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FLYSCH MICROFAUNA OF THE HAGENBACH VALLEY (NORTHERN VIENNA WOODS), AUSTRIA

(Pl. LIX—LXVII, 1 Tab.)

Mikrofauna vom Flysch im Hagenbach Tal (Wienerwald) Österreich

(Taf. LIX—LXVII, 1 Tab.)

Abstract: Arenaceous Foraminifera of the Upper Cretaceous and Palaeogene of the Northern Flysch Zone of Wienerwald are described and illustrated. The assemblages obtained from samples show large differences and, in association with nannoplankton-determinations, are valuable for stratigraphic research.

Ten samples of flysch marls from the Hagenbach Valley, Vienna Woods, were studied for their contents of arenaceous Foraminifera. Two different horizons can be discerned:

A lower horizon (samples 114, 1034, 2001, 110, 2063) with a microfauna rich in species and individuals of arenaceous Foraminifera, similar to those which are found in the Campanian to early Palaeocene flysch in other parts of the Vienna Woods. The occurrence of *Hormosina excelsa* indicates Upper Maestrichtian to early Paleocene age. Furthermore there is a high percentage of the *Valvulinidae* group (*Valv. sp.* indet. by Geroch 1960). There are also the characteristic *Matanzia mariae* (Vas.), *Rzehakina inclusa, Rz. epigona* and *Rz. complanata.* Species of the genus *Trochamminoides* are represented here in greater numbers than in other horizons. *Spiroplectamina spectabilis,* which was found in sample no. 1034, occurs not only in Upper Cretaceous, but also in Paleocene marine sediments.

In the higher horizon, the samples (no. 2057, 400, 2060) differ from the ones mentioned above in their poorer assemblages of arenaceous Foraminifera. No age determination based on their microfauna was possible. The rare *Globigerinae* of these samples are not preserved well enough for species determinations. The samples of the higher horizon lie within the „*Marthasterites tribrachiatus* Zone" on account of the nannoplankton described by H. Stradner (same volume, p. 403—432). The geology and lithology of the Hagenbach Valley and its outcrops are treated in the same volume (p. 460—466) by F. Brix.

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DESCRIPTION OF FORAMINIFERA
SUPERFAMILY: ASTRORHIZIDEA

Family : SACCAMMINIDAE
Subfamily: Psammosphaerinae
Genus: *Psammosphaera* Schulze 1875

Psammosphaera fusca Schulze 1875
(Pl. LIX, fig. 1, 2)

1875 *Psammosphaera fusca* n. sp. — Schulze, Comm. Wiss. Unters. Dt. Meere, Jg. 2—3, p. 113, pl. 2, fig. 8a—f, recent, Northsea.
1896 *Psammosphaera fusca* Schulze — Grzybowski, Rozpr. Akad. Um. Kraków, 30, p. 274, pl. 8, fig. 14, Paleocene, Carpathians, Poland.
1964 *Psammosphaera fusca* Schulze — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 247, pl. 3, fig. 3, Upper Cretaceous — Lower Tertiary, Vienna Woods, Austria.
1966 *Psammosphaera fusca* Schulze — Huss, Polsk. Akad. Nauk, Prace Geol., 34, p. 15, pl. 1, fig. 1—3, Upper Cretaceous — Eocene, Carpathians, Poland.

Remarks: The tests are seldom spherical in shape. More frequent are disc-shaped tests flattened by deformation after death. A characteristic feature is the extremely coarse agglutination, the rough surface and the lack of aperture. The greatest diameter ranges from 0,5 to 1 mm.

Subfamily: Saccamminae
Genus: *Saccammina* M. Sars 1869

Saccammina placenta (Grzybowski) 1898
(Pl. LIX, fig. 3a, b)

1898 *Reophax placenta* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 276, pl. 10, fig. 9, 10, Eocene — Oligocene, Carpathians, Poland.
1953 *Saccammina placenta* (Grzybowski) — Pokorný, Bull. Int. Acad. tchèque Sci., 52, p. 6, Eocene, Czechoslovakia.
1960 *Saccammina placenta* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, p. 37, pl. 2, fig. 1—6, Cretaceous — Paleogene, Carpathians, Poland.
1961 *Proteonina complanata* (Franke) — Stancheva, Bulg. Akad. Nauk., p. 259, pl. 1, fig. 9, Paleocene ?, Bulgaria.
1964 *Placentammina placenta* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 248, pl. 3, fig. 10, Upper Cretaceous — Paleocene, Vienna Woods, Austria (Further synonyms).
1964 *Placentammina gutta* Majzon — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 249, pl. 3, fig. 6, 11, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Proteonina complanata* (Franke) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 249, pl. 3, fig. 8, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Saccammina* sp. — Hanzlíková, Vestnik UUG., 39, pl. 1, fig. 5, 6, Paleogene, Czechoslovakia.
1964 *Pelosina complanata* Franke — Martin, Jb. Geol. Bundesanst., Sonderb. 9, Upper Cretaceous — Lower Tertiary, California.
1967 *Saccammina placenta* (Grzybowski) — Sandulescu, Ass. Geol. Carpato-Balkanique, 8. Congr., fig. 13, Lower Cretaceous, Rumania.

Remarks: Tests are flat, disc-shaped, showing a central depression. The simple aperture can be found anywhere on the test. Mostly the wall is finely, in the more arenaceous parts of the Greifenstein Beds, however, it is more often coarsely agglutinated. The greatest diameter ranges from 0,3 to 0,8 mm.

Family: MONOTHALAMIA
Genus: *Psammosiphonella* Avnimelech 1952

Psammosiphonella rzehaki (Andreae) 1892
(Pl. LX, fig. 9—15)

1892 *Rhabdammina rzehaki* n. sp. — Andreae, Mitth. Geol. Landesanst. Elsass-Lothr., 3, p. 114, fig. 6, Oligocene, Elsass.

1964 *Psammosiphonella rzehaki* (Andreae) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 245, pl. 3, fig. 2, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

Remarks: Within this species are tubular, finely arenaceous, single chambered tests with round or elliptical cross sections, linear — slightly curved, with equal diameter, without distinct swellings. The tubes consist of an outer, bright, finely arenaceous wall and an inner, dark zone built up of clay minerals. The limit of this wall and the inner zone may either be distinct or not clearly visible. The specimens with a round cross-section often have a fading inner zone. The flattened specimens, however, display a distinct limit of outer wall and inner zone. Therefore forms which were formerly called *Dendrophrya robusta* Grzybowski are, in so far as they are not branched, to be included among *Ps. rzehaki*. The specimens in question are fragments of long tubes and so variations in size are considerable.
Length: 0,3—3 mm; diameter of round forms: 0,2—0,8 mm; which of flattened forms: 0,3—2 mm.

Psammosiphonella cylindrica (Glaessner) 1937
(Pl. LX, fig. 1—8)

1937 *Rhabdammina cylindrica* n. sp. — Glaessner, Probl. Palaeontol., 2—3, p. 354, pl. 1, fig. 1, Cretaceous — Tertiary, Kaukasus.

1961 *Rhabdammina cylindrica* Glaessner — Stancheva, Bulg. Akad. Nauk., p. 258, pl. 1, fig. 1, 2, Paleocene ?, Bulgaria.

1964 *Psammosiphonella cylindrica* (Glaessner) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 246, pl. 3, fig. 4, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

Remarks: Tubular, single-chambered tests. The wall agglutinated very coarsely, translucent, even partly transparent. The inner zone consists of dark clay minerals. The limit of wall and inner zone is always distinct. The cross sections of the tubes are round, but also flattened forms caused by deformation after death can be seen. Unconformingly with Glaessner (1937, p. 354) I also include tubes with irregularly spaced swellings and contrictions in *P. cylindrica*.
Length: 0,3—1,5 mm; diameter: 0,1—0,5 mm.

Psammosiphonella annulata (Andreae) 1892

1892 *Rhabdammina annulata* n. sp. — Andreae, Mitth. Geol. Landesanst. Elsass-Lothr., 3, p. 114, fig. 5, Oligocene, Elsass.

1964 *Psammosiphonella annulata* (Andreae) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 246, pl. 3, fig. 5, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

Remarks: Tubular, exclusively flattened, single chambered tests. Wall finely arenaceous with considerable cementing. Therefore the wall is smooth and bright; it is mostly brownish coloured. Longitudinal wrinkles appear frequently while superficial constrictions and transverse wrinkles are seldom. The inner zone which is sharply separated from the wall consists of mostly dark, sometimes grey or even white clay minerals. The forms of the Hagenbach valley are smaller than the specimens examined in the other horizons of the flysch zone of the Vienna Woods. They show, however, all characteristic features of *P. annulata*.
Length: 0,3—1,2 mm; width: 0,2—0,4 mm.

Family: REOPHACIDAE
Genus: *Kalamopsis* De Folin 1883

Kalamopsis grzybowskii (Dylążanka) 1923
(Pl. LXI, fig. 1—8)

1923 *Hyperammina Grzybowskii* n. sp. — Dylążanka, Rocz. Polsk. Tow. Geol. Kraków, 1, p. 65, Upper Cretaceous, Carpathians, Poland.
1960 *Kalamopsis grzybowskii* (Dylążanka) — Pokorný, Rev. Inst. Franc. Petr., 15, pl. 3, 9, Upper Senonian — Paleocene, Czechoslovakia.
1964 *Kalamopsis grzybowskii* (Dylążanka) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 254, pl. 3, fig. 14, Upper Cretaceous — Paleocene, Vienna Woods, Austria.
1966 *Kalamopsis grzybowskii* (Dylążanka) — Geroch, Rocz. Pol. Tow. Geol. Kraków, 36, p. 438, fig. 6 (27—29), Lower Cretaceous, Carpathians, Poland.
1967 *Hyperammina grzybowskii* Dylążanka — Sandulescu, Ass. Geol. Carpato-Balkanique, 8. Congr., fig. 12, Lower Cretaceous, Rumania.

Remarks: Fragments of flattened tubes, showing constrictions at irregular distances. The surface is very smooth and bright. The wall consists of cement, it is transparent and coloured brownish. The single chambers are frequently longitudinally compressed. At the constrictions the walls are thicker.
Length of single chambers: 0,5—0,8 mm.

Genus: *Reophax* Montfort 1808

Reophax splendidus Grzybowski 1898
(Pl. LIX, fig. 4—6; pl. LXII, fig. 6)

1898 *Reophax splendida* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 278, pl. 10, fig. 16, Eocene — Oligocene, Carpathians, Poland.
1964 *Reophax splendidus* Grzybowski — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 253, pl. 3, fig. 15, 16, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Reophax splendidus* Grzybowski — Pflaumann, Inauguraldissertation, München, p. 82, pl. 11, fig. 17, Upper Cretaceous, Bavaria.

Remarks: Tests consist of 3 or more disc-shaped, equal chambers. The chambers, depending on the direction of deformation-pressure, are either situated one upon another or side by side. The wall is finely

arenaceous, its surface sometimes smooth often somewhat rough. Last chamber with single aperture at the end of a neck. In the samples in question only fragments of this species are to be found.
Diameter of single chambers: 0,5—0,7 mm.

Reophax duplex Grzybowski 1896
(Pl. LXII, fig. 1—4)

1896 *Reophax duplex n. sp.* — Grzybowski, Rozpr. Akad. Um. Kraków, 30, p. 276, pl. 8, fig .23—25, Paleocene, Carpathians, Poland.
1964 *Reophax duplex* Grzybowski — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 252, pl. 3, fig. 17, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

Remarks: The test consists of two, more or less equal, compressed, disc-shaped chambers. The wall is somewhat coarsely agglutinated. The aperture is not distinctly visible.
Diameter of single chambers: 0,4—0,8 mm.

Reophax pilulifer Brady 1884
(Pl. LXII, fig. 5; Pl. LXIII, fig. 1)

1884 *Reophax pilulifera* n. sp. — Brady, Challenger Rep., p. 292, pl. 33, fig. 18—20, recent.
1951 *Reophax pilulifera* Brady — Noth, Jb. Geol. Bundesanst., Sonderb. 3, p. 25, pl. 9, fig. 13, Upper Cretaceous, Austria.
1964 *Reophax pilulifer* Brady — Pflaumann, Inauguraldissertation, München, p. 81, pl. 11, fig. 16, Upper Cretaceous, Bavaria.
1964 *Reophax pilulifer* Brady — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 252, pl. 3, fig. 9, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Reophax trinitatensis* (Cushman & Renz) — Hanzlíková, Věstnik UUG., 39, pl. 1, fig. 4, Paleogene, Czechoslovakia.
1966 *Reophax pilulifera* Brady — Huss, Pol. Akad. Nauk, Pr. geol., 34, p. 22, pl. 2, fig. 1—6, 11, 12 (non 7—10), Upper Cretaceous — Eocene, Carpathians, Poland.

Remarks: The test consists of 3 to 4 chambers .The diameter of the chambers is more or less rapidly increasing. The wall is often very coarsely agglutinated. Single chambers are spherical and arranged in one line. Partly the tests are deformed in different directions.
Length: 1,0—1,5 mm.

Reophax minutus Tappan 1940
(Pl. LXIII, fig. 2)

1938 *Haplostiche* D 2 — Hecht, Abh. senckenberg. naturf. Ges., 443, pl. 3a, fig. 24—26; pl. 4, fig. 4—8; pl. 6a, fig. 29, Lower Cretaceous, NW Germany.
1940 *Reophax minutus* n. sp. — Tappan, Jour. Pal., 14, p. 94, pl. 14, fig. 4, Lower Cretaceous, Texas.
1955 *Reophax* sp. cf. *Reophax minuta* — Geroch & Gradziński, Rocz. Pol. Tow. Geol. Kraków 24, pl. 5, fig. 4, Lower Cretaceous, Carpathians, Poland.
1957 *Reophax minuta* Tappan — Huss, Acta geol. pol., 7, pl. 3, fig. 2 (4), Lower Cretaceous, Poland.
1960 *Reophax* cf. *minuta* — Geroch, Biul. Inst. Geol. Pol., 153, p. 41, pl. 6, fig. 2, 3, Lower Cretaceous, Carpathians, Poland.

1962 *Reophax minutus* Tappan — Bartenstein & Bettenstaedt, Leitfoss. d. Mikropal., Berlin, p. 282, pl. 39, fig. 16, Lower Cretaceous, Germany.
1964 *Reophax minutus* Tappan — Pflaumann, Inauguraldissertation, München, p. 83, pl. 11, fig. 14, Upper Cretaceous, Bavaria.
1966 *Reophax minutus* Tappan — Geroch, Rocz. Pol. Tow. Geol. Kraków, 36, p. 439, fig. 7 (7—17), Lower Cretaceous, Carpathians, Poland.
1967 *Reophax minuta* Tappan — Sandulescu, Ass. Geol. Carpato-Balkanique, 8, Congr., fig. 9, Lower Cretaceous, Rumania.

Remarks: This species is described predominantly from Lower Cretaceous deposits. Pflaumann (1964), however, describes *R. minutus* from the Upper Campanian of the „Buntmergelserie" in Bavaria. In the Vienna Woods *R. minutus* occurs, very seldom indeed, till the Eocene. Heterochronous reworking, however, is possible.
Length: 0,5—0,8 mm; diameter: 0,2—0,3 mm.

Genus: *Hormosina* Brady 1879

Hormosina ovulum (Grzybowski) 1896
(Pl. LXIII, fig. 3—7)

1896 *Reophax ovulum* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 30, p. 276, pl. 8, fig. 19—21, Paleocene, Carpathians, Poland.
1955 *Hormosina ovulum* (Grzybowski) — Geroch & Gradziński, Rocz. Pol. Tow. Geol. Kraków, 24, p. 38, pl. 5, fig. 3c—3e, Upper Cretaceous — Paleocene, Carpathians, Poland.
1958 *Saccammina caudata* n. sp. — Montanaro-Gallitelli, Atti. Mem. Accad. Sci. Let. Arti, p. 5, fig. 1; pl. 1, fig. 3, 4, Upper Cretaceous. Italy.
1959 *Hormosina ovulum* (Grzybowski) form b — Geroch, Paläont. Ztschr., 33, p. 116, pl. 13, Cretaceous — Paleocene, Carpathians, Poland.
1960 *Hormosina ovulum* (Grzybowski) — v. Hillebrandt, Abh. Bayr. Akad. Wiss., mat.-natw. Kl., N.F. 108, p. 24, Paleocene, Bavaria, Austria.
1960 *Hormosina ovulum* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, p. 43, pl. 2, fig. 20—22; pl. 10, fig. 8, 9, Cretaceous — Paleocene, Carpathians, Poland.
1961 *Hormosina ovulum* (Grzybowski) — Stancheva, Bulg. Akad. Nauk., Sofia, p. 259, pl. 1, fig. 12, Paleocene ?, Bulgaria.
1964 *Hormosina ovulum* (Grzybowski) — Pflaumann, Inauguraldissertation, München, p. 84, pl. 10, fig. 16, 17, Upper Cretaceous, Bavaria.
1964 *Hormosina ovulum* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 254, pl. 5, fig. 9, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1965 *Hormosina ovulum* (Grzybowski) form B — Hanzlíková, Geologicky Sbornik, 16, p. 37, fig. 6, Paleocene, Czechoslovakia.
1966 *Hormosina ovulum* (Grzybowski) — Geroch, Rocz. Pol. Tow. Geol. 36, p. 438, fig. 6 (30—33), Lower Cretaceous — Eocene, Carpathians, Poland.

Remarks: Tests consist of a ball- or flask-shaped proloculus and some further chambers separated by thin necks. The wall consists principally of siliceous cement with very fine arenaceous materials, it is often translucent. Last chamber with single aperture at the end of a neck. Only 10% of specimens represent embryonic chambers with one aperture.
Diameter: 0,4—0,8 mm.

Hormosina excelsa (D y l ą ż a n k a) 1923
(Pl. LXIV, fig. 1, 2; pl. LXV, fig. 1)

1923 *Hyperammina excelsa* n. sp. — D y l ą ż a n k a, Rocz. Pol. Tow. Geol., 1, p. 66, pl. 1, fig. 3, Upper Cretaceous, Carpathians, Poland.
1960 *Hormosina excelsa* (D y l ą ż a n k a) — P o k o r n ý, Rev. Inst. Franc. Petr., 15, p. 1121, pl .2, fig. 6—8, Paleocene ?, Czechoslovakia.

R e m a r k s: The tubular chamber shows spherical swellings at irregular but narrow distances. The swellings are often compressed and therefore show a somewhat irregular contour. The wall is coarsely agglutinated, the surface is rough. After P o k o r n ý (1960, fig. 2) *H. excelsa* occurs commonly together with *Rzehakina inclusa* and *Rzehakina complanata* in the upper part of Upper Senonian — Paleocene. In the flysch of the Vienna Woods, however, *H. exselsa* occurs since the Maestrichtian.
Length: 0,3—0,8 mm; maximum diameter of tubes: 0,1 mm; maximum diameter of swellings: 0,2 mm.

Family: A M M O D I S C I D A E
Subfamily: A m m o d i s c i n a e
G e n u s: *Ammodiscus* R e u s s 1862

Ammodiscus siliceus (T e r q u e m) 1862
(Pl. LXV, fig. 2, 3)

1862 *Involutina silicea* n. sp. — T e r q u e m, Mém. Acad. Imp. Metz, p. 450, pl. 6, fig. 11, Lias, France.
1936 *Ammodiscus incertus* (d'O r b i g n y) — S u b b o t i n a, Tr. NGRI., Ser. A, 96, pl. 1, fig. 3, Upper Cretaceous — Paleocene, Russia.
1950 *Ammodiscus incertus* (d'O r b i g n y) — S u b b o t i n a, Tr. VNIGRI., N.S., 51, p. 74, pl. 2, fig. 4, Upper Cretaceous — Paleocene, Russia.
1957 *Ammodiscus incertus* (d'O r b i g n y) — S z t e j n, Inst. Geol. Prace, 22, p. 206, pl. 2, fig. 4, Lower Cretaceous, Central Poland.
1960 *Ammodiscus incertus* (d'O r b i g n y) — H o f f m a n n & M a r t i n, Paläont. Ztschr., 34, p. 129, pl. 12, fig. 11, Lias, Germany.
1960 *Involutina silicea* T e r q u e m — E s p i t a l i e & S i g a l, Rev. Micropal., 3, p. 54, pl. 1, fig. 16, Jura, France.
1961 *Ammodiscus incertus* (d'O r b i g n y) — S t a n c h e v a, Bulg. Akad. Nauk., p. 260, pl. 1, fig. 7, Paleocene?, Bulgaria.
1961 *Ammodiscus incertus* (d'O r b i g n y) — S c h e i b n e r o v á, Acta geol. geogr. Univ. Comenianae, Geol. 5, p. 29, pl. 1, fig. 1a, b, Cretaceous, Czechoslovakia.
1964 *Ammodiscus siliceus* (T e r q u e m) — G r ü n et al., Vh. Geol. Bundesanst., Jg. 1964, p. 255, pl. 4, fig. 1, 2, Upper Cretaceous — Paleocene. Vienna Woods, Austria, (Further synonyms).
1966 *Ammodiscus incertus* (d'O r b i g n y) — H u s s, Pol. Akad. Nauk, Prace Geol., 34, p. 16, pl. 2, fig. 17—19, Lower Cretaceous — Eocene, Carpathians, Poland.
1966 *Ammodiscu siliceus* (T e r q u e m) — G e r o c h, Rocz. Pol. Tow. Geol., 36, p. 436, fig. 8 (2. 3), Lower Cretaceous, Carpathians, Poland.

R e m a r k s: The tubular test is coiled planispiraly. It consists of a proloculus and a long unseptate second chamber. The surface is smooth and shining. The wall consists of siliceous cement mainly. The aperture is the open end of the tube.
Diameter of coiled test: 0,5—1,0 mm; diameter of tube end: 0,1 mm.

Ammodiscus tenuissimus (Gümbel) 1862

1862 *Spirillina tenuissima* n. sp. — Gümbel, Württemb. Natw. Jh., Jg. 18, p. 214, pl. 13, fig. 2, Jura, Germany.
1892 *Ammodiscus tenuis* Brady — Chapman, Jour. Roy. Microscop. Soc. London, p. 326, pl. 6, fig. 12, Lower Cretaceous, Folkestone, England.
1898 *Ammodiscus tenuissimus* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 282, pl. 10, fig. 35, Eocene — Oligocene, Carpathians, Poland.
1901 *Ammodiscus tenuissimus* Grzybowski — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 271, Upper Cretaceous, Carpathians, Poland.
1902 *Ammodiscus tenuissimus* Grzybowski — Liebus, Jb. Geol. Reichsanst., 52, p. 82, Oligocene, Bavaria.
1923 *Ammodiscus tenuissimus* Grzybowski — Dylążanka, Rocz. Pol. Tow. Geol., 1, p. 70, Upper Cretaceous, Carpathians, Poland.
1937 *Ammodiscus tenuissimus* (Gümbel) — Bartenstein & Brand, Abh. Senckenb. Natf. Ges. ,439, p. 130, pl. 8, fig. 6, Lias — Dogger, Germany.
1951 *Ammodiscus tenuissimus* (Gümbel) — Bartenstein & Brand, Abh. Senckenb. Natf. Ges., 485, Rud. Richter Festschr., p. 267, pl. 1, fig. 14, Lower Cretaceous, Germany.
1956 *Involutina tenuissima* (Gümbel) — Said & Kenawy, Micropal., 2, p. 120, Upper Cretaceous, Egypt.
1964 *Ammodiscus tenuissimus* (Gümbel) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 258, pl. 4, fig. 3, Upper Cretaceous — Paleocene, Vienna Woods, Austria.
1966 *Ammodiscus tenuissimus* (Gümbel) — Geroch, Rocz. Pol. Tow. Geol., 36, p. 437, fig. 8 (1, 4), Lower Cretaceous, Carpathians, Poland.

Remarks: A tiny and extremely flat species of the genus *Ammodiscus*. In the samples in question *A. tenuissimus* is often broken and shows radial cracks.
Diameter: 0,2—0,4 mm.

Ammodiscus infimus Bornemann 1874, (non Strickland)

1863 *Involutina asper* Terquem — Terquem, Mém. Acad. Imp. Metz, p. 22, pl. 9, fig. 21a, b, Lias, France.
1874 *Ammodiscus infimus* (Strickland) — Bornemann, Z. dt. Geol. Ges., 26, p. 725, pl. 18, fig. 4—7; pl. 19, fig. 8, Lias, Germany.
1874 *Ammodiscus asper* Terquem — Bornemann, Z. dt. Geol. Ges., 26, p. 729, Lias, Germany.
1936 *Ammodiscus infimus* (Strickland) — Franke, Abh. Preuss. Geol. Landesanst., N.F., 169, p. 15, pl. 1, fig. 14a, b, Lias, Germany.
1939 *Ammodiscus giganteus* n. sp. — Miatluk, Tr. NGRI., Ser. A. 120, ONTI, p. 39, pl. 2, fig. 21, Malm, Russia.
1961 *Ammodiscus giganteus* Miatluk var. *cretacea* n. sp. — Tairov, p. 50, pl. 2, fig. 3, Lower Cretaceous, Kaukasus, Russia.
1964 *Ammodiscus giganteus* Miatluk — Pflaumann, Inauguraldissertation, München, p. 89, pl. 10, fig. 25, Upper Cretaceous, Bavaria.
1964 *Ammodiscus infimus* Franke — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 258, pl. 4, fig. 11, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1966 *Ammodiscus infimus* Franke — Geroch, Rocz. Pol. Tow. Geol., 36, p. 437, fig. 8 (13, 14), Lower Cretaceous, Carpathians, Poland.

Remarks: Test somewhat irregular, and planispiraly coiled. The outer

contour of the test is seldom round, more often it is elliptical and irregularly compressed by postmortal deformation. Wall coarsely agglutinated, surface very rough. In the samples in question fragmented tests of this species occur most frequently.
Diameter: 0,7—1,3 mm.

Genus: *Glomospira* Rzehak 1885.

Glomospira gordialis (Jones & Parker) 1860

1860 *Trochammina squamata* var. *gordialis* n. var. — Jones & Parker, Quart. Jour. Geol. Soc. London, 16, p. 304, recent, Mediterranean.
1953 *Glomospira gordialis* (Jones & Parker) — Pokorný, Bull. Int. Acad. tchèque Sci., 52, p. 9, Eocene, Czechoslovakia.
1957 *Glomospira gordialis* (Jones & Parker) — Ziegler, Geol. Bav., 30, p. 67, Upper Cretaceous, Germany.
1960 *Glomospira gordialis* (Jones & Parker) — Geroch, Biul. Inst. Geol. Pol., 153, p. 46, pl. 4, fig. 2, 5; pl. 10, fig. 5, Cretaceous — Paleogene, Carpathians, Poland.
1964 *Glomospira gordialis* (Jones & Parker) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 261, pl. 5, fig. 12, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Glomospira gordialis* (Jones & Parker) — Martin, Jb. Geol. Bundesanst., Sonderb. 9, p. 46, pl. 1, fig. 16a, b, Upper Cretaceous — Lower Tertiary, California.

Remarks: The tubular unseptate second chamber is (differing from *Gl. charoides*) irregular, but coiled in same direction. Wall consists of siliceous cement, surface is smooth.
Diameter: 0,15—0,35 mm.

Glomospira irregularis (Grzybowski) 1898
(Pl. LXV, fig. 5a, b)

1865 *Trochammina proteus* n. sp. — Karrer, Sitzber. Akad. Wiss., 52, p. 494, pl. 1, fig. 7 (p. p.), Upper Cretaceous, Vienna Woods, Austria.
1898 *Ammodiscus irregularis* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 285, pl. 11, fig. 2, 3, Eocene — Oligocene, Carpathians, Poland.
1898 *Ammodiscus gorayskii* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 283, pl. 11, fig. 5, Eocene — Oligocene, Carpathians, Poland.
1901 *Ammodiscus irregularis* Grzybowski — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 273, Upper Cretaceous, Carpathians, Poland.
1901 *Ammodiscus gorayskii* Grzybowski — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 272, pl. 8, fig. 13, Upper Cretaceous, Carpathians, Poland.
1901 *Ammodiscus dubius* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 274, pl. 8, fig. 12, 14, Upper Cretaceous, Carpathians, Poland.
1923 *Ammodiscus irregularis* Grzybowski — Dylążanka, Rocz. Pol. Tow. Geol., 1, p. 71, Upper Cretaceous, Carpathians, Poland.
1937 *Glomospira irregularis* (Grzybowski) — Glaessner, Probl. Palaeontol., 2—3, p. 359, pl. 1, fig. 7, Cretaceous — Tertiary, Kaukasus, Russia.
1953 *Glomospira irregularis* (Grzybowski) — Pokorný, Bull. Int. Acad. tchèque Sci., 52, p. 9, fig. 3, Eocene, Czechoslovakia.
1960 *Glomospira irregularis* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, p. 47, pl. 4, fig. 9, 10, Cretaceous — Paleogene, Carpathians, Poland.

1964 *Glomospira irregularis* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 263, pl. 4, fig. 4, Upper Cretaceous — Paleocene, Vienna Woods, Austria.

1964 *Glomospira irregularis* (Grzybowski) — Hanzlíková, Věstník UUG., 39, pl. 1, fig. 7, Paleogene, Carpathians, Czechoslovakia.

1964 *Glomospira gordialis* (Jones & Parker) — Pflaumann, Inauguraldissertation. München, p. 92, pl. 11, fig. 1, 2 (p. p.), Upper Cretaceous, Bavaria.

1964 *Glomospira gorayskii* (Grzybowski) — Pflaumann, Inauguraldissertation, München, p. 93, pl. 11, fig. 3, Upper Cretaceous, Bavaria.

1967 *Glomospira irregularis* (Grzybowski) — Sandulescu, Ass. Geol. Carpato-Balkanique, 8. Congr., fig. 31, Lower Cretaceous, Rumania.

Remarks: The tubular and unseptate second chamber is completely irregularly coiled. Wall is finely arenaceous, surface smooth, often somewhat rough. The aperture is the open end of the tube. Accordingly *G. gordialis* and *G. gorayskii* described by Pflaumann (1964) are synonyms. Pflaumann describes his *G. gordialis* as follows: „... völlig unregelmäßig aufgewickelt. Die Gehäuseoberfläche ist meist angerauht. Die Größe schwankt zwischen 0,1 mm und 1,5 mm max. Durchmesser" In his remarks to *G. gorayskii* he notes: „Diese Form tritt nur in Proben auf, die zahlreiche Glomospiren vom gordialis-Typ führen. Es liegt der Verdacht nahe, daß es sich hier ebenfalls nur um Extremformen dieser Art handelt". Beyond it *A. gorayskii* is a synonym of *G. irregularis* according to Glaessner (1937, p. 359).

Diameter: 0,3—1,3 mm.

Glomospira serpens (Grzybowski) 1896

1896 *Ammodiscus serpens* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 30, p. 285, pl. 10, fig. 31—33, Paleocene, Carpathians, Poland.

1923 *Ammodiscus pusillus* Geinitz — Dylążanka, Rocz. Pol. Tow. Geol., 1, p. 71, Upper Cretaceous, Carpathians, Poland.

1960 *Glomospira serpens* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, p. 47, pl. 4, fig. 13, Cretaceous — Paleogene, Carpathians, Poland.

non 1964 *Glomospira serpens* (Grzybowski) — Hanzlíková, Věstnik UUG., 39, pl. 1, fig. 8, 9, Paleogene, Carpathians, Czechoslovakia.

Remarks: The tubular chamber is coiled somewhat irregularly, but in parallel levels. Test wall is finely agglutinated, surface is rough. The specimens in question correspond more to the illustrations published by Geroch (1960) than to those by Grzybowski (1896).

Genus: *Glomospirella* Plummer 1945

Glomospirella gaultina (Berthelin) 1880

1880 *Ammodiscus gaultinus* n. sp. — Berthelin, Mém. Soc. Geol. France, Ser. 3, 1, p. 19, pl. 1, fig. 3a, b, Lower Cretaceous, France.

1936 *Ammodiscus gaultinus* Berthelin — Brotzen, Svering. Geol. Unders., Ser. C., 396, p. 31, pl. 1, fig. 3a, b, Upper Cretaceous, Sweden.

1954 *Ammodiscus gaultinus* Berthelin — Bartenstein, Senck. leth., 35, p. 38, pl. 1, fig. 17—20, Berthelin-Revision.

1957 *Ammodiscus gaultinus* Berthelin — Sztejn, Inst. Geol. Prace 22, p. 206, pl. 2, fig. 3, Lower Cretaceous, Central Poland.

1960 *Involutina gaultina* (Berthelin) — Takayanagi, Sci. Rep. Tohoku Univ., Ser. 2, 32, p. 67, pl. 1, fig. 13a—14b, Cretaceous, Japan.
1961 *Ammodiscus gaultinus* Berthelin — Scheibnerová, Acta geol. geogr. Univ. Comenianae, Geol. 5, p. 30, pl. 1, fig. 2, Cretaceous, Carpathians, Czechoslovakia.
1964 *Glomospirella gaultina* (Berthelin) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 259, pl. 4, fig. 5, 6, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).
1964 *Ammodiscus gaultinus* Berthelin — Pflaumann, Inauguraldissertation, München, p. 88, pl. 10, fig. 20, 21, Upper Cretaceous, Bavaria.
1964 *Glomospira serpens* (Grzybowski) — Hanzlíková, Vestnik UUG., 39, p.l 1, fig. 8, 9, Paleogene, Carpathians, Czechoslovakia.
1964 *Involutina irregularis* (Reuss) — Martin, Jb. Geol. Bundesanst., Sonderb. 9, p. 45, pl. 1, fig. 12a—13b, Upper Cretaceous — Lower Tertiary, California.
1966 *Ammodiscus gaultinus* Berthelin — Huss, Pol. Akad. Nauk., Prace Geol. 34, p. 17, pl. 3, fig. 9—11, Lower Cretaceous, Carpathians, Poland.

Remarks: The test consists of a proloculus and a tubular second chamber. In the initial stage the tubular chamber is coiled in various not parallel levels, in the adult stage it is coiled planispirally. The wall is composed of very fine arenaceous material with much cement. After Tappan (1962, p. 130) this species belongs to genus *Glomospirella* Plummer (1945, p. 233).
Maximum diameter: 0,4—0,9 mm.

Subfamily: Rzehakininae
Genus: *Rzehakina* Cushman 1927

Rzehakina inclusa (Grzybowski) 1901
(Pl. LXVI, fig. 1—3)

1901 *Spiroloculina inclusa* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 260, pl. 7, fig. 20, Upper Cretaceous, Carpathians, Poland.
1955 *Rzehakina inclusa* (Grzybowski) — Geroch & Gradziński, Rocz. Pol. Tow. Geol., 24, pl. 5, fig. 6a—d, Upper Cretaceous — Paleocene, Carpathians, Poland.
1960 *Rzehakina inclusa* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, p. 63, pl. 4, fig. 11, Upper Cretaceous — Paleocene, Carpathians, Poland.
1960 *Rzehakina inclusa* (Grzybowski) — Pokorný, Rev. Inst. France Petr., 15, p. 1121, pl. 2, fig. 2—4, Paleocene ?, Carpathians, Czechoslovakia.

Remarks: Test compressed, planispiral, involute, oval to elliptical in outline view, only last whorl visible. Periphery broadly rounded, edge with rounded carina. Chamber simple, best observable in immersion oil, tubular, each whorl constricted at opposite ends. Wall finely arenaceous with much siliceous cement, surface smooth, and sometimes shining.
Length: 0,5—0,8 mm; width: 0,3—0,55 mm; thickness: 0,15—0,25 mm.

Rzehakina epigona (Rzehak) 1895

1895 *Silicina epigona* n. sp. — Rzehak, Ann. k.k. nat. hist. Hofmus., 10, p. 214, pl. 6, fig. 1, Tertiary, Austria.
1927 *Rzehakina epigona* (Rzehak) — Cushman, Roy. Canada Trans., Ser. 3, 21, pl. 23, fig. 4, Cretaceous, Canada.
1954 *Rzehakina epigona* (Rzehak) var. *lata* Cushman & Jarvis — Friz-

zell, Univ. Texas Bur. Econ. Geol. Rep. Invest., 22, p. 76, pl. 6, fig. 29a, b, Cretaceous, Texas.

1955 *Rzehakina epigona* (Rzehak) — Geroch & Gradziński, Rocz. Pol. Tow. Geol., 24, pl. 5, fig. 7a—d, Upper Cretaceous — Paleogene, Carpathians, Poland.

1960 *Rzehakina epigona* (Rzehak) — Takayanagi, Sci. Rep. Tohoku Univ., Ser. 2, 32, p. 84, pl. 3, fig. 13a—c, Cretaceous, Japan.

1960 *Rzehakina epigona* (Rzehak) — Geroch, Biul. Inst. Geol. Pol., 153, p. 62, pl. 4, fig. 14—16; pl. 10, fig. 1, Upper Cretaceous — Paleogene, Carpathians, Poland.

1964 *Rzehakina epigona* (Rzehak) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 271, pl. 5, fig. 11, Upper Cretaceous — Paleocene, Vienna Woods, Austria.

1964 *Rzehakina epigona* (Rzehak) — Pflaumann, Inauguraldissertation, München, p. 94, Upper Cretaceous, Bavaria.

1964 *Rzehakina epigona* (Rzehak) var. *lata* Cushman & Jarvis — Martin, Jb. Geol. Bundesanst., Sonderb. 9, p. 56, pl. 4, fig. 2a—c, Upper Cretaceous — Lower Tertiary, California.

Remarks: Test resembles that of *R. inclusa* but differs from that in having deeper umbilical depressions. The last whorl is thickened and therefore covers the central part almost completely.
Length: 0,3—0,8 mm; width: 0,25—0,4 mm; thickness: 0,1—0,15 mm.

Rzehakina complanata (Grzybowski) 1901

1901 *Spiroloculina complanata* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków 41, p. 261, pl. 7, fig. 26, Upper Cretaceous, Carpathians, Poland.

1964 *Rzehakina complanata* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 272, pl. 5, fig. 8, 17, Upper Cretaceous — Paleocene, Vienna Woods, Austria.

Remarks: Test resembles that of *R. epigona* but differs from that in having a less thickened last coil; therefore the central part with the initial coils is visible.
Length: 0,4—0,8 mm; width: 0,2—0,5 mm; thickness: 0,1—0,15 mm.

Superfamily: LITUOLIDEA

Family: LITUOLIDAE
Genus: *Trochamminoides* Cushman 1910

Trochamminoides contortus (Grzybowski) 1898

1898 *Trochammina contorta* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków 33, p. 287, pl. 11, fig. 12—14, Eocene — Oligocene, Carpathians, Poland.

1960 *Trochamminoides contortus* (Grzybowski) — Geroch, Biul. Inst. Geol. Pol., 153, pl. 5, fig. 3, Cretaceous — Paleogene, Carpathians, Poland.

non 1961 *Trochamminoides contortus* (Grzybowski) — Scheibnerová, Acta geol. geogr. Univ. Commenianae, Geol. 5, p. 31, pl. 1, fig. 4, Cretaceous, Carpathians, Czechoslovakia.

1964 *Trochamminoides contortus* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 266, pl. 4, fig. 7, 8, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

1967 *Trochamminoides contortus* (Grzybowski) — Sandulescu, Ass. Geol. Carpato-Balkanique, 8. Congr., fig. 3, Lower Cretaceous, Rumania.

Remarks: Test more or less planispiral, compressed, biumbilicate. Chambers distinct, flattened, increasing in size very gradually, five to seven in last coil. Wall finely arenaceous; surface smooth; aperture in the form of a slit at the base of last chamber. The specimens in question correspond to the illustrations of Geroch (1960) and Grzybowski (1898).
Maximum diameter: 0,4—1,8 mm; thickness: 0,25—0,8 mm.

Trochamminoides variolarius (Grzybowski) 1898

1865 *Trochammina proteus* n. sp. — Karrer, Sitzber. Akad. Wiss., 52, p. 494, pl. 1, fig. 5, Upper Cretaceous, Vienna Woods, Austria.
1898 *Trochammina variolaria* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 288, pl. 11, fig. 15, Eocene — Oligocene, Carpathians, Poland.
1898 *Trochammina deformis* n. sp. — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 288, pl. 11, fig. 20—22, Eocene — Oligocene, Carpathians, Poland.
1901 *Trochammina variolaria* Grzybowski — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 276, Upper Cretaceous, Carpathians, Poland.
1901 *Trochammina deformis* Grzybowski — Grzybowski, Rozpr. Akad. Um. Kraków, 41, p. 277, Upper Cretaceous, Carpathians, Poland.
1923 *Trochammina variolaria* Grzybowski — Dylążanka, Rocz. Pol. Tow. Geol., 1, p. 72, Upper Cretaceous, Carpathians, Poland.
1923 *Trochammina deformis* Grzybowski — Dylążanka, Rocz. Pol. Tow. Geol., 1, p. 72, Upper Cretaceous, Carpathians, Poland.
1964 *Trochamminoides variolarius* (Grzybowski) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 267, pl. 4, fig. 12, 14, Upper Cretaceous Paleocene, Vienna Woods, Austria.

Remarks: Test discoidal and planispirally coiled. Single chambers flattened and distinct. Last coil consists of 3 to 5 chambers. Wall finely agglutinated; surface smooth, often somewhat rough. There are all transitions between *Tr. variolaria* and *Tr. deformis* described by Grzybowski and Dylążanka. The specimens in question correspond to both species illustrated by Grzybowski (1898).
Diameter: 0,5—1,2 mm.

Trochamminoides irregularis (White) 1928

1928 *Trochammina irregularis* n. sp. — White, Jour. Pal., 2, p. 307, pl. 42, fig. 1, Upper Cretaceous, Mexico.
1937 *Trochamminoides irregularis* (White) — Glaessner, Probl. Palaeontol., 2—3, p. 360, pl. 1, fig. 9a, b, Cretaceous — Tertiary, Kaukasus.
1964 *Trochamminoides irregularis* (White) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 265, pl. 4, fig. 13, Upper Cretaceous — Paleocene, Vienna Woods, Austria. (Further synonyms).

Remarks: Chambered test is entirely irregularly coiled, caused by continual alternation of coiling-direction. The specimens in question correspond to the illustration of Glaessner (1937).
Diameter: 0,8—1,6 mm.

Trochamminoides trifolius (Egger) 1899

1899 *Haplophragmium trifolium* n. sp. — Egger, Abh. kgl. bayr. Akad. Wiss., math.-phys. Cl., 21, p. 137, pl. 1, fig. 10, 11, 32, 52, 53, Upper Cretaceous, Bavaria.

Table 1

DISTRIBUTION OF ARENACEOUS FORAMINIFERA IN THE FLYSCH OF THE HAGENBACH VALLEY

	Maestrichtian					?		Eocene		
	Samples No									
	114	1034	2001	110	2063	406	401	2057	400	2060
Psammosphaera fusca Schulze	●		●						●	●
Saccammina placenta /Grzybowski/	⁄	●	⁄	⁄	●					
Psammosiphonella rzehaki /Andreae/	╳	╳	▬	▬	▬		●	╳	╳	●
Psammosiphonella cylindrica /Glaessner/	●	╳	╳	⁄	╳	●				╳
Psammosiphonella annulata /Andreae/	●									▬
Kalamopsis grzybowskii /Dylążanka/	⁄		●	●	●					
Reophax splendidus Grzybowski		●		●		●			●	
Reophax duplex Grzybowski	●	●	●	●	●				●	●
Reophax pilulifer Brady			●							
Reophax minutus Tappan								●		
Hormosina ovulum /Grzybowski/				●	●					
Hormosina excelsa /Dylążanka/			●	●						
Ammodiscus siliceus /Terquem/				●	●					●
Ammodiscus tenuissimus /Guembel/		●		●						
Ammodiscus infimus Bornemann	●	●	●							●
Glomospira charoides /Jones & Parker/			●	●	●		●	●	●	●
Glomospira gordialis /Jones & Parker/		●		●		●	●	●		●
Glomospira irregularis /Grzybowski/	●	●	●	●		●				
Glomospira serpens /Grzybowski/				●						

1957 *Trochammina trifolium* (Egger) — Ziegler, Geol. Bav., 30, p. 72, Upper Cretaceous, Bavaria.

1964 *Trochamminoides trifolius* (Egger) — Grün et al., Vh. Geol. Bundesanst., Jg. 1964, p. 266, Upper Cretaceous — Paleocene, Vienna Woods, Austria.

Remarks: Test consists of 3 rarely 4 chambers, rapidy increasing in size. Chambers very flattened; wall consists of siliceous cement, surface is smooth and shiny. The specimens in question correspond to the illustrations of Egger (1899).
Diameter: 0,2—0,3 mm.

Trochamminoides elegans (Rzehak) 1887

(Pl. LXV, fig. 4a, b)

1865 *Trochammina proteus* n. sp. — Karrer, Sitzber. Akad. Wiss., 52, p. 494, pl. 1, fig. 8, Upper Cretaceous, Vienna Woods, Austria.

1887 *Trochammina elegans* n. sp. — Rzehak, Vh. k.k. Geol. Reichsanst., Jg. 1887, p. 88, Eocene, Moravia, Czechoslovakia.

1898 *Trochammina elegans* Rzehak — Grzybowski, Rozpr. Akad. Um. Kraków, 33, p. 287, pl. 11, fig. 10, Eocene — Oligocene, Carpathians, Poland.

	114	1034	2001	110	2063	406	401	2057	400	2060
Glomospirella gaultina /Berthelin/	●	•	•	●	•			•		•
Rzehakina inclusa /Grzybowski/	•		•	•	•	•				
Rzehakina epigona /Rzehak/	•			•						
Rzehakina complanata /Grzybowski/	•			•						
Trochamminoides contortus /Grzybowski/	●	●	•	●	•	●		•		•
Trochamminoides variolarius /Grzybowski/	●	•	•	•				●		•
Trochamminoides irregularis /White/	●	●	●		•	●				
Trochamminoides elegans /Rzehak/				•						
Trochamminoides trifolius /Egger/	•		•	•					•	
Trochamminoides vermetiformis /Grzybowski/								•		
Recurvoides deflexiformis /Noth/	•	●	●	•	•	X	•	•		●
Recurvoides imperfectus Hanzlikova	•	●		•	●	•		●	●	
Ammobaculites cf. fontinensis Geroch 1960								•		
Ammobaculites sp.		•								
Spiroplectammina spectabilis /Grzybowski/		•			▬					
Spiroplectammina sp.			●							
Trochammina globigeriniformis /Parker & Jones/				•						
Plectina cf. apicularis Geroch & Gradziński 1955	●									•
Plectina conversa /Grzybowski/						•				
Plectina coniformis /Grzybowski/, Geroch 1960	•		•							
Patanzia mariae /Vasicek/			•	•						
Valvulinidae sp. indet. Geroch 1960	/		●							
Globigerina sp. indet.										●
Ostracoda sp. indet.			•							

• 1 - 5 specimens; ● 5 - 20 specimens; / 20 - 50 specimens;
X 50 - 100 specimens; ▬ >100 specimens

1964 *Trochamminoides proteus* (K a r r e r) — G r ü n et al., Vh. Geol. Bundesanst., Jg. 1964, p. 264, pl. 4, fig. 9, Upper Cretaceous — Paleocene, Vienna Woods, Austria.

1964 *Trochamminoides proteus* (K a r r e r) — M a r t i n, Jb. Geol. Bundesanst., Sonderb. 9, p. 47, pl. 2, fig. 1a, b, Upper Cretaceous — Lower Tertiary, California.

1966 *Trochamminoides elegans* (G r z y b o w s k i) — H u s s, Pol. Akad. Nauk., Pr. geol., 34, p. 28, pl. 4, fig. 28—32, Upper Cretaceous — Paleocene, Carpathians, Poland.

R e m a r k s: Test discoidal and planispirally coiled with regularly spaced constrictions. Single chambers somewhat flattened and distinct. Last whorl consists of 8 to 12 chambers. Wall finely agglutinated; surface smooth, often somewhat rough.
Diameter: 0,9—1,3 mm.

Family: VERNEUILINIDAE
Subfamily: Valvulininae
Genus: *Matanzia* Palmer 1936

Matanzia mariae (Vašiček) 1947
(Pl. LXIV, fig. 5a—d)

1947 *Remesella mariae* n. sp. — Vašiček, Vest. Stat. Geol. Ust. Rep. Cesk., 22, p. 246, fig. 2; fig. 14a, b, Eocene, Carpathians, Moravia, Czechoslovakia.
1950 *Remesella mariae* Vašiček — Vašiček, Sborn. Stat. Geol. Ust. Rep. Cesk., 17, pl. 2, fig. 5a, b, Lower Tertiary, Czechoslovakia.

Description after Vašiček (1947): „Chambers with uncomplete secondary transversal septa, which shine through the wall; surface rough but polished; material siliceous with much cement especially on the later chambers. Secondary sutures slightly depressed". In the Vienna Woods *Matanzia mariae* occurs since the Maestrichtian.
Length: 0,9—1,3 mm; diameter: 0,7—0,9 mm.

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ZUSAMMENFASSUNG

In der vorliegenden Arbeit werden agglutinierende Foraminiferen aus Oberkreide und Paläogen der nördlichen Wienerwald-Flyschzone beschrieben und abgebildet. Die Sandschaler-Assoziationen der Bearbeiteten Proben zeigen deutliche Unterschiede und sind daher in Kombination mit Nannofossil-Untersuchungen für stratigraphische Einstufungen verwendbar.

EXPLANATION OF PLATES

Plate LIX

1a, b. *Psammosphaera fusca* Schulze, sample 114, Altlengbach beds, Maestrichtian

2a, b. *Psammosphaera fusca* Schulze, sample 400, Greifenstein sandstone, Eocene

3a, b. *Saccammina placenta* (Grzybowski), sample 110, Altlengbach beds, Maestrichtian

4a, b. *Reophax splendidus* Grzybowski, sample 110, Altlengbach beds, Maestrichtian

5a, b. *Reophax splendidus* Grzybowski, sample 1034, Altlengbach beds, Maestrichtian

6a, b. *Reophax splendidus* Grzybowski, sample 1034, Altlengbach beds, Maestrichtian

Plate LX

1—8. *Psammosiphonella cylindrica* (Glaessner), sample 2001, Altlengbach beds, Maestrichtian

9—15. *Psammosiphonella rzehaki* (Andreae), sample 110, Altlengbach beds, Maestrichtian

Plate LXI

1a, b—8a, b. *Kalamopsis grzybowskii* (Dylążanka), sample 114, Altlengbach beds, Maestrichtian

Plate LXII

1a, b—4a, b. *Reophax duplex* Grzybowski, sample 2001, Altlengbach beds, Maestrichtian
5a, b. *Reophax pilulifer* Brady, sample 2001, Altlengbach beds, Maestrichtian
6a, b. *Reophax splendidus* Grzybowski, sample 400, Greifenstein sandstone, Eocene

Plate LXIII

1a, b. *Reophax pilulifer* Brady, sample 2001, Altlengbach beds, Maestrichtian
2. *Reophax minutus* Tappan, 2057, Greifenstein sandstone, Eocene
3a, b—7a, b. *Hormosina ovulum* (Grzybowski), sample 2063, Altlengbach beds?

Plate LXIV

1. 2. *Hormosina excelsa* (Dylążanka), sample 110, Altlengbach beds, Maestrichtian
3a, b. *Plectina* cf. *apicularis* Geroch & Gradziński 1955, sample 114, Altlengbach beds, Maestrichtian
4a, b. *Ammobaculites* sp., sample 1034, Altlengbach beds, Maestrichtian
5a—d. *Matanzia mariae* (Vašiček), sample 2001, Altlengbach beds, Maestrichtian

Plate LXV

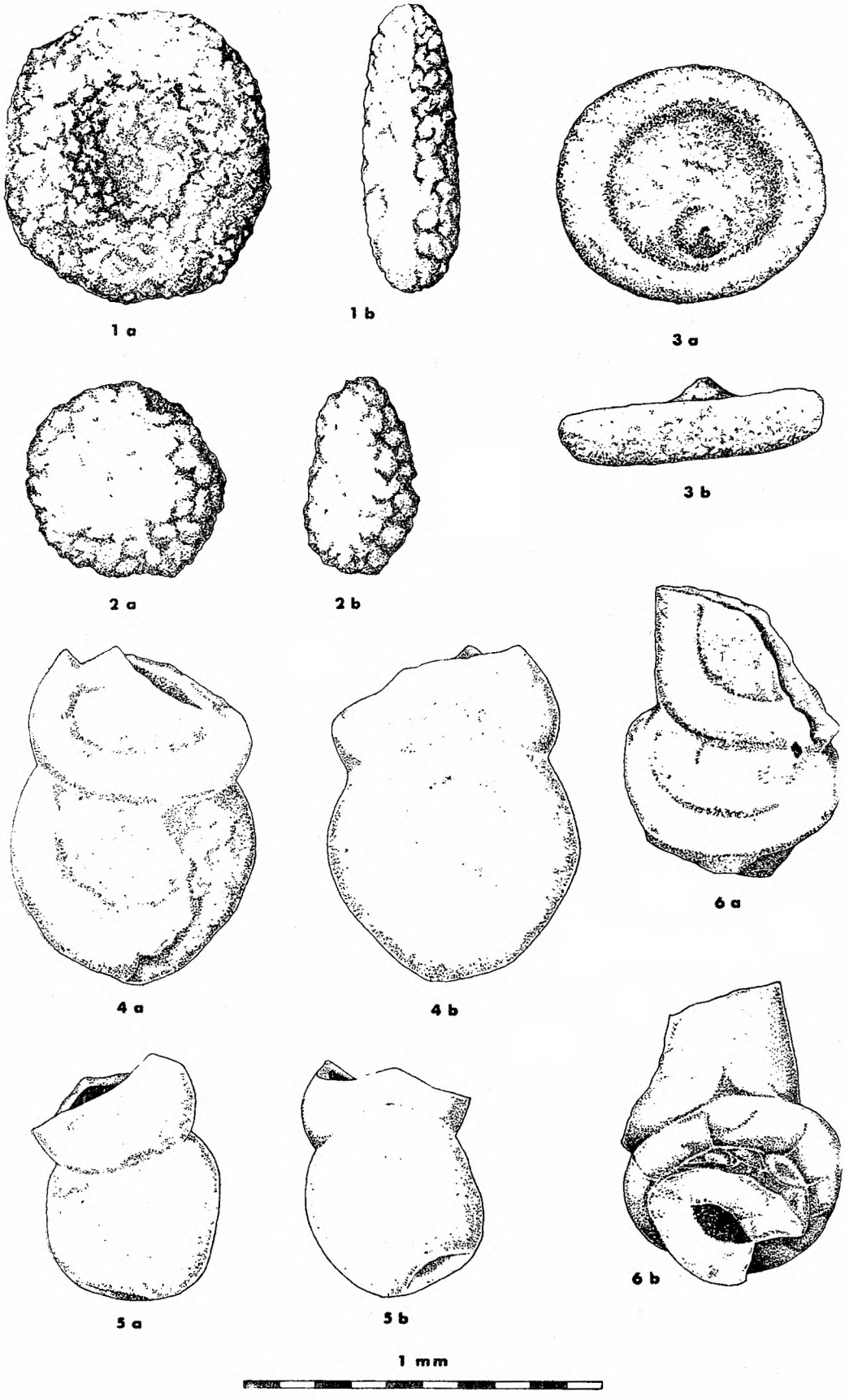
1. *Hormosina excelsa* (Dylążanka), sample 2001, Altlengbach beds, Maestrichtian
2a, b—3a, b. *Ammodiscus siliceus* (Terquem), sample 110, Altlengbach beds, Maestrichtian
4a, b. *Trochamminoides elegans* (Rzehak), sample 110, Altlengbach beds, Maestrichtian
5a, b. *Glomospira irregularis* (Grzybowski), sample 1034, Altlengbach beds, Maestrichtian

Plate LXVI

1a, b—4a, b. *Glomospira charoides* (Jones & Parker), sample 2060, Greifenstein sandstone, Eocene

Plate LXVII

1—3. *Rzehakina inclusa* (Grzybowski), sample 2063, Altlengbach beds?
4, 5. *Spiroplectammina* sp., sample 2001, Altlengbach beds, Maestrichtian
6—8. *Valvulinidae* sp. indet. Geroch 1960, sample 114, Altlengbach beds, Maestrichtian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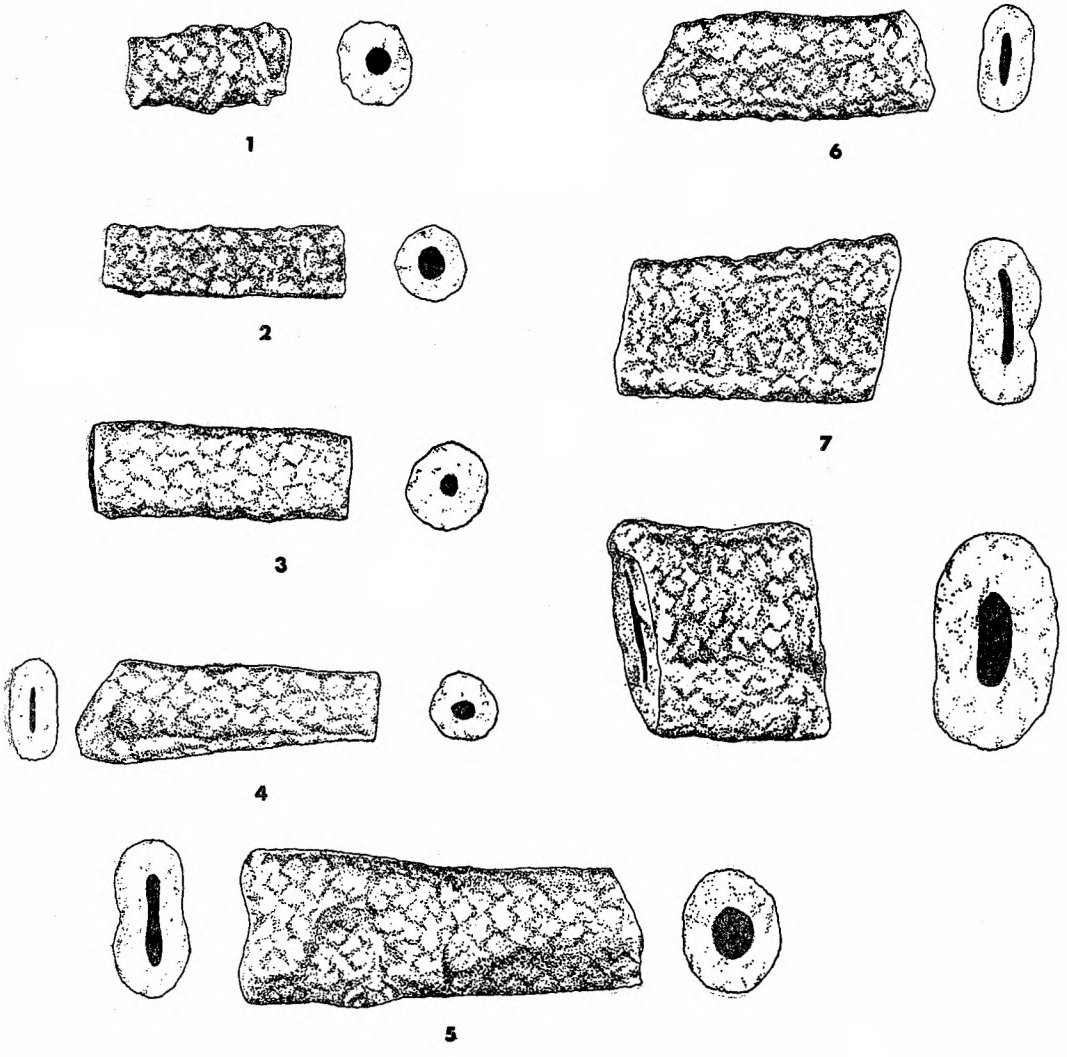
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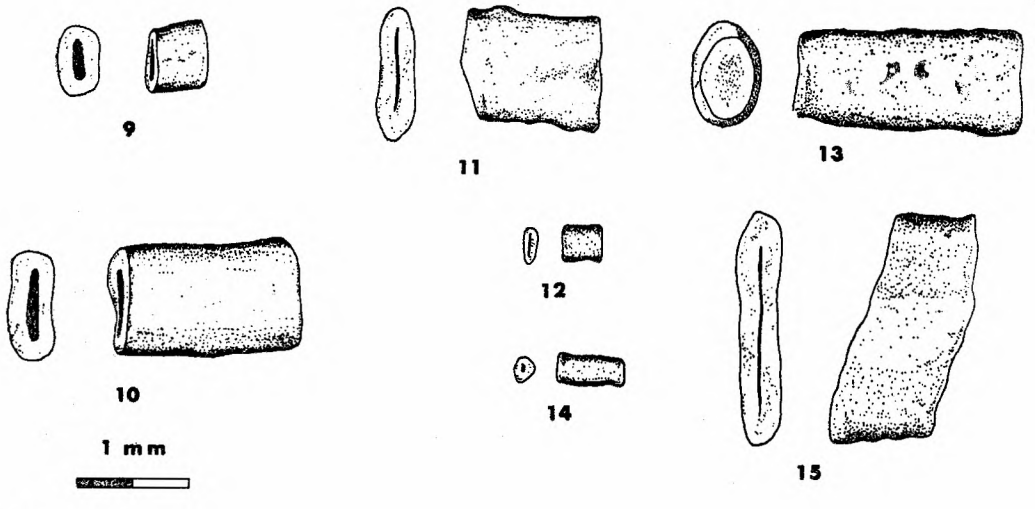
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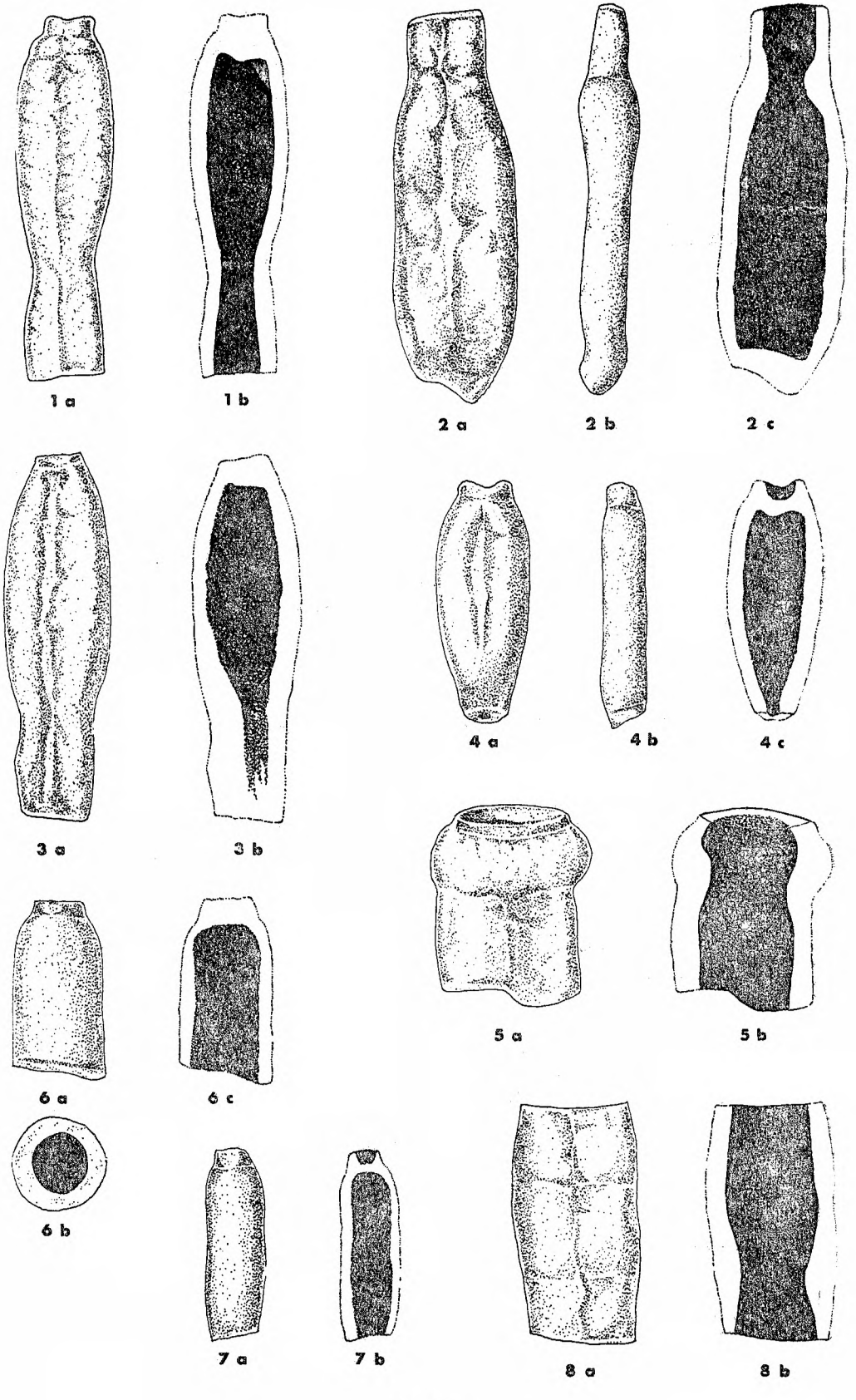
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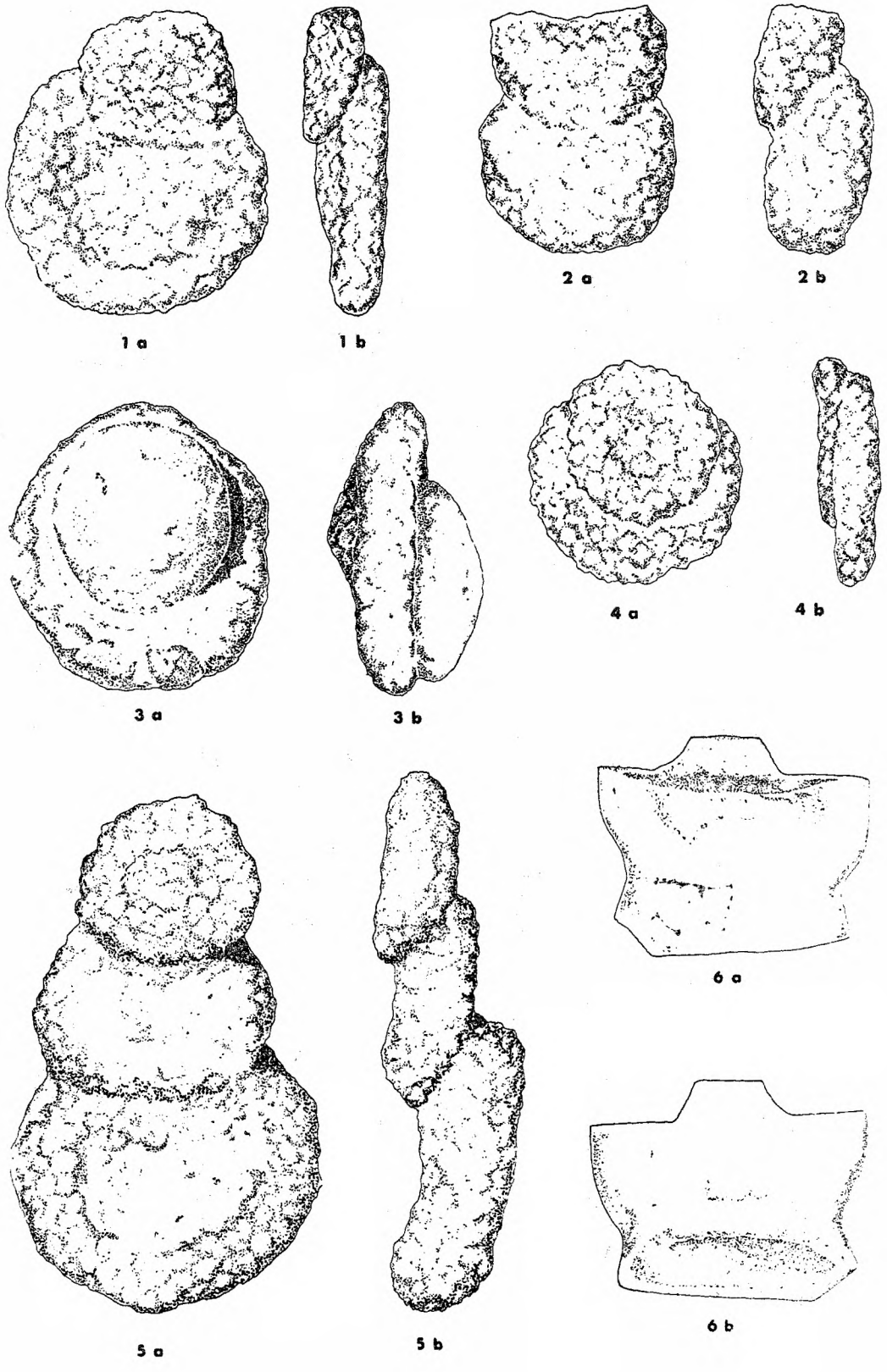
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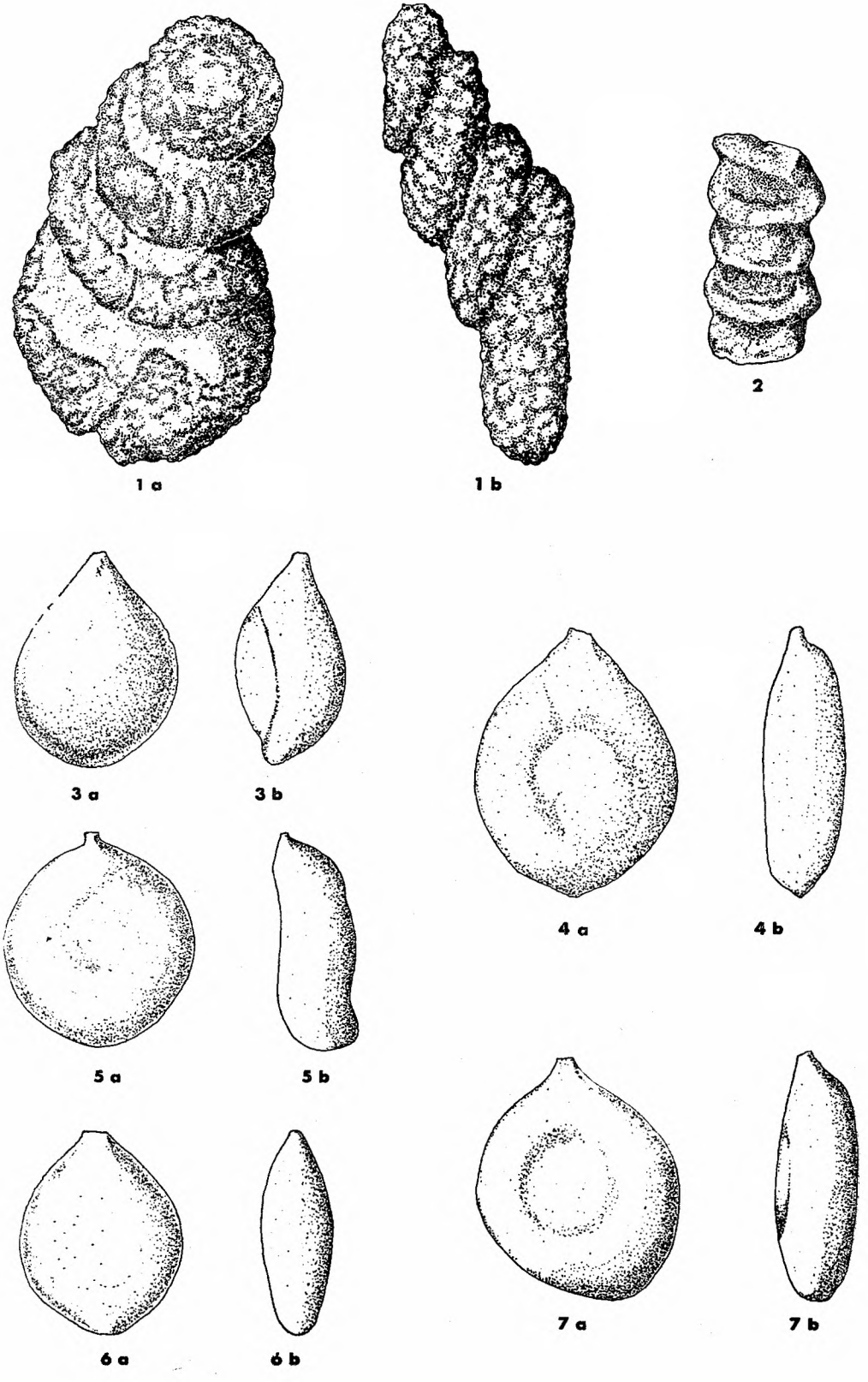
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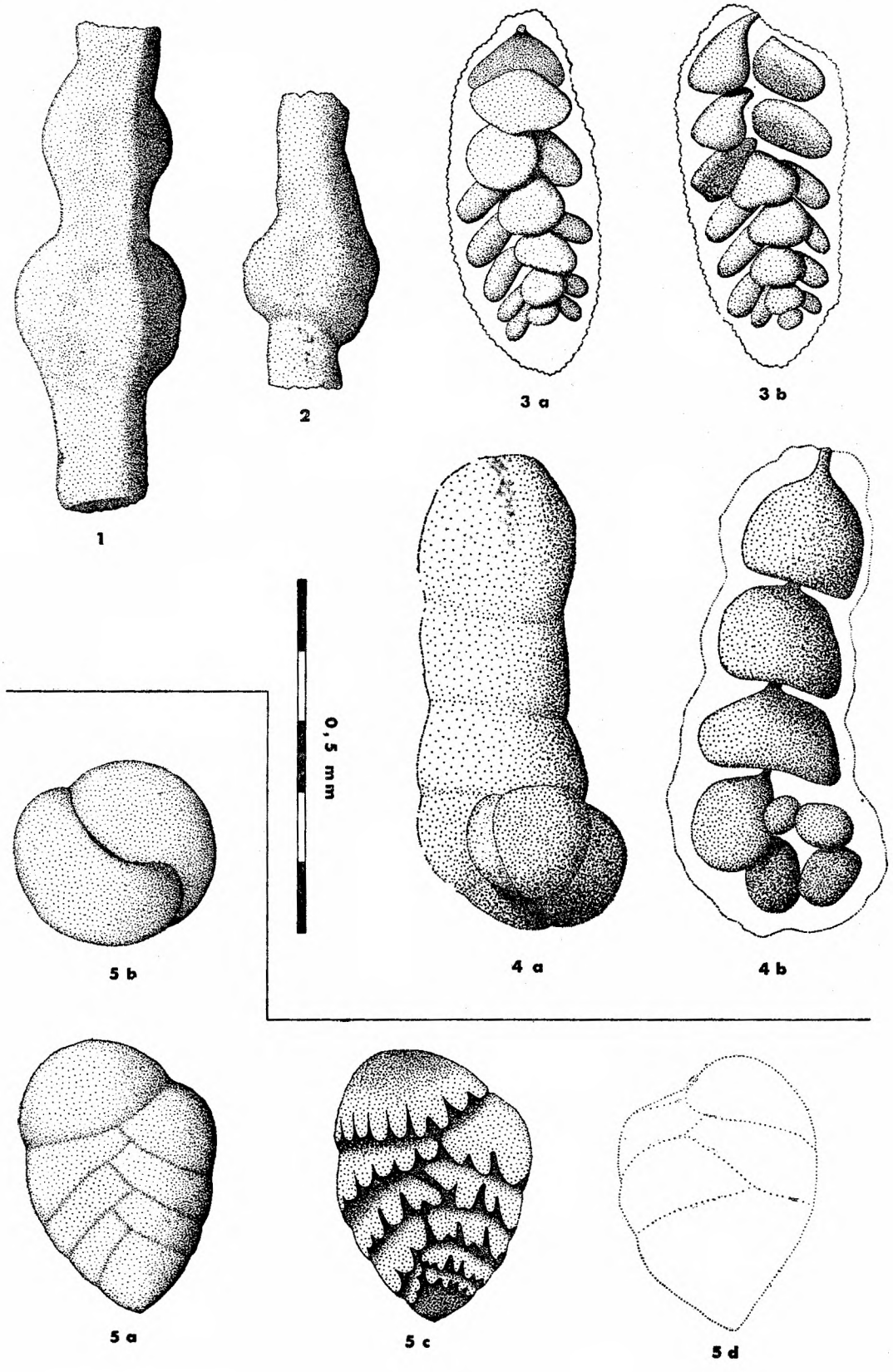

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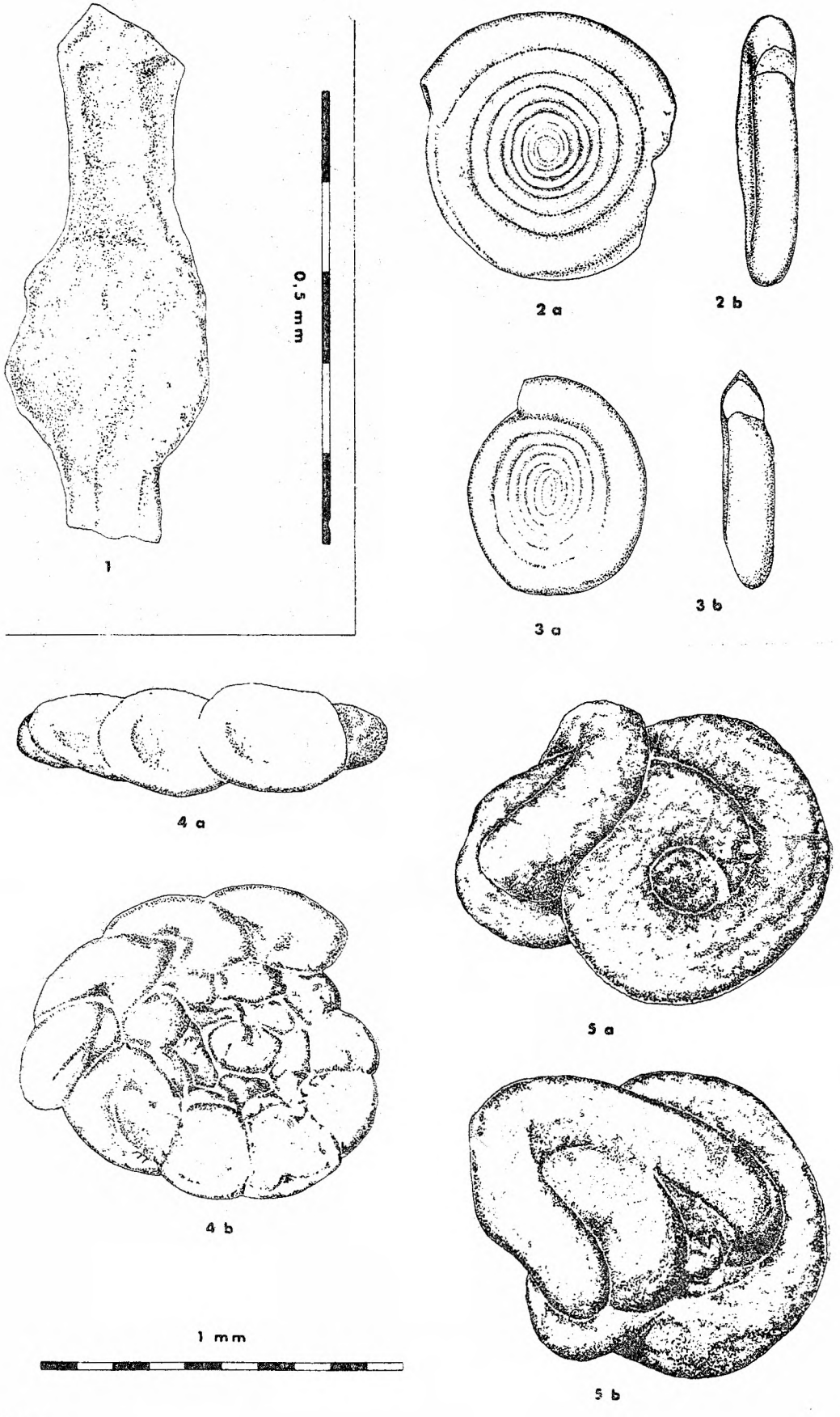
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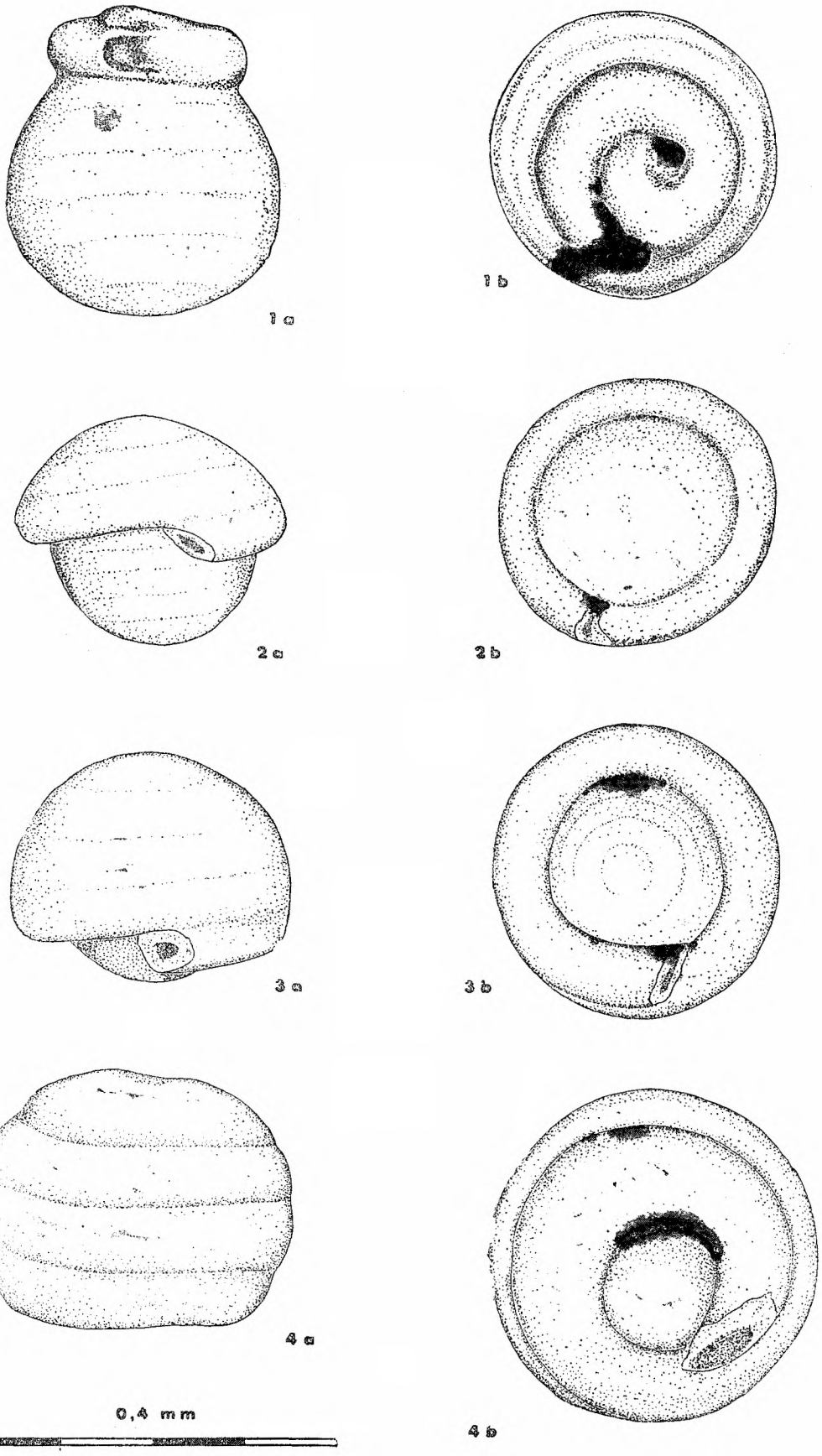
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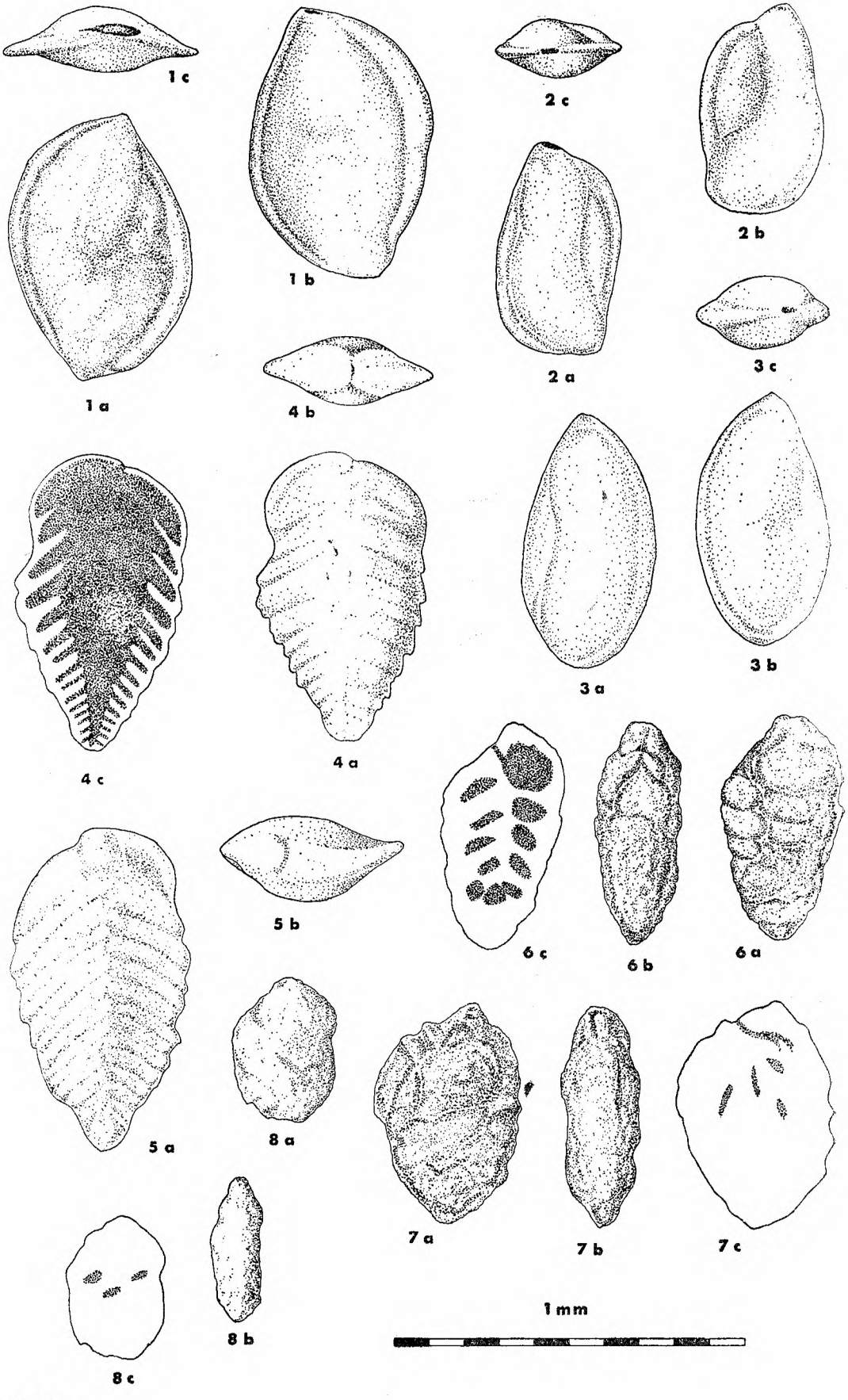

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