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Autor: Brönnimann, Paul

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PSEUDOTEXTULARIELLA COURTIONENSIS, N. SP., FROM THE VALANGINIAN OF WELL COURTION 1, COURTION, CANTON OF FRIBOURG, SWITZERLAND

by

Paul BRÖNNIMANN

In a recent paper, CHAROLLAIS and BRÖNNIMANN (1966) proposed the Lower Cretaceous (Hauterivian to Aptian-Albian) genus *Sabaudia* CHAROLLAIS and BRÖNNIMANN, type species *Textulariella minuta* HOFKER, 1965, and re-examined the morphology of *Pseudotextulariella cretosa* (CUSHMAN), 1932, from the Cenomanian of southern England. While writing the paper, Mr. Danilo RIGASSI, Geneva, kindly drew my attention to a form morphologically similar to *Pseudotextulariella* BARNARD, 1953, illustrated by FISCHER and LUTERBACHER (1963, pl. 1, fig. 2, 3; pl. 5, fig. 1a, d-h). This foraminifer was encountered in thin sections of core no. 4, 1402.70-1407.70 m, from British Petroleum Exploration well Courtion 1, SE of Courtion, canton of Fribourg, Switzerland. The age of this core was determined by FISCHER and LUTERBACHER (1963, p. 4) as Valanginian on the basis of its lithology (" ... limonitisch gefleckten, dichten, splitterigen Kalken... stark von Stylolithen durchzogen und von zahlreichen sehr kleinen Kalkdrüsen durchsetzt... gegen unten leicht oolithisch; die Ooide sind vor allem in unregelmässig verteilten Nestern angehäuft. ") and a rather undiagnostic microfossil assemblage containing:

" Trocholinen, u.a. *Trocholina* cf. *alpina* (LEUPOLD)
Textulariella sp.
Haplophragmoides sp. (" *Nautiloculina* ")
Pfenderina? sp.
Lenticulinen, Textularien, Milioliden, Ostracoden, Dasycladaceen, Austernfragmente "

In the lower, oölitic portion of the core were recorded:

" Trocholinen, u.a. *Trocholina elongata* Leupold
Haplophragmoides sp.
Textulariella sp.

Feurtillia? sp.
Textularien, Valvuliniden, Milioliden, Algen- und Echinodermen Bruchstücke "

In ignorance of BARNARD and BANNER's (1953) paper in which *Pseudotextulariella* BARNARD was proposed, FISCHER and LUTERBACHER listed this Valanginian foraminifer as *Textulariella* sp. Although profusely illustrated, its morphology was not described.

In a more recent paper in which *Pseudotextulariella cretosa* (CUSHMAN) from the Cenomanian of Cressier, canton of Neuchâtel, western Switzerland, is described and illustrated, GRÖNHAGEN and LUTERBACHER (1966, p. 236, fig. 1; p. 237, fig. 2) briefly referred to *Textulariella* sp. from the Valanginian of Courtion 1, and implicitely assigned it to *Pseudotextulariella* BARNARD:

" Eine Form, die zu *Pseudotextulariella cretosa* eine gewisse Ähnlichkeit zeigt, ist aus dem Valanginien und aus dem " Urgonien " des westschweizerischen Jura bekannt (vgl. FISCHER und LUTERBACHER, 1963; pl. 1, Abb. 2, 3; pl. 5, Abb. 1 d-h). In Unkenntnis der Arbeit von BARNARD and BANNER ist sie als *Textulariella* sp. bestimmt worden. Sie unterscheidet sich von *Pseudotextulariella cretosa* vor allem durch den gröberen Bau der Innenstruktur. Die radialen Septula 1. Ordnung reichen weiter in das Kammerlumen hinein; solche 3. Ordnung werden nicht beobachtet. Einfache horizontale Unterteilungen der Randzone finden sich nur in den letzten Kammern. Es werden aber nicht mehr als 2 Stockwerke gezählt. In den Kammerböden lassen sich Poren beobachten. "

GRÖNHAGEN and LUTERBACHER did not propose a trivial name for this Valanginian form, for which in the present paper *Pseudotextulariella courtionensis*, n. sp., is introduced, nor is their " differential diagnosis " adequate to establish a new species of *Pseudotextulariella*. As can be seen from pl. 3 which synoptically illustrates the axial cuts of the 3 herein recognized species of *Pseudotextulariella*, i.e. *P. cretosa* (CUSHMAN), *P. salevensis* CHAROLLAIS, BRÖNNIMANN and ZANINETTI and *P. courtionensis*, n. sp., the interior of *P. courtionensis*, n. sp., is not coarser than that of *P. cretosa*. On the other hand, in *P. courtionensis*, n. sp., the biserial chambers do not exhibit more than a single horizontal plate in the adult stage, whereas there occur 2 to 3 such plates in the adult stage of *P. cretosa*.

However, of particular interest and systematically significant is GRÖNHAGEN and LUTERBACHER's reference to pores in the main septa (= Kammerböden). If such pores would exist, and the present examination of the original material does not corroborate GRÖNHAGEN and LUTERBACHER's observation, *Textulariella* sp. could not be assigned to *Pseudotextulariella* BARNARD, characterized by a simple, symmetric, interiomarginal aperture, but would represent a different genus with a composite aperture (pl. 3, fig. 2). Reference is made to LOEBLICH and TAPPAN's (1964, p. C 295)

definition of *Pseudotextulariella* BARNARD, and to CHAROLLAIS, BRÖNNIMANN and ZANINETTI's (1966) emendation of this definition.

As far as the stratigraphic distribution of the Valanginian *Textulariella* sp. (= *Pseudotextulariella courtionensis*, n. sp.) is concerned, GRÖNHAGEN and LUTERBACHER (1966, p. 238) added the gratuitous remark, that this species is also known from the " Urgonian " of the Jura mountains of western Switzerland.

I am grateful to Mr. D. RIGASSI, Geneva, and to Miss D. GRÖNHAGEN, Basel, for their cooperation and to Drs. E. GASCHE, Naturhistorisches Museum, Basel, and L. HAUBER, Geol.-Pal. Institut, Basel, for the loan of the thin sections from core no. 4 of Courtion 1 containing the cuts of *Pseudotextulariella courtionensis*, n. sp. Mr. F.C.P. SLINGER, British Petroleum Company, Ltd., Sunbury-on-Thames, England, kindly informed me about the depositary of the cores from Courtion 1.

Pseudotextulariella BARNARD, 1953, emend. CHAROLLAIS, BRÖNNIMANN and ZANINETTI, 1966.

Pseudotextulariella courtionensis, n. sp.

Pl. 1, fig. 1-5; pl. 2, fig. 1, 2; pl. 3, fig. 3; and 8 figures in the text.

1963. *Textulariella* sp. FISCHER and LUTERBACHER, Beitr. geol. Karte Schweiz, *N.F.*, Vol. 115, p. 4; pl. 1, fig. 2, 3; pl. 5, fig. 1a, d-h.

1966. *Textulariella* sp. considered to represent a *Pseudotextulariella* sp. GRÖNHAGEN and LUTERBACHER, Ecl. Geol. Helv., Vol. 59, p. 238, 239.

Holotype: The holotype of *Pseudotextulariella courtionensis*, n. sp., is the slightly oblique axial section illustrated by pl. 1, fig. 5, pl. 3, fig. 3 and by text-fig. 4. It is also figured by FISCHER and LUTERBACHER (1963, pl. 5, fig. 1e). The height of the section is 800 μ and its basal width about 680 μ if the lower right of the cone would be complete. The holotype occurs in thin section (b) at 1407.47 m, of core no. 4 of Courtion 1. The thin section is deposited in the collections of the Geol.-Pal. Institute of the University of Basle, Bernoullianum, Basle, Switzerland. Age: Valanginian.

A. MORPHOLOGIC DESCRIPTION

a) *General features and dimensions.*

The oblique, axial, tangential and transversal sections encountered in the following 5 thin sections from core no. 4 of Courtion 1: 1403.90 (a), (b), (d), 1406.70 (b) and 1407.47 (b), indicate for *P. courtionensis*, n. sp., a conical test as it is known from *P. cretosa* (CUSHMAN), 1932, and *P. salevensis* CHAROLLAIS, BRÖNNIMANN and ZANINETTI (1966). The heights of the oblique axial sections range from about 170 to 800 μ and their basal diameters from about 280 to 820 μ. In the average, the oblique axial sections are about 540 μ + high and 530 μ + wide at the base.

These averages are clearly smaller than the dimensions of *P. cretosa* as cited by CUSHMAN (1932), BARNARD and BANNER (1953), and than those of the 2 axial sections

of average specimens from the Cenomanian of southern England illustrated by CHAROLLAIS and BRÖNNIMANN (1966, pl. 2, fig. a, b). The axial sections of *P. cretosa* from the Cenomanian of Cressier, Switzerland (GRÖNHAGEN and LUTERBACHER, 1966, p. 237, fig. 2) range in height from about 600 μ for the smallest, to about 840 μ for the middle, and to about 1130 μ for the largest of the 3 illustrated individuals. The average height of these 3 axial sections is with about 856 μ greater than that of the axial sections of *P. courtionensis*, n. sp. On the other hand, the average dimensions of *P. courtionensis*, n. sp., are much greater than those of *P. salevensis* CHAROLLAIS, BRÖNNIMANN and ZANINETTI (1966, p. 30).

b) *Morphologic analysis of the illustrated sections.*

1. Axial and tangential sections.

More or less oblique axial and tangential sections of *P. courtionensis*, n. sp., are illustrated by pl. 1, figs. 1, 2, 4, 5, pl. 2, fig. 2, pl. 3, fig. 3, and by text-figs. 1-4. From these sections it can be inferred that the adult stage of the conical test consists of biserially arranged primary septa or simply septa. Toward the axis of the cone, they are more or less strongly bent in apical direction thus producing a distinct central depression. This depression is shown by the axial section pl. 1, fig. 1, and text-fig. 1, and also by the oblique transverse section text-fig. 5 which cuts across the cone near its base and exhibits a central portion devoid of primary septal structures and secondary partitions. The biserially arranged chambers are apparently throughout the adult stage subdivided by numerous vertical partitions oriented perpendicular to the periphery of the conical test. In the final chamber (s) a single horizontal, rarely 2 (?) horizontal partitions, may be developed.

From the oblique axial and tangential sections it can further be deduced that the horizontal as well as the short vertical partitions are truely marginal structures. Vertical and horizontal partitions subdivide an adult chamber into 2 rows of " chamberlets " which remain open toward the interior of the chamber.

As none of the axial sections is centered in respect to the apex, nothing can be said on the arrangement of the embryonic and first post-embryonic chambers.

Detail descriptions of the illustrated sections:

The position of an oblique section across the test of a *Pseudotextulariella* is determined by (1) its angle to the axis of the cone, and (2) its orientation in respect to the biserial arrangement of the primary septa. In the following descriptions, the axial relation of the section will be first established, then its orientation in terms of the biserial organization of the test.

Pl. 1, fig. 1. Thin section Courtion 1: 1407.47 (b)

(1) The section is almost centered at the base, but slightly tangential to the margin of the central depression. Then it crosses the central depression and leaves the cone below its apex.

(2) The biserial arrangement of the septa is exposed which means that the section cuts the septa parallel to their radial extension.

The vertical partitions are obliquely cut and therefore represented either by dark patches between successive primary septa, as on the right lower portion of the section, or by pillar-like connections between successive septa. Short horizontal partitions seem to occur in the lower third of the test. There seem to be 2 short horizontal partitions on the left and a single one on the right of the section. Although this portion of the section was examined in detail and represented in text-fig. 1, its

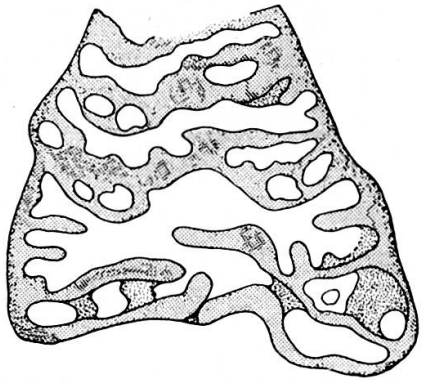

Fig. 1.
Pseudotextulariella courtionensis, n. sp.
Thin section 1407.47 (b) ca. 83.5 ×.

morphology could not be clearly established. In the upper, apical portion of the test no such horizontal partitions seem to exist. The axial depression is well developed.

Dimensions in micron:

Height of the section: 640 μ
Basal diameter of the section: 657 μ
Height of final chamber including septum: 38-57 μ
Thickness of final septum: 10-15 μ
Thickness of lateral wall: 5-20 μ
Diameter of axial depression: about 200 μ
Number of pairs of septa: probably more than 11 pairs.

Pl. 1, fig. 2. Thin section Courtion 1: 1407.47 (b)

(1) The section is oblique to the axis of the test and lies throughout in the marginal space characterized by vertical and in the final stage also by a single horizontal partition per chamber.

(2) The biserial arrangement is not exposed. The section runs perpendicular to the radial extension of the septa.

Vertical partitions occur throughout the section. Horizontal partitions, one per chamber, have been noticed in the 4 basal chambers of the section (for detail see text-fig. 2). The lowermost chamber lies completely within the range of the horizontal partition. The penultimate chamber shows the horizontal partition only in the lateral, very tangentially cut portions of the chamber. In its central portion, the section

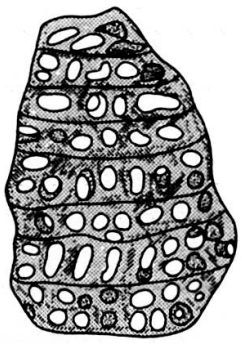

Fig. 2.
Pseudotextulariella courtionensis, n. sp.
Thin section 1407.47 (b) ca. 81.5 ×.

penetrates already deeper into the test, beyond the range of t he horizontal partition so that only the vertical partitions are shown. The occurrence of horizontal partitions suggest that the section is a tangential cut near the base of a fairly large specimen.

Dimensions in micron:

Height of the section: 412 μ
Height of final chamber including septum: 65 μ
Height of " chamberlet " of final chamber (lumen only): 15-36 μ
Thickness of vertical or horizontal partitions: 8-30 μ
Thickness of septum: about 20 μ
Number of septa: 8.

Pl. 1, fig. 4. Thin section Courtion 1: 1406.70 (b)

(1) The lower part of the section starts tangential to the cone, remains in this position in the lower third, then crosses the axis and emerges well below the apex on the other side of the cone.

(2) In its lower half, the section is oriented perpendicular to the radial extension of the septa. In the upper part of the section, the biserial arrangement indicates overlap of the septa.

The lower half of the section corresponds exactly with the cut described above and illustrated by pl. 1, fig. 2. It remains well within the marginal space characterized

by vertical and horizontal partitions. The last chamber of the section cuts from the left to the right from a very tangential position with vertical and a single horizontal plate across a slightly deeper position with only vertical plates again to a very tangential position with vertical partitions and a single horizontal plate. Subdivisions by a horizontal partition may also be seen in the higher chambers where the cut leaves the cone (for detail, see text-fig. 3).

Fig. 3.
Pseudotextulariella courtionensis, n. sp.
Thin section 1406.70 (b) ca. 75 ×

Vertical partitions, in the upper third of the section, are cut obliquely to tangentially and represented by dark patches connecting successive septa. The umbilical depression is sectioned in the upper part of the cone where it is correspondingly small.

To judge from the development of horizontal partitions in the lower half of the section and from its dimension, the cut must be from the adult stage of a rather large specimen.

Dimensions in micron:

Height of section: 488 μ
Height of final chamber including septum: 70 to 80 μ
Height of " chamberlet " of final chamber (lumen only): about 25 μ
Thickness of vertical or horizontal partition: 10 to 25 μ
Thickness of septum: 15 to 30 μ
Diameter of umbilical cavity: 80 μ
Number of septa: about 8.

Pl. 1, fig. 5. Thin section Courtion 1: 1407.47 (b)
Holotype of *P. courtionensis*, n. sp.

(1) The section starts at its base in a tangential position. Then it gradually penetrates deeper and deeper into the cone, crosses its axis and leaves it on the other side little below the apex.

(2) From the asymmetric biserial arrangement of the septa it can be inferred that the section is oriented obliquely to the radial extension of the septa.

Vertical partitions occur in form of pillar-like connections already in the upper third of the section. They are clearly developed in its lower half, where also a single horizontal partition per chamber starts to appear (for detail see text-fig. 4).

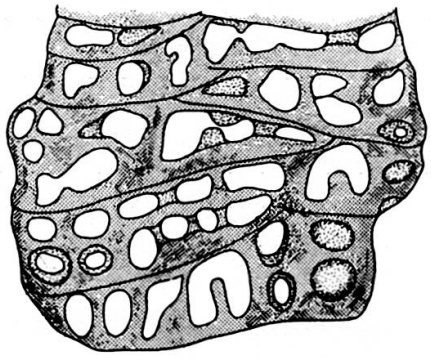

Fig. 4.
Pseudotextulariella courtionensis, n. sp.
Thin section 1407.47 (b).
Detail of holotype ca. 92×.

Dimensions in micron:

Height of the section: 800 μ
Basal diameter of the section: about 680 μ (if completed)
Height of " chamberlet " in final chamber (lumen only): about 50 μ
Thickness of vertical and horizontal partitions: 10 to 30 μ
Thickness of septum: 15 to 35 μ
Number of septa: about 11 pairs.

Pl. 2, fig. 2. Thin section Courtion 1: 1403.90 (a)

(1) The section starts at its base almost axially, perhaps slightly tangential to the central cavity. Then it crosses the well developed axial depression and emerges on the side of the cone well below the apex.

(2) The section is almost parallel to the radial extension of the septa.

The vertical partitions are either obliquely or perpendicularly cut and appear therefore either in form of dark patches or as pillar-like structures. They are well visible in the upper part of the section, where it reaches a tangential position.

Dimensions in micron:

Height of the section: 480 μ (about 9 pairs of septa)
Basal diameter of section: 615 μ
Diameter of the umbilical depression: about 95 μ.

2. *Transverse sections.*

Pl. 1, fig. 3. Thin section Courtion 1: 1403.90 (d)

The section cuts the cone near its base, almost perpendicularly to the axis. In the central portion it remains within septal material and along the margin it is partially within chamber lumina where it cuts vertical and horizontal (?) partitions. The vertical partitions consist of alternating long and short plates. Dark patches in marginal position may indicate horizontal plates.

There are a few, small, irregularly shaped and at random distributed light patches in the center of the transverse section which may have been taken by GRÖNHAGEN and LUTERBACHER (1966, p. 239) to represent septal perforations. Detailed examination of these irregularities however, have shown them to represent most probably crystals incorporated at the base of the primary septa as shown by text-fig. 8. In some cases these light patches might also be caused by irregular folds of the primary septa.

Dimensions in micron:

Maximum diameter of the section: 560 μ
Length of short vertical partitions: 55-80 μ
Length of long vertical partitions: about 130 μ
Thickness of vertical partitions: 15 to 25 μ
Distance between vertical partitions: 5 to 15 μ.

Pl. 2, fig. 1. Thin section Courtion 1: 1403.90 (b)

The section traverses the cone near its base, almost perpendicularly to the axis. In the lower part it passes through septal material and in its upper part through chamber lumina showing alternating short and long vertical plates. Some dark patches within the range of the short vertical partitions are interpreted as oblique cuts across horizontal plates. The axial cavity is well developed (for details see text-fig. 5).

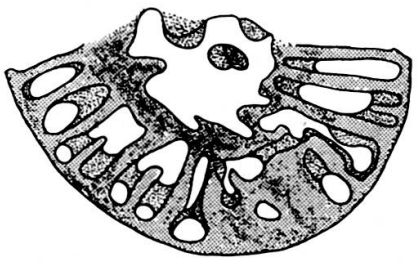

Fig. 5.
Pseudotextulariella courtionensis, n. sp.
Thin section 1403.90 (b) ca. 78×.

Dimensions in micron:

Maximum diameter of the section: 560 μ
Length of short vertical partitions: 60 to 90 μ

Length of long vertical partitions: 130-180 μ
Thickness of vertical partitions: 12-30 μ
Distance between vertical partitions: about 20 μ
Diameter of umbilical depression: about 162 μ.

c) *Microtexture and microstructure of the walls.*

The primary septa of *P. courtionensis*, n. sp., show a dark, minutely granular microtexture in which foreign elements are incorporated. The basic microtexture is very similar to that of other accompanying organic remains and microfossils such as nautiloculinas, miliolids, textularias, etc. Even some of the pseudoölites exhibit the same or a very similar microtexture as that of the walls of *P. courtionensis*, n. sp. The reasons for this are unknown, but it seems that the rock underwent some sort of diagenetic change which resulted in the same or almost the same microtexture of its various components. The basic granular microtexture of the primary septa does not differ from that of the vertical and horizontal plates.

The microstructure of the primary septa, on the other hand, differs slightly from that of the vertical and horizontal plates. The primary septa exhibit a more or less distinct layering characterized by a thin basal stratum of inclusions, usually clear crystals, overlain by a thicker layer of microgranules virtually devoid of inclusions. This layering of the primary septa with much stronger accumulation of foreign elements than in *P. courtionensis*, n. sp., has also been described from the primary septa of *P. cretosa* (CUSHMAN). Reference is made to the here illustrated axial sections

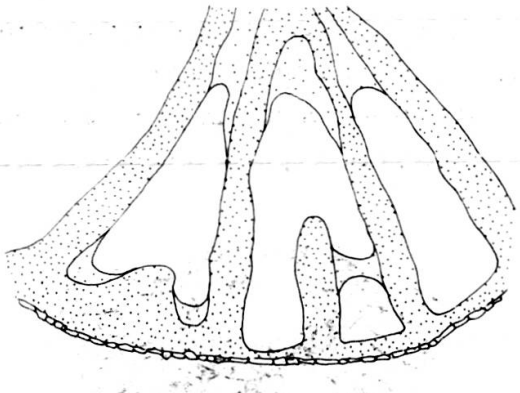

Fig. 6.
Pseudotextulariella courtionensis, n. sp.
Thin section 1403.90 (a).
Vertical partitions as seen in oblique transversal cut.
ca. 170×.

pl. 3, fig. 1, 5, and to the details of another almost axial section illustrated by CHAROLLAIS and BRÖNNIMANN (1966, pl. 3, fig. a, b). The layering of the primary septa of *P. courtionensis*, n. sp., is shown by pl. 1, fig. 2, 4 and 5, and by text-fig. 8. Occasionally, the basal limits of primary septa, and also the boundaries of the " cham-

berlets ", as seen in the various more or less oblique axial cuts, are indicated by a slightly denser microgranular texture than that in the rest of the walls.

The same thin layer of clear crystals, which are usually oriented with their longer axis parallel with the walls, occurs also on the flanks of the test. This indicates, that

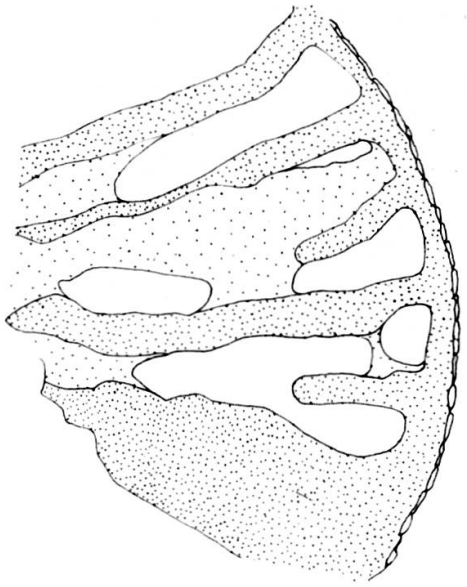

Fig. 7.
Pseudotextulariella courtionensis, n. sp.
Thin section 1403.90 (b).
Primary septa and horizontal partitions as seen in an oblique axial cut.
ca. 170×.

foreign elements were incorporated in the basic microgranular texture of the primary septa wherever they formed the surface of the test. Text-fig. 6 and 7, which are from the flanks of a strongly oblique axial cut, show this thin epidermic layer of clear crystals.

d) *Aperture.*

The aperture of *P. courtionensis*, n. sp., seems to be a symmetric interiomarginal opening as suggested by pl. 1, fig. 1, pl. 2, fig. 2 and by text-fig. 1. GRÖNHAGEN and LUTERBACHER (1966, p. 239) reported pores in the primary septa. This observation cannot be confirmed. Neither in transverse nor in axial sections perforations occur in the primary septa. Should such pores exist, they would have to show up in the subaxial cuts illustrated by the photographs pl. 1, fig. 1, 2, 4, 5 and pl. 2, fig. 2. The aperture of *P. cretosa* (CUSHMAN) is shown by the transversal section pl. 3, fig. 2.

Minute lighter patches in the centers of transverse cuts, as seen in pl. 1, fig. 3, are here interpreted either as crystalline inclusions in the basal layer of the main septa or then caused by slight deformations of the primary septa. Such deformations are quite common toward the axial depression (pl. 1, fig. 1).

As there is no morphologic basis in support of GRÖNHAGEN and LUTERBACHER'S assertion, the generic position of *P. courtionensis*, n. sp., does not need to be changed.

B. COMPARISON OF *P. courtionensis*, n. sp., with *P. cretosa* (CUSHMAN) and *P. salevensis* CHAROLLAIS, BRÖNNIMANN and ZANINETTI.

The average dimensions of the cones of *P. courtionensis*, n. sp., are with 540 μ + high and 530 μ + wide at the base, less than those of *P. cretosa* and greater than those of *P. salevensis*. The holotype of *P. salevensis*, fairly representing its group, is with 176 μ high and 184 μ wide at the base, much smaller than the average representatives of *P. courtionensis*, n. sp., which therefore is as far as dimensions go, intermediate between *P. salevensis* and *P. cretosa* (pl. 3).

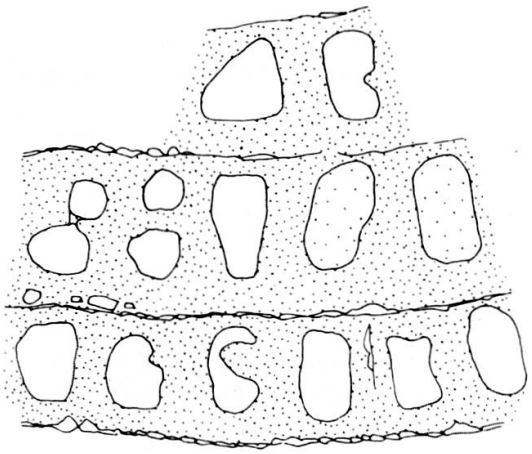

Fig. 8.
Pseudotextulariella courtionensis, n. sp.
Thin section 1403.90 (b).
Detail of a tangential cut showing primary septa, vertical and, in the middle chamber on the left, a single horizontal plate.
ca. 170×.

The cone of *P. courtionensis*, n. sp., differs from that of *P. salevensis* and of *P. cretosa* further by its better developed axial depression (see also FISCHER and LUTERBACHER, 1963, pl. 5, fig. 1g).

Apart from the dimensions of the cones and the marked difference in the development of the axial depression, *P. courtionensis*, n. sp., distinguishes itself from both *P. cretosa* and *P. salevensis* in the internal structure. In *P. cretosa* as well as in *P. courtionensis*, n. sp., the vertical partitions occur throughout the post-embryonic stage. The horizontal partitions which appear in *P. cretosa* early in ontogeny occur in *P. courtionensis*, n. sp., only in the final chambers of the adult and then only in form of a single plate per chamber. As had been described (CHAROLLAIS and BRÖNNIMANN, 1966) there are up to 3 horizontal plates of different length in the final chambers of

P. cretosa. *P. salevensis*, on the other hand, does not develop horizontal partitions at all. *P. courtionensis*, n. sp., occupies in its internal features an intermediate position between *P. salevensis* and *P. cretosa*.

The microtexture and microstructure of the walls of *P. cretosa* and of *P. courtionensis*, n. sp., are virtually identical. *P. salevensis* differs apparently from these species by the absence in the main septa of a layer of minute inclusions.

On the basis of the differences in dimension, external morphology and internal structure, *P. courtionensis*, n. sp., appears to be clearly separated from both *P. cretosa* and *P. salevensis*.

The 3 species differ further in age and geographic distribution. *P. courtionensis*, n. sp., has so far been reported only from the Valanginian beds (fide FISCHER and LUTERBACHER, 1963), of Courtion 1, W Switzerland, and *P. salevensis* from the Valanginian (Calcaire roux, Salève (Haute-Savoie), Calcaires blancs (Provence)), from the Neocomian (Corbières), and perhaps from other Lower Cretaceous localities listed by CHAROLLAIS, BRÖNNIMANN and ZANINETTI (1966, p. 33, 34). *P. cretosa* is known from the Cenomanian (*Schloenbachia varians* zone) of England, the Cenomanian (*Mantelliceras mantelli* zone) of Cressier and Souaillon, Neuchâtel, and of La Vraconne, Vaud, W Switzerland. According to GRÖNHAGEN and LUTERBACHER (1966, p. 239) *P. cretosa* starts at the type locality of the " Vraconnian " at La Vraconne, Vaud, W Switzerland, already in the *Arraphoceras substuderi* zone of Upper Albian age.

Institut de Paléontologie.
Université de Genève

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PLATE I

Pseudotextulariella courtionensis, n. sp.

Fig. 1, 2, 5. — Thin section 1407.47 (b) 125 ×

Fig. 3. — ,, 1403.90 (d) ca. 51 ×

Fig. 4. — ,, 1406.70 (b) 125 ×

Fig. 5. — Holotype

PLATE II

Pseudotextulariella courtionensis, n. sp.

Fig. 1. — Thin section 1403.90 (b) 163 ×

Fig. 2. — ,, 1403.90 (a) 163 ×

PLATE III

Fig. 1. — *Pseudotextulariella cretosa* (CUSHMAN). Cut on main road WNW from Dumstable (Watling Street). England. GRIMSDALE No. 34. " Chalk marl ", Cenomanian, ca. 91 ×

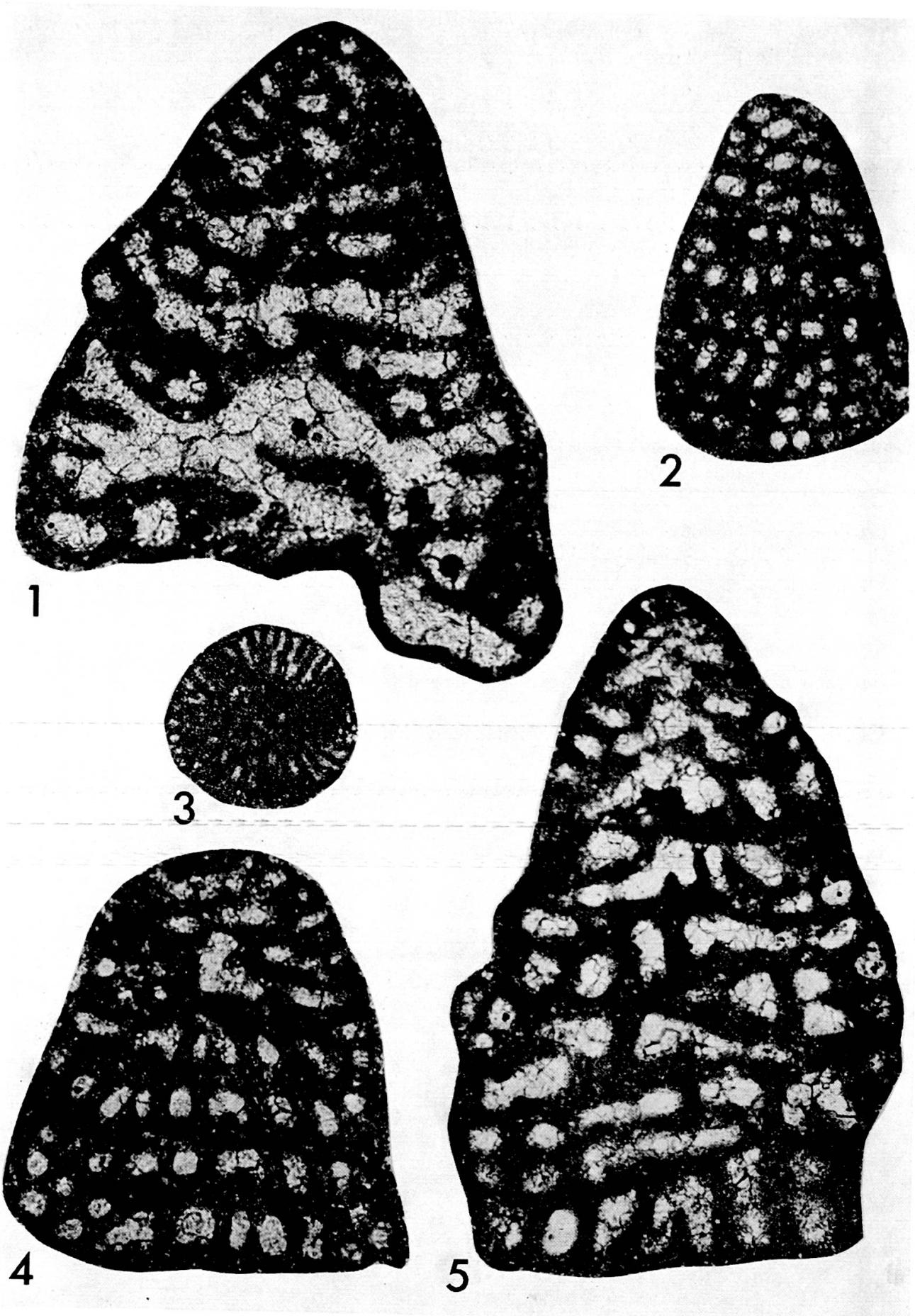
Fig. 2. — *Pseudotextulariella cretosa* (CUSHMAN). Cut on main road WNW from Dumstable (Watling Street), England. GRIMSDALE No. 35. " Chalk marl ", Cenomanian, ca. 91 × Transversal cut showing vertical and horizontal partitions, and symmetric interiomarginal aperture.

Fig. 3. — *Pseudotextulariella courtionensis*, n. sp. Thin section 1407.47 (b), Courtion 1, W Switzerland, Valanginian. 91 ×

Fig. 4. — *Pseudotextulariella salevensis* CHAROLLAIS, BRÖNNIMANN and ZANINETTI. CHAROLLAIS 18, thin section 1. Calcaire roux, Valanginian, Salève, Haute-Savoie, France. 91 ×

Fig. 5. — *Pseudotextulariella cretosa* (CUSHMAN) Coll. BARNARD and BANNER, British Museum (Nat. History), London, No. P 45682, Folkestone, England. *Schloenbachia varians* zone, Cenomanian. 91 ×

Fig. 6. — *Sabaudia minuta* (HOFKER). Charollais 54, thin section 54c, Rocher de Cluses, Cluses, Haute-Savoie, France. Lower Aptian? (" Urgonian facies "). 91 ×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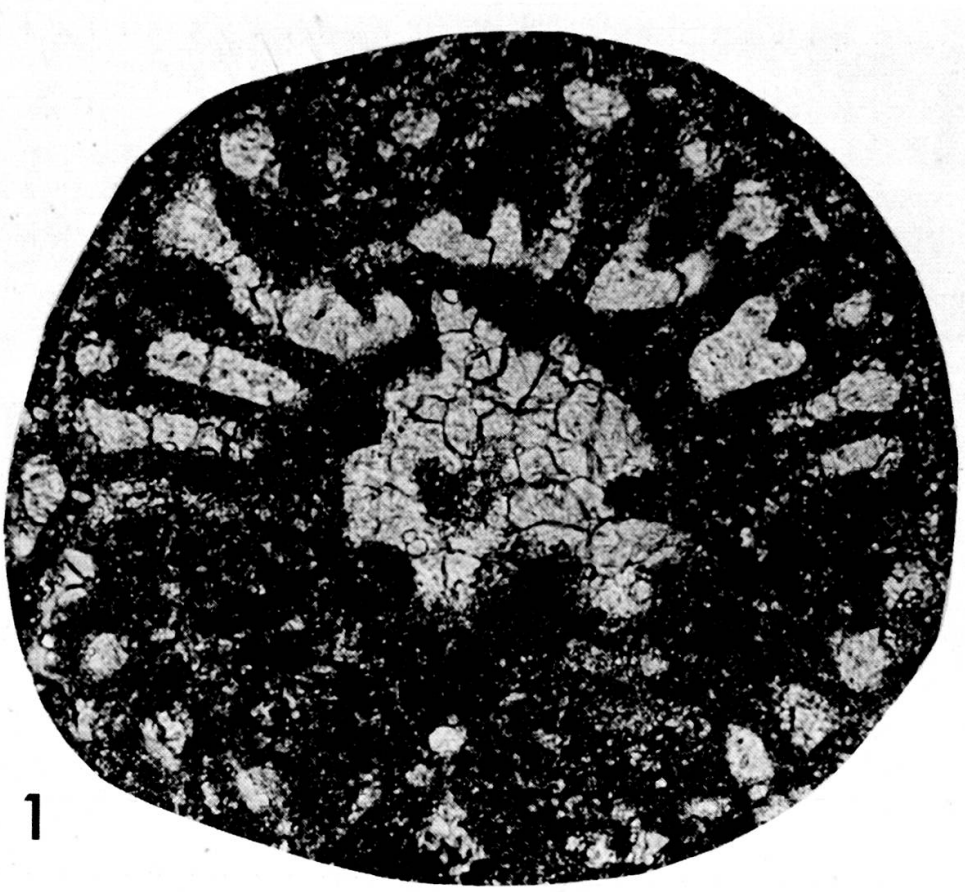

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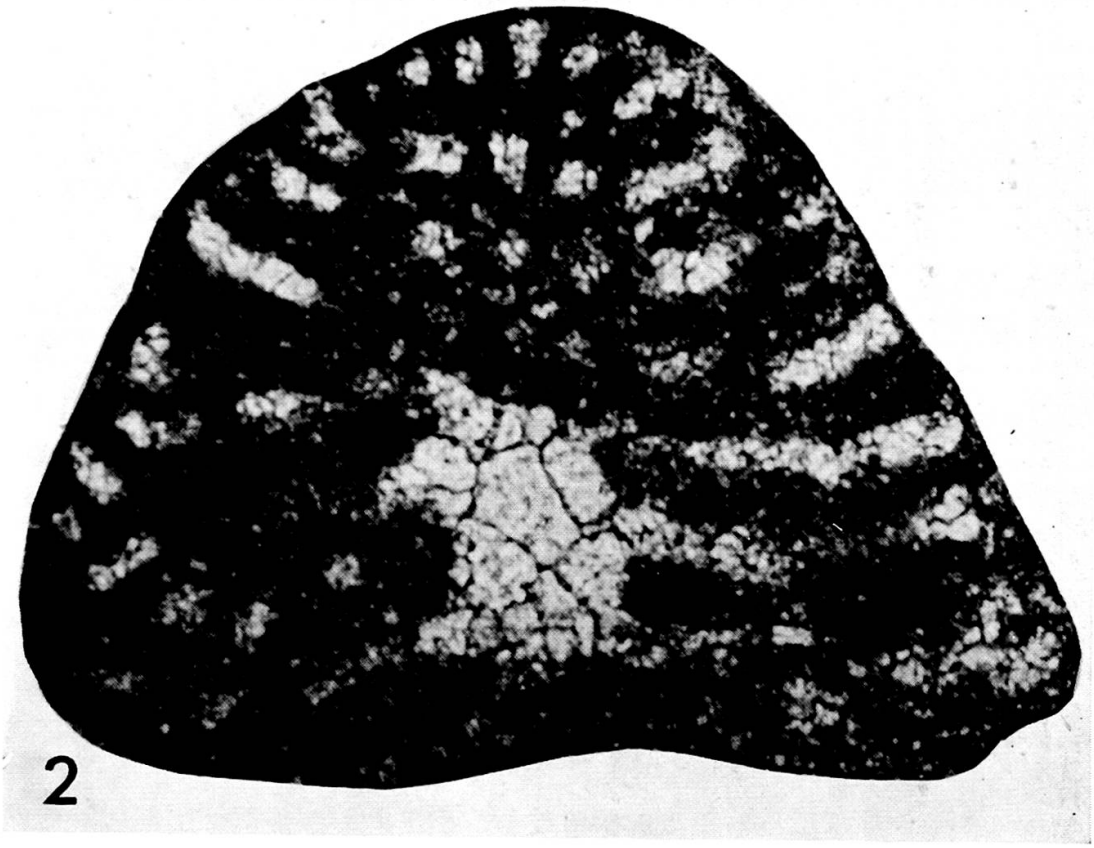

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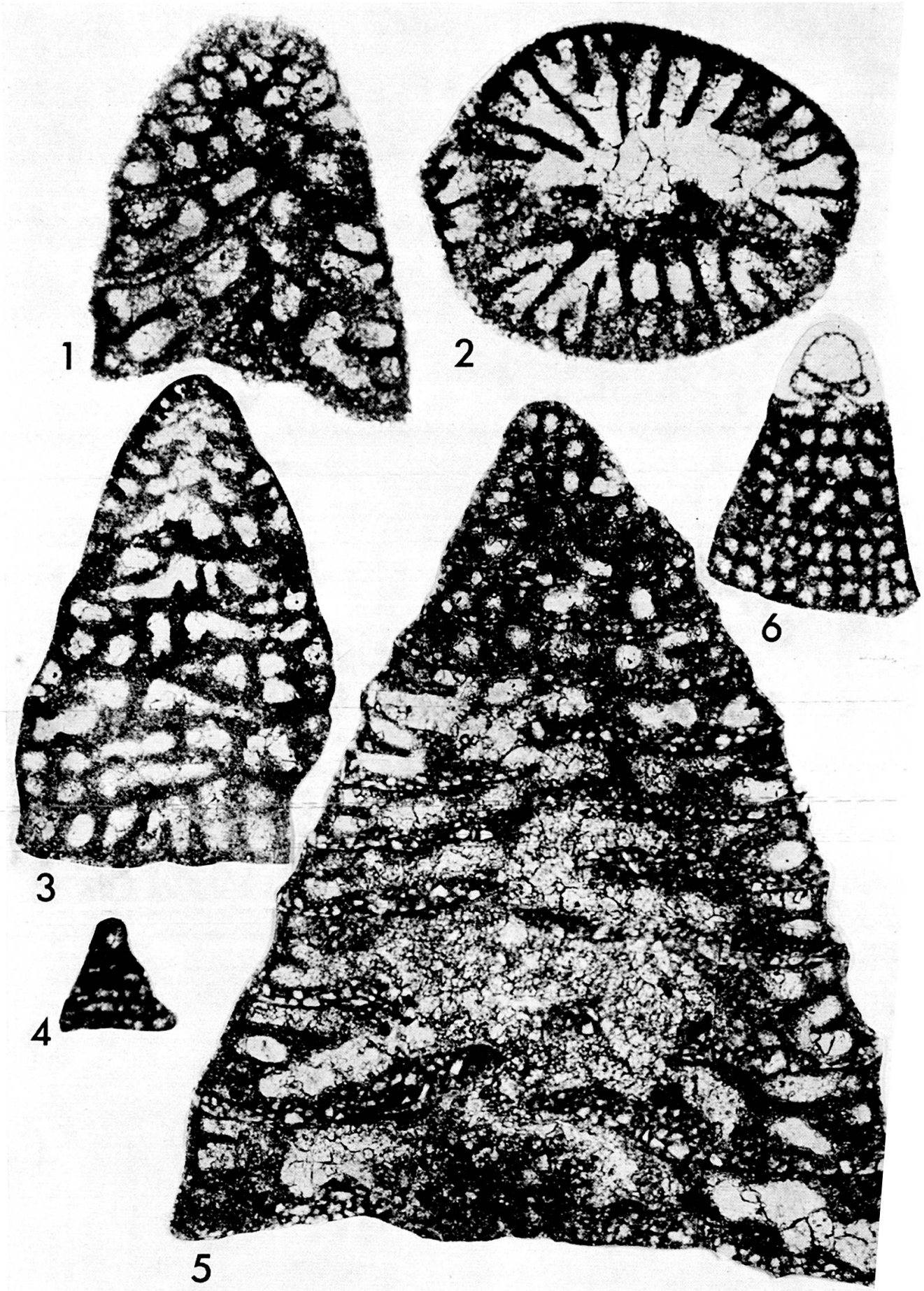
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