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EMENDATION OF *VIDALINA* SCHLUMBERGER AND THE NEW GENUS *AGERINA* (FORAMINIFERA)

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ABSTRACT- The topotypes of *Vidalina hispanica* Schlumberger have been investigated by light and electron microscopy and the supposed hyaline calcite wall confirmed. Schlumberger's genus and species are here emended.

In contrast *Vidalina martana* Farinacci has a porcelaneous wall, and other features not previously seen are described. A new genus is here erected: *Agerina* (named in honour of Prof. D.V. Ager) with *Agerina martana* (Farinacci) as type species.The latter species is emended.

RIASSUNTO - (Emendamento di *Vidalina* Schlumberger ed istituzione del genere *Agerina* (Foraminifera)). Il ritrovamento di una ricca e bella associazione a *Vidalina martana* Farinacci ha reso possibile il riesame di questa specie. Da tempo ero dubbiosa circa l'assegnazione della specie *martana* al genere *Vidalina* Schlumberger , perchè da un esame approfondito della specie-tipo *Vidalina hispanica* Schlumberger avevo supposto un guscio di calcite ialina.

L'oscillazione del piano di avvolgimento negli ultimi giri in *Vidalina martana*, ancora non rilevato nei sintipi, ha causato erronee interpretazioni. Infatti, la parete dell'unica camera tubulare, attraversata casualmente più volte dal piano della sezione sottile, poteva mostrare interruzioni e false flessioni. Queste forme di attraversamento sono state interpretate come setti, di conseguenza il guscio non suddiviso è stato considerato pluriloculare.

Pertanto, considerando la presenza di una parete di calcite ialina nel genere *Vidalina* Schlumberger, un emendamento di questo genere era necessario.

Il nuovo genere *Agerina* è stato qui istituito per la forma porcellanacea con il piano oscillante degli ultimi giri ed assegnata ad

esso la specie tipo *Vidalina martana* nella nuova combinazione *Agerina martana* (Farinacci) ed emendata.

KEY WORDS -Benthonic Foraminifera, *Vidalina*, *Agerina*, Santonian, Pliensbachian.

INTRODUCTION

The discovery of a very good assemblage containing many well preserved *Vidalina martana* Farinacci, has made possible a re-study of this species. Previously I was doubtful about this assignment to the genus *Vidalina* Schlumberger, because improved observations had suggested to me that *Vidalina hispanica* Schlumberger had a hyaline calcite wall whilst *Vidalina martana* has a porcelaneous test.

Moreover the oscillation of the coiling plane of the last whorls has caused misinterpretation, being often obliquely cut by the plane of thin section, giving a false appearance of subdivision of the undivided rolled tubular test. These apparent subdivisions were interpreted as septa, so a divided test of pluriloculine type was considered by several authors.

This was the result of micropaleontological analysis made only on thin section of hard limestones.

In view of the hyaline calcite wall of *Vidalina* Schlumberger, an emendation of this genus is necessary before discussing *Vidalina martana* and its emendation.

The new genus *Agerina* is here erected for the porcelaneous form with its oscillating plane of later whorls. To it is assigned *V. martana* with the name *Agerina martana* (Farinacci).

OBSERVATIONS

Vidalina hispanica Schlumberger and *Vidalina martana* Farinacci: comparison by original descriptions

The genus *Vidalina* was erected by Schlumberger in his study of the Santonian *Meandropsina* beds from Trago de Noguera (Spain). He considered that *Vidalina* belonged to the family Miliolidae, giving the following description:

Vidalina Schlumberger, n. gen. 1900 - "Plasmostracum discoidal formé par un tube continu enroulé dans un plan, mais dont la cloison extérieure s'étend et se superpose successivement sur les deux faces jusqu'au centre du disque en y produisant un renflement saillant".

Vidalina hispanica Schlumberger, n. sp. 1900 - "Ce sont de disques circulaires minces sur le bord et renflés au centre, constitués par un tube non cloisonné roulé en spirale. Le test non perforé est rugueux à l'extérieur et les tours de spire sont à peine marqués vers le bord du disque. L'ouverture est simple à l'extremité du tube. Le plus grands ont 1,55 mm de diamètre.

La section médiane horizontale montre le grand nombre de tours de spire et ce n'est que dans les premiers que l'on remarque quelques légers étranglements dans la croissance.

La section médiane transversale perpendiculaire au disque fait ressortir la superposition centrale de toutes les parois esternes.

Habitat - Très abondant dans le Santonien de Trago de Noguera. On les distingue facilement par le fait que le bouton se détache en blanc sur la couleur brune du test.

A second species of *Vidalina* was erected by the writer with the following description:

Vidalina martana Farinacci, n. sp. 1959 - Guscio a forma discoidale, con rigonfiamento irregolare centrale che diminuisce uniformemente verso i bordi tondeggianti, costituito da una camera tubulare non suddivisa, avvolta a spirale piana. La parete non perforata è rugosa all'esterno e formata di materiale calcitico opaco; esso ricopre i giri precedenti costituendo un avvolgimento involuto. Il numero dei giri è di 6 - 7. L'apertura è semplice all'estremità del tubo. Diametro del guscio = 0,25 mm".

I made the attribution of the species *martana* to the genus *Vidalina* by comparison with the figures and descrption of *Vidalina hispanica.* In the figures of *V. hispanica,* the wall looks like a hyaline calcareous test, but in the assignment by Schlumberger to the family Miliolidae, no doubt was expressed about the porcelaneous wall and I therefore supposed the hyaline appearance of the wall in his figures was due to recrystallization of the test.

Dimensions and number of whorls were the main differences between the two species, but also the outlines and the type of involution of the spiral tube: *V. hispanica* is centrally biumbonate, on the contrary *V. martana* is gradually inflated from the periphery to the centre. This feature corresponds to a complete involution in *V. martana* and a non-complete involution in the last whorls in *V. hispanica* in which a true involution is seen only on the early whorls in the central part of the test.

Shortly afterwards *Vidalina zujovici* Radoicic n. sp. 1962 was erected, but considered a synonym of *Vidalina martana* in a footnote added in proof in her paper by Radoicic. According to Radoicic the description of her species is equally applicable to my species: "Test calcaire imperforé. De proloculum part une spire planispirale entièrement involute enroulée qui s'agrandit progressivement. L'enroulement involute

cause des grossissements du test dans la partie umbilicale".

The dimensions are the same given for *V. martana.*

I agree with Radoicic's remarks on the differences between *V. hispanica* and *V. zujovici* = *martana,* she wrote: *"V. hispanica* ne montre pas de plus grandes différences sauf un plus petit nombre d'enroulements et de profils dans la coupe transversale qui est plutòt ovale. Chez l'espèce *V. hispanica* le grossissement umbilicale est plus prononcé et concentré sur la partie umbilicale plus étroit. C'est pour cette raison que je considère justifiable la séparation pour distinguer la forme liasique comme une nouvelle espèce".

New observations on the topotypes of *Vidalina hispanica*

From the topotypes preserved in the Henson's collection, deposited in the Natural History Museum, London, I have noted the vitro-hyaline character of the inner layer of the test in thin section which shows no evidence of recrystallization, while the outer layer and the external appearance of the test of other isolated specimens suggested to me a microgranular outer surface.

For this reason I asked E. Caus of Barcelona University for a sample of sediment from the type locality of *Vidalina,* from which I obtained many specimens that I have examined by light and by scanning electron microscopy.

As is clearly shown in the figures of Pl. 1, the wall is formed of two layers. This feature is well shown by light and electron microscopy. Thus the wall consists of a vitro-hyaline inner layer, very finely perforated and a outer microgranular layer.

This type of wall is unlikely to belong to the Miliolina, for which a porcelaneous wall is typical. The type of wall is enough to separate *Vidalina* from families of the Suborder Miliolina and put it in a family in which the calcareous finely perforated wall can be accompanied by a second layer with an external microgranular appearance.

But we know how the concept of "family" is very problematical for some groups of foraminifera also because of the choice of features characterizing a family.

In this case, the family Involutinidae seems to be the most suitable for *Vidalina.* In fact the family Involutinidae consists only of genera with a tubular enrolled chamber following the proloculus, accompanied by the most characteristic feature of the family, that is, the complete or partial involution of the shell with a hyaline calcareous perforate, lamellar, microgranular wall. In addition, several genera have additional shell material deposited on one or both sides of the test.

Because of this last feature, the family Spirillimidae, is not suitable to accommodate *Vidalina,* even though the test is formed by a tubular

enrolled chamber; in addition the wall in the Spirillinidae consists of a simple crystal of calcite.

New observations on specimens of *Vidalina martana* from Macchialunga

The discovery of a very rich and beautiful microfauna with *Vidalina martana*, persuaded me to re-study again this species that I had erected on 1959 in my degree thesis, in which the types were ill-preserved and there was little material. From 1959 to now, *Vidalina martana* has been considered stratigraphically very important because it is limited to the Pliensbachian, as shown by ammonite control, and widespread in the Tethyan domain from the northern to the southern margin.

Frequently very good specimens showed a more complicated coiling, not so simple as the planispiral arrangement of *Vidalina*.

Moreover the small various porcelaneous foraminifers that are always associated with *Vidalina martana* are liable to be misidentified. In fact, as this porcelaneous assemblage is contained in hard limestones, and having a generally simple construction of the test, various sections of different foraminifers can be readily confused with others. So some cuts of Ophthalmidiids have been attributed to *Vidalina* (Decrouez *et alii*, 1978, fig. 13). The lack of re-examination of true *Vidalina* specimens, made necessary an emendation of *V. martana*, following the finding of very good specimens. In fact the coiling of the undivided second chamber after the proloculus is not simply planispiral and is certainly not the type of coiling belonging to *Vidalina*. It is described and discussed below and a new genus is erected for *V. martana* Farinacci. In the new genus *Agerina* are grouped all the specimens previously named *Vidalina martana*, rejecting other attributions in which the similarity is suggested but not proved.

SYSTEMATIC DESCRIPTIONS

Consequent upon the above observations, *Vidalina* Schlumberger is here emended on the basis of the Santonian topotypes and *Agerina* n. gen. is here erected, its type species being *Vidalina martana* Farinacci. Locality and stratigraphical age: Macchialunga Mountain, Central Apennines; Pliensbachian.

Suborder Involutinina Hohenegger and Piller, 1977

Family Involutinidae Butschli, 1880

Test consisting of proloculus and undivided tubular chamber that is

planispirally to trochospirally coiled; may have additional shell material deposited at one or both sides of the test as thickening or nodes (Loeblich & Tappan, 1988).

Genus ***Vidalina*** Schlumberger, 1900 here emend.

Emended description: Test discoidal, proloculus followed by a planispirally involute enrolled undivided tubular chamber.

Wall calcareous of two layers, an inner hyaline one and an outer microgranular layer.

Type species: *Vidalina hispanica* Schlumberger, 1900 (below emended).

Vidalina hispanica Schlumberger, 1900 here emended

Pl. 1, figs 1 - 7

Material: From the type locality studied by Schlumberger at Trago de Noguera, Spain.

Dr. E. Caus kindly provided me with a sample of calcareous reddish sand belonging to the Santonian *Meandropsina* level, where I have found the fauna described by Schlumberger (1900).

Emended description: Test lenticular, proloculus followed by a planispirally enrolled tubular chamber. Umbilical area is always covered by umbonal lamellar thickening, due to involution of the early whorls in microspheric form, later ones evolute, small macrospheric test completely involute.

Wall composed of two layers, inner layer with fibrous structure of crystals aligned obliquely to the outer wall surface, finely perforated; external layer microgranular.

Dimensions: Diameter: mm 0.9 - 1.8 from microspheric to macrospheric form
Umbo-thickness / Diameter = about 1 / 3.

Remarks: Sexual dimorphism is reflected not only in the test size, but also in the feature of the involution of the shell, being complete in the macrospheric form.

In the early whorls of the tubular chamber, after the proloculus, there is a more prevailing development of the hyaline inner layer, responsible for the umbonal lamellar inflation; the microgranular dark layer being absent or very reduced. In the following whorls of the adult part of the shell, the hyaline and the dark layers are both developed, the last one prevailing.

The constancy of the development of the dark layer and the double layered structure, well shown in the electron microscope, exclude a secondary micritization of the external portion of the last whorls.

Suborder Miliolina Delage and Hérouard, 1896

Family Cornuspiridae Schultze, 1854

Test free or attached, proloculus followed by undivided planispiral to streptospiral tubular second chamber that may show later zigzag growth (Loeblich & Tappan, 1988).

Genus ***Agerina*** n. gen.

Derivation of name: I name this new genus in honour of Professor Derek V. Ager, in recognition of my esteem and friendship for him.

Type species: *Vidalina martana* Farinacci, 1959.

Description: Test lenticular, proloculus followed by undivided tubular second chamber, coiling planispirally involute, formed by about 6-8 whorls. Tendency to the variability in the planispirally growth by oscillation of the coiling plane, mainly of the later whorls.

Wall porcelaneous. Aperture at the end of the tube.

Agerina martana (Farinacci, 1959) new comb. and emend.
Pl. 2, figs 1 - 7 (neotype fig. 1)

1959 *Vidalina martana* Farinacci, p. 12, 13, pl.9, fig. 3, pl. 10, figs 1, 2, text-fig. 2.
1964 *Vidalina martana* Farinacci; Farinacci & Radoicic, pl. 2, fig. 2.
1962 *Vidalina zujovici* Radoicic, p. 219, 220, pl. 8, figs 1-4.
1969 *Vidalina martana* Farinacci; Manganelli & Zuccari, pl. 5, fig. B
1970 *"Vidalina" martana* Farinacci; Bronnimann, Posson & Zaninetti, p. 16, pl. 1, fig. 3.
1971 *Vidalina martana* Farinacci; Cousin & Neumann, pl. 2, fig. 1, pl. 3, figs 6, 7.
1971 *Vidalina martana* Farinacci; Centamore, Chiocchini, Deiana, Micarelli & Pieruccini, pl. 39, figs 4, 5
1978 *Ophthalmidium martanum* (Farinacci); Decrouez, Fleury & Zaninetti, pl. 1, figs 13, 18.
1988 *Ophthalmidium martanum* (Farinacci); Karakitsios & Tsaila- Monopolis, p. 52, pl. 1, figs 6, 10.

Holotype: Holotype of *Vidalina martana* was not designated on the three figures published in 1959, which are thus syntypes; unfortunately the specimens on which the new species *V. martana* was erected are lost. Moreover new topotypes are not collected because the material from that locality is not good; therefore I prefer do not designate the lectotype among the figures of the syntypes. The emended description is made on the base of the fauna from Macchialunga.

Type locality: Macchialunga Mountain, South of Stroncone village, Umbria, Fo. 138, Terni of the Geological Map of Italy 1:100.000,

Central Apennines, Italy.

Type level: Pliensbachian. Age controlled by the following Ammonites: *Harpophylloceras eximium* (Hauer), *Cetonoceras psiloceroides* (Fucini), *Arieticeras almoetianum* Fucini.
(G. Pallini, personal communication).

Emended description: Test lenticular with a rounded periphery. Proloculus followed by an undivided tubular second chamber, involute coiling of 6-8 whorls. Early whorls are planispirally enrolled, the later whorls have tendency to a streptospiral coiling, changing the coiling plane by slight oscillation, expecially in the microspheric forms. The diameter of the chamber increases gradually. In the later stage the oscillation of the coiling plane is accompanied by a slight increase of the chamber diameter that becomes spirally no more round but sharp-cornered. Aperture simple at the end of the tube.

Dimensions: Diameter: mm 0,23 - 0,38 from macrospheric to microspheric forms.

Remarks: *Agerina martana* differs from *Cornuspira* sp. Schultze = *Cyclogyra* sp. Wood in having the involute coiling and a oscillating coiling plane of streptospiral tendency in the last stage. They are easily distinguishable in axial section where in *Agerina* the presence of involute coiling is clearly shown, *Cornuspira* being evolute.
The type species *Vidalina martana* of the new genus *Agerina* was considered by Wernly (1972) as doubtfully belonging to the genus *Vidalina* Schlumberger, not because of the type of the wall, but the manner of the coiling. Wernli and later Zaninetti (1976) suggested a similarity between *Vidalina martana* and the genus *Ophthalmidium* Kubler & Zwingli (se below).
The new material from Macchialunga Mountain establish that the monotype genus *Agerina* is the same as *Vidalina martana* Farinacci and that the latter is a quite separate genus from the emended true *Vidalina* as typified by *V. hispanica* Schlumberger.

Differences exist between *Agerina martana* and *Ophthalmidium* which were not documented by Wernli (1972) and Zaninetti (1976). The new genus differs from *Ophthalmidium* in lacking many ophthalmidiid features, as: "chamber broader at the base and tapering toward the aperture. from one-half to one coil in length, coiling planispiral or slightly deviating from this, chambers with distinct floors and lateral extensions that in involute tests partially or completely overlap earlier whorls, and in evolute tests form platelike connections between successive whorls" (Loeblich & Tappan, 1988). On the contrary *Agerina* is formed by an undivided tubular chamber planispirally coiled with only a streptospirally slight deviation in the last stage.

In conclusion, the reason for the misinterpretations of the morphology of this foraminifer is determined by the type of their assemblage accompanying *Agerina martana*. Frequently it is found together with other porcelaneous simple forms, as: *Cornuspira* sp. = *Cyclogyra* sp., *Nubecularia* sp., *Ophthalmidium* spp., and also together with small agglutinated microgranular forms, always in hard rocks, so that some sections of them in random thin section could easily be incorrectly assigned to *Agerina martana*, causing confusion.

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PLATE 1

Vidalina hispanica Schlumberger from Type Locality Trago de Noguera, Spain

Fig. 1, 2 - Topotype of the Henson's Collection, Natural History Museum, London. Thin section, light microscope, x 7.5.

Fig. 3 - Topotype of the Museo di Paleontologia (Università La Sapienza, Roma). Thin section, light microscope, x 8.

Fig. 4 - 7- Topotypes of the Museo di Paleontologia (Università La Sapienza, Roma). Scanning Electron Microscope:

4) Lateral view, natural fracture without etching.

5) Lateral view, wall corroded by etching showing two layers.

6) Artificial rupture shoving assial view.

7) Artificial rupture and etching. Particular inside the wall, shoving the inner layer made by calcite needles; among them there are very small pores.

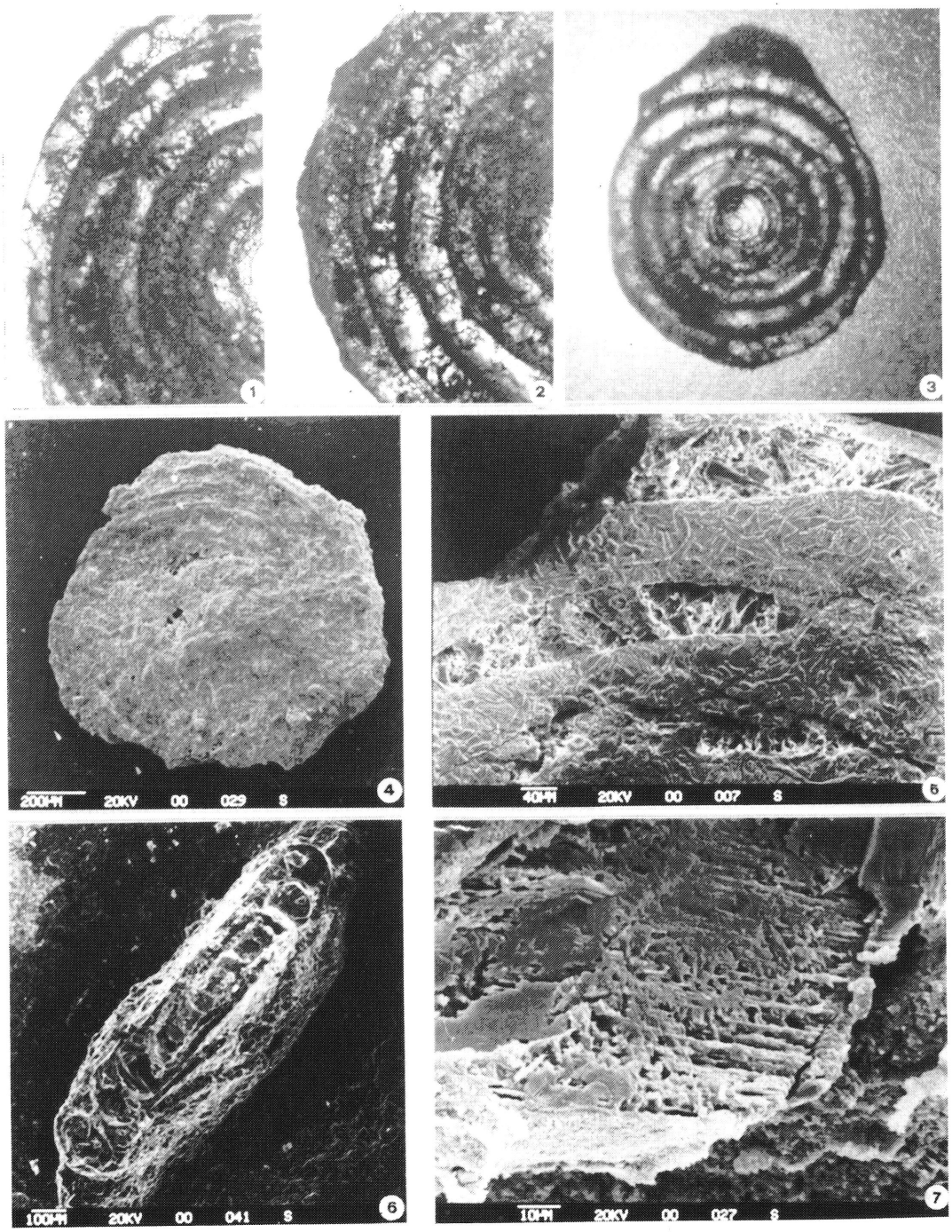
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PLATE 2

Agerina martana (Farinacci) from Macchialunga Mountain, Umbria, Italy

Fig. 1 - Axial section, x 95, NS33-C8-3.

Fig. 2 - Axial slightly oblique section, x 120, NS33-C7-2.

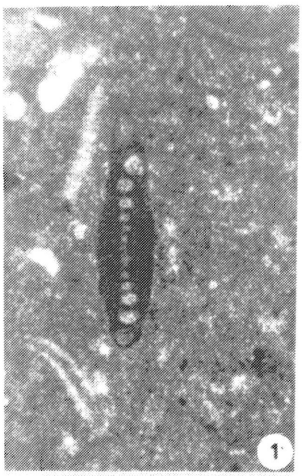
Fig. 3, 7 - (3) almost equatorial section, x 130, NS33-C7-2.
(7) equatorial section, the undivided tubular chamber forming the test is well shown, x 100, NS33-A9-10.

Fig. 4 - On the left: a) axial section and b) parallel to the axial plane; on the right: c) equatorial section, x 90, NS33-A3-13.

Fig. 5 - The oscillation of the coiling plane in the last two whorls is clearly shown, x 95, NS33-C8-3.

Fig. 6 - a, b) Assial section
c) Questionable specimen of *Agerina* cf. *martana*
d) Indetermined foraminifer with early planispiral coil, followed by monoserial chambers
e) ? *Ophthalmidium* sp. x 110, NS33-C7-2.

Depository: Museo di Paleontologia, Università La Sapienza, Roma.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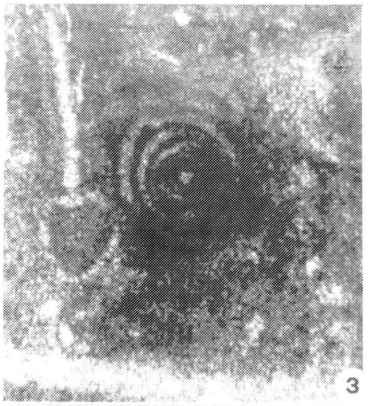
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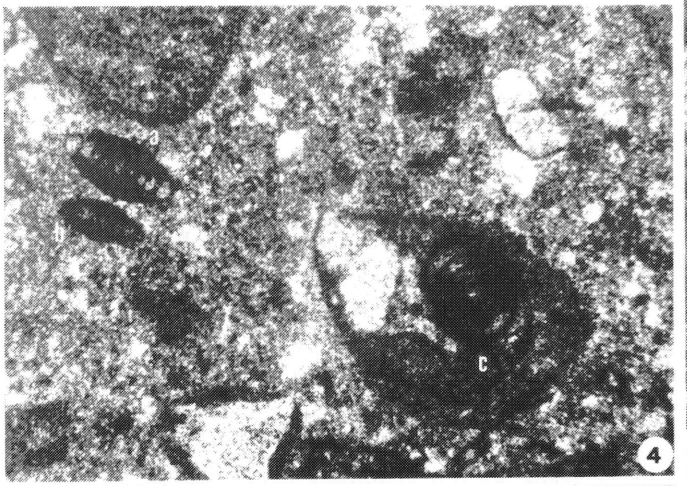
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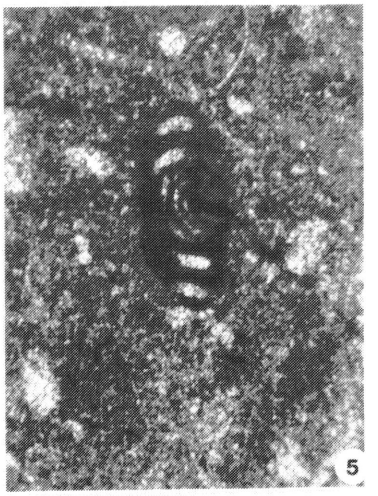
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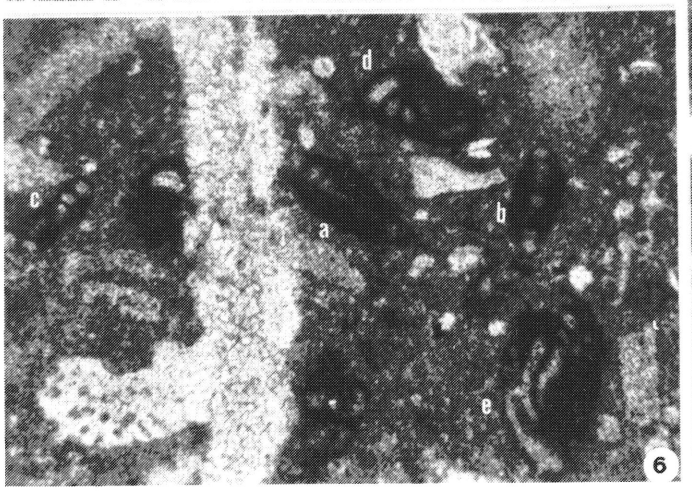
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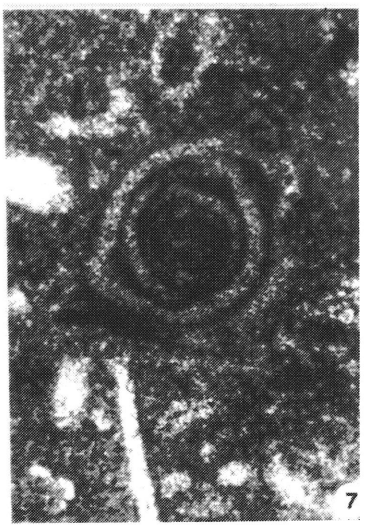
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