

Cretaceous benthic foraminifers and calcareous algae from Monte Cairo (southern Latium, Italy)

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KEY WORDS - Benthic Foraminifera, Calcareous Algae, Systematics, Biostratigraphy, Cretaceous, Apennine Platform, Italy.

ABSTRACT - A total of ten species of foraminifers and three species of dasycladaceans from the lower Cretaceous carbonate sediments of the Monte Cairo area (southern Latium) are discussed and illustrated. The species chosen from among the less known and/or those never recorded in the southern central Apennines are: *Arenobulimina cochleata*, *Cuneolina sliteri*, *Dictyoconus algerianus*, *D. pachymarginalis*, *Nezzazata isabellae*, *Orbitolinidae* ind., *Paracoskinolina tunesiana*, *Praealveolina* sp. cf. *P. tenuis*, *Pseudonummoloculina aurigera* and *Pseudorhapydionina* (?) *anglonensis* among the foraminifers, and *Bakalovella elitzae*, *Heteroporella* (?) *graeca* and *Milanovicella pejovicae* among the dasycladales. The identified taxa come from the Barremian-Cenomanian shallow water carbonate sediments; their local stratigraphic distribution in the Monte Cairo area is given and their paleobiogeographic significance is discussed.

RIASSUNTO - [Foraminiferi bentonici ed alghe calcaree del Cretacico del Monte Cairo (Lazio meridionale, Italia)] - In un recente studio a carattere microbiostratigrafico volto alla ricostruzione dell'evoluzione paleogeografia dell'area del Monte Cairo (Lazio meridionale, Italia) sono state analizzate numerose successioni stratigrafiche composte in prevalenza da sedimenti carbonatici del Cretacico che sono stati riferiti ad un ambiente di retromargine, con caratteristiche chimico-fisiche intermedie tra quelle proprie della laguna interna e quelle di margine della piattaforma carbonatica. Il materiale analizzato ha fornito ricche associazioni micropaleontologiche; sono state identificate oltre 150 specie di foraminiferi bentonici e alghe calcaree. A completamento del lavoro citato vengono ora descritte e illustrate dieci specie di foraminiferi e tre specie di dasycladales, scelte tra quelle meno note e/o mai segnalate in Appennino e cioè: *Arenobulimina cochleata*, *Cuneolina sliteri*, *Dictyoconus algerianus*, *D. pachymarginalis*, *Nezzazata isabellae*, *Orbitolinidae* ind., *Paracoskinolina tunesiana*, *Praealveolina* sp. cf. *P. tenuis*, *Pseudonummoloculina aurigera* e *Pseudorhapydionina* (?) *anglonensis* tra i foraminiferi, e *Bakalovella elitzae*, *Heteroporella* (?) *graeca* e *Milanovicella pejovicae* tra le dasycladales. Tra queste, *Cuneolina sliteri*, *Nezzazata isabellae*, *Pseudonummoloculina aurigera*, *Pseudorhapydionina* (?) *anglonensis* e *Heteroporella* (?) *graeca* non risultano finora segnalate al di fuori della località tipo. Il loro ritrovamento nei sedimenti carbonatici dell'area del Monte Cairo assume grande importanza dal punto di vista paleobiogeografico in quanto contribuisce a migliorare le conoscenze sulla distribuzione delle biofacies nel Cretacico dell'area tetidea. Le specie descritte, inoltre, per la loro limitata estensione stratigrafica, possono essere aggiunte a quelle già note e di grande valore biostratigrafico per il Cretacico in facies di piattaforma carbonatica dell'Appennino centro-meridionale. I taxa descritti, infine, per il loro valore paleoecologico, possono essere utilizzati per caratterizzare i diversi subambienti della piattaforma Appenninica; infatti, mentre *Arenobulimina cochleata*, *Dictyoconus algerianus*, *Nezzazata isabellae* e *Paracoskinolina tunesiana* sono presenti, anche se meno abbondanti, anche nei coevi sedimenti in facies di piattaforma carbonatica interna dell'Appennino centro-meridionale, *Dictyoconus pachymarginalis*, *Orbitolinidae* ind., *Cuneolina sliteri*, *Pseudonummoloculina aurigera*, *Praealveolina* sp. cf. *P. tenuis* e *Pseudorhapydionina* (?) *anglonensis* sembrano esclusivi della facies di retromargine, in quanto non sono stati mai osservati nei coevi sedimenti di piattaforma carbonatica interna, molto diffusi a sud e sud-ovest dell'area di Monte Cairo, nei Monti Aurunci, Ausoni e Lepini.

INTRODUCTION

In a recent study on the microbiostratigraphy and paleogeographic evolution in the Monte Cairo area of southern Latium numerous stratigraphic successions were analyzed; they are mostly composed of Cretaceous carbonate sediments attributed to a back-reef environment, having intermediate characteristics between an inner shelf and a platform margin (Chiochini et al., 2005). A total of 150 species of benthic foraminifers and calcareous algae were identified; as a corollary to the above mentioned work, ten species of foraminifers and three dasyclades, chosen from among the less known and/or those never

recorded in the southern central Apennines are reported in the present study. Some of these have never been reported outside the type locality. The described species derive from the Colle S. Angelo, Colle Santa Lucia, Colle la Cicogna, l'Ottaduna and San Vincenzo successions, located in the Sheet 160 Cassino of the 1:100,000 Geological Map of Italy (Fig. 1). These successions, described in detail including the fossil distribution in the paper of Chiochini et al. (2005), are now schematically illustrated and correlated, according to the biostratigraphical schemes proposed by Chiochini & Mancinelli (1977) and Chiochini et al. (1994), that are useful in the stratigraphy of the Apennine carbonate facies (Fig. 2).

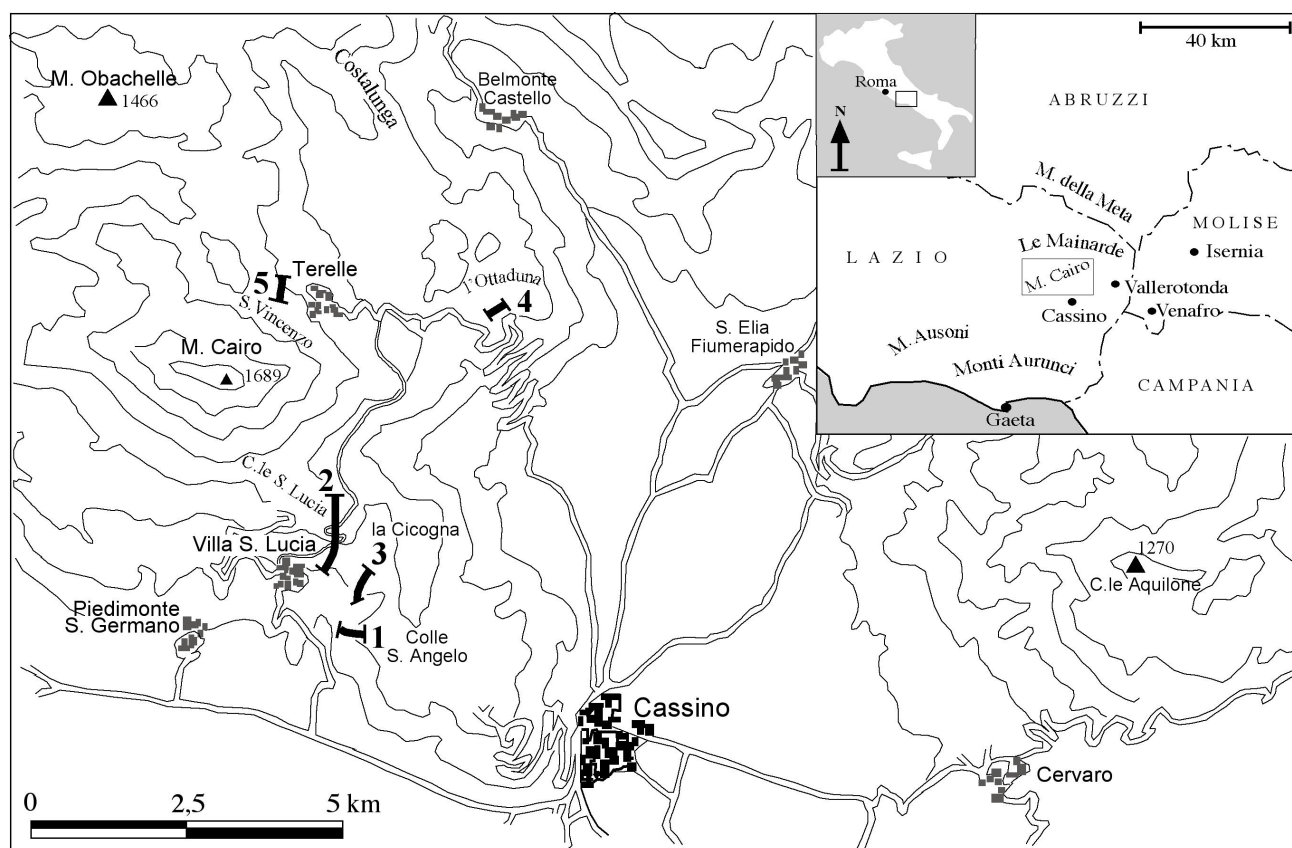


Fig. 1 - Map of the Monte Cairo area with location of the sampled successions. 1) Colle S. Angelo; 2) Colle Santa Lucia; 3) Colle la Cicogna; 4) l'Ottaduna; 5) San Vincenzo (after sheet 160 Cassino of the 1:100,000 Geological Map of Italy).

SYSTEMATICS

The biostratigraphically most important species of benthic foraminifers and calcareous algae found in the Monte Cairo area of the central-southern Apennines are discussed and illustrated. The synonymic list for each taxon is reduced to the original description and the principal previous references.

Order FORAMINIFERIDA Eichwald, 1830

Suborder TEXTULARIINA Delage & Hérouard, 1896

Superfamily HAPLOPHRAGMIACEA Eimer & Fickert, 1899

Family NEZZAZATIDAE Hamaoui & Saint-Marc, 1970

Subfamily NEZZAZATINAE Hamaoui & Saint-Marc, 1970

Genus *Nezzazata* Omara, 1956

Nezzazata isabellae Arnaud Vanneau & Sliter, 1995
(Pl. 4, figs. 11-21)

1995 *Nezzazata isabellae* ARNAUD VANNEAU & SLITER, p. 552; text-fig. 7 (A-D); Pl. 2, figs. 11-24.

1995 *Nezzazata isabellae* Arnaud Vanneau & Sliter - ARNAUD VANNEAU & PREMOLI SILVA, Pl. 2, figs. 1-3.

Description - Low trochospiral small test with rounded periphery, dorsal side more convex than the umbilical side that shows a very narrow umbilicus; 2-3 whorls of numerous chambers separated by slightly depressed sutures. Aperture, typical of the genus *Nezzazata*, extends from the umbilicus to the periphery and bends parallel to the peripheral margin; the toothplate is projecting back towards the previous aperture.

Stratigraphic and geographic distribution - Erected by Arnaud Vanneau & Sliter (1995) from the upper Aptian to the Albian of Allison Guyot (Western Mid-Pacific Mountains) and mentioned by the above authors from the lower to middle Albian of Mexico, the species is known from middle to upper Albian of MIT and Takuyo-Daisan Guyots (Arnaud Vanneau & Premoli Silva, 1995). Already observed by Chiocchini (1989) in the lower Albian of the Aurunci Mountains (southern Latium) from the type level of *Cribellopsis arnaudae* Chiocchini, *Nezzazata isabellae* is reported for the first time in the upper Aptian-lowermost Albian of the Monte Cairo area. The species occurs at Colle Santa Lucia, Colle la Cicogna and Colle S. Angelo successions, in the uppermost part of the *Archaealveolina reicheli* biozone and in the lowermost part of the Ostracoda and Miliolidae biozone.

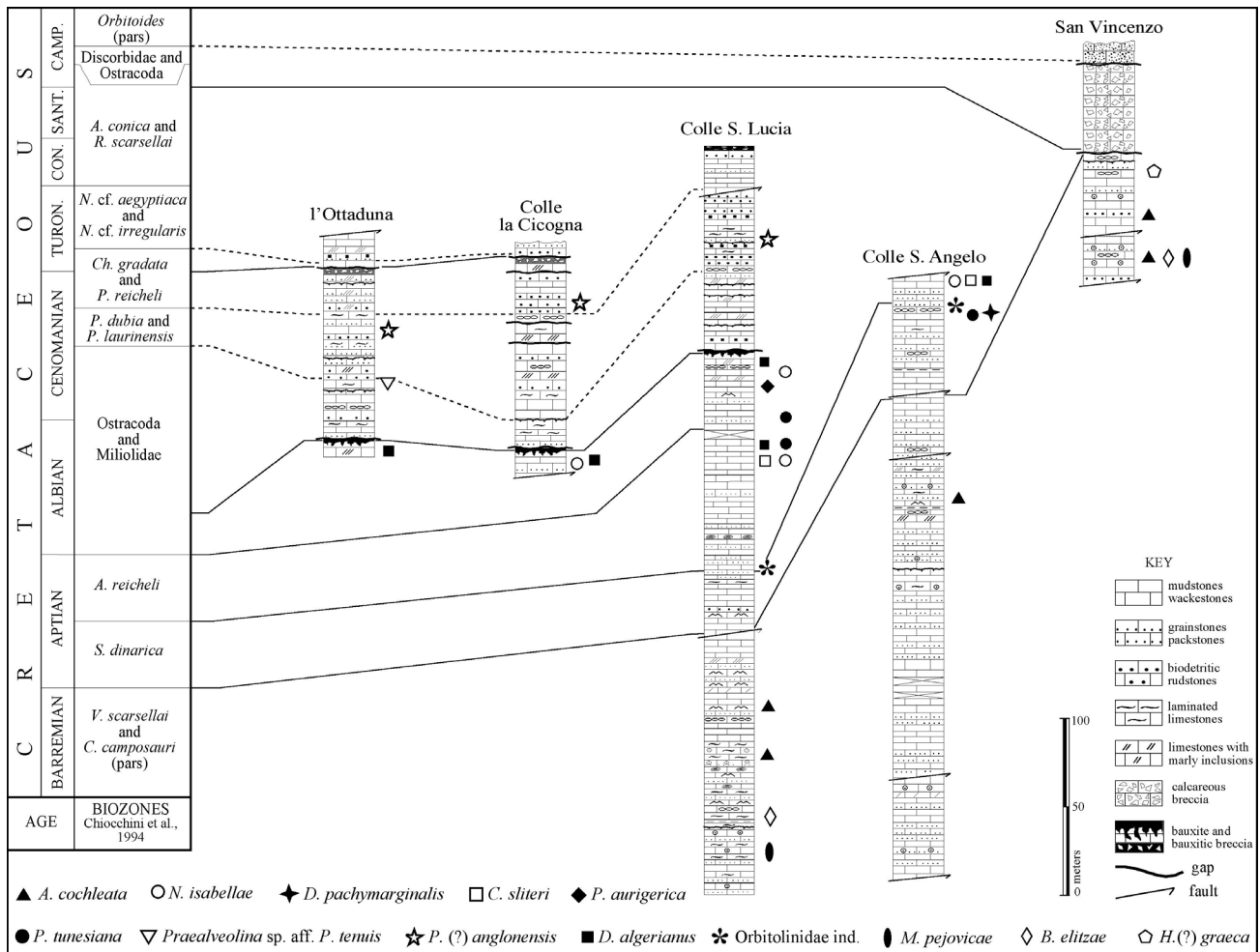


Fig. 2 - Bio- and chronostratigraphic correlations among the analyzed successions. The location of the selected foraminifers and calcareous algae is noted alongside the logs.

Superfamily ATAXOPHAGMICEA Schwager, 1877
 Family ATAXOPHRAGMIDAE Schwager, 1877
 Subfamily ATAXOPHRAGMIINAE Schwager, 1877
 Genus *Arenobulimina* Cushman, 1927

Arenobulimina cochleata Arnaud Vanneau, 1980
 (Pl. 1, figs. 14-16)

- 1980 *Arenobulimina cochleata* ARNAUD VANNEAU, p. 446-450, text-figs. 166-167; Pl. 53, figs. 4-10; Pl. 81, figs. 9-21 (cum syn.).
 1985 *Arenobulimina cochleata* Arnaud Vanneau - N'DA LOUKOU, Pl. 7, figs. 11-14.
 1995 *Arenobulimina cochleata* Arnaud Vanneau - ARNAUD VANNEAU & SLITER, Pl. 1, figs. 13-14.

Description - Species of the genus *Arenobulimina* characterized by numerous chambers trochospirally arranged; five chambers per whorl in the early stage that is laterally shifted, the last whorl made up of four big and inflated chambers that take up 2/3 of the whole test. Apertures at base of apertural face, opening in a

large axial cavity that is delimited by the toothplate joining.

Remarks - The morphological characters as well as the biometric parameters of the specimens coming from Monte Cairo correspond to the larger specimens described by Arnaud Vanneau (1980) and by N'da Loukou (1985).

Stratigraphic and geographic distribution - Originally described by Arnaud Vanneau (1980) in the upper Barremian-Bédulian (intra-Urgonian *Orbitolina* beds) of the Western Alps (France), *A. cochleata* is known in the upper Barremian of the Geneva region, Switzerland (Conrad, 1969), in the Gargasien of the western French Pyrenees (N'da Loukou, 1985) and in the Hauterivian-(lowermost ?) Aptian of the Allison and Resolution Guyots (site 866) Mid-Pacific Mountains (Arnaud Vanneau & Sliter, 1995). Mentioned but not described and figured by Luperto Sinni & Masse (1993) in the Murge (Apulia region, Italy), in the Monte Cairo area *A. cochleata* occurs in the Barremian sediments

of Colle Santa Lucia, Colle S. Angelo and San Vincenzo (upper part of the *Vercorsella scarsellai* and *Cuneolina camposaurii* biozone).

Family CUNEOLINIDAE Saidova, 1981
Subfamily CUNEOLININAE Saidova, 1981
Genus *Cuneolina* d'Orbigny, 1839

Cuneolina sliteri Arnaud Vanneau & Premoli Silva,
1995
(Pl. 4, figs. 1-10)

- 1995 *Cuneolina sliteri* ARNAUD VANNEAU & PREMOLI SILVA, p. 207-208, Pl. 3, figs. 1-9.
1995 *Cuneolina* sp. - ARNAUD VANNEAU & SLITER, Pl. 4, figs. 1-10.

Description - Species of the genus *Cuneolina* characterized by its small dimensions, an embryonic apparatus made up of a small subspherical protoconch and a deuteroconch subdivided by a few rafters and beams; the biserial stage is composed of 6-7 pairs of chambers subdivided by radial beams that thin towards the inside, and by rafters in the last chambers only.

Remarks - In the Monte Cairo area *C. sliteri* is restricted to the upper Aptian, associated with *Cuneolina laurentii* Sartoni & Crescenti, *Dictyoconus algerianus* Cherchi & Schroeder, *Nezzazata isabellae*, *Praechrysalidina infracretacea* Luperto Sinni, *Sabaudia minuta* (Hofker), *Coptocampilodon* sp., *Lithocodium aggregatum* Elliott, sponge spicules and requienid remains.

Stratigraphic and geographic distribution - Previously, the species was known from the Pacific areas only, Takuyo-Daison Guyot-Hole 879A, north-eastern MIT Guyot-Hole 878A (Arnaud Vanneau & Premoli Silva, 1995) and Allison and Resolution Guyots (site 865) of the Mid Pacific Mountains (Arnaud Vanneau & Sliter, 1995), corresponding to the upper

Aptian-middle Albian; now, *C. sliteri* is reported for the first time outside the Pacific areas, in the upper Aptian of Monte Cairo. The species occurs at Colle S. Angelo and Colle Santa Lucia stratigraphical sections, (*Archaealveolina reicheli* biozone).

Superfamily ORBITOLINACEA Martin, 1890
Family ORBITOLINIDAE Martin, 1890
Subfamily DICTYOCONINAE Moullade, 1965
Genus *Dictyoconus* Blankenhorn, 1900

Dictyoconus algerianus Cherchi & Schroeder, 1982
(Pl. 3, figs. 6-9)

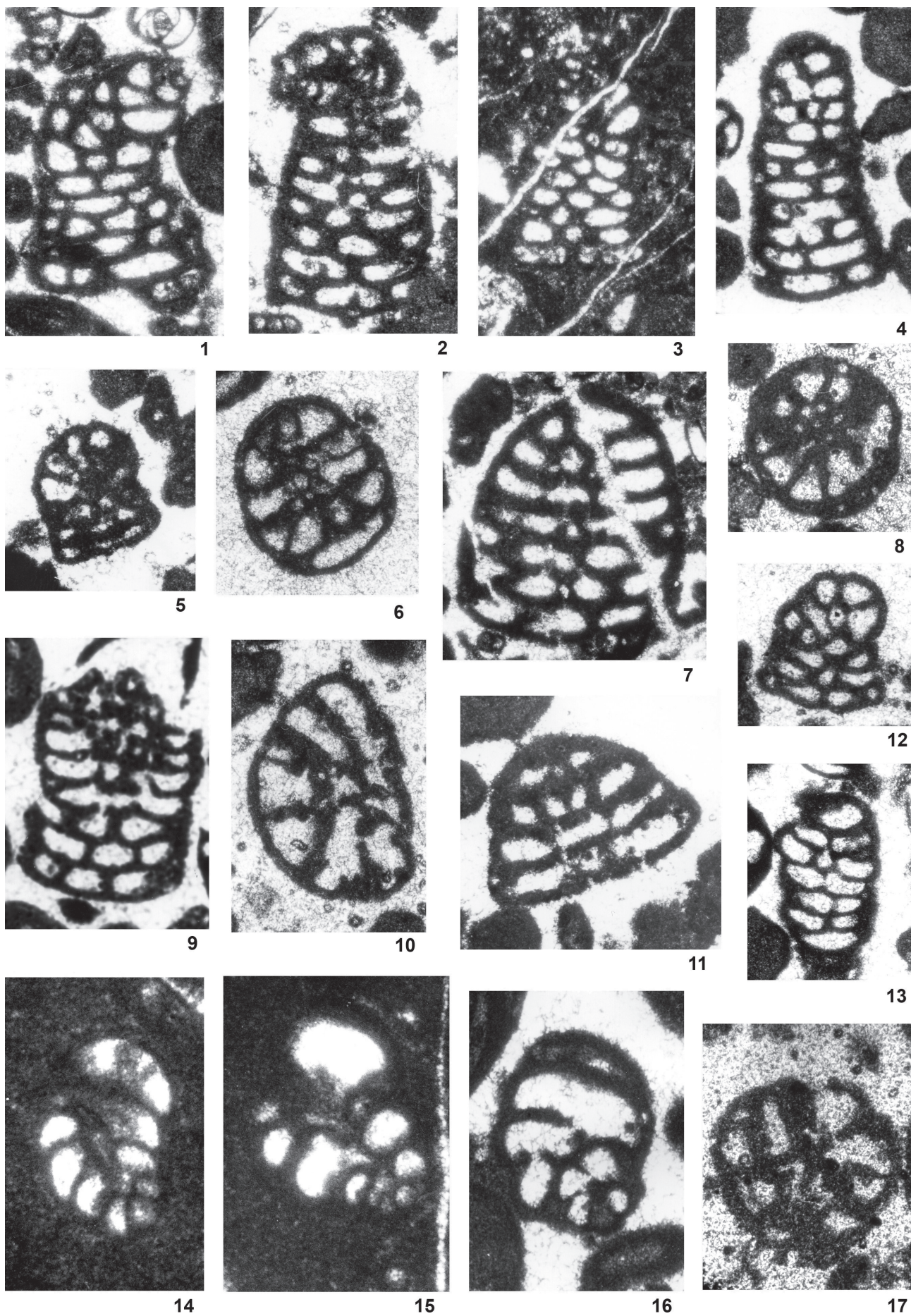
- 1966 *Coskinolina sunnilandensis* LUPERTO SINNI, Pl. 6, figs. 2, 4 (pars).
1973 *Paracoskinolina sunnilandensis* FOURCADE & RAOULT, Pl. 3, figs. 4?, 5.
1982 *Dictyoconus algerianus* - CHERCHI & SCHROEDER, p. 77-82, Pl. 1, figs. 1-9 (cum syn.).
1988 *Dictyoconus algerianus* Cherchi & Schroeder - KUSS & SCHLAGINTWEIT, Pl. 20, figs. 1-3.
1989 *Dictyoconus ? algerianus* Cherchi & Schroeder - CHIOCCHINI ET AL., Pl. 1, figs. 7, 8, ?9.
1994 *Dictyoconus algerianus* Cherchi & Schroeder - CHIOCCHINI ET AL., pl. 13, figs. ?1, 2, ?3.

Description - Conical test composed of spiral early stage small and asymmetric, followed by numerous (26-30) uniserial discoidal chambers, which in the marginal zone are subdivided in chamberlets by first-order radial beams, alternated from one chamber to the next. A shorter and thinner radial beam of the second order is present. Central zone subdivided by pillars that appear subtriangular in the tangential sections, but in the axial sections they show thickened tips. Due to the joining up of the pillars, a "vermiculate" structure (*sensu* Cherchi & Schroeder, 1982) can be observed near the top of the chambers.

Remarks - As regards the hypothesis supported by some Authors that *D. algerianus* is a junior synonym

EXPLANATION OF PLATE 1

- figs. 1-13, 17 - Orbitolinidae ind. (x 50). Colle S. Angelo succession, lower-upper Aptian boundary.
1 - Subaxial section. Megalospheric form.
2 - Subaxial section showing the shifted early stage. Microspheric form.
3 - Subaxial section. Microspheric form.
4 - Tangential section. Microspheric form.
5, 7 - Subaxial sections of young specimens. Megalospheric forms.
6, 9-11 - Oblique sections. Microspheric forms.
8 - Horizontal section. Microspheric form.
12 - Tangential section. Megalospheric form.
figs. 14-16 - *Arenobulimina cochleata* Arnaud Vanneau, 1980 (x 100). San Vincenzo succession, upper Barremian.
14-15 - Subaxial sections of large specimens.
16 - Oblique section.



of *Paracoskinolina tunesiana*, not everybody is of the same opinion. The hypothesis is based on the conviction that the same specimens coming from the same locality have been figured and named with different names by different authors. Thus, it is necessary to precise that, according to Cherchi & Schroeder (1982), the whole type material of *D. algerianus* come from "Mechtat el Melab (948 m), versant méridional du Djebel Grar, (feuille Hamman Meskoutine) Algérie NE". Furthermore the above authors assert that the specimen from Tunisia figured by Bismuth, 1973 (pl. III, fig. 3) and named *Paracoskinolina sunnilandensis* (?), belong to *D. algerianus* (op. cit., p. 81).

Although quite similar, the two species can be distinguished on the basis of the biometric value of the specimens coming from their type locality.

Stratigraphic and geographic distribution - Originally described by Cherchi & Schroeder (1982) in the upper Aptian (Gargasien?-Clansayésien) of Algeria and reported by the above Authors from Tunisia and Sicily, *D. algerianus* was previously known in the uppermost Aptian-lowermost Albian of the Caserta Mountains (Chiocchini et al., 1989) and the Matese (Coccia, 2001). In the Monte Cairo area the species occurs at Colle Santa Lucia, Colle la Cicogna, Colle S. Angelo and l'Ottaduna stratigraphical sections, in the upper portion of the *Archaealveolina reicheli* biozone and in the lower part of the Ostracoda and Miliolidae biozone, few meters below the bauxitic deposit.

Dictyoconus pachymarginalis Schroeder, 1965
(Pl. 2, figs. 1-10)

1965 *Dictyoconus pachymarginalis* SCHROEDER, p. 976-979, Pl. 1, figs. 1-7; Pl. 2, figs. 1-6.

1985 *Dictyoconus pachymarginalis* Schroeder - N'DA LOUKOU, Pl. 1, figs. 9-10.

Description - Conical test characterized by an eccentric embryonic apparatus, a marginal zone subdivided by 2 or 3 rafters and by radial beams that irregularly bend and thicken at their distal tips; shorter second- and third-order beams are intercalated. The marginal zone takes up about a half of the chamber radius. The irregularly arranged pillars of the central zone enlarge upwards more than in their lower part.

Remarks - In the Monte Cairo area, *D. pachymarginalis* occurs 10-15 m below the first

occurrence of *Archaealveolina reicheli* (De Castro); it is associated with *Cuneolina camposaurii* Sartoni & Crescenti, *C. laurentii*, *Glomospira urgoniana* Arnaud Vanneau, *Orbitolina* (*Mesorbitolina*) *parva* Douglas, *Praechrysalidina infracretacea*, *Sabaudia minuta*, *Trochamminoides coronus* Loeblich & Tappan, *Lithocodium aggregatum* Elliott, *Rivularia piaie* (Frollo), gastropods, anthozoan and requienid remains.

Stratigraphic and geographic distribution - Described by Schroeder (1965) from carbonate sediments of northern Iran (Bédoulien-Gargasien boundary) and only known in the Gargasien of the western Pyrenees (N'da Loukou, 1985), *D. pachymarginalis* is now identified for the first time in the Apennines; in the Monte Cairo area the species occurs at Colle S. Angelo succession in the uppermost lower Aptian (upper part of the *Salpingoporella dinarica* biozone).

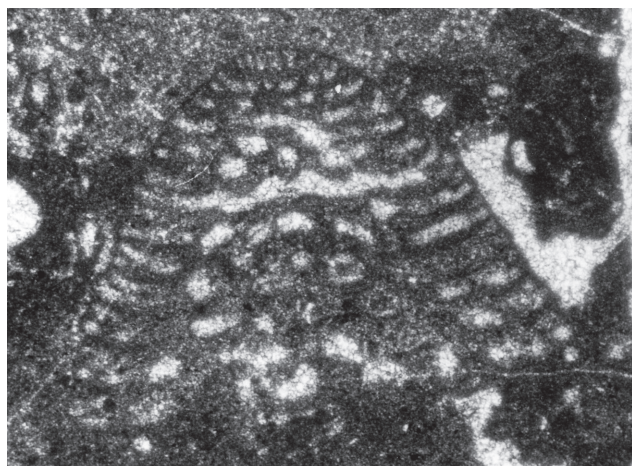
Orbitolinidae ind.
(Pl. 1, figs. 1-13, 17)

Description - Conical small test composed of a large initial trochospira laterally shifted, followed by a rectilinear stage of 7-9 discoidal chambers. Marginal zone of the chambers subdivided by first-order radial beams; the central zone is made up of structures that can be doubtfully interpreted as pillars or as extensions of the radial beams. Apertures made of subvertical pores in the central zone of the test. Very pronounced sexual dimorphism; in particular, the megalospheric forms are characterized by a developed streptospiral early stage, that is laterally shifted and at times forms a right angle with the axis of the following rectilinear stage, which is composed of 3-4 chambers.

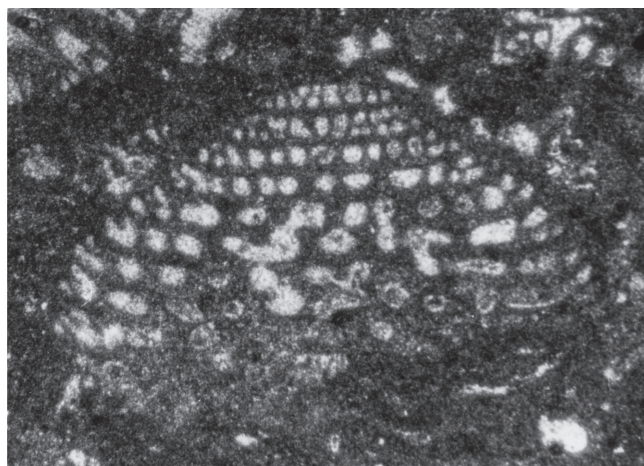
Remarks - Chiocchini et al. (2005) referred this specimens to *Orbitolinopsis reticulata*, on the basis of limited material (op. cit., Pl. 1, figs. 2, 4, 6). Further thin sections from the original sample allowed us to exclude the presence of "cupulae" (*sensu* Arnaud Vanneau, 1980) that characterize the genus *Orbitolinopsis*, but still prevent a precise generic attribution of this probably new species. The doubts mostly concern the difficulty to establish whether the radial partitions are produced by invaginations of the chamber floors; if so, the examined specimen should be close to *Falsurgonina*. The presence of central

EXPLANATION OF PLATE 2

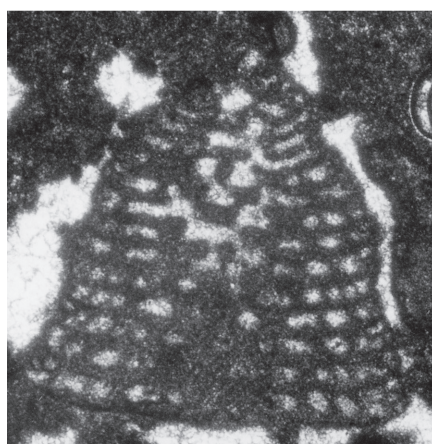
- figs. 1-10 - *Dictyoconus pachymarginalis* Schroeder, 1965 (x 50). Colle S. Angelo succession, uppermost lower Aptian.
1 - Subaxial section.
2, 7-8 - Longitudinal oblique sections.
3, 6 - Nearly axial sections.
4-5, 10 - Oblique sections.
9 - Longitudinal tangential section.



1



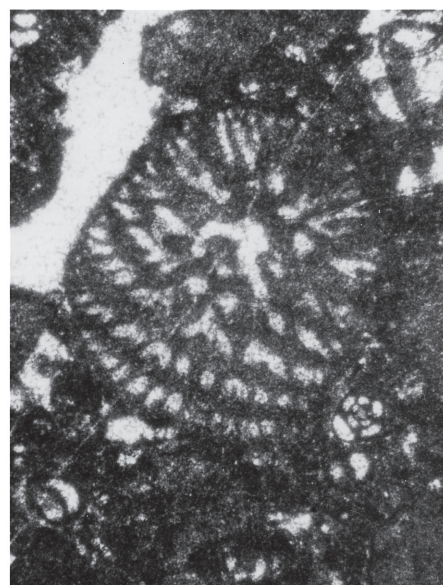
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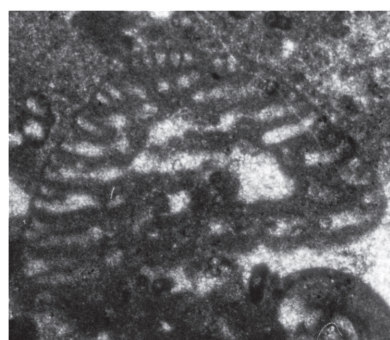
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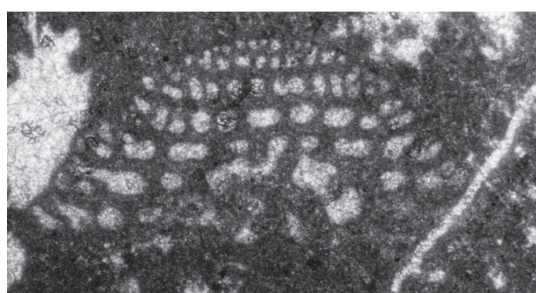
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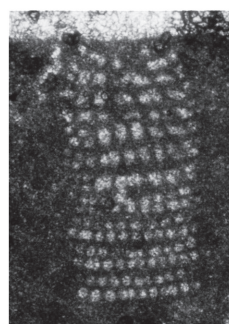
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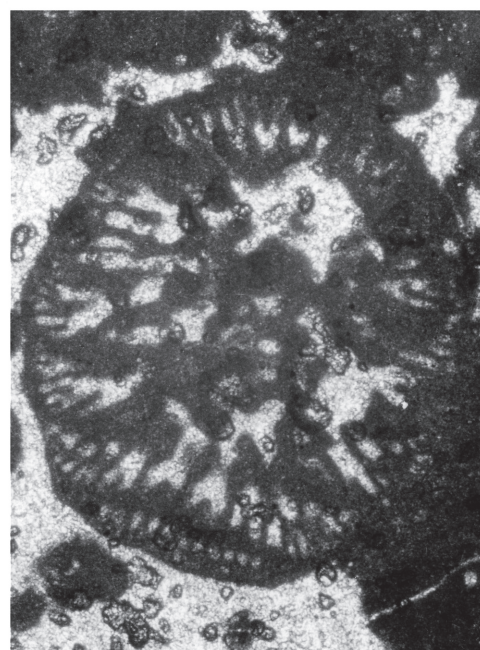
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8



9



10

structures similar to pillars, however, should prevent this attribution and the specimens could be compared with *Urgonina*. This is the reason why Orbitolinidae ind. was not assigned to genus or species.

Stratigraphic distribution - Orbitolinidae ind. has been identified at Colle S. Angelo and Colle Santa Lucia successions, in close proximity of the boundary between the *Salpingoporella dinarica* and *Archeoalveolina reicheli* biozones (lower-upper Aptian boundary).

Genus *Paracoskinolina* Moullade, 1965

Paracoskinolina tunesiana Peybernès, 1980 (Pl. 3, figs. 1-5)

- 1973 *Paracoskinolina* cf. *sunnilandensis* BISMUTH, Pl. 4, fig. 1.
 1973 *Paracoskinolina sunnilandensis*? BISMUTH, Pl. 3, figs. 3, 8.
 1980 *Paracoskinolina tunesiana* PEYBERNÈS, Pl. 1, figs. 1, 3-8 (cum syn.).
 1981 *Paracoskinolina tunesiana* Peybernès - PEYBERNÈS ET AL., Pl. 1, figs. 1-5; Pl. 2, figs. 1-3, 6-7.
 1984 *Paracoskinolina tunesiana* Peybernès - CHIOCCHINI ET AL., Pl. 2, figs. 9-11.
 1994 *Paracoskinolina* sp. 2 - CHIOCCHINI ET AL., Pl. 11, figs. 12-13.

Description - Conical test made up of a slightly eccentric trochospire followed by rectilinear discoidal chambers. Marginal zone subdivided by quite thick radial beams, which alternate from one chamber to the next; one shorter and thick beam of the second order is present. In the tangential sections the chamberlets are rectangular to quadrangular. Central zone with thick pillars extending from the floor to the top of the chamber; the pillars appear continuous from one chamber to the next (Pl. 3, fig. 2, on the right and fig. 5). Aperture of subvertical pores ranged in rows between adjacent chambers (Pl. 3, fig. 1).

Remarks - The holotype of *P. tunesiana* chosed by Peybernès (1980) is the subaxial section figured by Bismuth, 1973 (Pl. IV, fig. 1) and referred to *Paracoskinolina* cf. *sunnilandensis*; more recently,

Peybernès et al. (1981) gave the same figure (Pl. II, fig. 3). It is necessary to precise that the holotype of *P. tunesiana* come from Tunisia "forage Douleb 2, carote n° 5 (1143.25 m)", chosed by Peybernès (1980) as type locality. Among the paratypes, was also placed the specimen figured by Schroeder et al. (1978, Pl. 1, fig. 1) as *Paracoskinolina sunnilandensis*, coming from Algeria (versant méridional du Djebel Garar) that subsequently, has been referred by Cherchi & Schroeder (1982) to the new species *Dictyoconus algerianus*.

P. tunesiana is mostly characterized by its large dimensions and a quite coarse endoskeletal structure, due to the thickness of internal elements; the above characters appear particularly evident in the material from Algarve, Portugal (Tab. 1). The specimens from Monte Cairo, as well as those from Monti Aurunci (Chiocchini et al., 1984, 1994) are similar to the specimens illustrated by Peybernès et al. (1981) coming from Portugal.

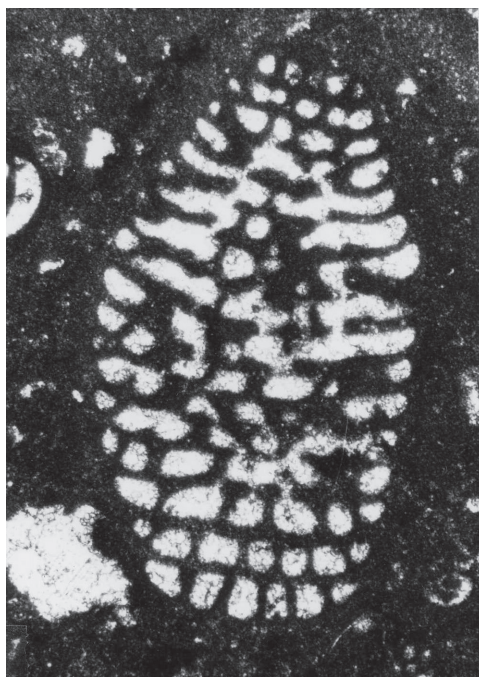
Stratigraphic and geographic distribution - The holotype has been referred to the late Gargasien of central-northern Tunisia. The species is known in the Gargasien of Algeria ("Mole néritique du Costantinois") and of Portugal (Peybernès et al., 1981). In Italy, *Paracoskinolina tunesiana* was recorded by Luperto Sinni & Masse (1993) in the upper Aptian of the Murge (Apulia), and by Chiocchini et al. (1984, 1994) close to the Aptian-Albian boundary of the Aurunci Mountains.

In the Monte Cairo area the species occurs at Colle Santa Lucia and Colle S. Angelo successions, in the uppermost upper Aptian and lowermost lower Albian (uppermost part of the *Archeoalveolina reicheli* biozone and in the lowermost part of the Ostracoda and Miliolidae biozone).

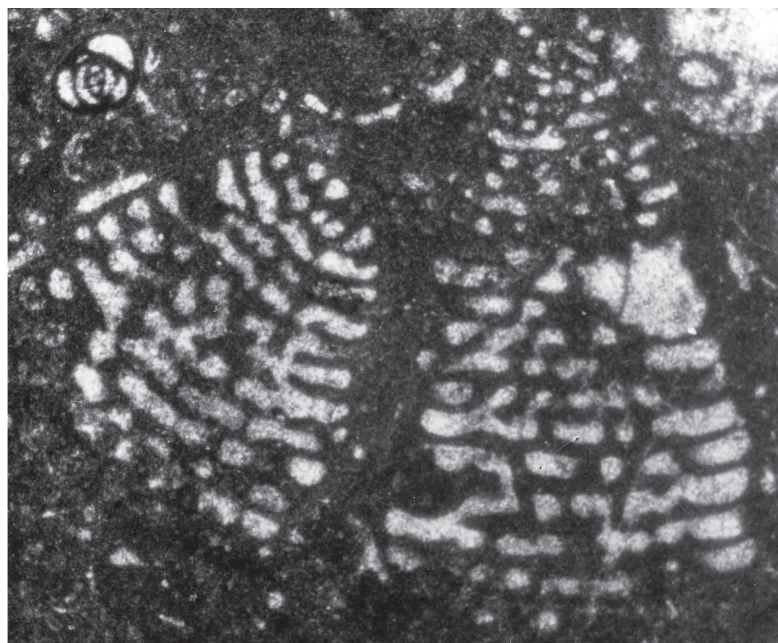
Suborder MILIOLINA Delage & Herouard, 1876
 Superfamily MILIOLACEA Ehrenberg, 1839
 Family HAUERINIDAE Schwager, 1876
 Subfamily HAUERININAE Schwager, 1876
 (=QUINQUELOCULININAE Cushman, 1917)
 Genus *Pseudonummoloculina* Calvez, 1988

EXPLANATION OF PLATE 3

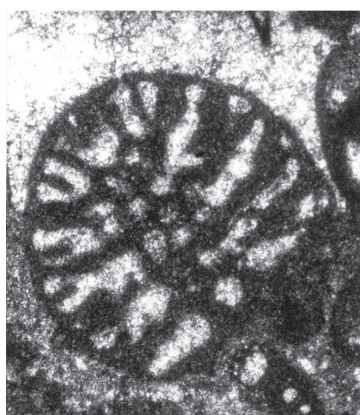
- figs. 1-5 - *Paracoskinolina tunesiana* Peybernès, 1980 (x 50). Colle Santa Lucia succession, uppermost Aptian-lowermost Albian.
 1 - Subaxial section.
 2 - Nearly axial section (right side) and subaxial section (left side).
 3-4 - Horizontal oblique sections.
 5 - Oblique section.
- figs. 6-9 - *Dictyoconus algerianus* Cherchi & Schroeder, 1982 (x 50). Colle Santa Lucia succession, uppermost Aptian- lowermost Albian.
 6 - Subaxial section.
 7 - Nearly axial section.
 8 - Horizontal oblique section.
 9 - Longitudinal slightly oblique section.



1



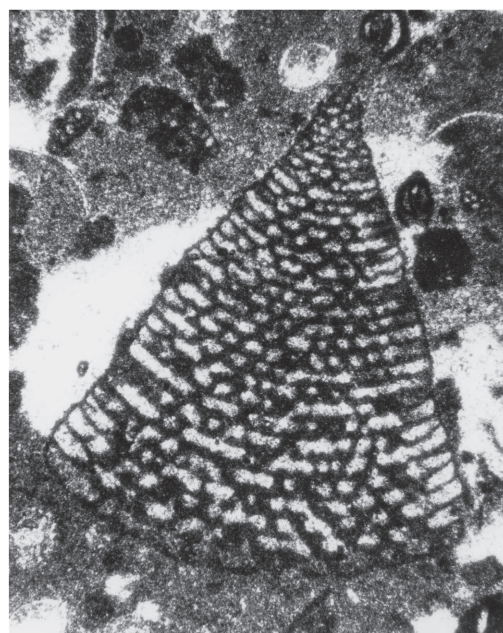
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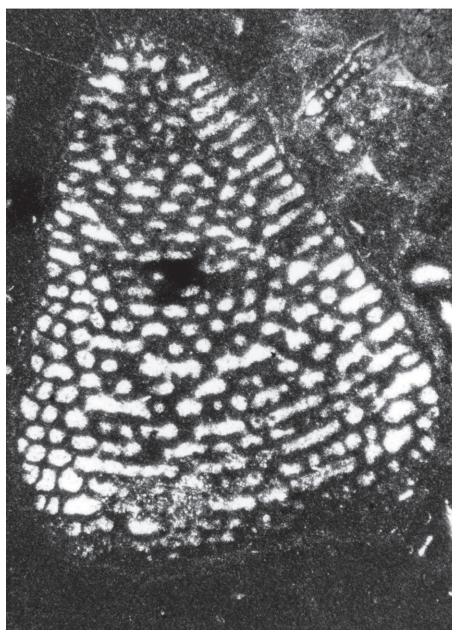
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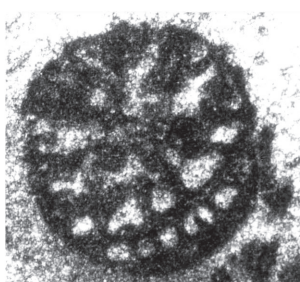
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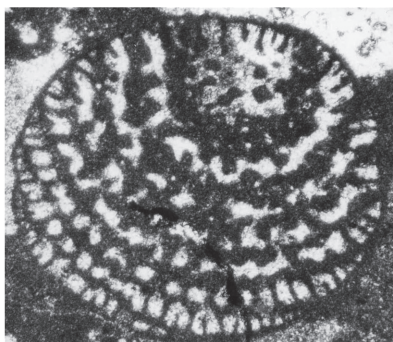
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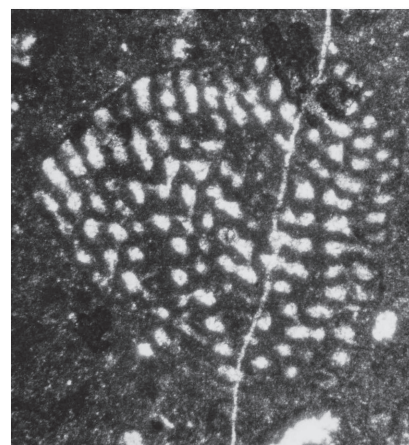
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9

BIOMETRIC PARAMETERS (mm)	holotype Bismuth, 1973 (Tunisia)	Fourcade & Raoult, 1982 (Algeria)	Peybernè s, et al., 1982 (Portugal)	Luperto Sinni & Masse, 1993 (Apulia, Italy)	Chiocchini et al., 1984, 1994 (Latium, Italy)	Chiocchini et al., 2005 (M. Cairo)
height (h)	> 1.4	1.4	1.2-1.4	1.1-1.2	1.1-1.4	1.5
diameter (d)	> 0.91	0.90	0.85-1.0	0.90	0.80-0.90	1.0
h/d ratio	0.52	1.55	1.3-1.6	1.3	1.1-1.4	1.6
n° rectilinear chambers	> 17	18	18-23	17-20	19	21-22

Tab. 1 - Biometric parameters of *Paracoskinolina tunesiana* from Monte Cairo compared with the specimens from literature.

Pseudonummoloculina aurigerica Calvez, 1988
(Pl. 6, figs. 8-15)

1988 *Pseudonummoloculina aurigerica* CALVEZ, p. 392-395, Pl. 1, figs. 1-18; text-figs. 2-3.

Description - Egg-shaped crushed test slightly biumbilical. Spherical protoconch followed by well developed quinqueloculine stage, then becoming streptospiral; partially overlapping low and long chambers that increase gradually in size. Aperture a long arched slit at base of apertural face bordered by crenulations that can already be observed in the final chambers of the early stage.

Remarks - Due to the characteristics of its aperture, *Pseudonummoloculina aurigerica* can be easily recognized in the sections that cut the septa of the last stage; whereas in other cases it can prove more difficult to identify. The species differs from *Pseudonummoloculina heimi* in having different biometric parameters and because the latter shows a more reduced early stage and a more developed final stage.

Stratigraphic and geographic distribution - Originally described by Calvez, 1988 from the lower-middle Albian of the central Pyrenees (France) previously, *Pseudonummoloculina aurigerica* was

restricted to the type locality. In the Monte Cairo area the species occurs in the lower Albian sediments of the Colle Santa Lucia succession (lower portion of the Ostracoda and Miliolidae biozone).

Superfamily SORITIDACEA Ehrenberg, 1839

Family SORITIDAE Ehrenberg, 1839

Subfamily PRAERHAPYDIONINAE Hamaoui & Fourcade, 1973

Genus *Pseudorhapydionina* De Castro, 1971

Pseudorhapydionina (?) *anglonensis* Cherchi & Schroeder, 1986
(Pl. 6, figs. 1-7)

1985 *Pseudorhapydionina anglonensis* CHERCHI & SCHROEDER, p. 90 (*nomen nudum*).

1985 *Pseudorhapydionina dubia* DE CASTRO, Pl. 42, figs. 6, 15.

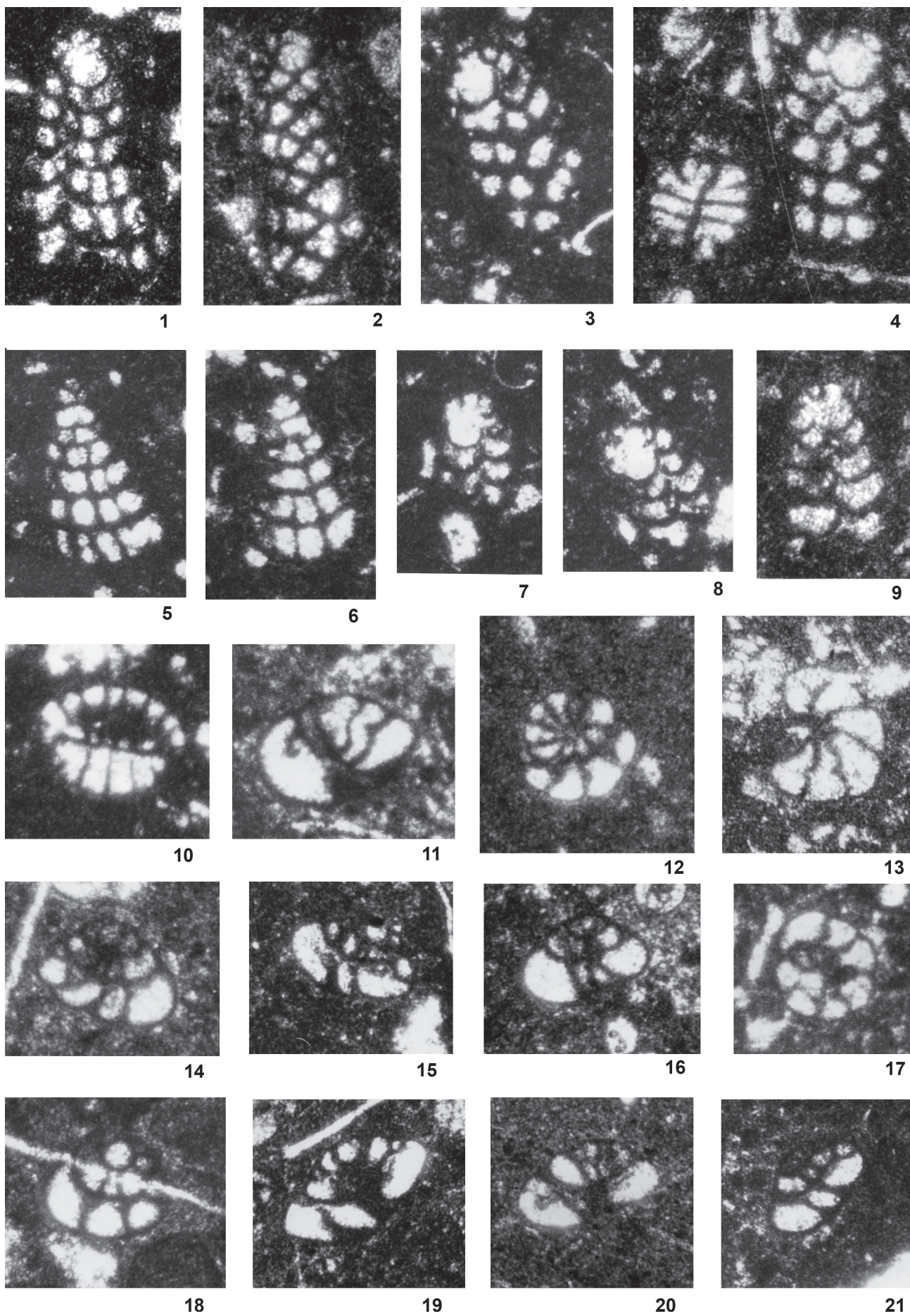
1986 *Pseudorhapydionina* (?) *anglonensis* CHERCHI & SCHROEDER, p. 188, Pl. 1, figs. 4, 6, 8-11.

Description - Nautiloid test laterally compressed and biumbilical, formed by spherical proloculus followed by 2-2.5 whorls with numerous planispiral chambers that regularly increase, except for the last two that are bigger than the previous ones. A few thin sub epidermal septa extend from the top to the floor of the chambers, bending slightly in the direction of the coil. Interiomarginal aperture that in the last chambers seem

EXPLANATION OF PLATE 4

figs. 1-10 - *Cuneolina sliteri* Arnaud Vanneau & Premoli Silva, 1995 (x 100). Colle Santa Lucia succession, upper Aptian.
1-4 (right side) - Longitudinal sections cutting the embryo.
5-6 - Longitudinal sections.
7-9 - Axial sections.
10 - Horizontal sections.

figs. 11-21 - *Nezzazata isabellae* Arnaud Vanneau & Sliter, 1995 (x 100). Colle Santa Lucia succession, upper Aptian-lower Albian.
11 - Oblique section cutting the apertural face.
12 - Horizontal slightly oblique section cutting the dorsal side.
13, 17 - Horizontal sections cutting the ventral side.
14-16 - Subaxial slightly oblique sections.
18 - Horizontal oblique section cutting the proloculus.
19-20 - Nearly axial sections.
21 - Subaxial section.



to be multiple, at last in the final chambers; however, it cannot be established whether in fact the aperture is cribriform.

Remarks - According to Cherchi & Schroeder (1986) the generic attribution of the species is uncertain because the presence of a cribriform aperture is not sure; the specimens from Monte Cairo do not allow the question to be solved.

Stratigraphic and geographic distribution - The species was originally described from the upper Cenomanian of south-western Sardinia by Cherchi & Schroeder (1986); according to the authors some specimens illustrated by De Castro (1985) from the upper Cenomanian of Monte Cerreto (Campania, Italy) belong to *Pseudorhapydionina* (?) *anglonensis*. In the Monte Cairo area the species occurs at Colle Santa Lucia, Colle la Cicogna and l'Ottaduna successions, in the upper part of the *Pseudorhapydionina dubia* and *P. laurinensis* biozone and in the lower part of the *Chrysalidina gradata* and *Pseudolituonella reicheli* biozone (middle part of the upper Cenomanian).

Family ALVEOLINIDAE Ehrenberg, 1839
Genus *Praealveolina* Reichel, 1933

Praealveolina sp. cf. *P. tenuis* Reichel, 1933
(Pl. 5, figs. 1-6)

- 1933 *Praealveolina tenuis* REICHEL, p. 273, text-figs. 1-7a-d, 8, 9; p. 275, text-figs. 10-14.
1985 *Praealveolina tenuis* Reichel - NEUMANN & FOURCADE, text-figs. 13-14; Pl. 60, figs. 1-6; Pl. 61, figs. 1-7; Pl. 62, figs. 1-7 (*cum syn.*).
1985 *Praealveolina tenuis* Reichel - CHERCHI & SCHROEDER, text-fig. 1.
1989 *Praealveolina tenuis* Reichel - CHERCHI & SCHROEDER, text-fig. 1 (*pars*).
2002 *Praealveolina tenuis* Reichel - CALONGE, CAUS, BERNAUS & AGUILAR, Pl. 6, figs. 1-3, 5-8.
2005 *Praealveolina* gr. *cretacea* d'Archiac - CHIOCCHINI ET AL., Pl. 4, figs. 1-4.

Description - Species of the genus *Praealveolina* characterized by long fusiform test, sometimes swollen in equatorial plane, with a high index of elongation ($L/D = 3.86-6.09$); the slightly oval, small proloculus (136-227 μm) is followed by 8-10 spiral whorls; oval to quadrangular chamberlets separated by septa generally thinner than the chamberlet lumina. Numerous supplementary chamberlets in the polar regions (up to 5 rows) extending to the equatorial area, where they are less numerous (2 rows).

Remarks - The species closely resembles *Praealveolina tenuis* in its test shape, the elongation index value, the shape of the chamberlets and the thickness of septula; however, in the number of spiral whorls and above all in the arrangement of supplementary chamberlets not restricted to the polar regions, the species resembles *Praealveolina cretacea* (d'Archiac) (Tab. 2). Besides, it differs from both *P. tenuis* and *P. cretacea* in having a smaller proloculus; this prevents any sure specific assignment and is the reason why we tentatively name the species from Monte Cairo which may possibly represent a new species, *Praealveolina* sp. cf. *P. tenuis*.

In the Monte Cairo sediments the species is associated with *Cisalveolina lehneri* Reichel, *Nezzazata conica* Smouth, *Merlingina cretacea* Hamaoui & Saint Marc, *Orbitolina* (*Conicorbitolina*) *conica* (d'Archiac), *Rotalia mesogeensis*, *Vidalina radoicicae* Cherchi & Schroeder and *Heteroporella lepina* Granier et al., ex Praturlon.

Stratigraphic and geographic distribution - Originally described by Reichel (1933) from the Cenomanian of Provence, *P. tenuis* was identified in Cenomanian sediments of France (Saint-Marc, 1965; Deloffre, 1965, 1978; Bilotte, 1978; Moreau et al., 1978; Tronchetti, 1981), the French and Spanish Pyrenees (Reichel, 1936; Souquet, 1967; Feuillée, 1967; Moreno de Castro, 1970; Calonge et al., 2002), Portugal (Reichel, 1936; Berthou, 1973), Sardinia (Cherchi & Schroeder, 1976), Lebanon (Saint-Marc, 1974), Iran (Reichel, 1941), central Somalia (Prestat, 1977) and Qatar (Henson, 1948). In the Monte Cairo area *Praealveolina* sp. cf. *P. tenuis* occurs at l'Ottaduna succession, close to the lower-upper Cenomanian boundary (uppermost part of the Ostracoda and Miliolidae biozone).

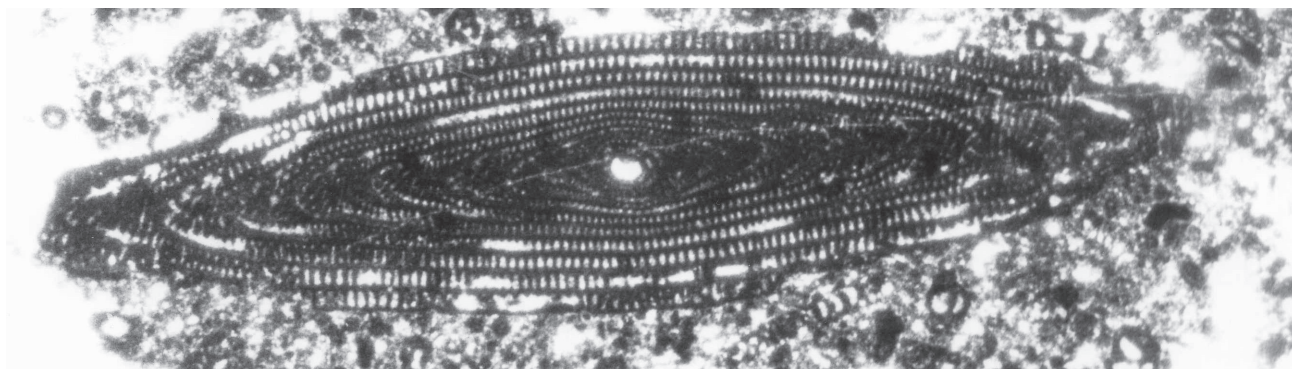
Order DASYCLADALES Pasher, 1931
Tribe NEOMEREAES Pia, 1920, Bassoullet et al., 1979
Genus *Bakalovella* Bucur, 1993

Bakalovella elitzae (Bakalova, 1971), Bucur, 1993 n. comb.
(Pl. 8, figs. 1-8)

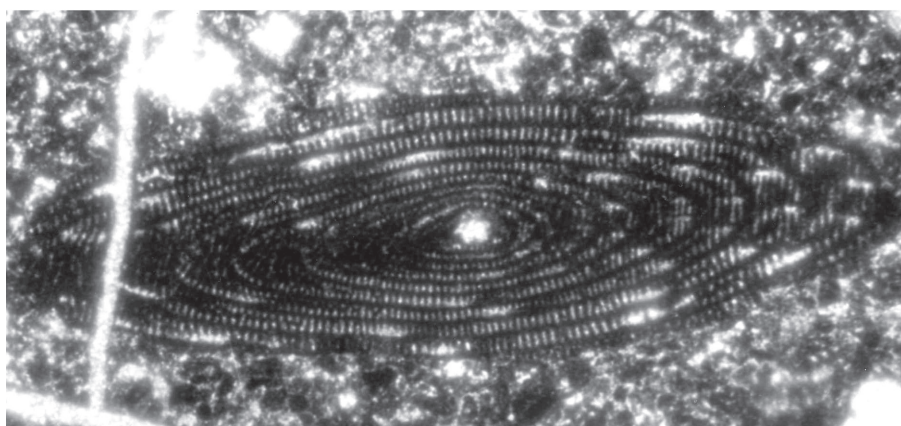
- 1971 *Cylindroporella elitzae* n. sp. BAKALOVA, p. 126, Pl. III, figs. 1-8.
1980 *Montiella? elitzae* (Bakalova) - RADOIČIĆ, p. 109, Pls I-III.
1988 *Montiella elitzae* (Bakalova) - GRANIER, p. 33, Pl. 3, figs. c-d; Pl. 4, figs. h-n.
1992 *Montiella? elitzae* (Bakalova) - MANCINELLI, p. 11, Pl. 1, figs. 1-2.

EXPLANATION OF PLATE 5

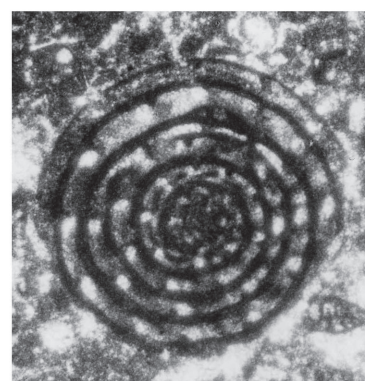
- figs. 1-6 - *Praealveolina* sp. cf. *P. tenuis* Reichel, 1933. l'Ottaduna succession, uppermost lower Cenomanian.
1-2, 4, 6 - Axial sections (x 30).
3, 5 - Transverse sections (x 40).



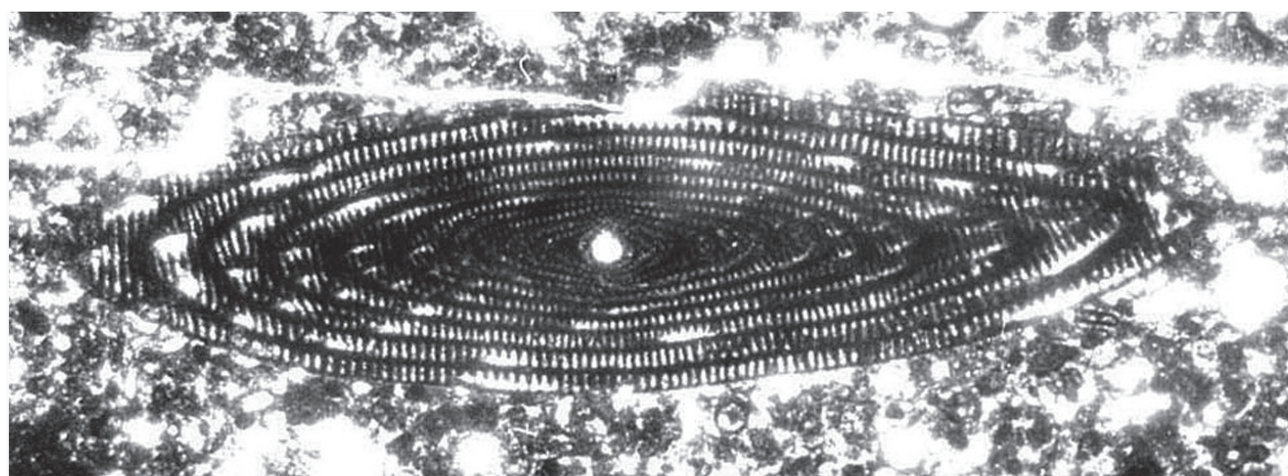
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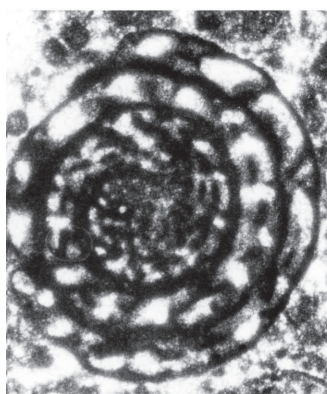
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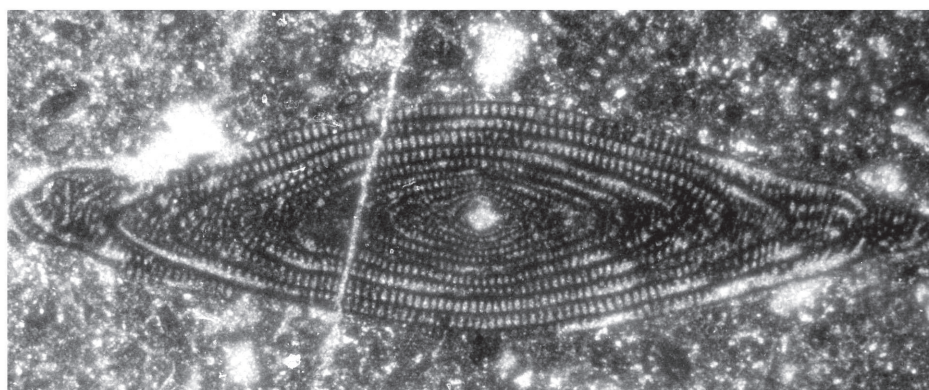
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BIOMETRIC PARAMETERS	test shape	axial diam. (A forms)	D/d (A forms)	n° of whorls	chamberlet shape	supplementary chamberlets	proloculus (A forms)
<i>P. cretacea</i>	subcylindric	3.4-4.8 mm	2.3-2.8	7-10	oval	4-5 rows	slightly oval 270-450 μ
<i>P. tenuis</i>	fusiform	3.5-9.5 mm	4-5.5	5-7	oval to quadrangular	polar regions 4-6 rows	oval 340-850 μ
<i>P. aff tenuis</i>	fusiform	4.1-8.1 mm	3.86-6.09	8-10	oval to quadrangular	4-5 rows	slightly oval 136-227 μ

Tab. 2 - Biometric parameters of *P. cretacea* and *P. tenuis* (from literature) compared with *P. sp. aff. P. tenuis* from Monte Cairo.

1993 *Bakalovella elitzae* (Bakalova) n. gen. - BUCUR, p. 100-102, Pl. 7, figs. 1-18 (*cum syn.*).

Description - Cylindrical thallus with densely spaced verticils of tubular branches alternating in adjacent whorls; primary branches give rise on the upper side to big spherical fertile ampoules and on the lower side, under the ampoules, to secondary tubular branches widening distally.

Remarks - In the specimens from Monte Cairo calcification does not always comprise both primary and secondary branches; this could be the reason why the value of the length (l+l') is slightly shorter compared with the specimens figured by Bucur (Tab. 3).

Stratigraphic and geographic distribution - Originally described by Bakalova (1971) from the Urgonian of the central Prebalkans, the species is quite widespread along the northern margin of the Tethys, from Iberia to the Carpathian-Balkan domain. It is known also in the lower Aptian of the Apennines (Mancinelli, 1992). In the Monte Cairo area *Bakalovella elitzae* occurs in the Barremian sediments of Colle Santa Lucia and San Vincenzo successions (upper portion of

the *Vercorsella scarsellai* and *Cuneolina camposaurii* biozone).

Tribe CYLINDROPORLEAE Pal, 1976
Genus *Heteroporella* Cros & Lemoine, 1966 ex Pratulon, 1967

Heteroporella (?) *graeca* Conrad, Pavlopoulos, Peybernès & Radoičić, 1980
(Pl. 7, figs. 1-6)

1980 *Heteroporella graeca* CONRAD, PAVLOPOULUS, PEYBERNÈS & RADOIČIĆ, p. 199-211, text-figs. 2, 3; Pl. I, figs. 1-4; Pl. II, figs. 1-4; Pl. III, figs. 2-4.

2005 *Heteroporella graeca* Conrad, Pavlopoulos, Peybernès & Radoičić - CHIOCCHINI ET AL., Pl. 9, fig. 19.

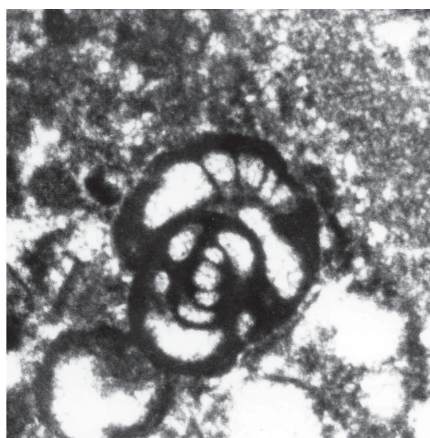
Description - Based on the original diagnosis, *H. graeca* is characterized by a cylindrical thallus with alternate whorls of sterile and fertile branches. Fertile verticils made up of pear-shaped ampoules perpendicular to the main axis that give rise at their distal end to one thin secondary ramification; sterile verticils with slightly flat branches that give origin to probably 4 secondary ramifications markedly oblique

EXPLANATION OF PLATE 6

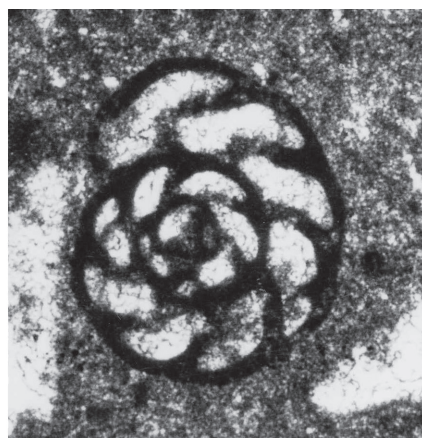
- figs. 1-7 - *Pseudorhapydionina* (?) *anglonensis* Cherchi & Schroeder, 1986 (x 75). L'Ottaduna succession, upper Cenomanian.
1 - Oblique section.
2 - Axial section.
3 - Nearly equatorial section.
4, 7 - Subaxial sections.
5-6 - Tangential oblique sections.
- figs. 8-15 - *Pseudonummoloculina aurigerica* Calvez, 1988 (x 50). Colle Santa Lucia succession, lower Albian.
8 - Oblique section
9 - Nearly equatorial section.
10, 12 - Subaxial oblique sections.
11 - Nearly axial section.
13, 15 - Axial slightly oblique sections.
14 - Subequatorial, slightly oblique section.



1



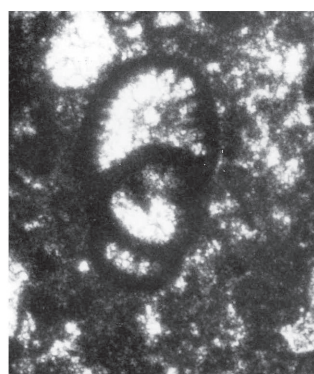
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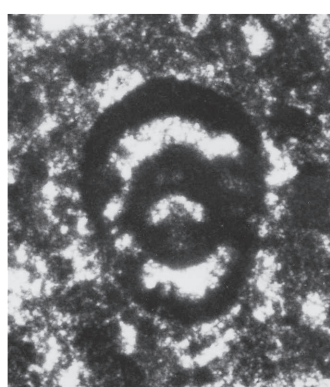
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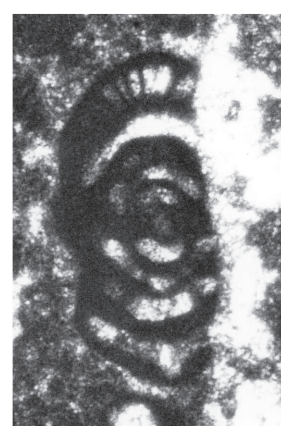
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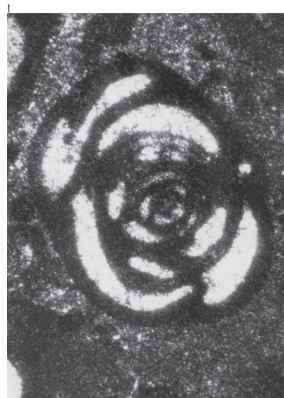
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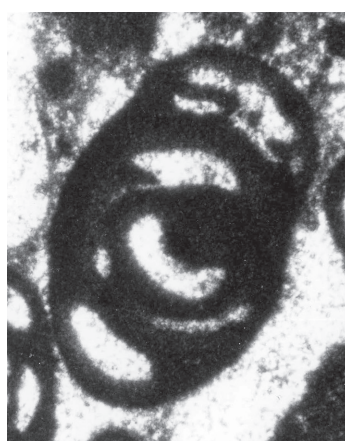
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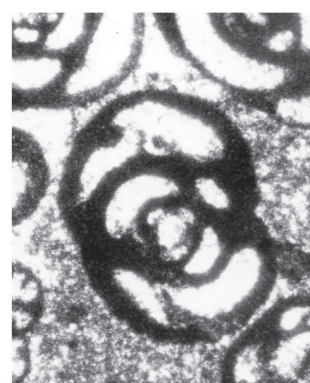
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14



15

BIOMETRIC PARAMETERS (mm)	<i>B. elitzae</i> Bucur, 1993	<i>B. elitzae</i> Monte Cairo
D	0.51-1.24	0.63-0.84
d	0.12-0.34	0.26-0.33
d/D	0.13-0.37	0.39-0.41
h	0.21-0.23	0.9-0.12
p	0.09-0.11	0.06-0.10
p' (fert.)	0.19-0.26	0.16-0.23
p' (st.)	0.09	0.06-0.10
l	0.09-0.15	0.11-0.15
l + l'	0.35-0.48	0.26-0.33
w	8	?10
L (max)	6.00	3.34

Tab. 3 - Biometric parameters of *Bakalovella elitzae* (Bucur, 1993) compared with the specimens from Monte Cairo.

and divergent. Calcification comprises the main stem and fertile whorls only.

According to Granier et al. (1994) the diagnosis is uncorrected because the pear-shaped ampoules, which give rise to one thin secondary branches are clearly acrophourous first order branches; this is the reason why the described species, which can not be referred to the genus *Heteroporella*, is left in open nomenclature.

Remarks - According to the amendment of the genus *Heteroporella* Cros & Lemoine, 1966 (ex Pratulon, 1967) and its type species *Heteroporella lepina* Pratulon by Granier et al. (1994), the occurrence and/or the absence of second order branches on inflated (fertile) first order branches are to be considered as diagnostic criteria at generic level. So, as amended, the genus *Heteroporella* is restricted to its type species. Most of the species previously included in this genus

BIOMETRIC PARAMETERS (mm)	<i>H. graeca</i> Conrad et al., 1980 Grece	<i>H. graeca</i> Monte Cairo
L (max)	10	3.5
D	0.86-1.48	0.81-1.03
d	0.30-0.76	0.42-0.72
d/D	0.33-0.53	0.51-0.69
h	0.13-0.18	0.75-0.10

Tab. 4 - Biometric parameters of *Heteroporella* (?) *graeca* from Monte Cairo compared with the holotype (Conrad et al., 1980).

have been referred to the genus *Chinianella* Ott, 1967 (ex Granier & Deloffre, 1994) and to the new genus *Otternstella* Granier, Masse & Berthou (1994), based on the characters (shape and orders) of the branches; five species among which *Heteroporella* (?) *graeca*, on the contrary, need to be reexamined.

Stratigraphic and geographic distribution - Originally described by Conrad et al. (1980) from the Barremian-lower Aptian of Greece, *Heteroporella* (?) *graeca* was previously restricted to the type locality. In the Monte Cairo area the species occurs in the upper Barremian sediments of the San Vincenzo succession (upper part of the *Vercorsella scarsellai* and *Cuneolina camposaurii* biozone).

Genus *Milanovicella* Granier & Berthou, 1994

Milanovicella pejovicae (Radoičić, 1969) (Pl. 7, figs. 7-10)

1969 *Clypeina pejovici* RADOIČIĆ, p. 71-84, figs. 2-3.

1970 *Clypeina pejovicae* Radoičić - RADOIČIĆ, p. 5.

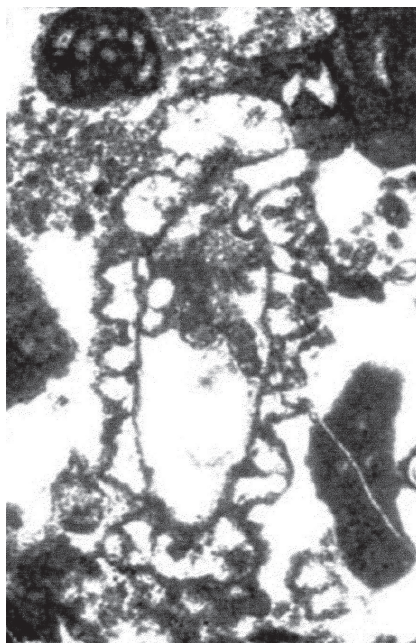
1978 *Likanella pejovicae* (Radoičić) n. comb. - BASSOULLET ET AL., p. 145, Pl. 5, figs. 1-2 (*cum syn.*).

1993 *Falsolikanella pejovicae* (Radoičić) - DRAGASTAN & BUCUR, p. 17.

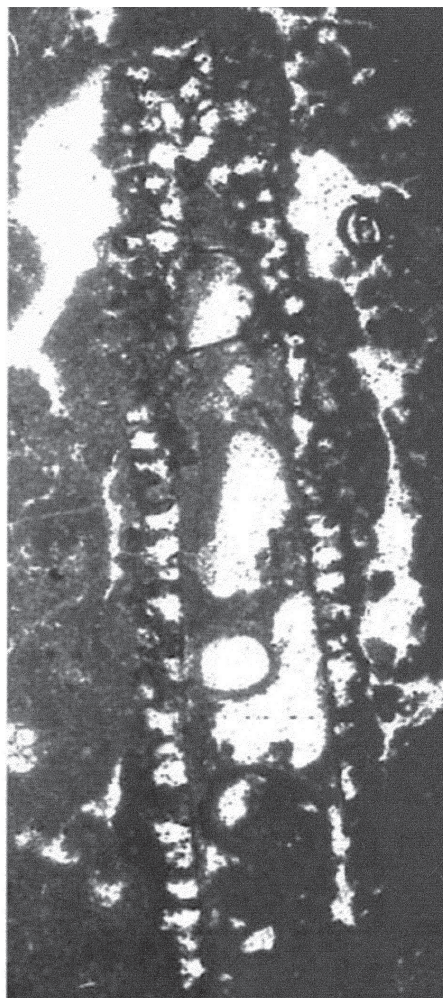
EXPLANATION OF PLATE 7

figs. 1-6 - *Heteroporella* (?) *graeca* Conrad et al. (x 33). San Vincenzo succession, upper Barremian.
1 - Longitudinal oblique section.
2, 6 - Longitudinal sections.
3-4 - Oblique sections
5 - Transverse section.

figs. 7-10 - *Milanovicella pejovicae* (Radoičić) (x 33). Colle Santa Lucia succession, Barremian.
7-8, 10 - Oblique sections.
9 - Tangential section of a verticil.



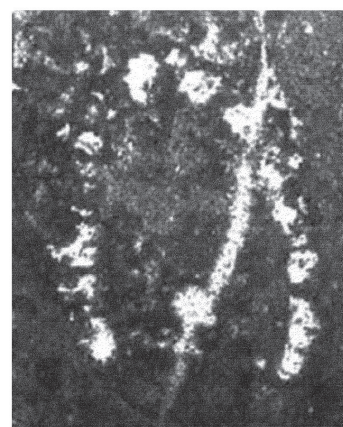
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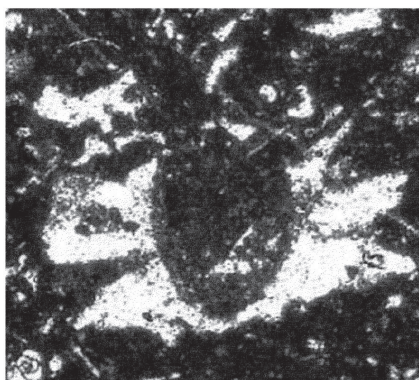
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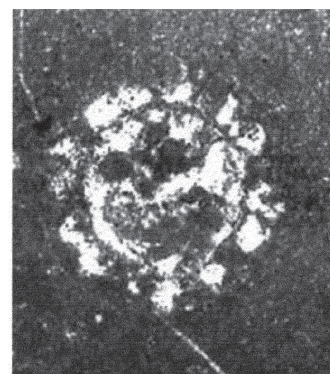
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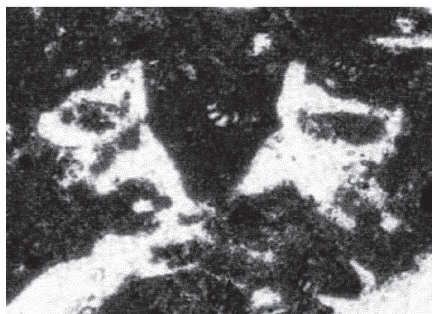
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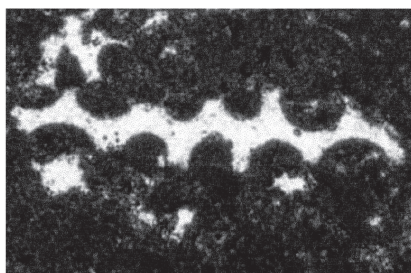
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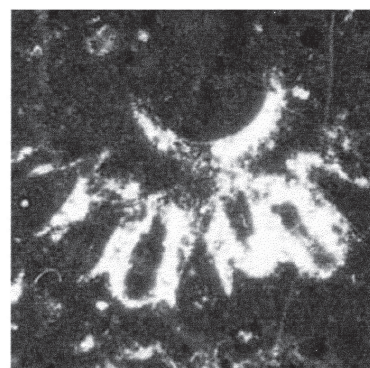
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1996 *Praturlonella pejovicae* (Radoičić) n. comb. - SOKAČ, p. 22-23, Pl. XVII, figs. 8-14.

1999 *Milanovicella pejovicae* (Radoičić) n. comb. - BUCUR, p. 59

2005 ? *Likanella pejovicae* (Radoičić) - CHIOCCHINI ET AL., Pl. 9, figs. 10-11.

Description - Alga with a "clypeiniform" aspect; cylindrical thallus made up of disc-like regularly spaced whorls that thicken towards the outside; verticils composed of numerous club-shaped laterals, that are distributed in two rows and fused laterally.

Remarks - Originally described as *Clypeina* by Radoičić, 1969, the species was attributed to different genera by different authors. Bassoullet et al. (1978) emended the genus *Likanella* Milanović, 1965, including species "avec verticils constitués par deux ou plusieurs rangées de ramifications" (op. cit., p. 140). According to these authors *Clypeina pejovici* should belong to *Likanella*.

Sokač (1996) asserting the presence of branches arranged in two rows, proposed a new combination and assigned the species to the genus *Praturlonella* Barattolo (1978). Dragastan & Bucur (1993), although without argumentation, referred *C. pejovicae* to *Falsolikanella*. More recently, Bucur (1999) proposed a new combination and assigned the species to the genus *Milanovicella* Granier & Berthou (1994), based on the presence of double whorls of laterals.

Stratigraphic and geographic distribution - Originally described from the Barremian-Aptian of southern Herzegovina (Radoičić, 1969), *Milanovicella pejovicae* was previously known from Lower Cretaceous of Romania (Dragastan & Bucur, 1993) and from Hauterivian-Barremian of Croatia (Sokač, 1996). In the Monte Cairo area the species occurs in the Barremian sediments of San Vincenzo and Colle Santa Lucia successions, in the upper part of the the *Vercorsella scarsellai* and *Cuneolina camposaurii* biozone.

CONCLUSIONS

All the Lower Cretaceous benthic foraminifers and algae identified from Monte Cairo (Apennines) are known from the southern and northern margins of the Tethys, except for *Nezzazata isabellae* and *Cuneolina sliteri* that are known from the Pacific area only (Fig. 3). In particular the assemblages from Monte Cairo contain:

BIOMETRIC PARAMETERS (mm)	<i>L. pejovicae</i> (Radoicic, 1969)	<i>L. pejovicae</i> Monte Cairo
D	1.2-3.04	1.28-1.71
d	0.29-0.72	0.48-0.51
d/D	0.33-0.53	0.29-0.37
p (dist)	0.19-0.32	0.24
h	0.40-0.72	0.42
w	30-52	?

Tab. 5 - Biometric parameters of *Milanovicella pejovicae* according to Radoičić, 1969 compared with the specimens from Monte Cairo.

a) restricted northern margin taxa, such as *Pseudonummoloculina aurigerica* (Central Pyrenees, France), *Dictyoconus pachymarginalis* (Iran and Western Pyrenees) and *Bakalovella elitzae* (widespread from Iberia to Carpathian-Balkan domain);

b) restricted southern margin taxa, such as *Dictyoconus algerianus* (Northern Africa and Apulian platform) and *Heteroporella (?) graeca* (Gavrovo);

c) mixed taxa from northern and southern margins such as *Pseudorhapydionina (?) anglonensis* (Sardinia and southern Apennines), *Paracoskinolina tunesiana* (Portugal, Apulian platform, Algeria and Tunisia) and *Milanovicella pejovicae* (Carpathian-Balkan domain and Karst platform);

d) taxa previously known in the Pacific areas (Pacific guyots), such as *Cuneolina sliteri* and *Nezzazata isabellae* (the latter is reported also from Mexico by Arnaud Vanneau & Sliter, 2005);

e) mixed taxa from Pacific and northern margin of the Tethys, such as *Arenobulimina cochleata* (Pacific guyots, Western Pyrenees, French and Swiss Western Alps).

The degree of mixing of benthic taxa from the two margins of the Tethys and Central Pacific Ocean in the faunas from Monte Cairo is quite important for paleobiogeographic considerations.

During the Early Cretaceous, the southern part of the Apulian promontory located on the southern margin of the Tethys, displayed several carbonate platforms

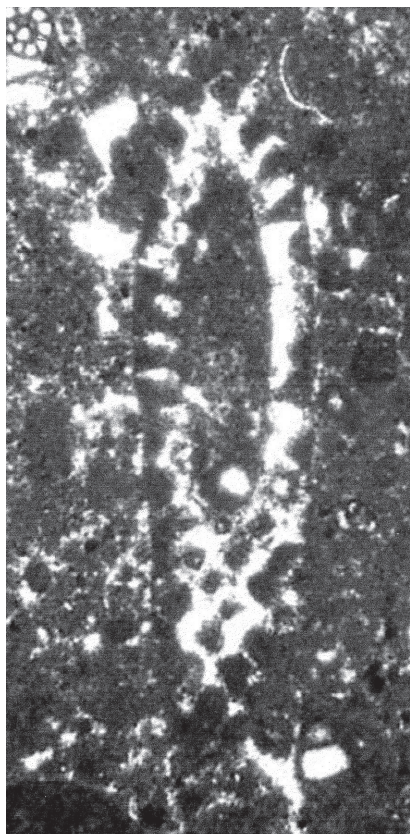
EXPLANATION OF PLATE 8

figs. 1-8 - *Bakalovella elitzae* (Bakalova) (x 30). Colle S. Lucia succession, Barremian.

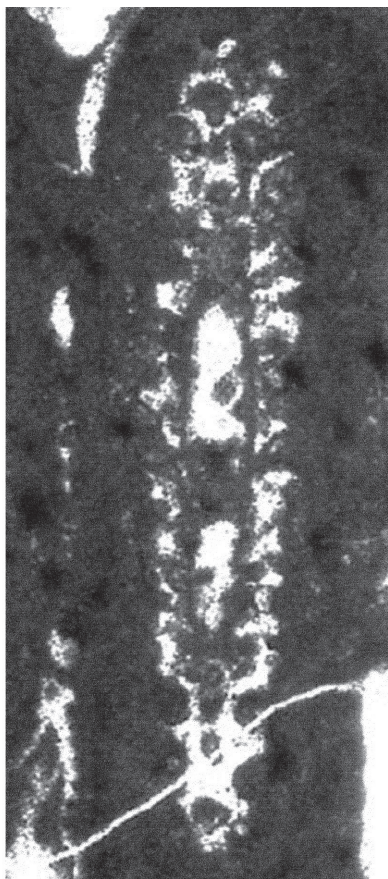
1-2 - Longitudinal oblique sections.

3-6, 8 - Oblique sections cutting fragments of thalli.

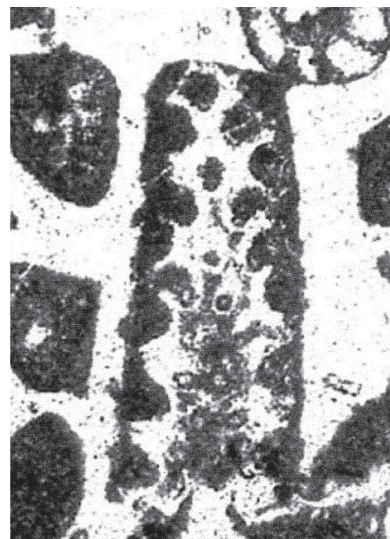
7 - Transverse section.



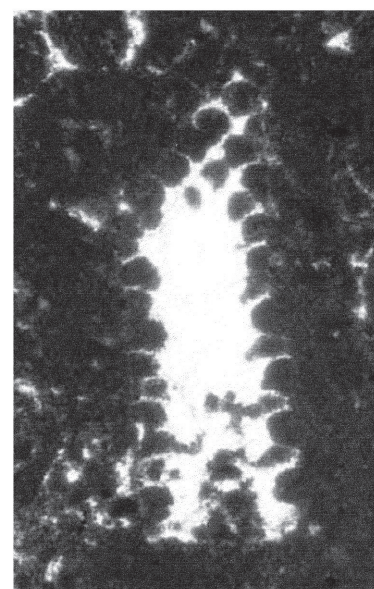
1



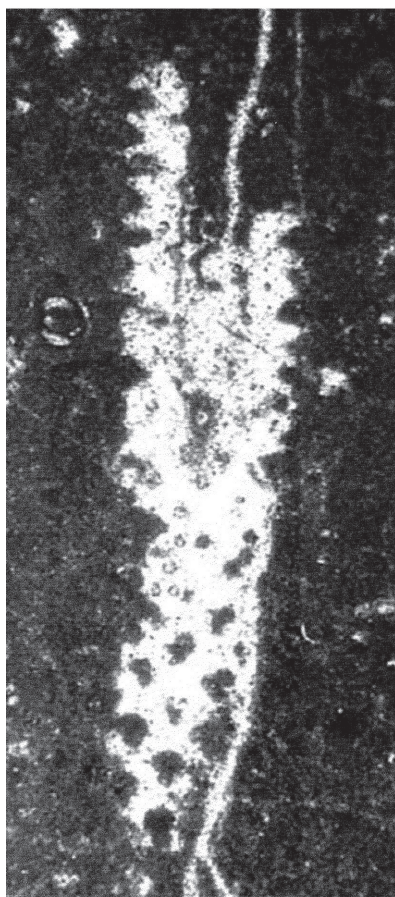
2



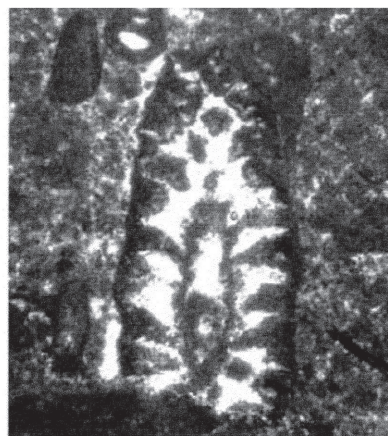
3



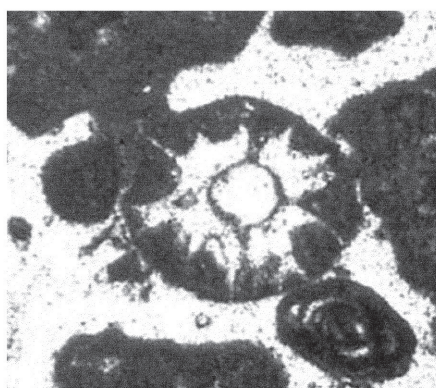
6



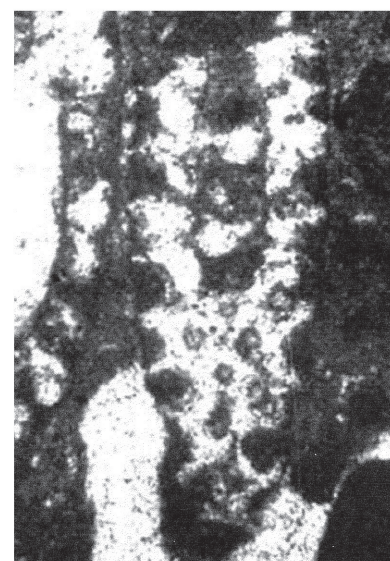
4



5



7



8

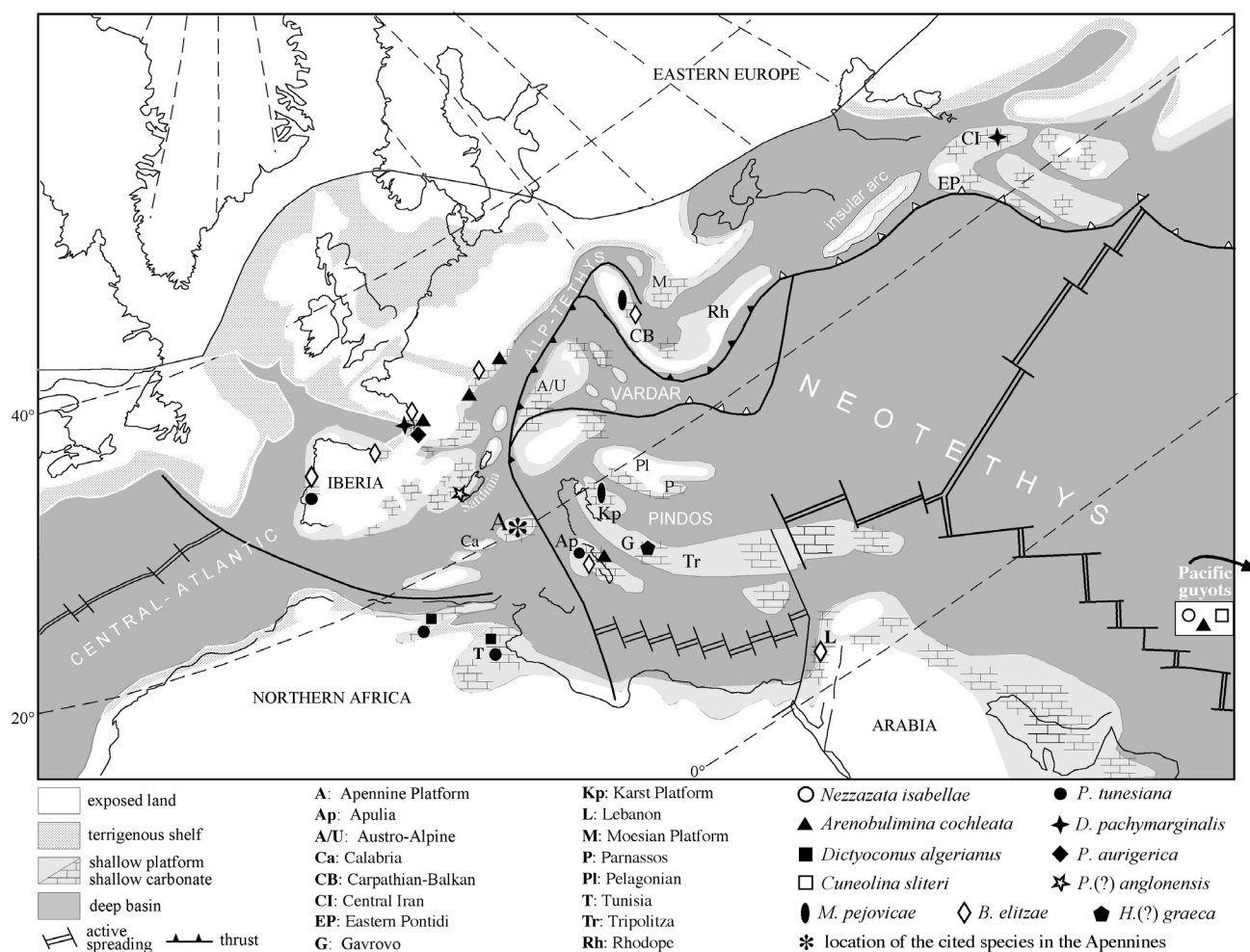


Fig. 3 - Main Aptian paleoenvironments in the paleogeographic map of western Tethys (based on Masse et al., 1993) and site location of the species identified from Monte Cairo.

that paleogeographically were close to the Iberian Urgonian platforms, from Sardinia, Provence and subalpine French-Swiss margins, to northwest Austria (Masse et al., 1993). Such a paleogeographical setting favoured migration of the benthic taxa between the northern and southern margins of the Tethys. A faunal similarity between the Apennine platform and the Iberian block during the Early Cretaceous (late Albian to early Cenomanian), has been already observed by Mancinelli et al. (2003).

An example of mixed benthic faunas between the margins of the Tethys and the Pacific areas was previously known by Arnaud Vanneau & Premoli Silva (1995) and by Arnaud Vanneau & Sliter (1995). According to the above-mentioned authors, the benthic foraminiferal fauna from the Hauterivian to lower Aptian sequence in the Pacific is similar to that observed in the Tethys; subsequently, there was no apparent barrier to migration of benthic faunas through the tropical oceans. In the upper Aptian to Albian, the Pacific area continued to receive migrating faunas from the Tethys,

but “the occurrence of typical American taxa associated with Tethyan taxa in the Pacific faunas, proves that a certain isolation existed at that time between Europe-Africa on the one hand, and the Americas on the other, following the opening of the central Atlantic Ocean. The Pacific regions, however was not affected by isolation and continued to receive migrating microfaunas from all the sources” (Tethys and Americas) (op. cit., p. 550). Therefore, the finding of such a mixing of benthic taxa (already known from Croatia and Slovenia regions according to Arnaud Vanneau & Sliter, 2005) from the Apennine platform (Monte Cairo area), adds to our knowledge on Lower Cretaceous benthic foraminifers and algae distribution and may be used to better understand the influence of paleogeographic factors on the dispersal of benthic microfossils.

Due to their limited stratigraphic range in the Monte Cairo area, the described species can be added to those already known, and which are most important for the Cretaceous biostratigraphy of the Apennine platform (Fig. 4).

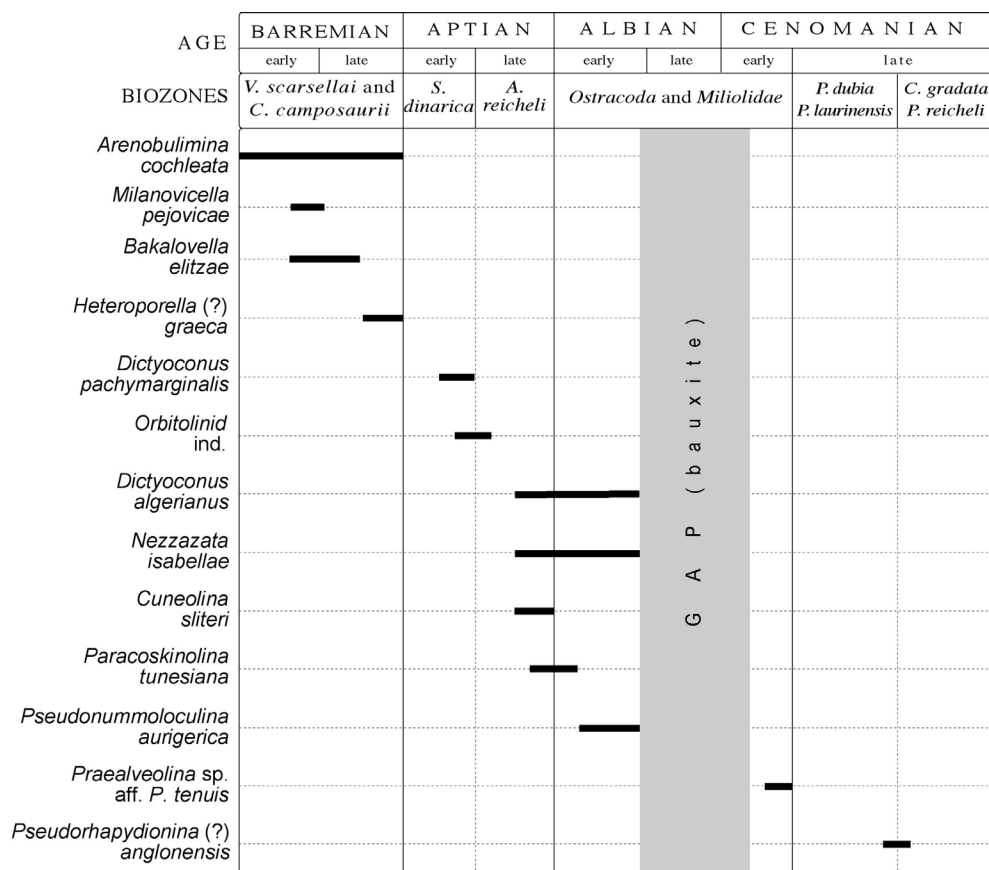


Fig. 4 - Local stratigraphic distribution of the described species from Monte Cairo. Biozones after Chiocchini et al. (1994).

Finally, due to their paleo-ecological significance, the same species can be utilized in characterizing the different sub-environments of the Apennine platform (*sensu* Mostardini & Merlini, 1986). In particular, while *Arenobulimina cochleata*, *Dictyoconus algerianus*, *Nezzazata isabellae* and *Paracoskinolina tunesiana* are present both in the back reef facies, where they are more frequent, and in the inner shelf facies, *Dictyoconus pachymarginalis*, *Orbitolinidae* ind., *Cuneolina sliteri*, *Pseudonummoloculina aurigerica*, *Praealveolina* sp. cf. *P. tenuis* and *Pseudorhapydionina (?) anglonensis* seem to be exclusive to the back reef facies, in so far as they are not found in coeval sediments of the inner carbonate platform, which are widespread southwards and south-westwards of the studied area, in Aurunci, Ausoni and Lepini mountains (Chiocchini & Mancinelli, 1977; Chiocchini et al., 1994).

ACKNOWLEDGEMENTS

This paper is financially supported by a MIUR grant (Project COFIN 2002) to A. Mancinelli. Thanks are due to A. Arnaud and to the anonymous reviewer for improving the manuscript by means of their critical and constructive remarks.

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Manuscript received 11 July 2005

Revised manuscript accepted 13 May 2006

