

EUGENIA GAWOR-BIEDOWA

NEW BENTHIC FORAMINIFERS FROM THE LATE CRETACEOUS
OF POLAND

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New taxa of benthic foraminifers are described from rich microfaunal assemblages of Campanian and Maastrichtian deposits from eastern and central Poland. The new taxa include 13 species and 9 genera (*Telatynella telatynensis* and *T. clavata*; *Varsoviella pazdroae*; *Cribrella lacrima*, *C. fusiformis* and *C. ovata*; *Coryphostomella lublinensis* and *C. telatynensis*; *Czarkowyella czarkowyensis*; *Pazdroella olgae*; *Triaperturina polonica*; *Quadriaperturina varsoviensis*; *Lublinella lublinensis*), 3 new subfamilies (Haplophragmiidae: *Telatynellinae*; *Ataxophragmiidae*: *Varsoviellinae*; and *Pleurostomellidae*: *Pazdroellinae*) and one family (*Rotallina*: *Lublinidae*).

Key words: Foraminiferida, taxonomy, stratigraphy, Campanian, Maastrichtian, Poland.

Eugenia Gawor-Biedowa, Instytut Geologiczny, Rakowiecka 4, 00-975 Warszawa, Poland. Received: October 1985.

INTRODUCTION

Numerous drillings made in the last decade in the Polish Lowlands yielded very rich material for micropaleontological studies. The material most interesting from the point of view of microfaunistic studies came from the Upper Cretaceous in the Lublin region, eastern Poland (boreholes Lublin IG 2, Piaski IG 1, Telatyn IG 1 and Dorohuczka IG 5), and southernmost Kielce region, central Poland (borehole Rejon Czarkowy IG 10/2, made in the vicinities of the Czarkowy village — fig. 1).

In the Lublin region, the borehole columns of the Upper Cretaceous were only partly cored, which impedes detail reconstruction of the lithological section. However, all the holotypes of the described foraminiferal taxa come from core material. In the borehole Rejon Czarkowy IG 10/2,

the Upper Cretaceous was fully cored. The stratigraphic subdivision of the strata was made on the basis of the recorded foraminifers.

The core material from the above mentioned boreholes yielded very abundant microfauna, including highly interesting group of benthic forms, which are the subject of this paper.



Fig. 1. Location of boreholes which yielded here described Campanian and Maastrichtian species of benthic foraminifers. 1 Lublin IG-2, 2 Dorohucz IG-5, 3 Piaski IG-1, 4 Telatyn IG-1, 5 Rejon Czarkow IG-10/2.

The studied collection is housed in the Museum of the Geological Institute (IG).

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CHARACTERISTICS OF THE STUDIED STRATA

Lublin Region

The Campanian is represented in the lower part by white to white-grey marly limestones, passing upwards into white or greenish marly limestones in some sections (borehole Lublin IG 2 and Piaski IG 1) and light grey marls in the others (e.g. the borehole Telatyn IG 1). The strata were assigned to the Campanian with references to the record of *Cibicides involutus* (Reuss), *Stensioeina clementiana* (d'Orbigny), *S. exsculpta* (Reuss), *Bolivinoidea miliaris* Hiltermann et Koch, *Rosita fornicata* (Plummer) and *Bolivina incrassata* Reuss, characteristic of that stage (Gawor-Biedowa 1984, Gawor-Biedowa and Witwicka 1984).

The Lower Maastrichtian begins with white or, sometimes, greenish marls, locally with streaks of grey marls (boreholes Lublin IG 2 and Piaski IG 1), and light-grey marls, locally with greenish shade and fairly brittle (borehole Telatyn IG 1). The strata pass upwards into white to grey-white, medium hard marly limestones in the above sections (except for the borehole column Dorohucza IG 5, where they pass into rocks of the chalk facies). The characteristic taxa, indicative of the Lower Maastrichtian age of the strata, include *Angulogavelinella gracilis* (Marsson), *Pseudouvierina cristata* (Marsson), *Neoflabellina reticulata* (Reuss), *Bolivinoidea sidestrandensis* Barr and others.

The Upper Maastrichtian is mainly represented by marly chalk and chalk in lower and middle parts of its section in the borehole columns Lublin IG 2, Piaski IG 1 and Dorohucza IG 5, and white-grey, medium hard marly limestones passing upwards into chalky limestones in the borehole column Telatyn IG 1. In the borehole columns Lublin IG 2, Piaski IG 1 and, partly, Dorohucza IG 5 and Telatyn IG 1; upper part of the section begins with chalky marly limestones passing upwards into marls, massive marly opokas or light-grey opokas with intercalations of marls and marly limestones. The foraminiferal species indicative of the Upper Maastrichtian, numerous in these strata, include *Anomalinoidea pinguis* (Jennings), *Bolivinoidea draco* (Marsson), *Gavelinella gankinoensis* (Neckaja), *G. danica* (Brotzen), *Bolivinoidea giganteus* Hiltermann et Koch and others.

The Kielce region

In that region the new foraminiferal taxa were found in the Lower Maastrichtian, so, only these rocks are briefly discussed here. They are represented by light-very silty marls with abundant foraminifers. The recorded guide species include the Lower Maastrichtian *Angulogavelinella gracilis* (Marsson) and the Maastrichtian *Pseudouvierina cristata* (Marsson) and *Neoflabellina reticulata* (Reuss).

DESCRIPTIONS

Order **Foraminiferida** Eichwald, 1830
 Suborder **Textulariina** Delage et Hérouard, 1896
 Superfamily **Lituolacea** de Blainville, 1827
 Family **Haplophragmiidae** Eimer et Fickert, 1899
 Subfamily **Telatynellinae** subfam. nov.

Type genus: Telatynella gen. n.

Diagnosis.—Initial part of test streptospirally coiled, comprising three to five chambers; the remaining part uniserial, rectilinear; interior of chambers simple, aperture terminal, small, circular in outline, with very narrow lip; test imperforate, calcareous, microgranular.

Assigned genera: Telatynella gen. n.

Remarks.—The subfamily Telatynellinae subfam. nov. most closely resembles the family Haplophragmiidae Eimer et Fickert, 1899 in streptospirally coiled initial part of test, rectilinear uniserial part, and simple interior of chambers. It differs from the latter in imperforate, calcareous and microgranular test structure and cylindrical uniserial part of test.

Genus *Telatynella* gen. n.

Type species: Telatynella telatynensis sp. n.

Derivation of the name: After the Telatyn locality, where the foraminifers have been found for the first time.

Stratigraphic and geographic range: As for the type species.

Diagnosis.—Test free, smooth, elongate, with initial part streptospirally coiled, short (consisting of 3 to 5 chambers), and the remaining part uniserial, long, rectilinear, circular in cross-section and almost uniform in width along its whole length. Sutures flat, horizontal, and parallel to one another in the uniserial part. Aperture terminal, circular, small, with narrow lip, situated in the center of almost flat apertural surface. Test calcareous, microgranular, nonlamellar.

Assigned species: T. telatynensis sp. n., and *T. clavata* sp. n.

Remarks.—*Telatynella* gen. n. differs from *Bulbophragmium* Maync, 1952 in having single aperture, and from *Haplophragmium* Reuss, 1860 in cylindrical uniserial part of the test, flat apertural surface, and microgranular test. It differs from *Martinottiella* Cushman, 1933 in streptospirally coiled initial part of test, the lack of biserial part and circular aperture.

Telatynella telatynensis sp. n.
 (pl. 23: 5a, b; pl. 26: 1, 2; pl. 28: 2)

Holotype: Specimen IG No. 45627(85)F, presented in pl. 23: 5a, b.

Paratypes: Specimens IG Nos. 45628A, 45628, and 45628B/85/F, presented in pl. 26: 1, 2 and pl. 28: 2, and specimen 45628C/85/F.

Type horizon: Upper Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 10m.

Derivation of the name: After the type locality.

Diagnosis.—Test smooth, with initial part streptospirally coiled, short, and subtriangular in outline, and the uniserial part narrow, long, rectilinear and cylindrical. Test microgranular, nonlamellar.

Material.—About fifty specimens with uniserial part often damaged.

Dimensions (in mm):

IG No.	Holotype		Paratypes	
	45627/85/F	45628/85/F	45628C/85/F	45628D/85/F
Length of coiled part	0.096	0.120	0.120	0.120
Width of coiled part	0.192	0.144	0.168	0.168
Length of uniserial part (4 chambers)	0.240	0.265	0.312	0.312
Width of uniserial part	0.096	0.096	0.096	0.096

Description.—Test smooth, with initial part streptospirally coiled and consisting of 3 to 5 chambers, and the remaining part uniserial. The coiled part very short, subtriangular and horse-shoe-like in appearance. Chambers convex, with sutures slightly depressed to obscure. Uniserial part narrow, long rectilinear and cylindrical, consisting of tubular chambers somewhat higher than wide; sutures straight, arranged parallel to one another, flat and translucent. Aperture very small, circular, with narrow lip, and situated in the center of almost flat apertural surface.

Variability.—The individual variability is connected with differences in convexity of chambers of the coiled part of the test and degree of depression of sutures in the uniserial part. In the latter part, sutures are varying from slightly to strongly depressed. In the former case, chambers appear difficult to separate as they merge with one another, and in the latter—they are fairly well traceable and slightly convex.

Distribution.—Poland, the Cretaceous of the Lublin region, Upper Maastrichtian from the drillings Telatyn IG 1, Dorohucza IG 5, Piaski IG 1 and Lublin IG 2.

Telatynella clavata sp. n.

(pl. 23: 6, pl. 24: 1, pl. 26: 3, 4; pl. 28: 1)

Holotype: Specimen IG No. 45629/85/F, presented in pl. 23: 6 and pl. 24: 1.

Paratypes: Specimens IG Nos. 45630, 45630A, and 45630B/85F presented in pl. 26: 3, 4; pl. 28: 1, and specimen 45630E/85/F.

Type horizon: Upper Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 10.0m.

Derivation of the name: Lat. clava—club, after club-like shape of test.

Diagnosis.—Test smooth, club-like, with initial part streptospirally coiled and very short in comparison with the uniserial. Uniserial part straight, long, narrow, cylindrical and circular in cross-section. Aperture circular, very small, with narrow lip, situated in the center of almost flat apertural surface of the last chamber. Test microgranular.

Material.—Over 80 specimens with uniserial part often damaged.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45629/85/F	45630/85/F	45630E/85/F
Length of coiled part	0.168	0.168	0.144
Width of coiled part	0.192	0.192	0.192
Length of uniserial part	0.457	0.984	0.840
	(7 chambers)	(10 chambers)	
Width of uniserial part	0.120	0.120	0.120

Description. — Test smooth, club-like, with very short streptospirally coiled part and long uniserial one. Streptospirally coiled part initially ovate, irregular, formed of 3 to 4 chambers. Uniserial part straight, narrow, long, cylindrical, formed of more than 11 chambers. Chambers slightly convex, difficult to separate from one another and with poorly traceable sutures in the coiled part, low, fairly uniform in size, somewhat wider than high, with flat surface and straight, flat, translucent parallel sutures in uniserial part. Aperture small, circular, with narrow lip, situated in the center of almost flat apertural surface of the last chamber. Test microgranular, nonlamellar.

Variability. — The individual variability is rather low. It appears mainly connected with differences in convexity of chambers in the coiled part and, therefore, variability in outline of the initial part from ovate to somewhat irregular (when chambers are more convex).

Remarks. — The available material comprises numerous specimens with the uniserial part comprising 10 or 11 chambers. This made it possible to state that this part is presumably uniform in width along its whole length. That is why the broken-off parts of a test may be identified.

The species differs from *Telatynella telatynensis* sp. n. in outline of initial part of the test with, generally less convex chambers, and somewhat lower (wider than high) chambers in the uniserial part.

Distribution. — Poland, the Cretaceous of the Lublin region: Upper Maastrichtian from the boreholes Telatyn IG 1, Lublin IG 2, Dorohuczka IG 5 and Piaski IG 1.

Superfamily Ataxophragmiacea Schwager, 1877

Family Ataxophragmiidae Schwager, 1877

Subfamily Varsoviellinae subfam. n.

Type genus: *Varsoviella* gen. n.

Diagnosis. — Initial part of test trochospirally coiled, with four chambers in early whorls and two in the late ones and the remaining part uniserial. Chambers simple inside. Test calcareous, microgranular. Aperture terminal, circular.

Remarks. — The subfamily Varsoviellinae subfam. n. is the closest to the families Ataxophragmiidae Schwager, 1877 and Dorothisidae Balakhmatova, 1972 in trochospirally coiled initial part of test, number of chambers in early whorls and reduction of the number in younger ones. It differs from these and other families of the superfamily Ataxophragmiacea Schwager, 1877 in calcareous, microgranular test. It further differs from the family Ataxophragmiidae in having elongate, cylindrical uniserial test part and circular, areal aperture. This type of aperture brings Varsoviellinae closer to some representatives of Dorothisidae.

Subfamily monotypic.

Genus *Varsoviella* gen. n.

Type species: *Varsoviella pazdroae* sp. n.

Derivation of the name: After *Varsovia*, Latin name of Warszawa.

Stratigraphic and geographic range: As for the type species.

Diagnosis.—Test free, calcareous, microgranular, smooth, elongate, with initial part trochospirally coiled and wedge-like, and the remaining part uniserial, cylindrical. Trochospiral part short, formed of 5–6 poorly traceable whorls, with four chambers in early whorls and two chambers in late ones, difficult to trace at the surface. In some specimens the uniserial part may be formed of 5 to 7 chambers and two times higher than the trochospiral. Chambers are simple inside. Aperture terminal, circular.

Genus monotypic.

Remarks.—*Varsoviella* gen. n. is most similar to the genus *Martinotiella* Cushman, 1933, differing in microgranular test, circular aperture, and the lack of triserial part. It resembles the genus *Telatynella* gen. n. in uniserial part and microgranular test, differing in trochospirally coiled initial part.

Varsoviella pazdroae sp. n.

(pl. 27: 5, pl. 28: 5, pl. 29: 2)

Holotype: Specimen IG No. 45650/85/F, presented in pl. 27: 5.

Paratypes: Specimens IG Nos. 45651 and 45652/85/F, presented in pl. 28: 5 and pl. 29: 2, and specimen 45653/85/F.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Lublin IG 2, depth 440.0 m.

Derivation of the name: In honour of the late Polish micropaleontologist, Olga Pazdro.

Diagnosis.—Test smooth, elongate, with initial part of test trochospirally coiled and wedge-shaped, and the remaining part uniserial, cylindrical, and two times higher than the former. The trochospiral part formed of 5 to 6 whorls, difficult to trace at test surface; the number of chambers equals 4 in the three early whorls, decreasing to 2 in the later ones. The uniserial part is formed of 2 to 7 chambers. Chambers with simple interior. Aperture terminal, circular, small.

Material.—About twenty five well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45650/85/F	45651/85/F	45653/85/F
Length	1.248	0.960	1.320
Width	0.360	0.240	0.288

Description.—Test smooth, elongate, cylindrical, straight or slightly incurved, almost uniform in width along its whole length. The initial part trochospirally coiled, wedge-shaped, short, equal a third of test length in adult individuals, and formed of 5–6 whorls. The number of chambers equals 4 in three early whorls, decreasing to 2 in the later ones. Whorls and chambers difficult to trace at test surface. Uniserial part of adult specimens formed of 5 to 7 chambers uniform in size, arranged one above the other, more than two times wider than high and with flat surface. Sutures horizontal, very slightly depressed and poorly visible. The

youngest chambers higher than the remaining ones. Apertural surface flat; aperture terminal, small, circular.

Variability.—The individual variability small. Test may be straight or somewhat incurved when first chamber of the uniserial part adjoins the trochospiral at an angle. The chambers, usually flat in both parts of the test, may be somewhat convex in the trochospiral part or at the beginning of the uniserial one in some specimens. There were found specimens with only trochospiral part developed and displaying 1 to 7 chambers of uniserial part.

Remarks.—The new species resembles *Arenobulimina (Pasternakia) cuneata* Woloschyna in number of chambers and shape of the initial part, differing in calcareous microgranular test, poorly visible whorls and chambers of the trochospiral part, and more numerous chambers in the uniserial part.

Distribution.—Poland, the Cretaceous of the Lublin region: Campanian-Maastrichtian from the drillings Lublin IG 2, Telatyn IG 1 and Piaski IG 1.

Suborder **Lagenina** Delage et Hérouard, 1896
 Superfamily **Nodosariacea** Ehrenberg, 1838
 Family **Nodosariidae** Ehrenberg, 1838
 Subfamily **Nodosariinae** Ehrenberg, 1838
 Genus *Cribrella* gen. n.

Type species: *Cribrella lacrima* sp. n.

Derivation of the name: After cribrate sieve-like aperture.

Stratigraphic and geographic range: Maastrichtian of the Lublin region.

Diagnosis.—Test free, smooth, uniserial, with numerous chambers, elongate, circular in cross-section. Chambers poorly visible. Aperture terminal, sieve-like. Test wall calcareous, monolamellar.

Species assigned: *C. lacrima* sp. n., *C. fustiformis* sp. n., *C. ovata* sp. n.

Remarks.—The new genus most closely resembles *Pseudonodosaria* Boomgaard, 1949 in general outline of test, differing in chambers not convex and sieve-like aperture. It differs from the genus *Nodosaria* Lamarck, 1812 in undepressed sutures and outline of test, and from the genus *Lagena* Walker et Jacob in Kanmacher, 1798 in the unornamented test surface, lack of apertural neck and sieve-like aperture.

Cribrella lacrima sp. n.
 (pl. 29: 1a—c)

Holotype: Specimen IG No. 45654/85/F, presented in pl. 29: 1a—c.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 242.0 m.

Derivation of the name: Lat. *lacrima*—tear, after tear-like shape of test.

Diagnosis.—Test smooth, glittering, finely and regularly perforated, markedly sharpened downwards and ending with short, thin spine, and rapidly widening along with growth, tear-like in shape. Top part of the last chamber dome-like raised, with sieve-like aperture formed of numerous very small openings.

Material.—Twenty five well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45654/85/F	45655/85/F	45656/85/F
Length	0.408	0.264	0.144
Width	0.240	0.168	0.144

Description.—Test smooth, glittering, finely and regularly perforated, and tear-like in shape, with lower part sharpened and ending with short, thin spine, suddenly widening. The last chamber dome-like rised. Chambers and sutures very difficult to trace at test surface. When submerged in immersional liquid, the test shows 2 to 3 very low and wide chambers in its narrow, initial part. The youngest, dome-like chamber equal about 4/5 of test length. Aperture sieve-like, formed of numerous fine openings, terminal. Test calcareous, monolamellar.

Variability.—The individual variability mainly expressed in differences in dimensions of test.

Remarks.—The new species appears most similar to *Pseudonodosaria obesa* (Loeblich et Tappan) (Loeblich and Tappan 1964: C522—524, fig. 408: 5, 6), especially its microspheric form, in shape of test and mode of arrangement of chambers, differing in sieve-like aperture and chambers and sutures difficult to trace at the surface. The similarities and differences in relation to *C. fusiformis* sp. n. and *C. ovata* sp. n. as given below.

Distribution.—Poland, the Cretaceous of the Lublin region: Maastrichtian from the drillings Telatyn IG 1 and Lublin IG 2.

Cribrella fusiformis sp. n.

(pl. 30: 1a, b)

Holotype: Specimen IG No. 45657/85/F, presented in pl. 30: 1a, b.

Paratypes: Specimens IG Nos. 45658 and 45659/85/F.

Type horizon: Upper Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 10.0 m.

Derivation of the name: Lat. *fuscus*—spindle-shaped, after spindle-like shape of test.

Diagnosis.—Test smooth, glittering, finely and regularly perforated, spindle-shaped, rounded in cross-section, usually built of 7 chambers poorly traceable at the surface. Aperture terminal, sieve-like. Wall calcareous, monolamellar.

Material.—About thirty well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45657/85/F	45658/85/F	45659/85/F
Length	0.504	0.624	0.336
Width	0.167	0.129	0.144

Description.—Test elongate, spindle-shaped, gradually widening along with growth, smooth, glittering, finely and regularly perforated. Initial part very fine spine. Chambers and sutures poorly traceable at the surface. When the test is submerged in immersion liquid, there may be noted chambers very low and wide in initial part and higher than wide in the distal. Sutures straight and horizontal. Usually 7 chambers. Aperture sieve-like, situated at somewhat narrowed top part of the youngest chamber. Test wall calcareous, monolamellar.

Variability.—The individual variability is marked in test dimensions and its widening along with growth. A part of individuals are typically spindle-shaped, with

markedly sharpened proximal part and the distal almost equally narrow, whereas some others display distal part somewhat wider than the proximal.

Remarks. — *Cribrella fusiformis* sp. n. differs from *C. lacrima* sp. n. in spindle-like shape, more numerous chambers (usually 7 and 2—4, respectively) and gradual increase in their size, as well the dimensions and shape of the youngest chamber.

Distribution. — Poland, the Cretaceous of the Lublin region: Maastrichtian from the drilling Telatyn IG 1.

Cribrella ovata sp. n.

(pl. 30: 2a, b)

Holotype: Specimen IG No. 45660/85/F presented in pl. 30: 2.

Paratypes: Specimens IG Nos. 45661 and 45662/85/F.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 231.0 m.

Derivation of the name: After ovate shape of the test.

Diagnosis. — Test calcareous smooth, glittering, finely and regularly perforated, ovate. Chambers and septal sutures indiscernible at the surface. Aperture terminal, sieve-like, situated at convex apertural surface.

Material. — Twenty well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45660/85/F	45661/85/F	45662/85/F
Length	0.288	0.720	0.384
Width	0.240	0.360	0.240

Description. — Test calcareous smooth, glittering, finely and regularly perforated, ovate narrowed in proximal part, widened and rounded in the distal, formed of 5—8 chambers. Chambers, untraceable unless the test is submerged in immersion liquid, increase nonuniformly in height along with growth. The two youngest of them are equal about two-thirds of test length. Septal sutures straight and horizontal. Aperture terminal, sieve-like, situated at convex apertural surface.

Variability. — The individual variability is marked in dimensions of test, degree of narrowing of the proximal part, and convexity of apertural surface.

Remarks. — *Cribrella ovata* sp. n. differs from *C. lacrima* sp. n. and *C. fusiformis* sp. n. in shape of test and the mode of increase of chambers along with growth. In this species the two youngest chambers are equal about two-thirds of test length whereas in *C. lacrima* sp. n. the youngest chamber is equal 4/5 of test length, and in *C. fusiformis* sp. n. the chambers gradually increase in length and the youngest of them is equal a quarter of test length.

Distribution. — Poland, the Cretaceous of the Lublin region: Maastrichtian from the drilling Telatyn IG 1.

Suborder **Rotaliina** Delage et Hérouard, 1896

Superfamily **Pleurostomellacea** Reuss, 1860

Family **Pleurostomellidae** Reuss, 1860

Subfamily **Wheelerellinae** Petters, 1954

Genus *Czarkowyella* gen. n.

Type species: *Czarkowyella czarkowyensis* sp. n.

Derivation of the name: After the Czarkowy village.

Stratigraphic and geographic range: Lower Maastrichtian, southernmost Kielce region.

Diagnosis. — Test free, smooth, elongate, initially tri- and subsequently biserial with a tendency to become uniserial. Chambers difficult to trace in the initial part, wedge-shaped thereafter. Sutures depressed, oblique, straight. Test calcareous, multilamellar. Aperture in the form of small, circular opening situated in spoon-shaped apertural area.

Genus monotypic.

Remarks. — *Czarkowyella* gen. n. differs from *Ellipsoidella* in triserial initial part of test, and circular aperture situated in spoon-shaped apertural area. The type of aperture differentiates it also from *Bandyella*.

Czarkowyella czarkowyensis sp. n.

(pl. 23: 1, 2; pl. 26: 6a, b, c; pl. 28: 6)

Holotype: Specimen IG No. 45631/85/F, presented in pl. 26: 6a, b, c.

Paratypes: Specimens IG Nos. 45633, 45632 and 45633A/85/F, presented in pl. 23: 1, 2 and pl. 28: 6.

Type horizon: Lower Maastrichtian.

Type locality: The Rejon Czarkowy, borehole IG 10/2, depth 15 m.

Derivation of the name: After the Czarkowy village.

Diagnosis. — Test smooth, elongate, thick, tri- and biserial, with a tendency to become uniserial. Test outline incised. Chambers difficult to trace in initial part of test, wedge-like and strongly convex in the remaining one. Sutures strongly incised, oblique. Aperture small, circular, situated at spoon-shaped apertural surface. Test calcareous, multilamellar.

Material. — About 17 more or less damaged specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45631/85/F	45632/85/F	45633/85/F
Length	2.364	2.280	0.976
Width	0.672	0.696	0.528

Description. — Test smooth, elongate, thick, markedly incised in outline, gradually and slightly widening towards aperture. Initial part triserial, short, rounded at the base or narrowing, with poorly traceable chambers and sutures. Biserial part formed of 4–6 chambers; chambers wedge-shaped, strongly convex and loosely arranged, alternating. Top part of the last chamber convex. Sutures strongly depressed, straight, oblique. Apertural surface of the last chamber spoon-shaped; aperture in the form of small, circular opening situated close to top part of the chamber. Test calcareous, multilamellar.

Variability. — The individual variability is reflected by differences in dimensions of tests, degree of convexity of chambers and depression of sutures, and length of the triserial part. However, the latter part is never longer than a quarter of test length.

Remarks. — All the available specimens are more or less damaged. Nevertheless, it may be stated that they do not have any other aperture except for the above mentioned circular opening from the apertural surface.

The species is most similar to *Pleurostomella wadowicensis* Grzybowski in

dimensions, shape of test and chambers and arrangement of the latter in the biserial part, differing in circular aperture situated in spoon-like apertural area.

Distribution. — Poland, the southernmost part of Kielce region, boreholes Rejon Czarkowy IG 10/1 and 10/2, the Lower Maastrichtian.

Subfamily **Pazdroellinae** subfam. n.

Type genus: *Pazdroella* gen. n.

Diagnosis. — Test calcareous, perforate, hyaline, triserial in the initial part and subsequently uniserial. Aperture formed of 2 to 4 arcuate or horse-shoe-like fissures, often with tooth.

Genera assigned: *Pazdroella* gen. n., *Triaperturina* gen. n., and *Quadriaperturina* gen. n.

Remarks. — The subfamily Pazdroellinae subfam. n. displays all the features of the family Pleurostomellidae Reuss, 1860 except for the type of aperture, formed of 2 to 4 arcuate or horse-shoe-like fissures arranged in the mirror way and often with tooth.

Genus *Pazdroella* gen. n.

Type species: *Pazdroella olgae* sp. n.

Stratigraphic and geographic range: Lower Maastrichtian of the Lublin region.

Derivation of the name: In honour of the late Polish micropaleontologist, Olga Pazdro.

Diagnosis. — Test free, elongate, cylindrical, thick, smooth. Initial part triserial, passing into uniserial. Chambers poorly traceable and almost flat, except for the last one, dome-like. Sutures flat. Aperture subterminal, formed of two arcuate fissures, arranged parallel to one another and in the mirror way.

Remarks. — The new genus is most similar to *Triaperturina* gen. n., differing in two apertural fissures arranged in the mirror way.

Pazdroella olgae sp. n.

(pl. 23: 7; pl. 24: 4; pl. 26: 5)

Holotype: Specimen IG No. 45634/85/F, presented in pl. 24: 4.

Paratypes: Specimens IG Nos. 45635 and 45634A/85/F, presented in pls. 23: 7 and 26: 5.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 246.0 m.

Derivation of the name: As in generic name.

Diagnosis. — Test elongate, smooth, finely and regularly perforated, cylindrical. Initial part of test triserial, passing into uniserial. Chambers poorly traceable, with flat surface, except for the last one, dome-like. The suture between the two youngest chambers slightly depressed, the remaining one flat, almost untraceable. Aperture subterminal, in the form of two arcuate fissures arranged in the mirror way at opposite sides of rectangular top part of the last chamber.

Material. — Ten well-preserved and 5 somewhat damaged specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45634/85/F	45635/85/F	45634A/85/F
Length	0.768	1.00	0.888
Width	0.312	0.336	0.432

Description. — Test smooth, glittering, finely and regularly perforated, elongate, cylindrical, thick, gradually increasing in width along with growth, and regular in outline. Initial part of the test triserial, passing into uniserial. Chambers poorly traceable, except for the last one, dome-like. Sutures very poorly visible in proximal part, becoming slightly depressed and straight in the distal part, and most depressed between the last two chambers. The last chamber equal from a fifth to a half of the length of the test. Aperture subterminal, in the form of two arcuate fissures, arranged in the mirror way at the top of the last chamber.

Variability. — The studied population comprises both short, thick specimens with the last chamber equal a half of length of the test, and elongate, slender ones, with the last chamber equal a quarter to a third of length of the test, which may represent different generation of the species. The individual variability concerns the degree of widening of the test, convexity of chambers and depression of sutures as well as the number of chambers in the uniserial part. In some specimens, chambers are easy to trace and slightly convex (especially the last one), and sutures slightly depressed, straight and oriented obliquely in relation to one another in the uniserial part, consisting of 2 to 3 chambers. In the others sutures and chambers are poorly traceable, except for the last two chambers and suture separating them. The penultimate chamber is low and very weakly convex, the ultimate one dome-like, and suture between them weakly depressed and straight arranged horizontally or slightly obliquely.

Remarks. — The species resembles *Triaperturina polonica* sp. n. in outline of test, the shape of the last chamber and degree of convexity of chambers and depression of sutures, differing in aperture formed of two arcuate fissures arranged in the mirror way, more distinct widening of test along with growth and somewhat smaller dimensions.

Distribution. — Poland, Cretaceous of the Lublin region: Lower Maastrichtian of the borehole column Telatyn IG 1.

Genus *Triaperturina* gen. n.

Type species: *Triaperturina polonica* sp. n.

Stratigraphic and geographic range: Lower Maastrichtian of the Lublin region.

Derivation of the name: After aperture in the form of three fissures.

Diagnosis. — Test free, elongate, cylindrical, thick, finely perforated, uniserial in distal part. Chambers poorly traceable, except for the last one, dome-like. Aperture subterminal, in the form of three semicrescent fissures.

Monotypical genus.

Triaperturina polonica sp. n.

(pl. 27: 3a, b)

Holotype: Specimen IG No. 45636/85/F, presented in pl. 27: 3a, b.

Paratype: Specimen IG No. 45636A/85/F.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 246 m.

Derivation of the name: After Poland, where the species was found for the first time.

Diagnosis. — Test elongate, cylindrical, thick, glittering, finely perforated, uniserial in distal part. Chambers and sutures poorly traceable. The last chamber dome-like. Aperture subterminal, in the form of three semicrescent, narrow fissures.

Material. — Three well-preserved specimens.

Dimensions (in mm):

	Holotype	Paratype
IG No.	45636/85/F	45636A/85/F
Length	1.176	0.960
Width of the last chamber	0.480	0.384

Description. — Test elongate, cylindrical, thick, glittering, finely and regularly perforated, uniserial in distal part, gradually but markedly widening along with growth, at the height of the last chamber twice as thick as at the base. Initial part rounded, triserial. Uniserial part equal two-thirds of length of the test, formed of 3 chambers. Chambers obscure in initial part. The first two chambers of the uniserial part two times wider than high, very weakly convex and poorly traceable, separated by sutures parallel to one another. Sutures weakly depressed, almost flat. Aperture subterminal, in the form of three semicrescent, narrow openings.

Remarks. — The species is most similar to *Pazdroella olgae* sp. n. The similarities and differences as discussed above.

Distribution. — Poland, the Cretaceous of the Lublin region: Lower Maastrichtian of the borehole column Telatyn IG 1.

Genus *Quadriaperturina* gen. n.

Type species: *Quadriaperturina varsoviensis* sp. n.

Stratigraphic and geographic range: Lower Maastrichtian of the Lublin region.

Derivation of the name: After aperture in the form of four openings.

Diagnosis. — Test free, elongate, cylindrical, thick, glittering, with initial part triserial, passing into uniserial. Chambers obscure in the initial part, weakly convex in the uniserial; the last chamber dome-like. Sutures straight and weakly depressed in the uniserial part, parallel to one another. Aperture subterminal, in the form of 4 horse-shoe-like fissures with semiolate teeth.

Monotypic genus.

Remarks. — The genus is most similar to *Triaperturina* gen. n., differing in aperture in the form of 4 horse-shoe-like fissures with teeth.

Quadriaperturina varsoviensis sp. n.

(pl. 27: 4a, b)

Holotype: Specimen IG No. 45637/85/F, presented in pl. 27: 4a, b.

Paratype: Specimen IG No. 45637A/85/F.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 246 m.

Derivation of the name: After *Varsovia*, Latin name of Warszawa.

Diagnosis.— Test elongate, cylindrical, thick, smooth and glittering, finely and regularly perforated, with initial part possibly triserial, passing into uniserial. Chambers poorly traceable in the initial part, somewhat convex in the uniserial; the last chamber dome-like. Aperture subterminal, in the form of four horse-shoe like openings, each with semiovate tooth.

Material.— Five well-preserved specimens.

Dimensions (in mm):

	Holotype	Paratype
IG No.	45637/85/F	45637A/85/F
Length	1.032	0.912
Width	0.384	0.360

Description.— Test elongate, cylindrical, thick, smooth and glittering. Initial part of test somewhat sharpened, wedge-like and possibly triserial, passing into uniserial and gradually widening along with growth. Sutures obscure in the initial part. The uniserial part equal two-thirds of length of the test and formed of two chambers; the last chamber dome-like. Sutures straight, somewhat depressed and parallel to one another in that part. Aperture subterminal, in the form of two horse-shoe-like fissures, each with semiovate tooth.

Remarks.— The species is most similar to *Triaperturina polonica* sp. n., differing in aperture in the form of 4 horseshoe-like openings with teeth, slower increase in width along with growth, and chambers more convex in the uniserial part.

Distribution.— Poland, the Cretaceous of the Lublin region: Lower Maastrichtian from the borehole Telatyn IG 1.

Superfamily *Fursenkoinacea* Loeblich et Tappan, 1961

Family *Fursenkoinidae* Loeblich et Tappan, 1961

Subfamily *Fursenkoininae* Loeblich et Tappan, 1961

Genus *Coryphostomella* gen. n.

Type species: *Coryphostomella lublinensis* sp. n.

Stratigraphic and geographic range: Maastrichtian (Cretaceous) of the Lublin region.

Derivation of the name: After similarity to the genus *Coryphostoma*.

Diagnosis.— Test free, elongate, bilaterally flattened, biserial with a tendency to pass into uniserial. Test wall calcareous, fibrous. Chambers elongate, tear-like, rising one above the other in the initial part, almost wedge-like in shape in the youngest part. Sutures depressed. Test glittering, densely and regularly perforated. Aperture subterminal, very small, semicrescent, situated at top part of the last chamber, elongated in the form of neck.

Species assigned: *C. lublinensis* sp. n. and *C. telatynensis* sp. n.

Remarks.— *Coryphostomella* gen. n. differs from *Coryphostoma* Loeblich et Tappan, 1962 in semicrescent aperture, bilateral flattening of test, and the last chamber elongated in the form of neck. It differs from *Cassidella* Hofker, 1951 in test biserial with a tendency to pass into uniserial, and not twisted around the vertical axis, semicrescent aperture, and the lack of tooth plate, and from *Fursenkoina* Loeblich et Tappan, 1961, in test not twisted around the vertical axis, and narrow in cross-section, as well as semicrescent aperture situated at the base of a neck-like extension of the last chamber. The new genus differs from *Glandulo-*

pleurostomella Silvestri, 1903 in the lack of spiral part of test and radial aperture, and from *Ellipsoidella* Heron-Allen et Earland, 1910 in test bilaterally flattened and narrow in cross-section, tear-like chambers in initial part, and semicrescent, very small aperture.

Coryphostomella lublinensis sp. n.

(pl. 27: 1a, b; pl. 28: 4)

Holotype: Specimens IG No. 45645/85/F, presented in pl. 27: 1a, b.

Paratypes: Specimen IG No. 45645A/85/F, presented in pl. 28: 4, and specimens 45646 and 45647/85/F.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 246 m.

Derivation of the name: After the Lublin region.

Diagnosis.—Test free, biserial, smooth and glittering, gradually and slightly increasing in width along with growth, the widest at the base of the last two chambers; very narrow and oval in cross-section. Test wall calcareous, fibrous. Chambers convex, tear-like, arranged in an alternating way and rising one above the other. Sutures rectilinear, depressed, oblique to one another. The last chamber extending in the form of neck with very small, semicrescent aperture at the top.

Material.—Twenty five well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45645/85/F	45646/85/F	45647/85/F
Length	0.456	0.456	0.168
Width	0.072	0.144	0.144
Thickness	0.144	0.072	0.072

Description.—Test free, biserial, smooth and glittering, finely and regularly perforated, flattened and gradually and slightly widening along with growth, the thickest at the base of the last two chambers. Outline of test somewhat incised in places corresponding to septal sutures. Test very narrow and oval in cross section. Wall calcareous, fibrous. Chambers well visible, elongate, arranged in an alternating way, usually in 7 pairs, tear-like in shape; first chamber circular in outline and slightly convex, and the last — extending in the form of neck with very small, semicrescent aperture at the end. Sutures between chambers depressed, rectilinear markedly oblique.

Variability.—The individual variability is expressed by differences in degree of convexity of chambers, widening of test along with growth, and elongation and the arrangement of the youngest chamber. The orientation of the latter may vary from vertical to more or less inclined. It seems that the population comprises representatives of two generations of the species. It comprises very elongate specimens and those almost so wide as high, ovate in outline and with less convex chambers.

Remarks.—The species most closely resembles *Grammostomum macilentum* Ehrenberg, 1854 in outline of test and arrangement of chambers. However, Ehrenberg (1854) did not give description of this species, which precludes reliable identification. *Coryphostomella lublinensis* sp. n. somewhat resembles *Coryphostoma reussi* (Geinitz) in flattened test and arrangement of chambers, differing in test not twisted around the vertical axis, chambers almost uniform in width along the whole length of test, and semicrescent aperture oriented parallel to narrow margin of test.

Distribution. — Poland, the Cretaceous of the Lublin region: Campanian — Maastrichtian from the boreholes Telatyn IG 1 and Lublin IG 2.

Coryphostomella telatynensis sp. n.

(pl. 23: 3, 4; pl. 27: 2a, b; pl. 28: 3)

Holotype: Specimen IG No. 45642/85/F, presented in pl. 23: 3.

Paratypes: Specimens IG Nos. 45643, 45644, and 45644A/85/F, presented in pls. 23: 4; 27: 2a, b and 28: 3.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG 1, depth 246 m.

Derivation of the name: After the type locality, Telatyn.

Diagnosis. — Test biserial with a tendency to pass into uniserial, calcareous, fibrous, smooth and glittering, finely and regularly perforated, elongate. Cross-section narrow, oval; chambers convex. Aperture very small, semicrescent.

Material. — Ten well-preserved specimens.

Dimensions (in mm):

IG No.	Holotype	Paratypes	
	45642/85/F	45644/85/F	45643/85/F
Length	0.576	0.480	0.432
Width	0.144	0.144	0.096
Thickness	0.072	0.096	0.096

Description. — Test free, smooth and glittering, finely and regularly perforated, narrow and somewhat bilaterally flattened, very slightly widening along with growth. Test wall calcareous, fibrous. Test oval in cross-section. Arrangement of chambers very tight and biserial in the initial part of test, with a tendency to pass into uniserial in the youngest part. Chambers initially somewhat convex, later tear-like. The youngest chamber elongate, with top part protruding in the form of neck with a very small semicrescent aperture. Septal and spiral sutures depressed.

Variability. — Individual variability low, primarily expressed by differences in bilateral flattening of test, arrangement of chambers in its younger part, and in the degree of deepening the suture. The may be biserial, with chambers of the young part loosely arranged and rised one above the other, or uniserial, with typical wedge-shaped chambers arranged in alternating manner.

Remarks. — The above described specimens are most similar to those described as *Paleopolymorphina pleurostomelloides* (Franke) by Brotzen (1936). However, aperture of the specimen from Eriksdal locality remains unknown. The specimen described under the name *Polymorphina pleurostomelloides* by Franke (1928) was designated as the type of the genus *Glandulopleurostomella* Silvestri by Loeblich and Tappan (1964), whereas Vassilenko (1961) placed *Paleopolymorphina pleurostomelloides sensu* Brotzen (*non* Franke, 1928) in synonymy of her new species, *P. rara* Vassilenko. Aperture of *P. rara* Vassilenko also remains unknown since the last chambers are broken off in all the specimens from her collections. Thus, generic status of that species remains disputable. It may be added that *Coryphostomella lublinensis* sp. n. differs from the latter in less flattened and more slender test and chambers more wedge-like in shape.

Distribution. — Poland, the Cretaceous of the Lublin region: borehole Telatyn IG 1.

Superfamily *Chilostomellacea* Brady, 1881Family *Lublinidae* fam. n.

Type genus: Lublinella gen. n.

Diagnosis.—Test trochospiral, lenticular, evolute at one side and involute at the other. Chambers simple. Test calcareous, finely perforated. Septa made of three layers: inner and outer granular and central—fibrous. Primary aperture interomarginal, situated in proximity of umbilicus; secondary apertures at ventral side arranged at the umbilical ends of each chamber, forming a string around narrow, obscure umbilicus.

Remarks.—The new family differs from *Gavelinellidae* Hofker, 1956 in having secondary apertures at ventral side, in completely involute ventral side of the test and in the lack of umbilical flaps of chambers.

Genus *Lublinella* gen. n.

Type species: Lublinella lublinensis sp. n.

Stratigraphic and geographic range: The Campanian and Maastrichtian of the Lublin region.

Derivation of the name: Coming from the Lublin region.

Diagnosis.—Test free, trochospiral, unequally biconvex, lenticular. Dorsal side completely evolute, ventral side involute; margin narrow. Umbilicus very narrow, obscured by small tubercle. Primary aperture interomarginal, fissure-like, somewhat arcuate, extending from the middle of the base of apertural surface to umbilical tubercle. Secondary apertures small, elliptical, arranged at umbilical ends of all the chambers in the form of a string around the umbilicus. Test wall calcareous, perforate. Septa consisting of three layers: inner and outer granular and fibrous in the middle.

Remarks.—The new genus resembles *Angulogavelinella* Hofker, differing in the presence of secondary apertures, the primary aperture extending down to the umbilicus, and perforation of both sides of the test. It differs from *Buccella* Anderson in ventral side unornamented, the primary aperture extending from the middle of the base of apertural surface to umbilical tubercle, septa formed of three layers, and secondary apertures developed at umbilical ends of all the chamber.

Lublinella lublinensis sp. n.

(pl. 23: 8; pl. 24: 2, 3; pl. 25: 1—3; pl. 26: 7a—c; pl. 28: 7)

Holotype: Specimen IG No. 45639/85/F, presented in pl. 24: 3, and pl. 25: 3.

Paratypes: Specimens IG Nos. 45640, 45639A, 45639B, 45641, 45642, and 45639C/85/F presented in pls. 23: 8; 24: 2, 3; 25: 1, 2, 26: 7a, b, c; and 28: 7 respectively.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Lublin IG 2, depth 436.9 m.

Derivation of the name: Coming from the Lublin region.

Diagnosis.—Test trochospiral, lenticular, unequally biconvex, smooth and glittering, densely and regularly perforated at both sides, with narrow margin. Chambers of all the whorls traceable at dorsal, and only those of the last whorl—at the ventral side. Umbilical area very narrow, closed by small umbilical tubercle. Primary aperture fissure-like, somewhat arcuate, extending from the middle of the base of apertural surface to umbilical tubercle. Secondary apertures developed at umbilical

ends of all the chamber and arranged in the form of string around the umbilical tubercle.

Material. — About 400 well-preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG No.	45639/85/F	45639B/85/F	45642/85/F
Diameter	0.216	0.264	0.288
Thickness	0.096	0.120	0.120

Description. — Test trochospiral, biconvex, lenticular, uniformly convex at both sides or with dorsal side more convex, formed of two to two and a half of whorl. Test surface smooth and glittering, finely and regularly perforated at both sides, circular and regular in outline, with narrow, rounded margin. Whorls, gradually widening along with growth, well displayed at the evolutely coiled dorsal side. Initial chamber spherical, somewhat rising above the surface of the dorsal side. The remaining chambers trapezoid in outline, with flat surface, low and wide. The last whorl formed of 8 to 10 chambers almost uniform in size. Spiral and septal sutures flat and narrow; septal sutures oblique, strongly incurved. Ventral side displaying chambers of the last whorl only; the chambers similar in appearance as at the opposite side: trapezoid, flat, low and wide, subequal. The last chamber somewhat convex. Sutures flat, narrow, incurved. Umbilical tubercle small (equal about a sixth of test diameter), situated in the center and surrounded by a string of secondary apertures, situated at umbilical ends of all the chambers. Primary aperture fissure-like, sometimes somewhat arcuate, situated at the base of weakly convex, triangular apertural surface of the last chamber and extending from the middle of the base to umbilical tubercle.

Variability. — The individual variability fairly high, expressed in differences in convexity of opposite sides of tests. The available population comprises both equally convex specimens and some with more convex dorsal side or strongly convex dorsal side and flat ventral one. Umbilical tubercle is always very small but it may be protruding or completely flat. Secondary apertures are always very small, usually elliptical but some circular are also known.

Distribution. — Poland, the Cretaceous of the Lublin region. Campanian and Maastrichtian of the borehole columns Lublin IG 2, Telatyn IG 1 and Dorohucza IG 5.

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NOWE OTWORNICE BENTOSOWE PÓŹNEJ KREDY POLSKI

Streszczenie

Liczne otwory wiertnicze wykonane w ostatnim dziesięcioleciu na obszarze Niżu Polskiego dostarczyły nowych materiałów do badań mikropaleontologicznych. Najbardziej interesujące okazały się materiały pochodzące ze wschodniej Polski z górnej kredy regionu lubelskiego, z otworów: Lublin IG 2, Piaski IG 1, Telatyn IG 1, Dorohuczka IG 5 oraz z centralnej Polski z okolic wsi Czarkowy w kieleckim, z otworu Rejon Czarkowy IG 10/2 (fig. 1). Osady kredowe z lubelszczyzny rdzeniowane były jedynie częściowo; holotypy opisanych gatunków pochodzą z próbek rdzeniowych. Osady kredowe w rejonie wsi Czarkowy były całkowicie rdzeniowane.

Opisane tu nowe otwornice z kieleckiego pochodzą z osadów mastrychtu dolnego. Nowe otwornice z rejonu lubelszczyzny stwierdzono w osadach kampanu i mastrychtu wśród będącej w opracowaniu bogatej mikrofauny.

Kampan w otworze Lublin IG 1 i Piaski IG 1 wykształcony jest w niższej części w postaci wapieni marglistych białych, białoszarych, a w wyższej części w postaci wapieni marglistych białych miejscami zielonawych a w otworze Telatyn IG 1 — w postaci margli jasnoszarych. Spośród licznych otwornic występujących w tych osadach należy wymienić: *Cibicidoides involutus* (Reuss), *Stensioeina clementiana* (d'Orbigny), *S. exsculpta* (Reuss), *Bolivinooides miliaris* Hiltermann et Koch, *Rosita fornicata* (Plummer) i *Bolivina incrassata* Reuss charakterystyczne dla tego podpiętra (Gawor-Biedowa 1984, Gawor-Biedowa and Witwicka 1984).

Mastrycht dolny w otworze Lublin IG 2 i Piaski IG 1 wykształcony jest w dolnej części w postaci margli białych niekiedy zielonkawych, miejscami przekładanych marglem szarym, a w otworze Telatyn IG 1 z margli jasnoszarych miejscami z odcieniem zielonawym, dość kruchych. W wyższej części występują wapienie margliste białe lub szarobiałe średniej twardości z wyjątkiem otworu Dorohuczka IG 5, w którym występuje kreda pisząca. Z charakterystycznych gatunków określających wiek należy wymienić: *Angulogavelinella gracilis* (Marsson), *Pseudouvigerina cristata* (Marsson), *Neoflabellina reticulata* (Reuss), *Bolivinooides sidestrandensis* Barr.

Mastrycht górny w dolnej i środkowej części profilu, w otworach Lublin IG 2, Piaski IG 1, Dorohuczka IG 5, wykształcony jest głównie w postaci kredy piszącej marglistej i kredy piszącej, natomiast w otworze Telatyn IG 1 w postaci wapieni marglistych białoszarych, średniej twardości, w wyższych partiach kredowatych. W górnej części profilu, w otworze Lublin IG 2, Piaski IG 1 i częściowo Dorohuczka IG 5 oraz Telatyn IG 1, występują u dołu wapienie margliste kredowate, wyżej margle, opoki margliste zwięzłe lub opoki szare, lekkie z przewarstwieniami margli i wapieni marglistych. Z licznych gatunków przewodnich dla mastrychtu górnego należy wymienić: *Anomalinooides pinguis* (Jennings), *Bolivinooides draco* (Marsson), *Gavelinella gankinoensis* (Neckaja), *Gavelinella danica* (Brotzen), *Bolivinooides giganteus* Hiltermann et Koch.

W rejonie kieleckim na osady mastrychtu dolnego składają się margle mułkowe z *Angulogavelinella gracilis* (Marsson), przewodnią dla dolnego mastrychtu oraz z *Pseudouvierina cristata* (Marsson) i *Neoflabellina reticulata* (Reuss) przewodnimi dla obu podpięter mastrychtu.

W obecnej pracy przedstawiono jedynie nowe taksony otwornic. W omówionych wyżej osadach wyróżniono 13 gatunków i 9 rodzajów (*Telatynella telatynensis* i *T. clavata*; *Varsoviella pazdroae*; *Cribrella lacrima*, *C. fusiformis* i *C. ovata*; *Coryphostomella lublinensis* i *C. telatynensis*; *Czarkowyella czarkowyensis*; *Pazdroella olgae*; *Triaperturina polonica*; *Quadriaperturina varsoviensis*; *Lublinella lublinensis* (3 nowe podrodziny) Haplophragmiidae: *Telatynellinae*; *Ataxophragmiidae*: *Varsoviellinae* i *Pleurostomellidae*: *Pazdroellinae* (i jedną rodzinę) *Rotaliina*: *Lublinidae*. Należy dodać, że wszystkie te taksony z wyjątkiem rodzaju *Czarkowyella* pochodzą z kredy lubelskiej; rodzaj *Czarkowyella* został znaleziony w kredzie kieleckiej.

EXPLANATION OF PLATES 22—30

Pls. 23—25, 29, 30 SEM micrographs
Pls. 26—28 light microscope photographs

Plate 23

- 1, 2. *Czarkowyella czarkowyensis* sp. n.: 1 IG 45633/85/F, paratype, dorsal view, $\times 34$; 2 IG 45632/85/F, paratype, ventral view, $\times 24$; Rejon Czarkowy, borehole IG 10/2, depth of 15 m, Lower Maastrichtian.
- 3, 4. *Coryphostomella telatynensis* sp. n.: 3 IG 45642/85/F, holotype, side view, $\times 95$; 4 IG 45643/85/F, paratype, side view, $\times 115$; Telatyn IG 1 borehole, depth of 246 m. Lower Maastrichtian.
- 5a, b. *Telatynella telatynensis* sp. n.: IG 45627/85/F, holotype, a $\times 333$, b, $\times 180$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
6. *Telatynella clavata* sp. n.: IG 45629/85/F, holotype, $\times 85$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
7. *Pazdroella olgae* sp. n.: IG 45635/85/F, paratype, $\times 136$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
8. *Lublinella lublinensis* sp. n.: IG 45640/85/F, paratype, $\times 250$; Lublin IG 2 borehole, depth 436.9 m, Lower Maastrichtian.

Plate 24

1. *Telatynella clavata* sp. n.: IG 45629/85/F, holotype, $\times 230$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
- 2, 3. *Lublinella lublinensis* sp. n.: 2 IG 45639A/85/F, paratype, dorsal view, $\times 200$; 3 IG 45639/85/F, holotype, ventral view, $\times 300$; Lublin IG 2 borehole, depth 436.9 m, Lower Maastrichtian.
4. *Pazdroella olgae* sp. n.: IG 45634/85/F, holotype, $\times 96$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.

Plate 25

- 1, 2, 3. *Lublinella lublinensis* sp. n.: 1 IG 45639B/85/F, paratype, ventral view, $\times 300$; 2 IG 45641/85/F, paratype, dorsal view, $\times 250$; 3 IG 45639/85/F, holotype, ventral view, primary aperture and secondary apertures, $\times 600$; Lublin IG 2 borehole, depth 436.9 m, Lower Maastrichtian.

Plate 26

- 1, 2. *Telatynella telatynensis* sp. n.: 1 IG 45628A/85/F, paratype, side view, $\times 108$; 2 IG 45628/85/F, paratype, apertural view, $\times 145$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
- 3, 4. *Telatynella clavata* sp. n.: 3 IG 45630/85/F, paratype, side view, $\times 68$; 4 IG 45630A/85/F, paratype, apertural view, $\times 100$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
5. *Pazdroella olgae* sp. n.: IG 45634A/85/F, paratype, general view, $\times 70$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
- 6a, b, c. *Czarkowyella czarkowyensis* sp. n.: IG 45631/85/F, holotype, dorsal (a) view and ventral (b) views, $\times 26$; apertural view (c), $\times 123$; Rejon Czarkowy IG 10/2 borehole, depth 15 m, Lower Maastrichtian.
- 7a, b, c. *Lublinella lublinensis* sp. n.: IG 45642/85/F, paratype, dorsal (a) and ventral (b) views, $\times 117$; c edge view, $\times 125$; Lublin IG 2 borehole, depth 436.9 m, Lower Maastrichtian.

Plate 27

- 1a, b. *Coryphostomella lublinensis* sp. n.: IG 45645/85/F, holotype, side (a) and edge (b) views, $\times 72$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
- 2a, b. *Coryphostomella telatynensis* sp. n.: IG 45644/85/F, paratype, side (a) and (b) views, $\times 85$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
- 3a, b. *Triaperturina polonica* sp. n.: IG 45636/85/F, holotype, general (a) and apertural (b) views, $\times 58$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
- 4a, b. *Quadriaperturina varsoviensis* sp. n.: IG 45637, holotype, general (a) and apertural (b) views, $\times 61$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
5. *Varsoviella pazdroae* sp. n.: IG 45650/85/F, holotype, side view, $\times 70$; Lublin IG 2, borehole, depth 440 m, Lower Maastrichtian.

Plate 28

1. *Telatynella clavata* sp. n.: IG 45630B/85/F, paratype, axial section showing big embrional chamber, chambers in streptospiral and uniserial part of the test and monolamellar structure of septa, $\times 230$, Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
2. *Telatynella telatynensis* sp. n.: IG 45628B/85/F, paratype, axial section showing big embrional chamber, chambers in streptospiral and uniserial part of the test, $\times 229$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
3. *Coryphostomella telatynensis* sp. n.: IG 45644A/85/F, paratype axial section showing embrional chamber and monolamellar structure of septa, $\times 208$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.

4. *Coryphostomella lublinensis* sp. n.: IG 45645A/85/F, paratype, axial section showing embrional chamber and monolamellar structure of septa, $\times 208$; Telatyn IG 1 borehole, depth 246 m, Lower Maastrichtian.
5. *Varsoviella pazdroae* sp. n.: IG 45651/85/F, paratype, axial section showing embrional chamber, chambers in trochospiral part of the test and monolamellar structure of septa, $\times 200$; Lublin IG 2 borehole, depth 440 m, Lower Maastrichtian.
6. *Czarkowyella czarkowyensis* sp. n.: IG 45633A/85/F, paratype, axial section showing multilamellar structure of the test, $\times 54$; Rejon Czarkowy IG 10/2 borehole, depth 15 m, Lower Maastrichtian.
7. *Lublinella lublinensis* sp. n.: IG 45639C/85/F, paratype, horizontal section showing embrional chamber and trilamellar structure of septa, $\times 226$; Lublin IG 2 borehole, depth 436.9 m, Lower Maastrichtian.

Plate 29

- 1a, b, c. *Cribrella lacrima* sp. n.: IG 45654/85/F, holotype, general (a) and apertural (b, c) views, $\times 188$, $\times 830$, $\times 1660$; Telatyn IG 1 borehole, depth 242 m, Lower Maastrichtian.
2. *Varsoviella pazdroae* sp. n.: IG 45652/85/F, paratype, general view, $\times 78$; Lublin IG 2 borehole, depth 440 m, Lower Maastrichtian.

Plate 30

- 1a, b. *Cribrella fusiformis* sp. n.: IG 45657/85/F, holotype, general (a) and apertural (b) views, $\times 168$, $\times 600$; Telatyn IG 1 borehole, depth 10 m, Upper Maastrichtian.
- 2a, b. *Cribrella ovata* sp. n.: IG 45660/85/F, holotype, general (a) and apertural (b) views, $\times 260$, $\times 760$; Telatyn IG 1 borehole, depth 213 m, Lower Maastrichtian.















