratigraphic column.

At the type-locality, *Fleuryana adriatica* is abundantly present in the above mentioned interval. It is accompanied by numerous miliolids, two *Bolivinopsis* species (provisionally labelled *Bolivinopsis* sp. 1 and *Bolivinopsis* sp. 2) (Pl. 4, figs. 1-4, 6), "primitive" agglutinated conical foraminifera (Pl. 4, fig. 8a), polymorphinids, *Laffitteina* sp. (Pl. 4, figs. 5, 8a,b) (figured in Gušić & Jelaska 1990, Pl. XIX, fig. 2), and more rare *Thaumatoporella* and Charophyta remains. This level is about 1.5 m thick (Gušić & Jelaska 1990, p. 145). Also, remains of *"Gyropleura"* and/or *"Apricardia"* shells continue to occur from the underlying beds. The occurrence of all these taxa and unidentified forms is abruptly terminated at the top of that, *Fleuryana* bearing, level, except for rare and small *Laffitteina* and some conical forms. Their abrupt disappearance in a uninterruped sedimentary succession is a strong indication for the Cretaceous-Danian boundary. The overlying deposits are almost sterile, deprived of any significant forms, with exception of small and rare *Laffitteina*, and rare ostracodes, discorbids, "*Pseudochrysalidina*", and characean debris (Fleury 1980). This is what the K/T-boundary

researches informally call the Danian "desert". Therefore the stratigraphic position of *Fleuryana adriatica* n. gen., n. sp. at its type locality is considered to be the topmost Maastrichtian.

Outside of the Brač Island, *Fleuryana adriatica* n. gen., n. sp. has been identified in Slovenia (Bignot 1972), in the Dolenja Vas section (Drobne et al. 1988, 1989), and in the Sopada section (Drobne et al. 1994a), also in the Padriciano section (Caffau et al. 1994). *F. adriatica* appears in the borehole of Kate 1 (Lučić 1993) and also on the hill Filaro, as can be decided after the photo 15 of Molinari-Paganelli & Tilia Zuccari 1989. Its position in these profiles fully corresponds to its position at the type-locality, that is, Uppermost Maastrichtian (Fig. 1, see synonymy list).

ACKNOWLEDGEMENTS

We are grateful to V. Jelaska, B. Ogorelec, and R. Radoičić for placing their samples at our disposal. We also thank M. Trutin for his help in the field work, K. Cvetko-Barić for the preparation of thin sections, A. Košir and Mateja Debelak for computer treatment of the measurement data, B. Kotnik for technical assistance in preparation of the plates, and M. Zaplatil and I. Lapajne for making the photographic prints.

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PLATE 1

Fleuryana adriatica n. gen., n. sp.

All specimens from the type level of Island of Brač. Specimens 1, 2, 4, 9, 12, 14, 15 belong to the collection of K. Drobne; 3, 5, 10, 13, of I. Gušić; 6, 7, 8, 11 of P. De Castro.

Fig. 1. Br+1/7088, slightly oblique section, close to the axial. Note the last whorl departing from the equatorial plane.
Fig. 2. Br+1/7090, Holotype, slightly oblique section, nearly axial, cutting the septum and the apertures, showing the whorls with numerous chambers and weakly expressed umbilical depression.
Fig. 3. B 18/1, slightly oblique section, nearly axial, note the aperture of lunular shape, its position on the whorls higher and higher during the ontogeny, section cutting the large aperture just on the lateral part of the lip. Last chamber slightly depressed.
Fig. 4. Br+1/7088, axial section of a juvenile flattened test.
Fig. 5. B 18/1, axial section of a juvenile text. Note the large proloculus.
Fig. 6. A 8026.1, axial section, slightly oblique. Note the basal position of the apertures of the subcircular shape in the juvenile whorls.
Fig. 7. A 8026.1, slightly oblique axial section. Note the slightly visible perforations of the test wall, and the last whorl departing from the equatorial plane.
Fig. 8. A 8026.1, section subparallel to axial plane, showing 2.5 whorls, the arched aperture with small pillars in it. On the opposite side of the whorl, the septum is interrupted by lateral extensions of the aperture.
Fig. 9. Br+1/7090, axial section, showing the lips of the aperture; whorls almost involute.
Fig. 10. B 18/2, oblique section inclined to axis, cutting 3 whorls; note the apertures and the irregular chambers.
Fig. 11. A 8026.1, section subparallel to axial plane, cutting 2.5 whorls with the deformation on the last one.
Fig. 12. Br+1/7088, axial section with the involute whorls, slightly depressed in the marginal area.
Fig. 13. Br 18/1, axial section of a test of small size, with thin wall and large proloculus.
Fig. 14. Br+1/7088, axial section of a test of small size, cutting 2 whorls and the lip in the last one.
Fig. 15. Br+1/7088, slightly oblique axial section of a small specimen, showing 3 whorls and a deep umbilical depression on one side.

All figures x 80
Age: Uppermost Maastrichtian

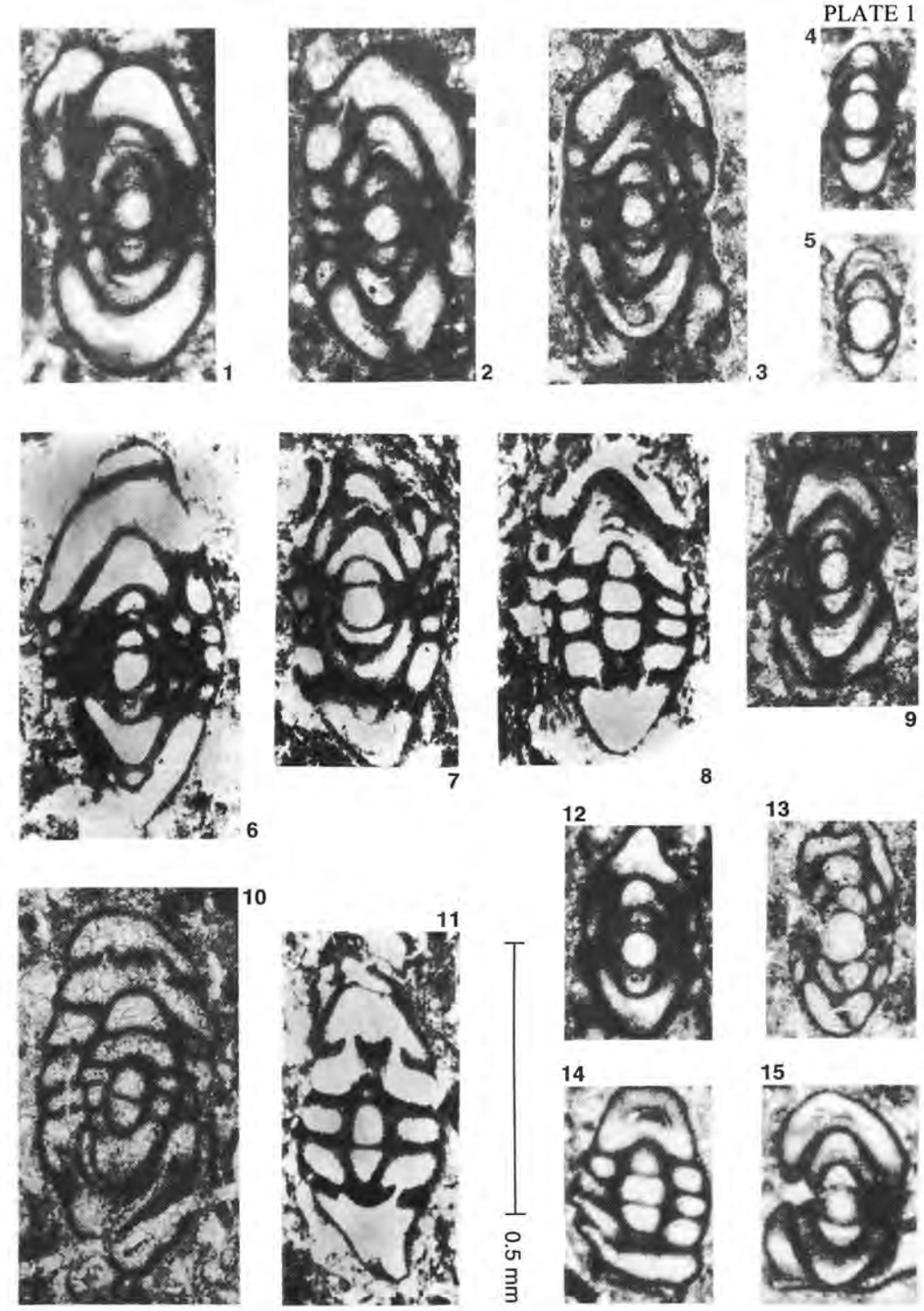


PLATE 2

Fleuryana adriatica n. gen. n. sp.

All specimens from the type level on the Island of Brač. Specimens 1-3, 5-8, 10 belong to the collection of K. Drobne; 4, 9, 11-14 of I. Gušić; 12 of P. De Castro.

Fig. 1. Br+1/7088, equatorial section of a large specimen, showing 3.5 whorls. Note the positions of the apertures higher and higher in the adult stage, with clearly projecting lips. Note rectangular shape of the chambers in early whorls. In the equatorial plane proloculus shows a small triangular hump. The outer wall impressed in some chambers of the last whorl.
Fig. 2. B 18/1, slightly inclined equatorial section, showing the aberrations on the last whorl.
Fig. 3. Br+1/7089, tangential section of the 5 last chambers, showing inflated shape of chamber, the impression of the suture and the aperture with the distinctive lips.
Fig. 4. B18/1, slightly oblique equatorial section, showing upword projecting lip.
Fig. 5. Br+1/7089, equatorial section, the proloculus with the hump after the first chamber, where the direction of the growth was changing. Note position of the apertures and inclination of the septa.
Fig. 6. Br+1/7088, equatorial section strongly inclined to axial plane, showing the first chamber.
Fig. 7. Br+1/7088, equatorial section of a test of small size, cutting one and half whorl.
Fig. 8. Br+1/7089, equatorial section of a small, juvenile test.
Fig. 9. B18/1, equatorial section of a small, juvenile test, showing one whorl with 10 chambers, the first having triangular shape, proloculus with the hump, and cutting 2 apertures with the lips on the base of the septum.
Fig. 10. Br+1/7088, equatorial section, cutting 2 whorls, a large proloculus with the hump, the first chamber of triangular shape.
Fig. 11. B18/2, equatorial section of a small test, cutting 2 and half whorls. Note position of the apertures and the impressed marginal wall of the last chambers.
Fig. 12. A 8026.1, section subparallel to equatorial plane, showing the umbilical side of the test, cutting septa with the apertures. Note the projecting lips. outer whorl secondarily damaged (partly destroyed).
Fig. 13. B18/1, equatorial section of small test, cutting 2 and half whorls, large proloculus with the hump, the first chamber of triangular shape.
Fig. 14. B18/2, oblique equatorial section of the test of small size. Note circular shape of proloculus.

All figures x 80
Age: Uppermost Maastrichtian

PLATE 2

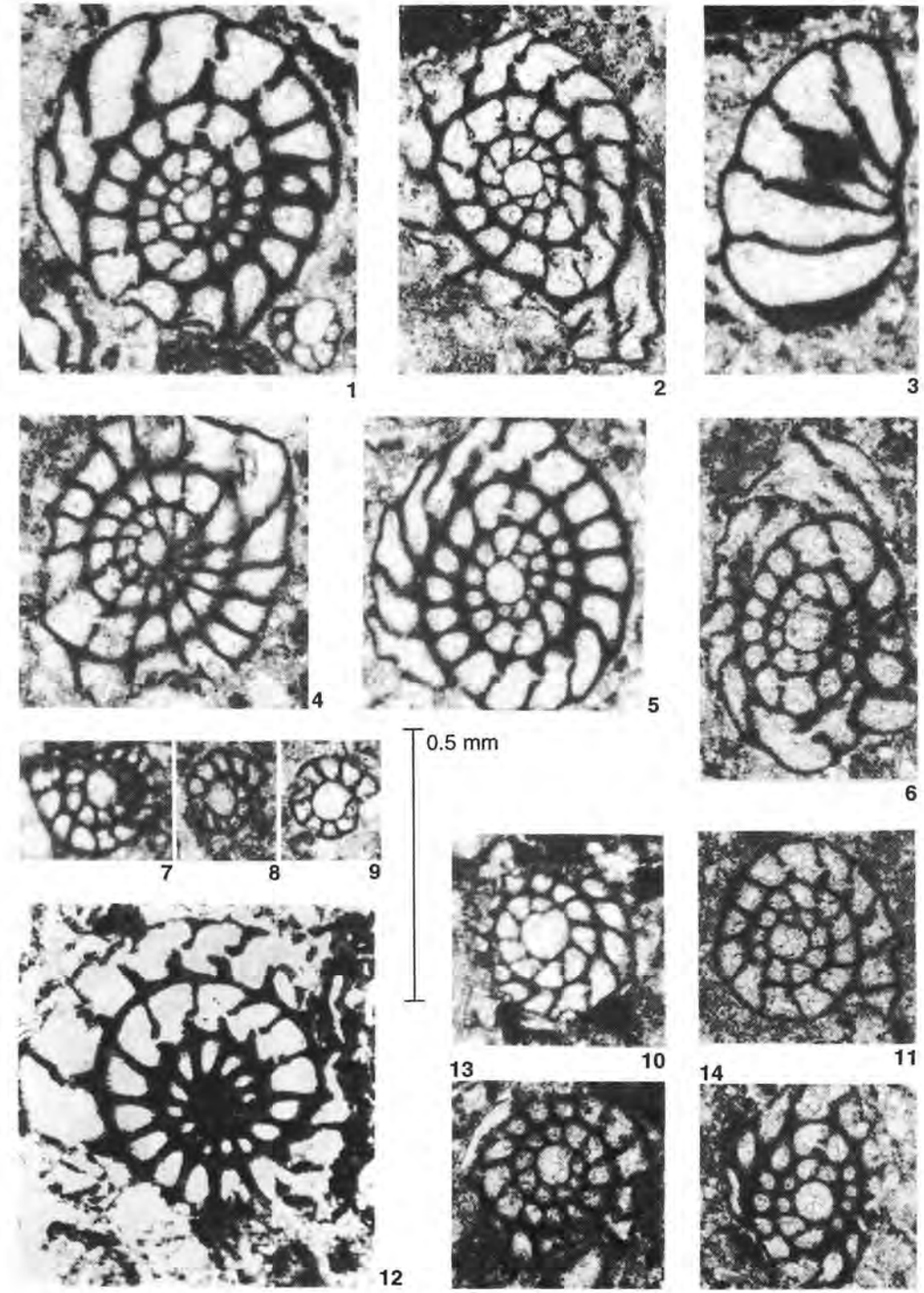


PLATE 3

Fleuryana adriatica n.gen., n.sp.

All specimens from the type level on the Island of Brač, Specimens 1, 4-11, 13-16 belong to the collection of I.Gušić; 2,3,12, of K.Drobne.

Fig. 1. B18/1, axial section, cutting 3 whorls, proloculus of the small size, umbilicus well expressed.
Fig. 2. Br+1/7091, axial section, cutting the septa through the aperture. Umbilicus well expressed.
Fig. 3. Br+1/7088, axial section. Note circular shape of the aperture in the 2nd whorl.
Fig. 4. B18/1, axial section inclined to equatorial plane, note the flattened (aberrant) proloculus.
Fig. 5. B18/1, section subparallel to axial plane, cutting two whorls.
Fig. 6. B18/1, tangential section, cutting the umbilicus side, showing aberrant last chambers.
Fig. 7. B18/1, section subparallel to axial plane, showing aberrant last chambers ("gerontic stage" deformation).
Fig. 8. B18/2, tangential section, showing a broken last chamber.
Fig. 9. B18/2, tangential section inclined to umbilical side, cutting 3 whorls. Note strongly expressed lip in the last whorl.
Fig. 10. B18/1, section subparallel to equatorial plane; the chambers are partly broken, partly aberrant.
Fig. 11. B18/1, bottom: section subparallel to equatorial plane; top: specimen with large proloculus, cut by oblique, nearly axial section.
Fig. 12. Br+1/7089, oblique axial section of the test of small size, cutting 3 whorls. Note the changing of the direction of growth.
Fig. 13. B18/1, section subparallel to axial plane of the test of small size. Note triangular shape of marginal area.
Fig. 14. B18/1, tangential section of a small test.
Fig. 15. B18/1, section subparellel to axial plane. Note the involute chamber with a lunular shape of the marginal area.
Fig. 16. B18/1, detail of axial section, showing microgranular wall with well expressed perforations. Enlarged x 160.

All figures x 80, except Fig.16 x 160
Age: Uppermost Maastrichtian

PLATE 3

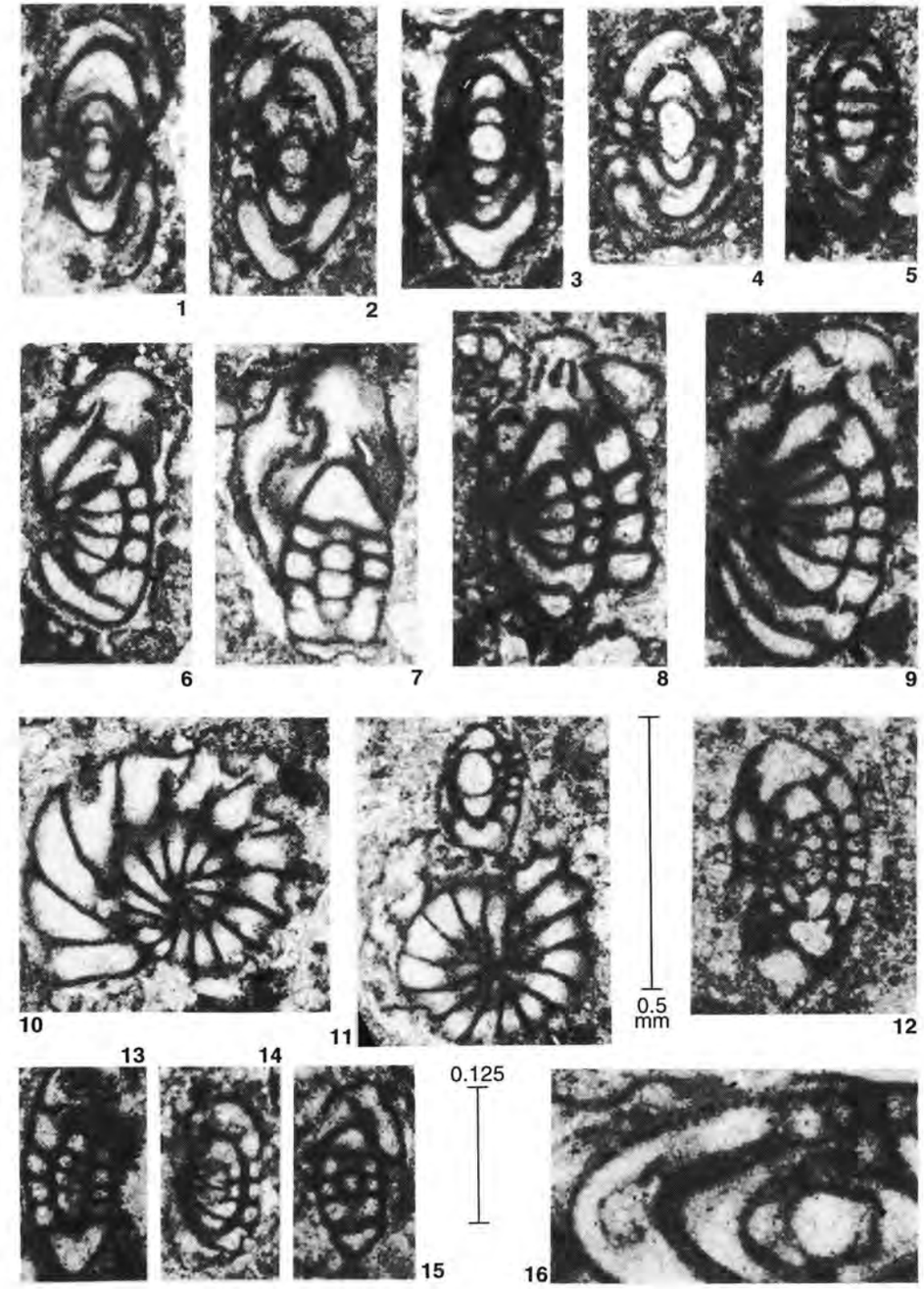


PLATE 4

Thin sections 1, 8 from the type level on the Island of Brač belong to the collection of K. Drobne; 2 - 7 of I. Gušić; Specimens 9-11 belong to the collection of P. De Castro from the Monte Tobenna, Salerno (Fig. 1), and 12, 13, belong to the same collection from the quarry Gioi, Salerno.

Figs. 1 - 8. *Fleuryana adriatica* n. gen., n. sp.

Fig. 1. Br+1/7091, centered section of *Bolivinopsis* sp., with juvenile whorls and tangential section above.
Fig. 2. B-18/1, *Fleuryana adriatica*, section subparallel to axial plane, *Bolivinopsis* sp. 1 above, *Bol.* sp. 2 below.
Fig. 3. B-18/1, *Fleuryana adriatica*, equatorial and axial sections, *Bolivinopsis* sp. 1.
Fig. 4. B-18/1, *Fleuryana adriatica*, section subparallel to equatorial plane, tangential section of *Bolivinopsis* sp. 2.
Fig. 5. B-18/2, sections of *Fleuryana adriatica*; *Laffiteina* sp. in upper right corner.
Fig. 6. B-18/2, two sections of *Fleuryana adriatica*, note a lunular shape of the aperture and a moderately flattened test; *Bolivinopsis* sp. 2.
Fig. 7. B-18/1, sections of *Fleuryana adriatica*.
Figs. 8a,b. Br+1/7089, note the equatorial section of *Fleuryana adriatica* to be compared with *Moncharmontia apenninica* (De Castro) (Figs. 12, 13a). Figs. 1-7 x 40; Figs. 8a,b x 10 (negative prints) Age: Uppermost Maastrichtian

Figs. 9-11. *Fleuryana* sp.

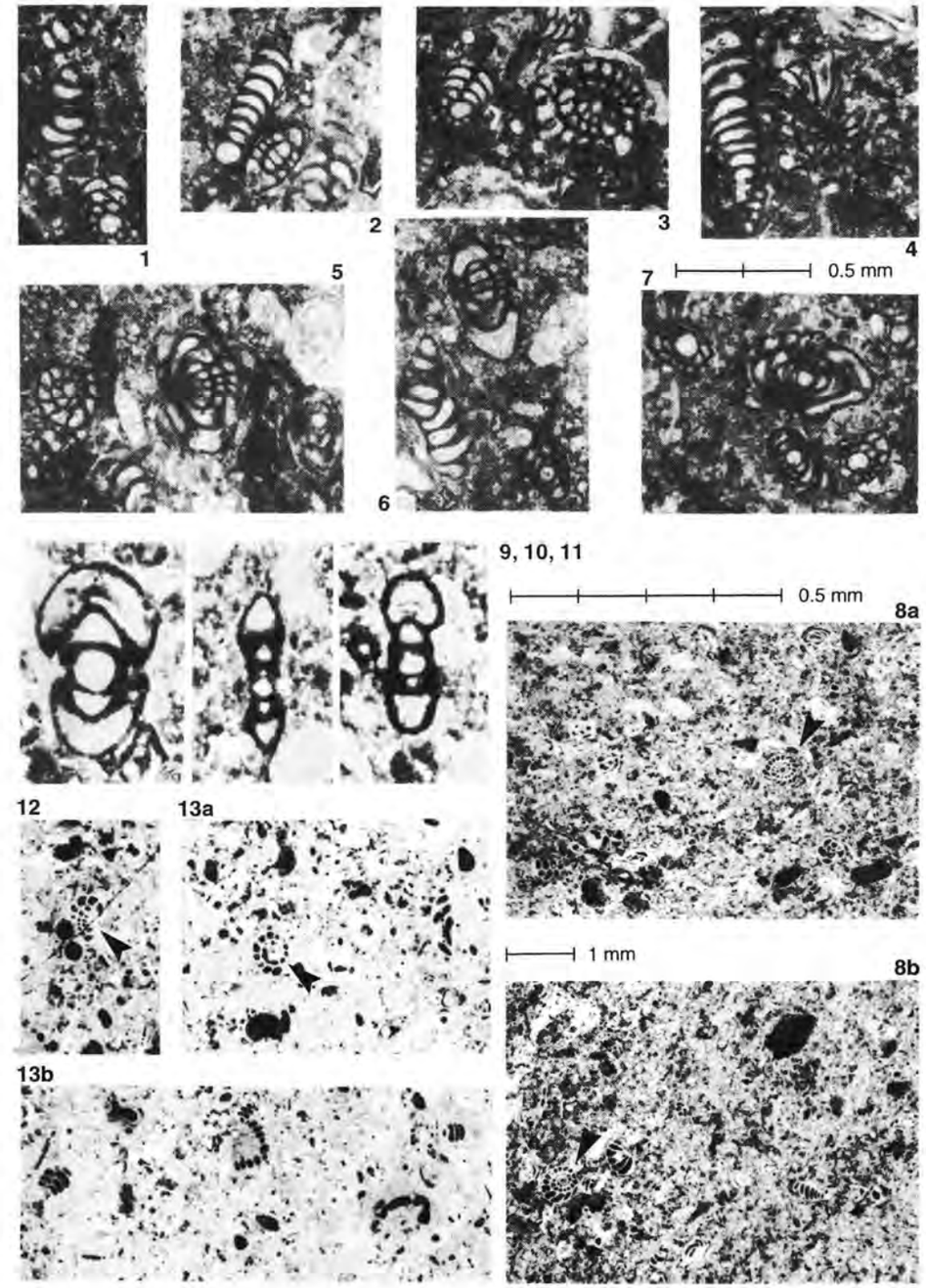
Fig. 9. A 1002.1, axial section, note lunular shape of the aperture.
Fig. 10. A 1305.4, axial section, flattened test with evolute coiling whorls, triangular shape of marginal area.
Fig. 11. A 1305.4, nearly axial section of a flattened test; note lunular shape of the aperture and evolute whorls.
Figures 9-11 x 80 Age: Senonian

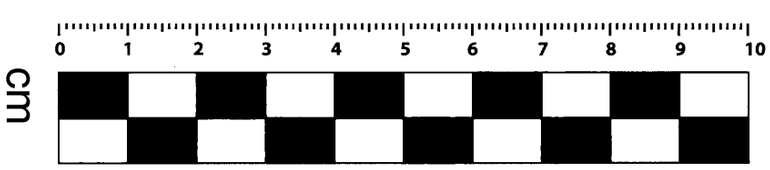
Figs. 12-13. *Moncharmontia apenninica* (De Castro)

Fig. 12. A 3959, tangential section to be compared with *Fleuryana adriatica* n. gen., n. sp.
Fig. 13a,b. A 3959, equatorial section of foraminiferal association consisting of *M. apenninica*, *Acordiella conica* Farinacci, *Bolivinopsis* sp.

Figures 12-13 x 10, negative prints
Age: Senonian.

PLATE 4

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