POLSKA AKADEMIA NAUK
INSTYTUT PALEOBIOLOGII

PALAEONTOLOGIA POLONICA

REDAKTOR
JÓZEF KAŹMIERCZAK

No. 52 — 1992

CAMPANIAN AND MAASTRICHTIAN FORAMINIFERA FROM THE LUBLIN UPLAND, EASTERN POLAND

(OTWORNICE KAMPANU I MASTRYCHTU WYŻYNY LUBELSKIEJ)

BY

EUGENIA GAWOR-BIEDOWA

(WITH 4 TEXT-FIGURES, 3 TABLES AND 39 PLATES)

WARSZAWA—KRAKÓW 1992

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P O L I S H A C A D E M Y OF S C I E N C E S
INSTITUTE OF PALEOBIOLOGY

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ZASTĘPCA REDAKTORA — ASSISTANT EDITOR

MAGDALENA BORSUK-BIAŁYNICKA

Adres Redakcji — Address of the Editorial Office
Instytut Paleobiologii
Polska Akademia Nauk
02-089 Warszawa, Al. Żwirki i Wigury 93

KOREKTA

Zespół

ISBN 83-01-09860-0
ISSN 0078-8562

Wydawnictwo Naukowe PWN — Oddział w Krakowie

Wydanie I. Nakład 473+67 egz.
Ark. wyd. 26. Ark. druk. $23^4/_8$+39
wkładek+5 wklejek. Papier offset. sat.
III kl. 120 g. Oddano do składania
w grudniu 1991 r. Podpisano do druku
w październiku 1992 r. Druk ukoń-
czono w listopadzie 1992 r.
Zam. 51/1992

Drukarnia Uniwersytetu Jagiellońskiego w Krakowie

EUGENIA GAWOR-BIEDOWA

CAMPANIAN AND MAASTRICHTIAN FORAMINIFERA FROM THE LUBLIN UPLAND, EASTERN POLAND

(Plates 1—39)

GAWOR-BIEDOWA, E.: Campanian and Maastrichtian Foramanifera from the Lublin Upland, Eastern Poland, Palaeontologia Polonica, 52, 3—187. 1992.

The volume contains descriptions of foraminifera from the Campanian and Maastrichtian deposits of the Lublin Upland (Eastern Poland). Of the 240 species described 22 are new. These are: *Hormosina telatynensis* sp. n., *Arenobulimina minutissima* sp. n., *Bolivina aleksandrae* sp. n., *Bolivina praecrenulata* sp. n., *Bolivina witwickae* sp. n., *Bolivinoides dentatus* sp. n., *Praebulimina dorohuczensis* sp. n., *Pseudouvigerina telatynensis* sp. n., *Biedafranciszkina polonica* sp. n., *Ellipsodimorphina pozaryskae* sp. n., *Allomorphina polonica* sp. n., *Allomorphinella lublinensis* sp. n., *Quadrimorphina varsoviensis* sp. n., *Sliteria varsoviensis* sp. n., *Stensioeina bella* sp. n., *Stensioeina pulchra* sp. n., *Anomalina incognita* sp. n., *Gavelinella postthalmanni* sp. n., *Guembelitria ornata* sp. n., *Heterohelix suwalkensis* sp. n., *Heterohelix varsoviensis* sp. n., *Hedbergella telatynensis* sp. n. Two new genera: *Biedafranciszkina* gen. nov. and *Sliteria* gen. nov. and one new family: *Biedafranciszkinidae* f. nov. are also designated. Forminiferal zones characteristic for the Upper Cretaceous of the Polish Lowlands have been distinguished and correlated with macro- and microfauna zones established previously for the Cretaceous deposits from central Poland and from other regions of the world.

Key words: Foraminifera, taxonomy, biostratigraphy, Campanian, Maastrichtian, Poland.

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OTWORNICE KAMPANU I MASTRYCHTU WYŻYNY LUBELSKIEJ

Streszczenie. — Z osadów kampanu i mastrychtu obszaru lubelskiego opracowano 240 gatunków otwornic, w tym 22 nowe: *Hormosina telatynensis* sp. n., *Arenobulimina minutissima* sp. n., *Bolivina aleksandrae* sp. n., *Bolivina praecrenulata* sp. n., *Bolivina witwickae* sp. n., *Bolivinoides dentatus* sp. n., *Praebulimina dorohuczensis* sp. n., *Pseudouvigerina telatynensis* sp. n., *Biedafranciszkina*

polonica sp. n., *Ellipsodimorphina pozaryskae* sp. n., *Allomorphina polonica* sp. n., *Allomorphinella lublinensis* sp. n., *Quadrimorphina varsoviensis* sp. n., *Sliteria varsoviensis* sp. n., *Stensioeina bella* sp. n., *Stensioeina pulchra* sp. n., *Anomalina incognita* sp. n., *Gavelinella postthalmanni* sp. n., *Guembelitria ornata* sp. n., *Heterohelix suwalkensis* sp. n., *Heterohelix varsoviensis* sp. n., *Hedbergella telatynensis* sp. n. oraz wprowadzono 2 nowe rodzaje: *Biedafranciszkina* gen. nov. and *Sliteria* gen. nov. i 1 nową rodzinę: *Biedafranciszkinidae* f. nov.

Przeprowadzono też korelację wydzielonych poziomów otwornicowych z podziałem makrofaunistycznym (Błaszkiewicz 1984a, b) i z podziałami mikrofaunistycznymi Gawor-Biedowa and Witwicka 1984, Peryt 1980), jak również z podziałami z innych obszarów świata (figury 3 i 4).

CONTENTS

INTRODUCTION

The aim of the present paper is to investigate in taxonomic terms the foraminifera from the Campanian and Maastrichtian deposits from 7 boreholes drilled by the State Geological Institute (Państwowy Instytut Geologiczny). Six boreholes (Lublin IG 2, Piaski IG 1, Dorohucza IG 5, Gorzków IG 1, Telatyn IG 1 and Tyszowce IG 1) are situated on the Lublin Upland (Eastern Poland), and one (Lubartów IG 2 some dozen kilometers north of the northern edge of the Lublin Upland (fig. 1). Of the 240 species identified in 191 samples (part of the samples from Tyszowce IG 1 are not marked in the Table 2), 22 are new. Two new genera and 1 new family have been established. Not all the holotypes of the new species come from the studied boreholes. In order to obtain the highest possible number of paratypes, the choice of type localities has been based on relative abundance of specimens. The holotypes of the species *Heterohelix suwalkensis* sp. n. and *Heterohelix varsoviensis* sp. n. come from the borehole Jeleniewo 1/V located on the Mazury-Suwałki elevation. The species *Bolivina witwickae* sp. n. has been noted on

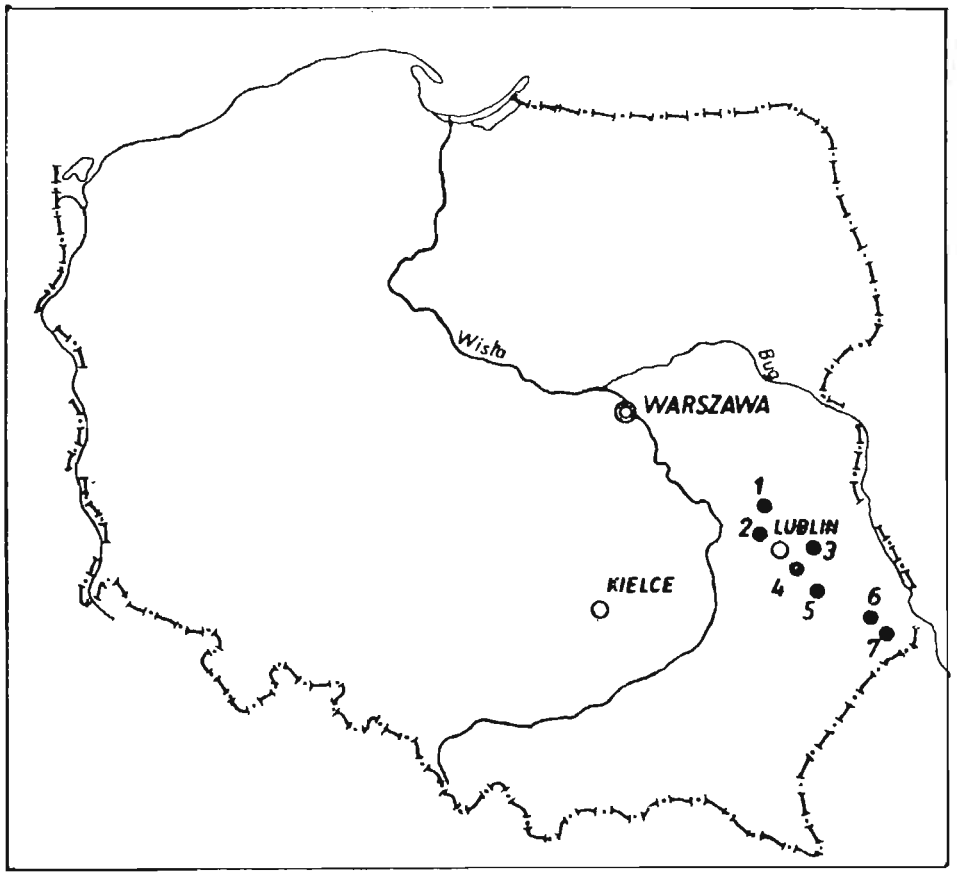


Fig. 1

Location of boreholes which yielded here described Campanian and Maastrichtian foraminifera
1—Lubartów IG 2, 2—Lublin IG 2, 3—Dorohucza IG 5, 4—Piaski IG 1, 5—Gorzków IG 1
6—Tyszowce IG 1, 7—Teatlyn IG 1.

the Lublin Upland (Telatyn IG 1). This taxon is most abundant in Orzechów IG 6, located several kilometers north of the northern margin of the Lublin Upland. Some taxa have been previously described (GAWOR-BIEDOWA 1987). The sequences have been divided into foraminiferal zones, and zones characteristic for the Upper Cretaceous deposits of the Polish Lowlands distinguished in the particular boreholes (Tables 1a—b, 2a—c and 3a—c). The established zones have also been correlated with macrofaunistic and microfaunistic zones from other areas of Poland and other regions of the world (figs. 3 and 4). Lithological profiles, as well as correlation boundaries of lithostratigraphic and biostratigraphic units were established by KRASSOWSKA (1976, 1986, unpublished reports 1976—1982). The macrofauna was determined by BŁASZKIEWICZ (unpublished reports 1976—1982).

Acknowledgements. — My warmest thanks are due to ALEKSANDRA KRASSOWSKA (State Geological Institute) for co-operation concerning various aspects of Upper Cretaceous stratigraphy and for permission to publish her lithological profiles. The invaluable help, during a dozen years, of ANDRZEJ BŁASZKIEWICZ (State Geological Institute) in correlation of microfaunistic with macrofaunistic zones in the Polish Lowlands, and his determination of macrofauna from the investigated boreholes, is greatly appreciated. KRZYSZTOF RADLICZ (State Geological Institute) kindly helped me in investigating the microstructure of some of the foraminifera described. Dr. ROLAND GOLDRING (University of Reading) has kindly improved the English of the General Part. JANINA MODRZEJEWSKA prepared the photographs. I am deeply grateful to all of them.

LITHOLOGY AND STRATIGRAPHY

The Campanian and Maastrichtian deposits have been only partly cored (fig. 2) in the boreholes. Only Tyszowce IG 1 has been totally cored. The remaining partly cored wells have been a source of interesting paleontological materials, even more interesting than that from Tyszowce IG 1. Most of the new species have been erected on the basis of specimens found in the Campanian and Maastrichtian in Telatyn IG 1 and Lublin IG 2, and they are less

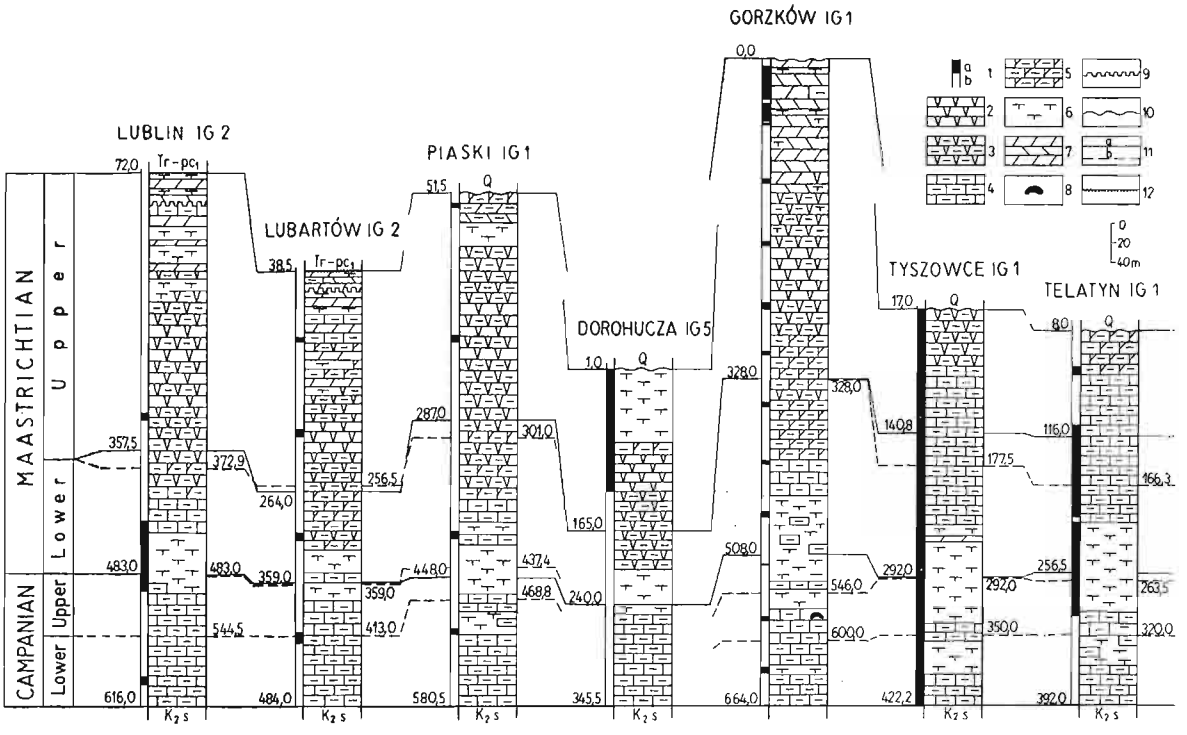


Fig. 2

Lithological and stratigraphical sections of the Campanian and Maastrichtian deposits.
1 — cored interval: *a* — core, *b* — detrital samples; 2 — chalk; 3 — marly chalk; 4 — marly limestone; 5 — chalk-like marly limenstone; 6 — marls; 7 — opokas; 8 — cherts; 9 — hard bottom; 10 — important dissolution surfaces; 11 — correlation surface: a—after KRASSOWSKA (1979, 1986, 1976—1988), depth in meters on the left, b-according to the author depth in meters on the right; 12 — stratigraphical lacune

common in Gorzków IG 1 and Dorohucz IG 5. In the last two wells new species have been encountered which were absent from other wells. Gorzków IG 1 is also interesting because sediments representing the uppermost Maastrichtian (corresponding to the Żyrzyn Beds) have been observed. Fortunately, the long cores from Lublin IG 2 and Telatyn IG 1 include the Campanian/Maastrichtian and Lower/Upper Maastrichtian boundaries (Telatyn IG 1), thus allowing determination of foraminiferal ranges, especially new species. Core of over 120 m length from Dorohucza IG 5 yielded a macrofauna including: *Hoploscaphites tenuistriatus* (KNER) at 100.10 m, and *Hoploscaphites constrictus constrictus* (SOWERBY) at 69.40 m, which also allowed correlation of stratigraphic ranges of foraminifera. Absence of foraminifera typical for the upper levels of the Upper Maastrichtian in this well supports the opinion that the absence of *Hoploscaphites constrictus crassus* (ŁOPUSKI) is not accidental. Boreholes Lubartów IG 2 and Piaski IG 1 were used for testing the presence of foraminifera species, especially new ones in the Lublin region. Lithological sections of these boreholes, as well as correlation boundaries

have been established by KRASSOWSKA 1976, 1986, archival materials from the years 1976—1988 based on debris samples, geophysical profiles and rare macro and microfaunistic data. Macrofauna from the same boreholes was studied by BŁASZKIEWICZ (unpublished reports 1976—1982) and the microfauna by the present author. The stratigraphic position of the deposits has been recognized, according to the zonation established in earlier papers by GAWOR-BIEDOWA (1984) and GAWOR-BIEDOWA and WITWICKA (1984). This foraminiferal zonation has been exactly correlated with macrofaunistic zonation by BŁASZKIEWICZ 1984a, b.

Campanian

Both substages of the Campanian have been recognized in the area studied. Campanian foraminifera were found in Tyszowce IG 1, Gorzków IG 1, Lublin IG 2 and, to the smaller degree, Lubartów IG 2. Piaski IG 1 yielded foraminifera only from the Lower Campanian and Telatyn IG 1 from only the Upper Campanian.

Lower Campanian deposits

The lower Campanian consists mostly of grey marly limestones with discrete laminae of green marl (Lublin IG 2 and Lubartów IG 2), and subordinate marls (Gorzków IG 1, Piaski IG 1). Marly limestones are present only in the lower part of the profile in Tyszowce IG 1 and Telatyn IG 1, whereas in the upper part marle dominate.

The following species have been recognized: *Cibicidoides involutus* (REUSS), *Stensioeina clementiana* (d'ORBIGNY), *Gavelinella stelligera* (MARIE), *Bolivinoides decoratus* (JONES), *B. laevigatus* MARIE, *Globorotalites michelinianus* (d'ORBIGNY), *G. multiseptus* (BROTZEN), *Stensioeina exculpta* (REUSS), *S. gracilis* BROTZEN, and in higher strata: *Gavelinella monterelensis* (MARIE), *Bolivinoides mielnicensis* BIEDA and *B. pustulatus* REISS, apart from numerous foraminifera having long stratigraphical ranges. On this basis the deposits have been considered as lower Campanian in age. A Santonian age of these deposits is excluded because *Cibicidoides involutus* (REUSS) occurs only in the Campanian and Maastrichtian of other regions, such as the Polish Lowlands (GAWOR-BIEDOWA 1984, GAWOR-BIEDOWA and WITWICKA 1984), the Russian Platform and other areas of the USSR (VASSILENKO 1954, GORBENKO 1974, KAPTARENKO-TSHERNOUSOWA *et al.* 1979). Further, *Gavelinella stelligera* (MARIE), known from the Polish Lowland and the British Isles (HART *et al.* 1981), is considered lower Campanian (*sensu* BŁASZKIEWICZ 1984a, b) in age, as it has never been found higher than the *Gonioteuthis quadrata* Zone. However, HART *et al.* (1981) use a tripartite division of the Campanian, and include the *Gonioteuthis quadrata* Zone within the middle Campanian. Finally, all the foraminifera listed above form an assemblage characteristic for lower Campanian deposits (GAWOR-BIEDOWA 1984, GAWOR-BIEDOWA and WITWICKA 1984).

Eleven of the 52 foraminifera species of the lower Campanian represent planktonic forms, 15 arenaceous-benthic and 26 calcareous benthic forms. First records of the following genera for the lower Campanian of the Lublin region are: *Telatynella* GAWOR-BIEDOWA, 1987, *Varsoviella* GAWOR-BIEDOWA, 1987, *Cribrebella* GAWOR-BIEDOWA, 1989 nom. nov., *Lublina* GAWOR-BIEDOWA, 1989 nom. nov. and *Biedafranciszkina* gen. n. Species encountered in this region for the first time include: *Hedbergella telatynensis* sp. n., *Telatynella telatynensis* GAWOR-BIEDOWA, 1987, *T. clavata* GAWOR-BIEDOWA, 1987, *Eponides dorsoconvexus* GAWOR-BIEDOWA, 1992, *Varsoviella pazdroae* GAWOR-BIEDOWA, 1987, *Gavelinella postthalmanni* sp. n., *Quadrimorphina varsoviensis* sp. n., *Anomalina incognita* sp. n., *Arenobulimina minutissima* sp. n., *Cribrebella lacrima* (GAWOR-BIEDOWA, 1987), *Ellipsoidella polonica* GAWOR-BIEDOWA, 1992, *Ellipsodimorphina cretacea* GAWOR-BIEDOWA, 1992, *Gavelinella tenuissima* GAWOR-BIEDOWA, 1992, *Lublina lublinensis* (GAWOR-BIEDOWA, 1987), *Ellipsoidella ovata* GAWOR-BIEDOWA, 1992, *Ellipsodimorphina*

Table 1 (a—b)

Foraminifers recorded from the Campanian and Maastrichtian of Eastern Poland

18	*Gyroidinoides nitidus*	101	*Gavelinella pertusa*
164	*Hedbergella holmdelensis*	102	*Rosita contusa*
52	*Hedbergella telatynensis sp.n.*	103	*Telatynella clavata*
11	*Heterohelix carinata*	104	*Tritaxia dubia*
149	*Heterohelix glabrans*	105	*Voloshinovella laffittei*
13	*Heterohelix globocarinata*	106	*Voloshinovella conica*
32	*Heterohelix moremani*	107	*Globotruncanella minuta*
117	*Heterohelix navarroensis*	108	*Telatynella telatynensis*
27	*Heterohelix planata*	109	*Arenobulimina minutissima sp.n.*
44	*Heterohelix pseudoglobulosa*	110	*Voloshinovella aquisgranensis*
70	*Heterohelix pseudotessera*	111	*Pyramidina pseudospinulosa*
23	*Heterohelix pulchra*	112	*Eponides frankei*
24	*Heterohelix punctulata*	113	*Verneuilina muensteri*
42	*Heterohelix robusta*	114	*Eouvigerina serrata*
186	*Heterohelix semicostata*	115	*Pseudotextularia elegans*
99	*Heterohelix striata*	116	*Ceratocancris caspia*
26	*Heterostomella foveolata*	117	*Heterohellx navarroensis*
120	*Heterostomella laevigata*	118	*Biedafranciszkina polonica sp.n.*
139	*Heterostomella leopolitana*	119	*Abathomphalus intermedius*
93	*Heterostomella rugosa*	120	*Heterostomella laevigata*
193	*Lituola cf. diformis*	121	*Tritaxia eggeri*
194	*Lituola sp.*	122	*Eponides dorsoconvexus*
53	*Loxostomum elcyl*	123	*Angulogavelinella gracilis*
46	*Lublina lublinensis*	124	*Neoflabellina reticulata*
7	*Marginotruncana bulloides*	125	*Pseudouvigerina cristata*
20	*Marginotruncana linnetana*	126	*Nodosarella subnodosa*
37	*Marginotruncana marginata*	127	*Globorotalites emdyensis*
124	*Neoflabellina reticulata*	128	*Cibicidoides bembix*
126	*Nodosarella subnodosa*	129	*Eponides concinna*
140	*Nodosarella suturicostata*	130	*Orbignyna ruegensis*
62	*Orbignyna inflata*	131	*Ellipsoidella polonica*
59	*Orbignyna ovata*	132	*Gyroidinoides girardan*
130	*Orbignyna ruegensis*	133	*Globotruncanella havanensis*
177	*Orbignyna sachert*	134	*Arenobulimina elevata*
146	*Orbignyna simplex*	135	*Bolivinoides dentatus sp.n.*
17	*Orbignyna variabilis*	136	*Ataxophragmium fartile*
1	*Osangularia cordieriana*	137	*Praebulimina ventricosa*
158	*Osangularia navarroana*	138	*Tappanina tuberosa*
180	*Osangularia peracuta*	139	*Heterostomella leopolitana*
176	*Plectina convergens*	140	*Nodosarella suturicostata*
175	*Plectina lenis*	141	*Gavelinella complanata*
67	*Plectina ruthenica*	142	*Stensioeina cf. diction*
135	*Pleurostomella pseudocurta*	143	*Tappanina selmensis*
56	*Pleurostomella subnodosa*	144	*Globotruncanella pschadae*
161	*Pleurostomella wadowicensis*	145	*Silicosigmoilina cf. perplexa*
185	*Praebulimina arcadelphiana*	146	*Orbignyna simplex*
179	*Praebulimina asperoaculeata*	147	*Bolivina decurrens*
76	*Praebulimina carseyae*	148	*Coryphostomella lublinensis*
40	*Praebulimina laevis*	149	*Heterohelix glabrans*
38	*Praebulimina obtusa*	150	*Stensioeina beccariiformis*
98	*Praebulimina parvula*	151	*Bolivinoides peterssoni*
198	*Praebulimina pusilla*	152	*Bolivinoides paleocenicus*
12	*Praebulimina reussi*	153	*Coryphostoma plaita*
137	*Praebulimina ventricosa*	154	*Gavelinella gankinoensis*
184	*Praeglobobulimina imbricata*	155	*Pleurostomella pseudocurta*
197	*Pseudoguembelina costulata*	156	*Eouvigerina gracilis*
115	*Pseudotextularia elegans*	157	*Bolivina crassa*
125	*Pseudouvigerina cristata*	158	*Osangularia navarroana*
51	*Pseudouvigerina rugosa*	159	*Bolivinoides draco*
25	*Pullenia cretacea*	160	*Gavelinella sahlstroemi*
54	*Pullenia jarvisi*	161	*Pleurostomella wadowicensis*
178	*Pyramidina minuta*	162	*Gavelinella acuta*
111	*Pyramidina pseudospinulosa*	163	*Globigerinelloides multispinus*
100	*Pyramidina rudita*	164	*Hedbergella holmdelensis*
39	*Pyramidina triangularis*	165	*Gavelinella danica*
49	*Quadrimorphina varsoviensis sp.n.*	166	*Dorothia pupa*
102	*Rosita contusa*	167	*Dorothia irregularis*
16	*Rosita fornicata*	168	*Frondicularia biformis*
33	*Rosita plummerae*	169	*Spiroplectammina baudouiniana*
79	*Rugoglobigerina hexacamerata*	170	*Bolivinoides giganteus*
78	*Rugoglobigerina milamensis*	171	*Eggerellina brevis*
77	*Rugoglobigerina rugosa*	172	*Cribrebella ovata*
188	*Rzehakina inclusa*	173	*Globulina lacrima*
145	*Silicosigmoilina cf. perplexa*	174	*Gaudryina frankei*
169	*Spiroplectammina baudouiniana*	175	*Plectina lenis*
195	*Spiroplectammina dentata*	176	*Plectina convergens*
21	*Spiroplectammina rosula*	177	*Orbignyna sacheri*
191	*Spiroplectammina suturalis*	178	*Pyramidina minuta*
150	*Stensioeina beccariiformis*	179	*Praebulimina asperoaculeata*
28	*Stensioeina clementiana*	180	*Osangularia peracuta*
148	*Stensioeina cf. diction*	181	*Ataxophragmium lvovense*
3	*Stensioeina exsculpta*	182	*Ellipsoidella divergens*
2	*Stensioeina gracilis*	183	*Anomalinoides pinguis*
15	*Stensioeina pommerana*	184	*Praeglobobulimina imbricata*
143	*Tappanina selmensis*	185	*Praebulimina arcadelphiana*
138	*Tappanina tuberosa*	186	*Heterohelix semicostata*
103	*Telatynella clavata*	187	*Ellipsodimorphina rara*
188	*Telatynella telatynensis*	188	*Rzehakina inclusa*
104	*Tritaxia dubia*	189	*Ataxophragmium depressum*
121	*Tritaxia eggeri*	190	*Alabamina dorsoplana*
50	*Trochammina globigeriniformis*	191	*Spiroplectammina suturalis*
85	*Valvulineria laevis*	192	*Arenobulimina obesa*
8	*Varsovella pazdroae*	193	*Lituola cf. diformis*
113	*Verneuilina muensteri*	194	*Lituola sp.*
110	*Voloshinovella aquisgranensis*	195	*Spiroplectammina dentata*
106	*Voloshinovella conica*	196	*Gavelinella costulata*
105	*Voloshinovella laffitei*	197	*Pseudoguembelina costulata*
41	*Whiteinella baltica*	198	*Praebulimina pusilla*

R – 1–4 specimens, C – 5–14 specimens, A – > 40 specimens

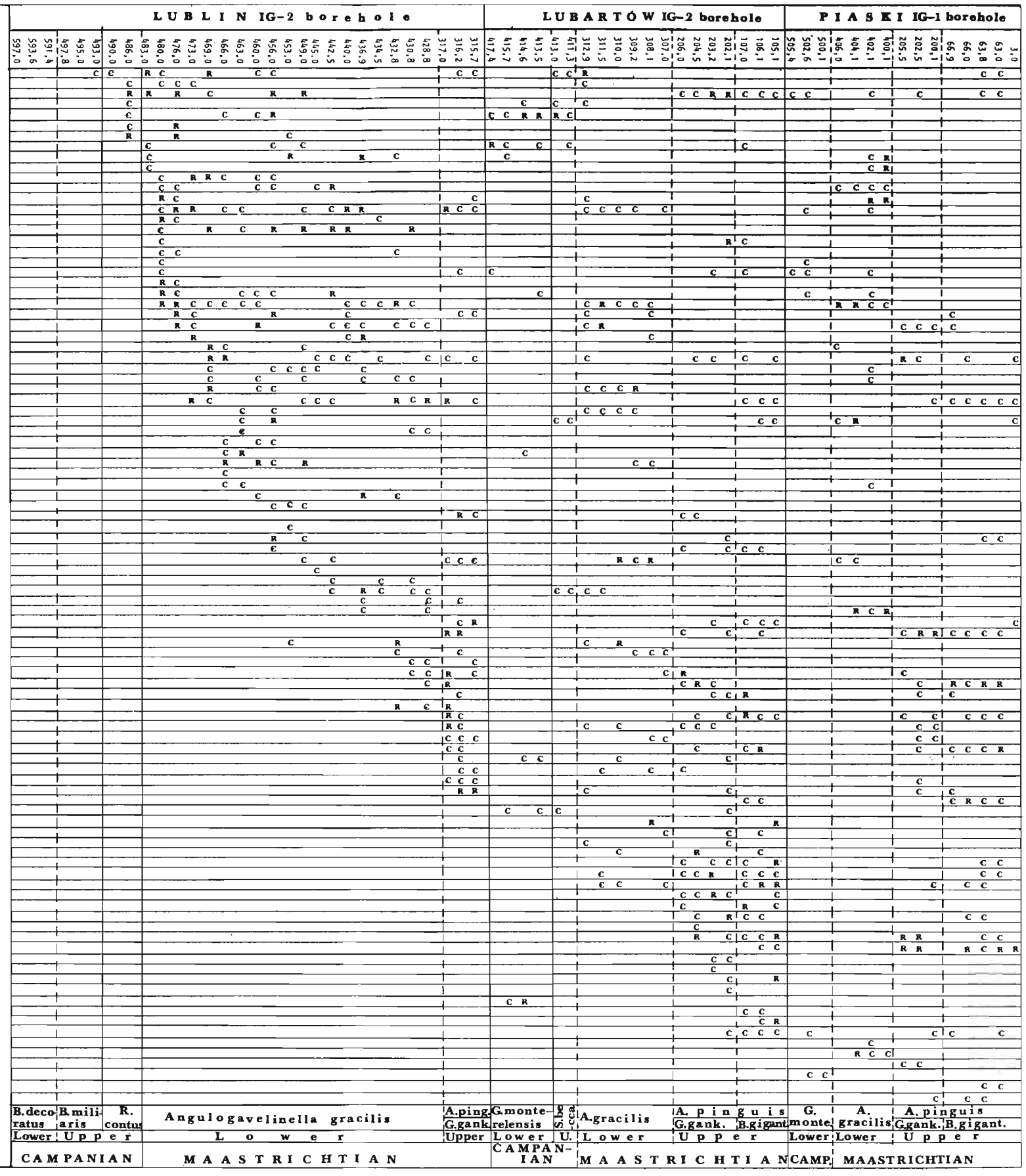
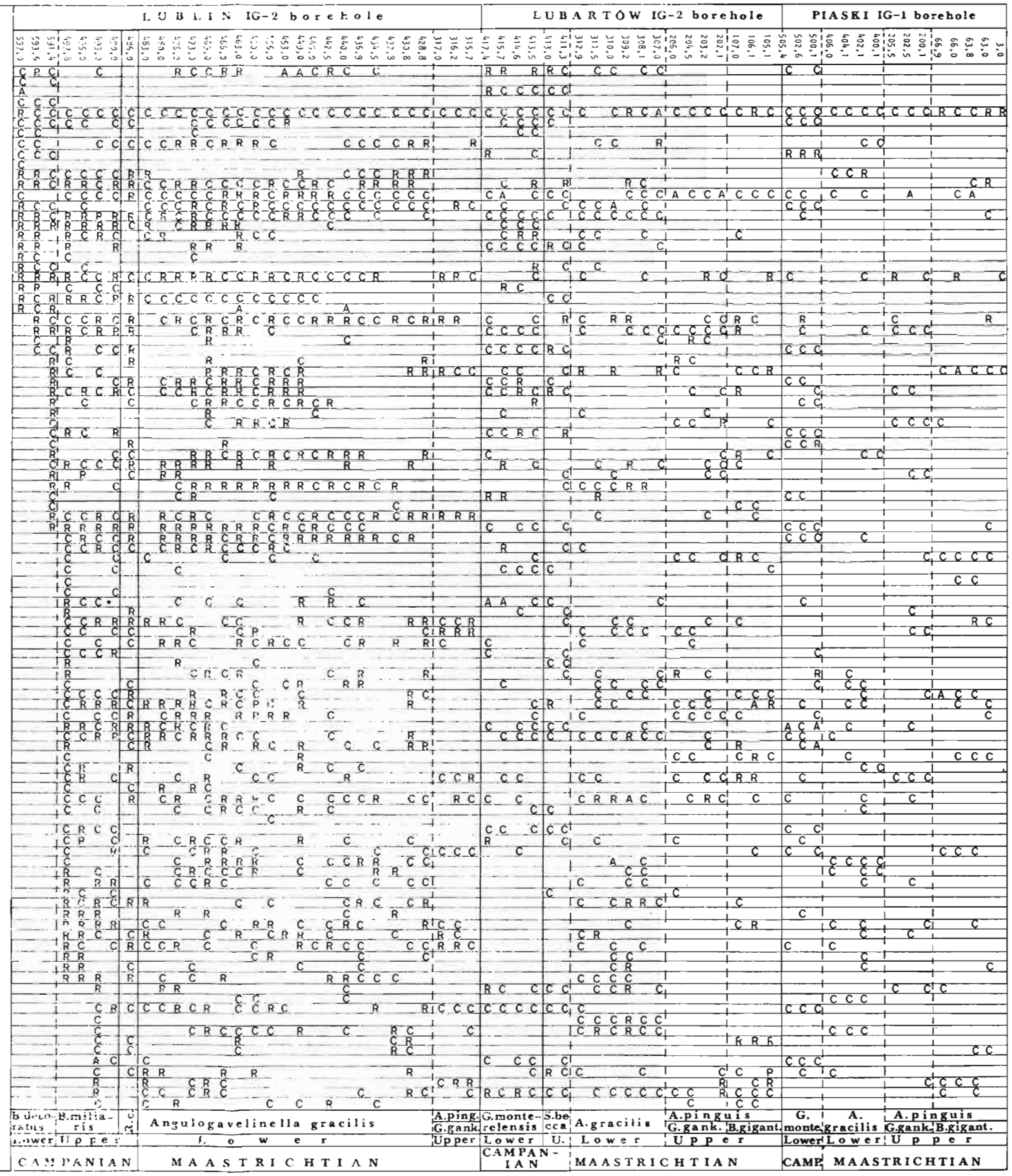


Table 1b

119	*Abathomphalus intermedius*
190	*Alabamina dorsoplana*
73	*Allomorphina polonica sp.n.*
84	*Allomorphina trochoides*
95	*Allomorphinella contraria*
90	*Allomorphinella lublinensis sp.n.*
123	*Angulogavelinella gracilis*
63	*Anomalina incognita sp.n.*
183	*Anomalinoides pinguis*
19	*Archaeoglobigerina cretacea*
35	*Arenobulimina conica*
97	*Arenobulimina cuneata*
134	*Arenobulimina elevata*
109	*Arenobulimina minutissima sp.n*
192	*Arenobulimina obesa*
34	*Arenobulimina preslii*
29	*Arenobulimina puschi*
48	*Arenobulimina sphaerica*
66	*Arenobulimina vialovi*
30	*Ataxophragmium crassum*
189	*Ataxophragmium depressum*
136	*Ataxophragmium fartile*
181	*Ataxophragmium lvovense*
94	*Ataxophragmium rimosum*
81	*Biedafranciszkina beaumonti*
118	*Biedafranciszkina polonica sp.n.*
157	*Bolivina crassa*
147	*Bolivina decurrens*
61	*Bolivina incrassata*
58	*Bolivinoides clavatus*
22	*Bolivinoides decoratus*
135	*Bolivinoides dentatus sp.n.*
159	*Bolivinoides draco*
170	*Bolivinoides giganteus*
89	*Bolivinoides laevigatus*
74	*Bolivinoides miclnicensis*
88	*Bolivinoides miliaris*
152	*Bolivinoides paleocenicus*
151	*Bolivinoides peterssoni*
75	*Bolivinoides pustulatus*
86	*Bolivinoides sidestrandensis*
116	*Ceratocancris caspia*
128	*Cibicidoides bembix*
6	*Cibicidoides eriksdalensis*
5	*Cibicidoides involutus*
60	*Cibicidoides voltzianus*
153	*Coryphostoma plaita*
148	*Coryphostomella lublinensis*
43	*Cribrebella lacrima*
172	*Cribrebella ovata*
167	*Dorothia irregularis*
166	*Dorothia pupa*
171	*Eggerellina brevis*
187	*Ellipsodimorphina rara*
182	*Ellipsoidella divergens*
80	*Ellipsoidella gracillima*
92	*Ellipsoidella kugleri*
131	*Ellipsoidella polonica*
156	*Eouvigerina gracilis*
114	*Eouvigerina serrata*
14	*Eponides biconvexus*
129	*Eponides concinna*
122	*Eponides dorsoconvexus*
112	*Eponides frankei*
65	*Eponides karsteni*
168	*Frondicularia biformis*
174	*Gaudryina frankei*
87	*Gaudryina pyramidata*
68	*Gaudryina rugosa*
162	*Gavelinella acuta*
141	*Gavelinella complanata*
196	*Gavelinella costulata*
165	*Gavelinella danica*
154	*Gavelinella gankinoensis*
96	*Gavelinella monterelensis*
101	*Gavelinella pertusa*
57	*Gavelinella postthalmanni sp.n.*
160	*Gavelinella sahlstroemi*
9	*Gavelinella stelligera*
82	*Gavelinella tenuissima*
64	*Gavelinella umbilicatula*
10	*Gavelinella vombensis*
55	*Globigerinelloides abberantus*
71	*Globigerinelloides asperus*
72	*Globigerinelloides ehrenbergi*
163	*Globigerinelloides multispinus*
127	*Globorotalites emdyensis*
4	*Globorotalites michelinianus*
36	*Globorotalites multiseptus*
91	*Globotruncana arca*
47	*Globotruncana obliqua*
45	*Globotruncana rugosa*
133	*Globotruncanella havanensis*
107	*Globotruncanella minuta*
144	*Globotruncanella pschadae*
173	*Globulina lacrima*
31	*Goesella rugosa*
83	*Guttulina trigonula*
132	*Gyroidinoides girardanus*
69	*Gyroidinoides globosus*
1	*Osangularia cordieriana*
2	*Stensioeina gracilis*
3	*Stensioeina exsculpta*
4	*Globorotalites michelinianus*
5	*Cibicidoides involutus*
6	*Cibicidoides eriksdalensis*
7	*Marginotruncana bulloides*
8	*Varsoviella pazdroae*
9	*Gavelinella stelligera*
10	*Gavelinella vombensis*
11	*Heterohelix carinata*
12	*Praebulimina reussi*
13	*Heterohelix globocarinata*
14	*Eponides biconvexus*
15	*Stensioeina pommerana*
16	*Rosita fornicata*
17	*Orbignyna variabilis*
18	*Gyroidinoides nitidus*
19	*Archaeoglobigerina cretacea*
20	*Marginotruncana linneiana*
21	*Spiroplectammina rosula*
22	*Bolivinoides decoratus*
23	*Heterohelix pulchra*
24	*Heterohelix punctulatas*
25	*Pullenia cretacea*
26	*Heterostomella foveolata*
27	*Heterohelix planata*
28	*Stensioeina clementiana*
29	*Arenobulimina puschi*
30	*Ataxophragmium crassum*
31	*Goesella rugosa*
32	*Heterohelix moremani*
33	*Rosita plummerae*
34	*Arenobulimina preslii*
35	*Arenobulimina conica*
36	*Globorotalites multiseptus*
37	*Marginotruncana marginata*
38	*Praebulimina obtusa*
39	*Pyramidina triangularis*
40	*Praebulimina laevis*
41	*Whiteinella baltica*
42	*Heterohelix robusta*
43	*Cribrebella lacrima*
44	*Heterohelix pseudoglobalosa*
45	*Globotruncana rugosa*
46	*Lublina lublinensis*
47	*Globotruncana obliqua*
48	*Arenobulimina sphaerica*
49	*Quadrimorphina varsoviensis sp.n.*
50	*Trochammina globigeriniformis*
51	*Pseudouvigerina rugosa*
52	*Hedbergella telatynensis sp.n.*
53	*Loxostomum eleyi*
54	*Pullenia jarvisi*
55	*Globigerinelloides abberantus*
56	*Pleurostomella subnodosa*
57	*Gavelinella postthalmanni sp.n.*
58	*Bolivinoides clavatus*
59	*Orbignyna ovata*
60	*Cibicidoides voltzianus*
61	*Bolivina incrassata*
62	*Orbignyna inflata*
63	*Anomalina incognita sp.n.*
64	*Gavelinella umbilicatula*
65	*Eponides karsteni*
66	*Arenobulimina vialovi*
67	*Plectina ruthenica*
68	*Gaudryina rugosa*
69	*Gyroidinoides globosus*
70	*Heterohelix pseudotessera*
71	*Globigerinelloides asperus*
72	*Globigerinelloides ehrenbergi*
73	*Allomorphina polonica sp.n.*
74	*Bolivinoides miclnicensis*
75	*Bolivinoides pustulatus*
76	*Praebulimina carseyae*
77	*Rugoglobigerina rugosa*
78	*Rugoglobigerina milamensis*
79	*Rugoglobigerina hexacamerata*
80	*Ellipsoidella gracillima*
81	*Biedafranciszkina beaumonti*
82	*Gavelinella tenuissima*
83	*Guttulina trigonula*
84	*Allomorphina trochoides*
85	*Valvulineria laevis*
86	*Bolivinoides sidestrandensis*
87	*Gaudryina pyramidata*
88	*Bolivinoides miliaris*
89	*Bolivinoides laevigatus*
90	*Allomorphinella lublinensis sp.n.*
91	*Globotruncana arca*
92	*Ellipsoidella kugleri*
93	*Heterostomella rugosa*
94	*Ataxophragmium rimosum*
95	*Allomorphinella contraria*
96	*Gavelinella monterelensis*
97	*Arenobulimina cuneata*
98	*Praebulimina parvula*
99	*Heterohelix striata*
100	*Pyramidina radita*

R – 1–4 specimens, C – 5–40 specimens, A – > 40 specimens



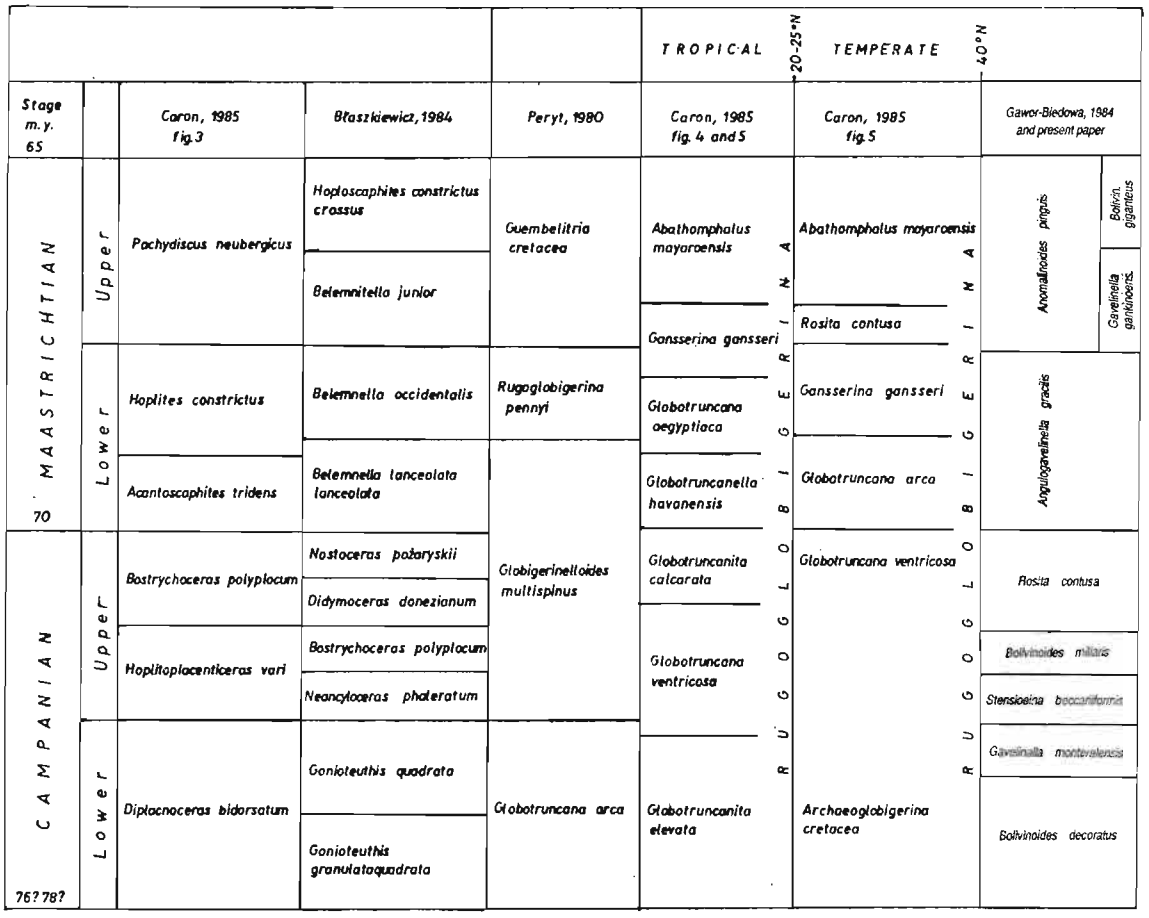


Fig. 3

Correlation table

hrubieszowiensis GAWOR-BIEDOWA, 1992, *Nodosarella suturicostata* GAWOR-BIEDOWA, 1992, *Fursenkoina polonica* GAWOR-BIEDOWA, 1992. Most of these species range into the upper Maastrichtian (Table 3). However, numerous foraminifera, such as *Ellipsodimorphina cretacea* GAWOR-BIEDOWA, 1992, *Gavelinella tenuissima* GAWOR-BIEDOWA, 1992, *Lublina lublinensis* (GAWOR-BIEDOWA, 1987), *Eponides dorsoconvexus* GAWOR-BIEDOWA, 1992. *Ellipsodimorphina hrubieszowiensis* GAWOR-BIEDOWA, 1992, *Nodosarella suturicostata* GAWOR-BIEDOWA, 1992 and *Fursenkoina polonica* GAWOR-BIEDOWA, 1992, do not cross the boundary of the lower Maastrichtian.

Borehole Lublin IG 2 yielded samples representing the lower part of the lower Campanian, i.e. *Bolivinoides decoratus* Zone (GAWOR-BIEDOWA 1984). Boreholes Tyszowce IG 1, Piaski IG 1, Lubartów IG 2 and Gorzków IG 1 include the lower Campanian *Gavelinella monterelensis* Zone (Tables 1 and 2). Lower Campanian deposits have not been cored in Dorohucza IG 5 and Telatyn IG 1 boreholes.

Upper Campanian

The upper Campanian is developed in most cases as marly limestone, often with marly laminae and streaks, sometimes with black chert, in the top passing into marls (Lublin IG 2, Lubartów IG 2, Piaski IG 1). In the south (Tyszowce IG 1 and Telatyn IG 1) marly limestones characterize only the lower part of the section, the rest being developed as marls.

These deposits have been attributed to the upper Campanian as they contain, together with such species as *Stensioeina clementiana* (d'ORBIGNY), *S. exculpta* (REUSS), *S. gracilis* BROTZEN which do not occur in the Maastrichtian (HART *et al.* 1981, KOCH 1977, GAWOR-BIEDOWA and WITWICKA 1984), *Bolivina incrassata* REUSS, *Stensioeina beccariiformis* (WHITE) and *Rosita contusa* (CUSHMAN). *Bolivina incrassata* REUSS appears, both in the Boreal and Mediterranean zones, in the upper Campanian (SLITER 1968, GORBENKO 1974, KOCH 1977, HART *et al.* 1981, KAPTARENKO-TSCHERNOUSOVA *et al.* 1979, GAWOR-BIEDOWA and WITWICKA 1984). *Stensioeina beccariiformis* (WHITE) ranges from the *Neancyloceras phaleratum* Zone, according to the zonation by BŁASZKIEWICZ (1984) and GAWOR-BIEDOWA and WITWICKA (1984) in the Polish Lowlands. In the Outer Carpathians this species has been noted in the Campanian and Maastrichtian, and also probably in the Paleocene by LISZKOWA and MORGIEL (1984) who, however, did not

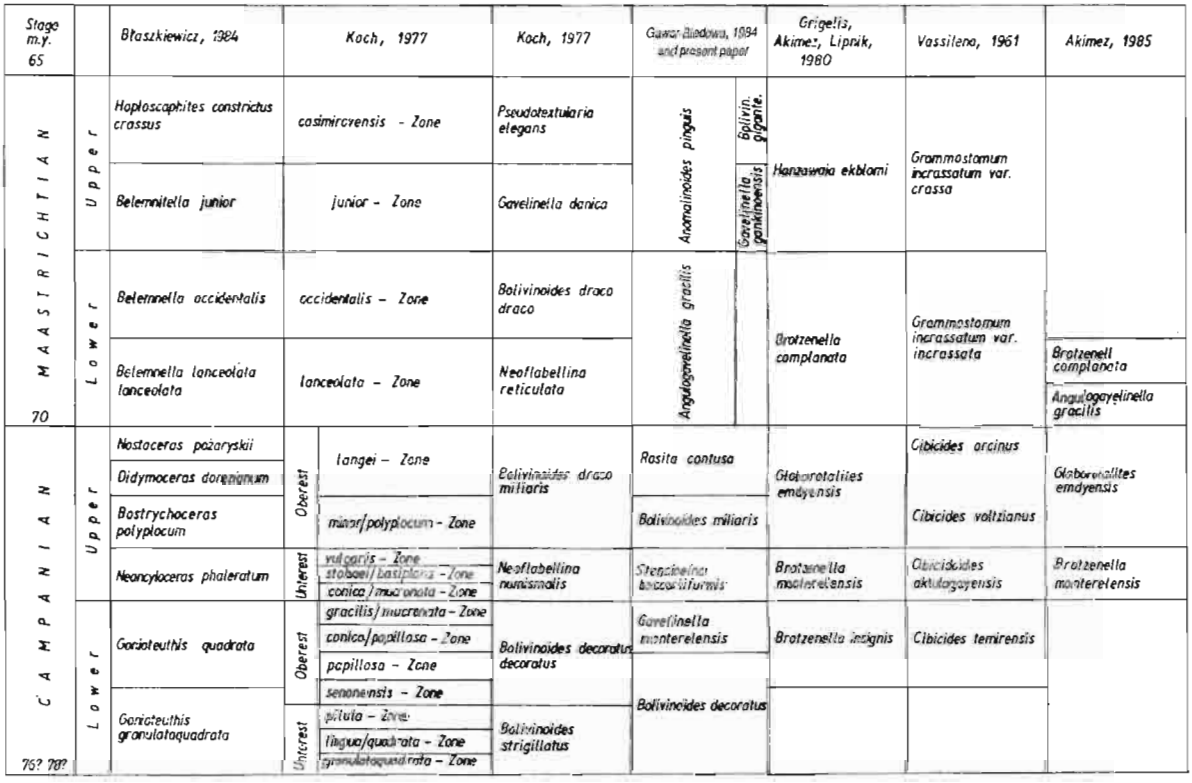


Fig. 4

Correlation table

subdivide the Campanian. BROTZEN (1945) had found specimens of this species in the Maastrichtian deposits in borehole Höllviken, and determined them as *Pseudouvalvulineria vombensis* (*recte Gavelinella*, see page 173). It is also described from Paleocene of the Polish Carpathians, where it is common (SZCZECHURA and POŻARYSKA 1974). *Rosita contusa* (CUSHAMN) was recorded for the first time in upper Campanian deposits by POŻARYSKI and WITWICKA (1956). Later, it was described and illustrated from the upper Campanian from Mielnik in the Polish Lowlands (BIEDA 1958). The age of deposits containing this species in Mielnik was confirmed by POŻARYSKI (1960) and PERYT (1981). Correlation of its stratigraphical range, in the Polish Lowlands, with the standard macrofaunistic zonation of BŁASZKIEWICZ (1984), was presented by GAWOR-BIEDOWA and WITWICKA (1984). It is thus inter-

Table 2 (a—c)

Foraminifers recorded from the Campanian and Maastrichtian of Eastern Poland

Sampled depths (m):

Borehole	Depths
TYSZOWCE IG-1 borehole	360,0; 350,0; 345,0; 340,0; 335,0; 330,0; 325,0; 320,0; 315,0; 294,0; 290,0; 280–282,0; 266,0; 240,0; 235–230,0; 210–200,0; 195,0; 190,0; 185,0; 180,0; 175,0; 170,0; 160,0; 158,0; 153,0; 150,0; 142,0; 135,0; 128,0; 125,0; 120,0; 110,0; 105,0; 95,0; 85,0; 65,0–60,0; 55,0
GORZKÓW IG-1 borehole	631,0; 628,0; 574,0; 572,7; 519,0; 469,2; 465,2; 412,5; 355,0; 302,0; 255,0; 251,0; 190,0; 147,0; 126,5; 65,0; 63,0; 57,6; 49,0; 41,0; 38,0; 32,2; 24,0; 17,2; 12,3; 10,8; 8,0
TELATYN IG-1 borehole	295,8; 294,1; 289,1; 285,0; 282,1; 279,0; 275,0; 271,5; 268,0; 265,0; 262,0; 259,1; 257,5; 254,5; 253,1; 246,0; 242,0; 239,0; 236,0; 231,0; 227,0; 222,5; 218,0; 206,0; 200,0; 195,0; 190,0; 183,5; 181,0; 178,0; 154,2; 153,0; 152,0; 127,5; 126,5; 100,5; 47,5; 47,0; 35,0; 25,0; 10,0
DOROHUCZA IG-5 borehole	95,0; 85,0; 75,0; 68,0; 65,4; 56,3; 47,0; 41,0; 27,0; 21,0; 7,2

Zones and stratigraphy:

Borehole	Campanian	Maastrichtian
TYSZOWCE IG-1	L.: G. mon.; Upper: S. becc., R. mil., R. contusa	Lower: A. gracilis; Upper: Anomalinoides pinguis (G. gankinoensis, B. gigant.)
GORZKÓW IG-1	L.: G. mon.; U.: R. con.	Lower: A. gracilis; Upper: Anomalinoides pinguis (G. gankinoen., Bolivinoides giganteus)
TELATYN IG-1	Upper: Rosita contusa	Lower: Angulogavelinella gracilis; Upper: A. pinguis (G. gankinoen., B. gigant.)
DOROHUCZA IG-5	—	Upper: A. pinguis, G. gankinoensis

Occurrences (marks per borehole, listed left to right in order of decreasing depth):

No.	Species (alphabetical index)	No.	Species	Tyszowce	Gorzków	Telatyn	Dorohucza
1	*Abathomphalus intermedius*	1	*Abathomphalus intermedius*	C C C C C C	C	C	
129	*Allomorphina polonica* sp.n.	2	*Hedbergella telatynensis* sp.n.	C C C C C C C C C A	C C C C	C C R C C C C C C C C C C	
24	*Allomorphina trochoides*	3	*Gavelinella postthalmanni* sp.n.	C C C C C C	C	C C C	
182	*Allomorphinella contraria*	4	*Praebulimina reussi*	C R C C C C C R R R C R	C R C C C C C C C C R C C C	C C C C C C C R C C R C C C C R C C C C C	
133	*Allomorphinella lublinensis* sp.n.	5	*Heterohelix moremani*	R C C C R C C C C R C C C	C C	C C C C C C C C R C C R R R	C C C
132	*Angulogavelinella gracilis*	6	*Heterohelix carinata*	C C R A C C C C C C		C C C C C C C	C
85	*Anomalina incognita* sp.n.	7	*Heterohelix pseudoglobulosa*	C C C C C C C C C C C C C C C C C C A C C C C C C C C C C C	A A C C C C C C	C C C C C R C C C C C C C C C C C C C C C C C C C C C C	C C C R R R R R C C C
206	*Anomalinoides pinguis*	8	*Biedafranciszkina beaumonti*	C C C C R C C C C C C C C C	C C	C C C C C C C C C C C C C	
81	*Archaeoglobigerina cretacea*	9	*Telatynella telatynensis*	R R R R C C	A	C R C C	C C C
146	*Arenobulimina conica*	10	*Pseudotextularia elegans*	C C C C C C C C		C C C C C C C C C	
87	*Arenobulimina cuneata*	11	*Gavelinella monterelensis*	C R C R R C C R C C	C R C	C C C	
58	*Arenobulimina minutissima* sp.n.	12	*Heterohelix pseudotessera*	R C C C C C C C C	C A	C C C C C C A C C C C C C C C C	
140	*Arenobulimina obesa*	13	*Bolivinoides laevigatus*	R R C R C R C C R R C R R R R R R		C C C C C R C C C C	
145	*Arenobulimina preslii*	14	*Ellipsoidella divergens*	C	C		
19	*Arenobulimina puschi*	15	*Cibicidoides involutus*	C C C C C C C C C C C C C C C C C C C C C	C C C C C C C C C A C C C A C C C C C C C	C C C C C C C C C C C C C C C C C C C A C C A A C C C C C C C C C C C C	A C C C A C C C C A A
84	*Arenobulimina sphaerica*	16	*Stensioeina pommerana*	C C C C C C C C C C C C C C C C C C C C C C C C C	C C C A C C	C C C C C C C C C C C C C C C C C C C C C C C C	
88	*Arenobulimina vialovi*	17	*Globorotalites multiseptus*	C C C C	C	C C C	
244	*Ataxophragmium beisseli*	18	*Trochammina globigeriniformis*	C R C C C C C C R	C C	C C C C C C C	
100	*Ataxophragmium crassum*	19	*Arenobulimina puschi*	C C C C C	C	R R R R R R R R	
38	*Ataxophragmium depressum*	20	*Globotruncana arca*	C C C C C C C C C C C C C C	C C C	C C C R C C C C R R R R C C C	
197	*Ataxophragmium fartile*	21	*Globotruncana rugosa*	C C R R R C C	C C C C R R	R C C C C C C C C C R R R R R C C R	
204	*Ataxophragmium lvovense*	22	*Gaudryina rugosa*	C C C R R C R R C		C R C	
208	*Ataxophragmium rimosum*	23	*Heterostomella foveolata*	C C C R R R C R R R R	C C C C C	C C C C C C R R C C R R C C C C C C C	C
214	*Ataxophragmium variabile*	24	*Allomorphina trochoides*	A R R C R C C R C C C C C R R C C C R R R	C A A	C C C R C C C R C R C C C C R C C C	C
8	*Biedafranciszkina beaumonti*	25	*Osangularia cordieriana*	R R C R C C C C C C C	C C C C C C	C R C C C C C C C C R C C C C C C	
127	*Biedafranciszkina polonica* sp.n.	26	*Gavelinella umbilicatula*	C R C C C C C C C C C C C R R C C	C C	C R C C C C C C C C C C C C	
219	*Bolivina aleksandrae* sp.n.	27	*Stensioeina gracilis*	C R	C C		
180	*Bolivina crassa*	28	*Bolivinoides mielnicensis*	C C C			
168	*Bolivina decurrens*	29	*Eponides biconvexus*	C C C C R C C C C C C C C	C C C C	C C C C R C C C C C R C R	
108	*Bolivina incrassata*	30	*Heterohelix planata*	C C C C C C R	C C C	C R C R	
220	*Bolivina praecrenulata* sp.n.	31	*Pyramidina szajnochae*	C C		C R R	
231	*Bolivina witwickae* sp.n.	32	*Pullenia cretacea*	C C C C C C C C C R C C C C C C C R C C C C C C C C C C C	C C C C C R C C C C	C C C C C R R R C C R R R R R R C R R R R C R	C C C C C C R R R
91	*Bolivinoides clavatus*	33	*Pullenia jarvisi*	R C C C C C R R R C C C C C R C R R C	C C C C R R R	C R R R R R R C R R R R C R R C C R R C R R	C C C
68	*Bolivinoides decoratus*	34	*Globorotalites emdyensis*	C C C C C C	C	C C C G R C C C C R	
128	*Bolivinoides dentatus* sp.n.	35	*Globigerinelloides abberantus*	A C C C C C C C C C C C C C R C C C C C C C R	C C C A C	C R C C C C C C C C A C C C C C C C C C A C C C C C C C	A A C A
172	*Bolivinoides draco*	36	*Globigerinelloides asperus*	C C C C C C C C C C C C C C C C C C C C	C C C C C C	C R C C C C R C C C C R R C R R C C C R C C C C C C C C C C C R C C C	A C A C C
199	*Bolivinoides giganteus*	37	*Orbignyna variabilis*	C C C C C R C	C C C C	R R C	
13	*Bolivinoides laevigatus*	38	*Ataxophragmium depressum*	C		C	
28	*Bolivinoides mielnicensis*	39	*Gavelinella stelligera*	C R	C		
137	*Bolivinoides miliaris*	40	*Pseudouvigerina rugosa*	C C C C C C R R C	C C C	C R C C R R R C	C C
200	*Bolivinoides paleocenicus*	41	*Nodosarella subnodosa*	C C C C C C C C C	C C	C R R C R R C C C C	
189	*Bolivinoides peterssoni*	42	*Ellipsoidella polonica*	C R C R R C R C C C C C	C C	C C C C C C	
118	*Bolivinoides pustulatus*	43	*Ellipsoidella ovata*	R C		C C C C C	
143	*Bolivinoides sidestrandensis*	44	*Pleurostomella pseudocurta*	C C R	C	C C C R R C C C C C	
154	*Ceratocancris caspia*	45	*Ellipsoidella gracillima*	C C R C C R R R R	C	C R C C C C C C C	
64	*Cibicidoides bembix*	46	*Cribrebella lacrima*	C R R R R C C R R R R	C C C	C R C C R R R C C R R R C	C C
217	*Cibicidoides commatus*	47	*Ellipsodimorphina cretacea*	R R R		C R R R C	
61	*Cibicidoides eriksdalensis*	48	*Ellipsodimorphina hrubieszowiensis*	C C C R		R R R R C C	
15	*Cibicidoides involutus*	49	*Gavelinella tenuissima*	C R C R R R	C	C C C C C	
78	*Cibicidoides voltzianus*	50	*Pyramidina rudita*	C C		C C C C C C C C C C	
179	*Coryphostoma plaita*	51	*Quadrimorphina varsoviensis* sp. n.	R R R R C C	C C	C R C R R C R	
98	*Coryphostomella lublinensis*	52	*Eouvigerina serrata*	R A C R R R C R R R C C C C C C C C C A C C	C C C R C	C C C C C C C C C C C C C C R C C C C C C C C	A
134	*Coryphostomella telatynensis*	53	*Nodosarella suturicostata*	C A		C C C C C A	
121	*Cribrebella fusiformis*	54	*Pleurostomella subnodosa*	C R R R R R R C R R R R R C	C C	C C C C C C C C R C C R C C R R	
46	*Cribrebella lacrima*	55	*Lublina lublinensis*	C C C C C C R C A R	C C	C C C C C C C C C R R C R C C C C C R	C
187	*Cribrebella ovata*	56	*Heterohelix pulchra*	C R R C R C R C R A C C	C C	C R C C R R C C C R C C A C C R R C R C C C	C
160	*Dorothia irregularis*	57	*Eponides dorsoconvexus*	R C C R C C	C C	C C C A C C	
76	*Dorothia pupa*	58	*Arenobulimina minutissima* sp.n.	R C C R R R R R	C	C C C C C C R R C R C	
116	*Eggerellina brevis*	59	*Heterohelix punctulata*	R C C A		A C C C C C C C C C	
47	*Ellipsodimorphina cretacea*	60	*Fursenkoina polonica*	C C	C	C C R C C A	
48	*Ellipsodimorphina hrubieszowiensis*	61	*Cibicidoides eriksdalensis*	C C R C R C	C C	C C C C C C C C C C C C	
72	*Ellipsodimorphina pozaryskae* sp.n.	62	*Globorotalites michelinianus*	C	C C		
164	*Ellipsodimorphina rara*	63	*Goesella rugosa*	C C C R R C	C	C C C C C C C C C C	
233	*Ellipsodimorphina variabilis*	64	*Cibicidoides bembix*	C C C C C R C C C	R C C R R C R R R C C C C	C C C C C C C R C R C C C C C R C	A A C
173	*Ellipsoglandulina manifesta*	65	*Stensioeina clementiana*	C C A A C R R	R A R A R	C C C C C C R R C	
95	*Ellipsoglandulina varsoviensis*	66	*Valvulineria laevis*	R R C R C R R C C C C C R C C C C C C	C R R C C	C C C C C C R C C C C C C R C C C C R C C C C R C C C C C R C C	C C R R C C C
14	*Ellipsoidella divergens*	67	*Spiroplectammina rosula*	R C C C C C C C C R C C C C C C A C C C C C	C C C R R C C R C	C C C C R C R C R R R C C C C C R C C C C R C R C C C C C C R C	C C C C C C R C R
45	*Ellipsoidella gracillima*	68	*Bolivinoides decoratus*	C C R A C C		R R R C	
235	*Ellipsoidella inflatocamerata*	69	*Marginotruncana marginata*	C C C C C		A C C C	
126	*Ellipsoidella kugleri*	70	*Gyroidinoides nitidus*	C C C R C R C C C A C C	R R R R R	C C C C C C C C R R C R C R C C C R C R	
43	*Ellipsoidella ovata*	71	*Eponides concinna*	C C R R		C C C C C C R C R	
42	*Ellipsoidella polonica*	72	*Ellipsodimorphina pozaryskae* sp.n.	C	C		
153	*Eouvigerina gracilis*	73	*Heterohelix semicostata*	A A	A		
52	*Eouvigerina serrata*	74	*Pleurostomella wadowicensis*	C C C		C	
29	*Eponides biconvexus*	75	*Voloshinovella laffittei*	C C	C C		
71	*Eponides concinna*	76	*Dorothia pupa*	C C C C R C C C C C R		A	
57	*Eponides dorsoconvexus*	77	*Orbignyna ovata*	C C C C C C C R C C C		C C C C C C C C C R R C C	C C
147	*Eponides frankei*	78	*Cibicidoides voltzianus*	C C R R C R C C C C A C C C C	R C C C	C R R C R C C R C C C C C C C C R	
119	*Eponides karsteni*	79	*Pseudoguembelina costulata*	C C C C C C C C C	C C	C C C C C C C C R R C C C C C C R	C C
183	*Frondicularia biformis*	80	*Rosita fornicata*	C C C C C C C C C C		C C C C A C C C C R R C	
60	*Fursenkoina polonica*	81	*Archaeoglobigerina cretacea*	C C C C R R	C C	C C C C C C	C
193	*Gansserina gansseri*	82	*Plectina ruthenica*	R R R	C	C C R R C C R R R	C C C C
201	*Gaudryina frankei*	83	*Stensioeina beccariiformis*	R R R R C		C A C	
227	*Gaudryina laevis*	84	*Arenobulimina sphaerica*	C C C C R	C C R C R	C C R	C R R R R C C
87	*Gaudryina pyramidata*	85	*Anomalina incognita* sp.n.	C R R C C R C C R R R	R R C C R R	C C C R C C R R C	C C C R C
22	*Gaudryina rugosa*	86	*Gaudryina pyramidata*	C C C C R C C R R C	C C C	C C C C C C R R R C C	C C
195	*Gavelinella acuta*	87	*Arenobulimina cuneata*	C C C R C C C C C C C	C	A C C C C C R C C C R C C R	C
210	*Gavelinella costulata*	88	*Arenobulimina vialovi*	A R R C R R	C C	C C C C C C C R C C C R C C R C C R C C	
192	*Gavelinella danica*	89	*Gyrodinoides globosus*	A C C C C C C C C C C C C C C R C C C C C C C C R C	A A C C C	C C C C C C C R C R R R C R C R C C C R R C C C C R R R	C C C C
171	*Gavelinella gankinoensis*	90	*Heterohelix globocarinata*	C C C C C C C C C C A C	C C C C C	R C C C C C C C C C C A A C C C C C C C C	A C C R R
218	*Gavelinella mariae*	91	*Bolivinoides clavatus*	R R R C R R	C	C R R C R R	
11	*Gavelinella monterelensis*	92	*Quadrimorphina allomorphinoides*	R R R C C C C R C R	C C C	C C C C C C C C C C C C C C C C	C C
110	*Gavelinella pertusa*	93	*Marginotruncana linneiana*	C C C			
3	*Gavelinella postthalmanni* sp.n.	94	*Marginotruncana bulloides*	C R C		C C C	
190	*Gavelinella sahlstroemi*	95	*Ellipsoglandulina varsoviensis*	R C C R C C		C C C	
39	*Gavelinella stelligera*	96	*Globulina prisca*	C C C C C		C C C	
49	*Gavelinella tenuissima*	97	*Rugoglobigerina milamensis*	C A C C C C A C C C C C A R C	A C A C	C C C C C C C C C C C C C C C	C
26	*Gavelinella umbilicatula*	98	*Coryphostomella lublinensis*	C C	C C	C C C C C	
35	*Globigerinelloides abberantus*	99	*Rosita plummerae*	C C C C R	C C C	C C C R R R C C C C R	C C C
36	*Globigerinelloides asperus*	100	*Ataxophragmium crassum*	C C C R R C	C C	C C C C R C C C C R C C R C	C C C C

R – 1–4 specimens, C – 5–14 specimens, A – > 40 specimens

Table 2 (a—c)

Foraminifers recorded from the Campanian and Maastrichtian of Eastern Poland

1	*Abathomphalus intermedius*	1	*Abathomphalus intermedius*
129	*Allomorphina polonica sp.n.*	2	*Hedbergella telatynensis sp.n.*
24	*Allomorphina trochoides*	3	*Gavelinella postthalmanni sp.n.*
182	*Allomorphinella contraria*	4	*Praebulimina reussi*
133	*Allomorphinella lublinensis sp.n.*	5	*Heterohelix moremani*
132	*Augulogavelinella gracilis*	6	*Heterohelix carinata*
85	*Anomalina incognita sp.n.*	7	*Heterohelix pseudoglobulosa*
206	*Anomalinoides pinguis*	8	*Biedafranciszkina beaumonti*
81	*Archaeoglobigerina cretacea*	9	*Telatynella telatynensis*
146	*Arenobulimina conica*	10	*Pseudotextularia elegans*
87	*Arenobulimina cuneata*	11	*Gavelinella monterelensis*
58	*Arenobulimina minutissima sp.n.*	12	*Heterohelix pseudotessera*
140	*Arenobulimina obesa*	13	*Bolivinoides laevigatus*
145	*Arenobulimina preslii*	14	*Ellipsoidella divergens*
19	*Arenobulimina puschi*	15	*Cibicidoides involutus*
84	*Arenobulimina sphaerica*	16	*Stensioeina pommerana*
88	*Arenobulimina vialovi*	17	*Globorotalites multiseptus*
244	*Ataxophragmium beisseli*	18	*Trochammina globigeriniformis*
100	*Ataxophragmium crassum*	19	*Arenobulimina puschi*
38	*Ataxophragmium depressum*	20	*Globotruncana arca*
197	*Ataxophragmium fartile*	21	*Globotruncana rugosa*
204	*Ataxophragmium lvovense*	22	*Gaudryina rugosa*
208	*Ataxophragmium rimosum*	23	*Heterostomella foveolata*
214	*Ataxophragmium variabile*	24	*Allomorphina trochoides*
8	*Biedafranciszkina beaumonti*	25	*Osangularia cordieriana*
127	*Biedafranciszkina polonica sp.n.*	26	*Gavelinella umbilicatula*
219	*Bolivina alecksandrae sp.n.*	27	*Stensioeina gracilis*
180	*Bolivina crassa*	28	*Bolivinoides mielnicensis*
168	*Bolivina decurrens*	29	*Eponides biconvexus*
108	*Bolivina incrassata*	30	*Heterohelix planata*
220	*Bolivina praecrenulata sp.n.*	31	*Pyramidina szajnochae*
231	*Bolivina witwickae sp.n.*	32	*Pullenia cretacea*
91	*Bolivinoides clavatus*	33	*Pullenia jarvisi*
68	*Bolivinoides decoratus*	34	*Globorotalites emdyensis*
128	*Bolivinoides dentatus sp.n.*	35	*Globigerinelloides abberantus*
172	*Bolivinoides draco*	36	*Globigerinelloides asperus*
199	*Bolivinoides giganteus*	37	*Orbignyna variabilis*
13	*Bolivinoides laevigatus*	38	*Ataxophragmium depressum*
28	*Bolivinoides mielnicensis*	39	*Gavelinella stelligera*
137	*Bolivinoides miliaris*	40	*Pseudouvigerina rugosa*
200	*Bolivinoides paleocenicus*	41	*Nodosarella subnodosa*
189	*Bolivinoides petersoni*	42	*Ellipsoidella polonica*
118	*Bolivinoides pustulatus*	43	*Ellipsoidella ovata*
143	*Bolivinoides sidestrandensis*	44	*Plewrostomella pseudocurta*
154	*Ceratocancris caspia*	45	*Ellipsoidella gracillima*
64	*Cibicidoides bembix*	46	*Cribrebella lacrima*
217	*Cibicidoides commatus*	47	*Ellipsodimorphina cretacea*
61	*Cibicidoides eriksdalensis*	48	*Ellipsodimorphina hrubieszowiensis*
15	*Cibicidoides involutus*	49	*Gavelinella tenuissima*
78	*Cibicidoides voltzianus*	50	*Pyramidina rudita*
179	*Coryphostoma plaita*	51	*Quadrimorphina varsovlensis sp. n.*
98	*Coryphostomella lublinensis*	52	*Eouvigerina serrata*
134	*Coryphostomella telatynensis*	53	*Nodosarella suturicostata*
121	*Cribrebella fusiformis*	54	*Plewrostomella subnodosa*
46	*Cribrebella lacrima*	55	*Lublina lublinensis*
187	*Cribrebella ovata*	56	*Heterohelix pulchra*
160	*Dorothia irregularis*	57	*Eponides dorsoconvexus*
76	*Dorothia pupa*	58	*Arenobulimina minutissima sp.n.*
116	*Eggerellina brevis*	59	*Heterohelix punctulata*
47	*Ellipsodimorphina cretacea*	60	*Fursenkoina polonica*
48	*Ellipsodimorphina hrubieszowiensis*	61	*Cibicidoides eriksdalensis*
72	*Ellipsodimorphina pozaryskae sp.n.*	62	*Globorotalites michelinlanus*
164	*Ellipsodimorphina rara*	63	*Goesella rugosa*
233	*Ellipsodimorphina variabilis*	64	*Cibicidoides bemblx*
173	*Ellipsoglandulina manifesta*	65	*Stensioeina clementiana*
95	*Ellipsoglandulina varsoviensis*	66	*Valvulineria laevis*
14	*Ellipsoidella divergens*	67	*Spiroplectammina rosula*
45	*Ellipsoidella gracillima*	68	*Bolivinoides decoratus*
235	*Ellipsoidella inflatocamerata*	69	*Marginotruncana marginata*
126	*Ellipsoidella kugleri*	70	*Gyroidinoides nitidus*
43	*Ellipsoidella ovata*	71	*Eponides concinna*
42	*Ellipsoidella polonica*	72	*Ellipsodimorphina pozaryskae sp.n.*
153	*Eouvigerina gracilis*	73	*Heterohelix semicostata*
52	*Eouvigerina serrata*	74	*Plewrostomella wadowicensis*
29	*Eponides biconvexus*	75	*Voloshinovella laffittei*
71	*Eponides concinna*	76	*Dorothia pupa*
57	*Eponides dorsoconvexus*	77	*Orbignyna ovata*
147	*Eponides frankei*	78	*Cibicidoides voltzianus*
119	*Eponides karsteni*	79	*Pseudoguembellna costulata*
183	*Frondicularia biformis*	80	*Rosita fornicata*
60	*Fursenkoina polonica*	81	*Archaeoglobigerina cretacea*
193	*Gansserina gansseri*	82	*Plectina ruthenica*
201	*Gaudryina frankei*	83	*Stensioelna beccariiformis*
227	*Gaudryina laevis*	84	*Arenobulimina sphaerica*
87	*Gaudryina pyramidata*	85	*Anomalina incognita sp.n.*
22	*Gaudryina rugosa*	86	*Gaudryina pyramidata*
195	*Gavelinella acuta*	87	*Arenobulimina cuneata*
210	*Gavelinella costulata*	88	*Arenobulimina vialovi*
192	*Gavelinella danica*	89	*Gyrodinoides globosus*
171	*Gavelinella gankinoensis*	90	*Heterohelix globocarinata*
218	*Gavelinella mariae*	91	*Bolivinoides clavatus*
11	*Gavelinella monterelensis*	92	*Quadrimorphina allomorphinoides*
110	*Gavelinella pertusa*	93	*Marginotruncana linneiana*
3	*Gavelinella postthalmanni sp.n.*	94	*Marginotruncana bulloides*
190	*Gavelinella sahlstroemi*	95	*Ellipsoglandulina varsoviensis*
39	*Gavelinella stelligera*	96	*Globulina prisca*
49	*Gavelinella tenuissima*	97	*Rugoglobigerina milomensis*
26	*Gavelinella umbilicatula*	98	*Coryphostomella lublinensis*
35	*Globigerinelloides abberantus*	99	*Rosita plummerae*
36	*Globigerinelloides asperus*	100	*Ataxophragmium crassum*

R—1–4 specimens, C—5–14 specimens, A—>40 specimens

TYSZOWCE IG-1 borehole

GORZKÓW IG-1 borehole

TELATYN IG-1 borehole

DOROHUCZA IG-5 borehole

	G. mon	S. becc.	R. cont.	R.contusa	A. gracilis	Anomalinoides pinguis G.gankinoensis	Anomalinoides pinguis B.giGant.	G. mon	R. con.	A.gracilis	Anomalinoides pinguis G.gankinoen.	Anomalinoides pinguis Bolivinoides giGanteus	Rosita contusa	Angulogavelinella gracilis	A. pinguis G.gankinoen.	A. pinguis B.giGant.	A.pinguis G.gankinoensis
	L.	Upper			Lower	Upper		L.	U.	Lower	Upper		Upper	Lower	Upper		Upper
	CAMPANIAN				MAASTRICHTIAN			CAMPA-NIAN		MAASTRICHTIAN			CAMPANIAN	MAASTRICHTIAN			MAASTRICHTIAN

Table 2b

212	*Globigerinelloides ehrenbergi*	101	*Voloshinovella aquisgranensis*
156	*Globigerinelloides multispinus*	102	*Orbignyna inflata*
34	*Globorotalites emdyensis*	103	*Voloshinovella conica*
62	*Globorotalites michelinianus*	104	*Roxita contusa*
17	*Globorotalites multiseptus*	105	*Quadrimorphina minuta*
20	*Globotruncana arca*	106	*Telatynella clavata*
123	*Globotruncana falsostuarti*	107	*Pyramidina triangularis*
111	*Globotruncana obliqua*	108	*Bulivina incrassata*
21	*Globotruncana rugosa*	109	*Rugoglobigerina rugosa*
151	*Globotruncanella havanensis*	110	*Guevelinella pertusa*
136	*Globotruncanella pschadae*	111	*Globotruncana obliqua*
130	*Globulina lucrima*	112	*Praebulimina corseyae*
96	*Globulina prisca*	113	*Rugoglobigerina hexacamerata*
63	*Goesella rugosa*	114	*Praebulimina obtusa*
238	*Gublerina cf. rentiformis*	115	*Praebulimina ventricosa*
216	*Guembelitria ornata sp.n.*	116	*Eggerellina brevis*
167	*Guttulina trigonula*	117	*Orbignyna simplex*
139	*Gyroidinoides girardanus*	118	*Bolivinoides pustulatus*
89	*Gyroidinoides globosus*	119	*Eponides karsteni*
70	*Gyroidinoides nitidus*	120	*Plectina convergens*
166	*Hedbergella holmdelensis*	121	*Cribrebella fusiformis*
2	*Hedbergella telatynensis sp.n.*	122	*Heterohelix striata*
6	*Heterohelix carinata*	123	*Globotruncana falsostuarti*
141	*Heterohelix glabrans*	124	*Orbignyna ruegensis*
90	*Heterohelix globocarinata*	125	*Heterostomella leopolitana*
3	*Heterohelix moremani*	126	*Ellipsoidella kuglerl*
209	*Heterohelix navarroensis*	127	*Bledafrunciszkina polonica sp.n.*
30	*Heterohelix planata*	128	*Bolivinoides dentatus sp.n.*
7	*Heterohelix pseudoglobulosa*	129	*Allomorphina polonica sp.n.*
12	*Heterohelix pseudotessera*	130	*Globulina lucrima*
56	*Heterohelix pulchra*	131	*Spiroplectammina chicoana*
59	*Heterohelix punctulata*	132	*Angulogavelinella gracilis*
181	*Heterohelix robusta*	133	*Allomorphinella lublinensis sp.n.*
73	*Heterohelix semicostata*	134	*Coryphostomella telatynensis*
122	*Heterohelix striata*	135	*Pyramidina pseudospinulosa*
163	*Heterohelix suwalkensis sp.n*	136	*Globotruncanella pschadae*
175	*Heterohelix varsoviensis sp.n*	137	*Bolivinoides miliaris*
243	*Heterostomella carinata*	138	*Whitinella baltica*
23	*Heterostomella foveolata*	139	*Gyroidinoides girardanus*
186	*Heterostomella laevigata*	140	*Arenobulimina obesa*
125	*Heterostomella leopolitana*	141	*Heterohelix glabrans*
157	*Heterostomella rugosa*	142	*Varsoviella pazdroae*
237	*Hormosina sp.*	143	*Bolivinoides sidestrandensis*
213	*Hormosina telatynensis sp.n*	144	*Neoflabellina reticulata*
202	*Karreria fallax*	145	*Arenobulimina preslii*
198	*Lituola cf. diformis*	146	*Arenobulimina conica*
211	*Laxostomum eleyi*	147	*Eponides frankei*
55	*Lublina lublinensis*	148	*Sliteria varsoviensis sp.n.*
94	*Marginotruncana bulloides*	149	*Rzehakina inclusa*
93	*Marginotruncana linneiana*	150	*Pseudouvigerina cristata*
69	*Marginotruncana marginata*	151	*Globotruncanella havanensis*
144	*Neoflabellina reticulata*	152	*Pazdroella olgae*
240	*Neoflabellina rugosa*	153	*Eouvigerina gracilis*
234	*Nodosarella hedbergi*	154	*Ceratocancris caspla*
41	*Nodpsarella subnodosa*	155	*Praebulimina laevis*
53	*Nodosarella suturicostata*	156	*Globigerinelloides multispinus*
102	*Orbignyna inflata*	157	*Heterostomella rugosa*
77	*Orbignyna ovata*	158	*Verneuilina muensteri*
124	*Orbignyna ruegensis*	159	*Spiroplectammina dentata*
178	*Orbignyna sacheri*	160	*Dorothia irregularis*
117	*Orbignyna simplex*	161	*Spiroplectammina baudouiniana*
37	*Orbignyna variabilis*	162	*Pyramidina minuta*
23	*Osangularia cordieriana*	163	*Heterohelix suwalkensis sp.n.*
169	*Osangularia navarroana*	164	*Ellipsodimorphina rara*
215	*Osangularia peracuta*	165	*Stensiocina bella sp.n*
221	*Paralabamina toulmini*	166	*Hedbergella holmdelensis*
152	*Pazdroella olgae*	167	*Guttulina trigonula*
191	*Planoglobulina acervulinoides*	168	*Bolivina decurrens*
188	*Planoglobulina brazoensis*	169	*Osangularia navarroana*
120	*Plectina convergens*	170	*Plectina lenis*
170	*Plectina lenis*	171	*Gavelinella gankinoensis*
82	*Plectina ruthenica*	172	*Bolivinoides draco*
44	*Pleurostomella pseudocurta*	173	*Elipsoglandulina manifesta*
54	*Pleurostomella subnodosa*	174	*Tritaxia dubia*
74	*Pleurostomella wudowicensis*	175	*Heterohelix varsoviensis sp.n*
185	*Praebulimina arcadelphiana*	176	*Spiroplectammina suturalis*
205	*Praebulimina asperoaculeata*	177	*Spiroplectammina navarroana*
112	*Praebulimina carseyae*	178	*Orbignyna sacheri*
241	*Praebulimina dorohuczensis*	179	*Coryphostoma plaita*
155	*Praebulimina laevis*	180	*Bolivina crassa*
114	*Praebulimina obtusa*	181	*Heterohelix robusta*
203	*Praebulimina parvula*	182	*Allomorphinella contraria*
207	*Praebulimina pusilla*	183	*Frondicularia biformis*
4	*Praebulimina reussi*	184	*Tappanina selmensis*
225	*Praebulimina taylorensis*	185	*Praebulimina arcadelphiana*
115	*Praebulimina ventricosa*	186	*Heterostomella laevigata*
194	*Praeglobobulimina imbricata*	187	*Cribrebella ovata*
79	*Pseudoguembelina costulata*	188	*Planoglobulina brazoensis*
10	*Pseudotextularia elegans*	189	*Bolivinoides peterssoni*
150	*Pseudouvigerina cristata*	190	*Gavelinella sahlstroemi*
40	*Pseudouvigerina rugosa*	191	*Planoglobulina acervulinoides*
232	*Pseudouvigerina telatynensis sp.n*	192	*Gavelinella danica*
32	*Pullenia cretacea*	193	*Gansserina gansseri*
33	*Pullenia jarvisi*	194	*Praeglobobulimina imbricata*
196	*Pyramidina cimbrica*	195	*Gavelinella acuta*
162	*Pyramidina minuta*	196	*Pyramidina cimbrica*
223	*Pyramidina prolixa*	197	*Atuxophragmium fartile*
135	*Pyramidina pseudospinulosa*	198	*Lituola cf. diformis*
50	*Pyramidina rudita*	199	*Bolivinoides giganteus*
31	*Pyramidina szajnochae*	200	*Bolivinoides palrocenicus*

R - 1 - 4 specimens, C - 5 - 14 specimens, A - > 40 specimens

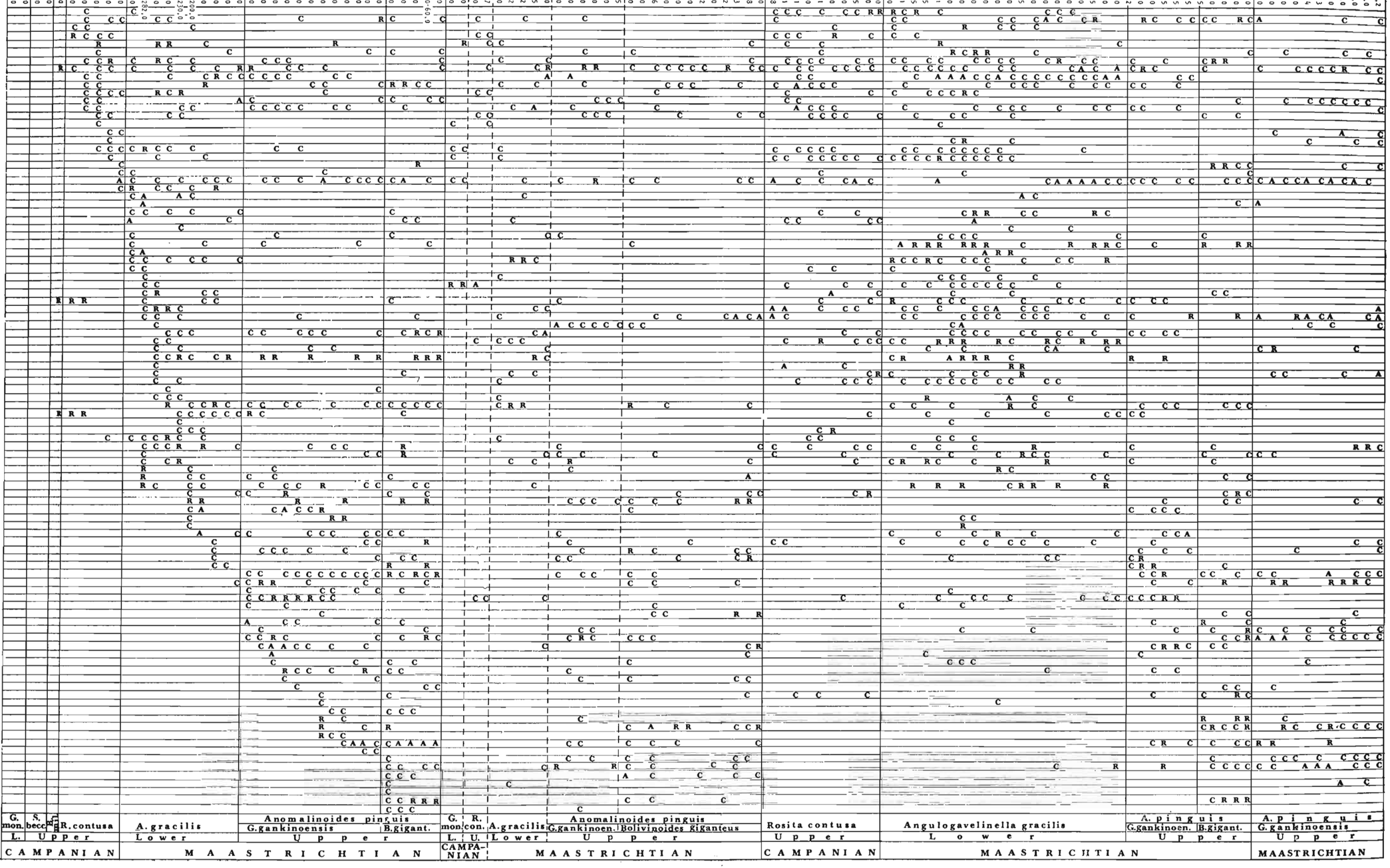
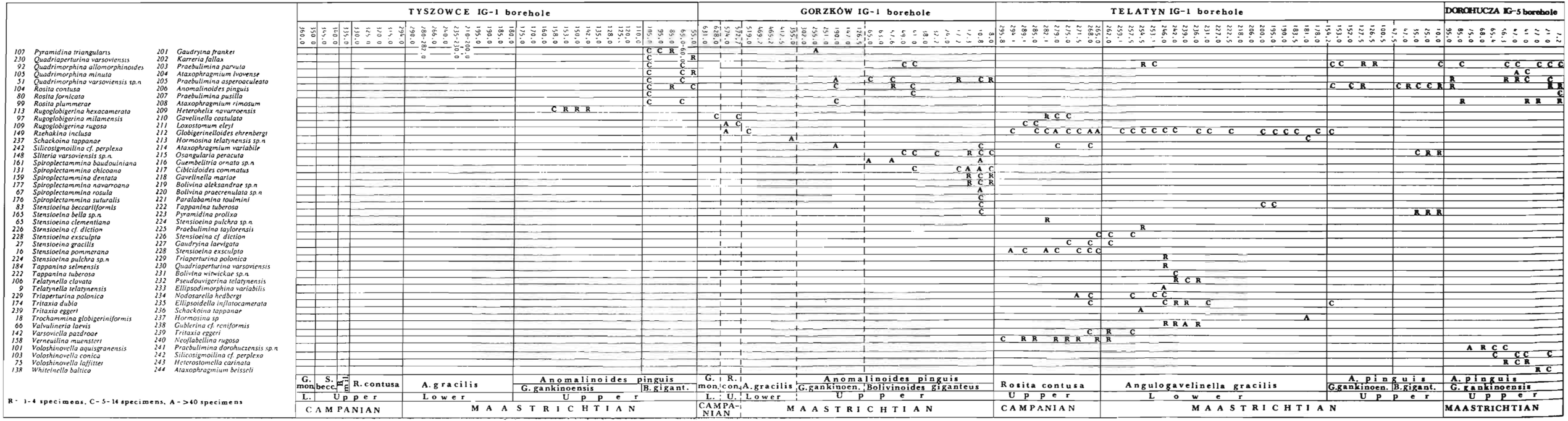


Table 2c


107 Pyramidina triangularis
230 Quadriaperturina varsoviensis
92 Quadrimorphina allomorphinoides
105 Quadrimorphina minuta
51 Quadrimorphina varsoviensis sp.n
104 Rosita contusa
80 Rosita fornicata
99 Rosita plummerae
113 Rugoglobigerina hexacamerata
97 Rugoglobigerina milamensis
109 Rugoglobigerina rugosa
149 Rzehakina inclusa
237 Schackoina tappanae
242 Silicosigmoilina cf. perplexa
148 Sliteria varsoviensis sp.n.
161 Spiroplectammina baudouiniana
131 Spiroplectammina chicoana
159 Spiroplectammina dentata
177 Spiroplectammina navarroana
67 Spiroplectammina rosula
176 Spiroplectammina suturalis
83 Stensioeina beccariiformis
165 Stensioeina bella sp.n.
65 Stensioeina clementiana
226 Stensioeina cf. diction
228 Stensioeina exsculpta
27 Stensioeina gracilis
16 Stensioeina pommerana
224 Stensioeina pulchra sp.n
184 Tappanina selmensis
222 Tappanina tuberosa
106 Telatynella clavata
9 Telatynella telatynensis
229 Triaperturina polonica
174 Tritaxia dubia
239 Tritaxia eggeri
18 Trochammina globigeriniformis
66 Valvulineria laevis
142 Varsovella pazdroae
158 Verneuilina muensteri
101 Voloshinovella aquisgranensis
103 Voloshinovella conica
75 Voloshinovella laffitteï
138 Whiteinella baltica
201 Gaudryina frankei
202 Karreria fallax
203 Praebulimina parvula
204 Ataxophragmium lwovense
205 Praebulimina asperoaculeata
206 Anomalinoides pinguis
207 Praebulimina pusilla
208 Ataxophragmium rimosum
209 Heterohelix navarroensis
210 Gavelinella costulata
211 Loxostomum eleyi
212 Globigerinelloides ehrenbergi
213 Hormosina telatynensis sp.n
214 Ataxophragmium variabile
215 Osangularia peracuta
216 Guembelitria ornata sp.n
217 Ciblcidoides commatus
218 Gavelinella mariae
219 Bolivina aleksandrae sp.n
220 Bolivina praecrenulata sp.n
221 Paralabamina toulmini
222 Tappanina tuberosa
223 Pyramidina prolixa
224 Stensioeina pulchra sp.n.
225 Praebulimina taylorensis
226 Stensioeina cf dictlon
227 Gaudryina laevigata
228 Stensioeina exsculpta
229 Triaperturina polonica
230 Quadriaperturina varsoviensis
231 Bolivina witwickae sp.n.
232 Pseudouvigerina telatynensis
233 Ellipsodimorphina variabilis
234 Nodosarella hedbergi
235 Ellipsoidella inflatocamerata
236 Schackoina tappanae
237 Hormosina sp
238 Gublerina cf. reniformis
239 Tritaxia eggeri
240 Neoflabellina rugosa
241 Praebulimina dorohuczensis sp.n
242 Silicosigmoilina cf. perplexa
243 Heterostomella carinata
244 Ataxophragmium beisseli
R - 1-4 specimens, C - 5-14 specimens, A - >40 specimens
TYSZOWCE IG-1 borehole
GORZKÓW IG-1 borehole
TELATYN IG-1 borehole
DOROHUCZA IG-5 borehole
G. mon.
S. becc.
R. contusa
A. gracilis
Anomalinoides pinguis
G. gankinoensis
B. gigant.
L.
Upper
Lower
CAMPANIAN
MAASTRICHTIAN
G. mon.
R. con.
A. gracilis
Anomalinoides pinguis
G.gankinoen.
Bolivinoides giganteus
L.
U.
Lower
Upper
CAMPA-NIAN
MAASTRICHTIAN
Rosita contusa
Upper
CAMPANIAN
Angulogavelinella gracilis
Lower
MAASTRICHTIAN
A. pinguis
G.gankinoen.
B.gigant.
Upper
MAASTRICHTIAN
A. pinguis
G. gankinoensis
Upper
MAASTRICHTIAN

esting that ROBASZYŃSKI *et al.* (1984) and CARON (1985) consider it as occurring only in the upper part of the Maastrichtian. The present material of upper Campanian age is richer in foraminifera than the lower Campanian deposits. In the upper Campanian the following planktonic foraminifera (not observed deeper) occur: *Pseudoguembelina*, *Globotruncanella* and *Rugoglobigerina*. Among the genera is *Corystomella* GAWOR-BIEDOWA. Among new species occurring only in the upper Campanian is *Stensioeina pulchra* sp. n. Such species as *Cribrebella fusiformis* (GAWOR-BIEDOWA), 1987, *Ellipsodimorphina pozaryskae* sp. n., *Ellipsoglandulina varsoviensis* GAWOR-BIEDOWA, 1992, *Bolivina witwickae* sp. n., *Coryphostomella lublinensis* GAWOR-BIEDOWA, 1987, *Allomorphina lublinensis* sp. n., *Ellipsoidella inflatocamerata* GAWOR-BIEDOWA, 1992, *Biedafranciszkina polonica* sp. n., (Tables 1, 2, 3) have not been noted older than the upper Campanian. *Ellipsoidimorphina pozaryskae* sp. n., *Ellipsoglandulina varsoviensis* GAWOR-BIEDOWA, 1992 and *Allomorphina lublinensis* sp. n. do not occur higher than the lower Maastrichtian, the remaining species being also known in the upper Maastrichtian (Tables 1, 2, 3). All three zones of the Campanian, according to the zonation by GAWOR-BIEDOWA (1984), are represented in Tyszowce IG 1. Only core of the *Stensioeina beccariiformis* Zone has been investigated from Lubartów IG 2, whereas core from Lublin IG 2 belongs to the *Bolivinoides miliaris* and *Rosita contusa* Zones. Samples from boreholes Telatyn IG 1 and Gorzków IG 1 represent the *Rosita contusa* Zone.

Maastrichtian

Both Maastrichtian substages occur over the entire studied area with rich foraminiferal assemblages comprising numerous new species.

Lower Maastrichtian

According to KRASSOWSKA (1986), the lower Maastrichtian deposits consist of two different lithological units. The lower is commonly of light-grey marls, sometimes with thin intercalations of opokas (Tyszowce IG 1). The upper part of this substage consists mostly of marly limestones and chalk-like marly limestones, sometimes with intercalations of marly chalk (e.g. Lublin IG 2, Piaski IG 1, Gorzków IG 1). In Telatyn IG 1 and Tyszowce IG 1 the lower Maastrichtian is represented only by marly limestones; marly chalk in Dorohucza IG 5.

Foraminifera are abundant in all these lithological units and their Maastrichtian age is indicated by the presence of: *Pseudouvigerina cristata* (MARSSON), *Neoflabellina reticulata* (REUSS), *Bolivinoides peterssoni* BROTZEN, *Bolivinoides paleocenicus* (BROTZEN), *Cibicidoides bembix* (MARSSON). A lower Maastrichtian age is indicated by *Angulogavelinella gracilis* (MARSSON) and *Gavelinella complanata* (REUSS). *Neoflabellina reticulata* (REUSS) and *Bolivinoides peterssoni* BROTZEN belong to species generally regarded as index taxa for the Maastrichtian in the European Lowlands and the British Isles (HILTERMANN and KOCH 1962, HART *et al.* 1981).

Discorbina gracilis MARSSON *(recte Angulogavelinella)* has been described for the first time by MARSSON (1878) from the lower Maastrichtian deposits of the Rugen Island. POŻARYSKA (1954: 267), who was the first to point out the index species of the Upper Cretaceous in Central Poland, refers to *Pseudovalvulinella gracilis* (MARSSON) *(recte Angulovalvulinella)* as "form not very common, but important stratigraphically as it occurs only in the lower Maastrichtian". It may be noted that POŻARYSKA (op. cit.) correlated the stratigraphical ranges of these foraminifera with the modified macrofaunistic zonation, (POŻARYSKA 1954, Table 1). The stratigraphic range of *Angulogavelinella gracilis* has been confirmed in numerous studies of the lower Maastrichtian deposits from deep boreholes by GAWOR-BIEDOWA and WITWICKA (1984). KOPAEVITZ, BENIAMOVSKIJ and NAIDIN (1987) are of the opinion that *Angulogavelinella gracilis* (MARSSON) occurs in the lower Maastrichtian deposits of the entire European paleobiogeographic area.

This was based on the correlation of macrofaunistic zones of NAIDIN *et al.*, with the macrofaunistic zonation established for the Polish Lowlands, by BŁASZKIEWICZ (1984a, b), Table 13. One should add that in the older Soviet literature different authors referred to this species as occurring also in the upper Campanian, as indicated in the present paper (p. 163). The phylogenetic lineages of the genera *Gavelinella*, *Angulogavelinella*, *Bolivinoides*, *Bolivina Neoflabellina* are considered by many authors, as by POŻARYSKA (1954) and KOPAEVITZ, BENIAMOWSKIJ and NAIDIN (1987), as most important for the stratigraphic subdivision of the Maastrichtian. Also *Gavelinella complanata* (REUSS), like *Angulogavelinella gracilis* (MARSSON), appears in the lower Maastrichtian in the European paleobiogeographic area (KOPAEVITZ, BENIAMOWSKIJ and NAIDIN 1987). There are, however, different opinions among Soviet students concerning the stratigraphic range of this former species. VASSILENKO (1954) states, for example, that it occurs in the Maastrichtian of the Russian Platform and Western Siberia, whereas GORBENKO (1974) recorded it in the upper Campanian in these areas. In the Polish Lowlands, *Gavelinella complanata* (REUSS) appears simultaneously with *Angulogavelinella gracilis*, noted first by WITWICKA (1961), and confirmed by further studies (GAWOR-BIEDOWA and WITWICKA 1984).

The Campanian/Maastrichtian boundary, in the type locality area of the Maastrichtian, was investigated by ROBASZYŃSKI *et al.* (1985), who studied the lithology, nannoplankton, pollen, spores, foraminifera, ostracodes and macrofauna at Halembaye (SE of the Belgian Limburg) and in the area around Beutenaken (SE of the Netherlands Limburg). It was decided (BIRKELUND *et al.* 1984) that the Maastrichtian begins with the appearance of *Belemnella lanceolata* (SCHLOTHEIM) agreeing with the opinion of many students, including BŁASZKIEWICZ (1979, 1984a). In the city of Maastricht establishing this boundary happens to be difficult because of the erosional gap at the stage boundary. The boundary interval is best developed in the borehole "Beutenaken", where the Campanian and Maastrichtian strata are separated by the Slenaken omission hardground.

Such a gap is absent in the Lublin region, thus allowing for more detailed observations of the ranges of foraminifera and other groups across the Campanian/Maastrichtian boundary.

The lower Maastrichtian deposits are rich in genera and species. The following genera of benthic calcareous foraminifera are newly recorded: *Pazdroella* GAWOR-BIEDOWA, 1987, *Triaperturina* GAWOR-BIEDOWA, 1987, *Quadriaperturina* GAWOR-BIEDOWA, 1987, *Sliteria* gen. n. New species have been noted in all three foraminiferal groups, i.e. planktonic, calcareous benthic and arenaceous: *Heterohelix varsoviensis* sp. n., *Heterohelix suwalkensis* sp. n., *Quadriaperturina varsoviensis* GAWOR-BIEDOWA, 1987, *Allomorphina polonica* sp. n., *Coryphostomella telatynensis* GAWOR-BIEDOWA, 1987, *Bolivinoides dentatus* sp. n., *Pazdroella olgae* GAWOR-BIEDOWA, 1987, *Triaperturina polonica* GAWOR-BIEDOWA, 1987, *Stensioeina bella* sp. n., *Pseudouvigerina telatynensis* sp. n., *Cribrebella ovata* GAWOR-BIEDOWA, 1987, *Sliteria varsoviensis* sp. n., *Ellipsodimorphina rara* GAWOR-BIEDOWA, 1992, *Ellipsodimorphina variabilis* GAWOR-BIEDOWA, 1992, *Hormosina telatynensis* sp. n. Numerous among them, such as *Quadriaperturina varsoviensis* GAWOR-BIEDOWA, 1987, *Pazdroella olgae* GAWOR-BIEDOWA, 1987, *Triaperturina polonica* GAWOR-BIEDOWA, 1987, *Stensioeina bella* sp. n., *Bolivinoides dentatus* sp. n., *Hormosina telatynensis* sp. n., *Coryphostomella telatynensis* GAWOR-BIEDOWA, 1987, *Ellipsodimorphina variabilis* GAWOR-BIEDOWA, 1992, and *Pseudouvigerina telatynensis* sp. n. All of these have been found only in lower Maastrichtian sections. The remaining species disappear at various levels of the upper Maastrichtian (Tables 1, 2, 3). There is an increase in the number of species and specimens of such planktic foraminifera as *Globotruncana*, *Rugoglobigerina* and *Hedbergella* in the lower Maastrichtian in relation to the Campanian. Specimens of the genus *Schackoina* have been found only in the lower Maastrichtian. Numerous species of the above genera are limited to the Maastrichtian, as is the case outside the study area, for instance *Heterohelix navarroensis* Loeblich *Globotruncana falsostuarti* SIGAL, *Rugoglobigerina hexacamerata* BRÖNNIMAN (BIRKELUND *et al.* 1984, ROBASZYNSKI *et al.* 1984, CARON 1985).

Upper Maastrichtian

The lithology of the upper Maastrichtian deposits is variable. In boreholes Lublin IG 2, Lubartów IG 2 and Gorzków IG 1 the following section has been described (from bottom to the top): marly chalk-like limestones (only Gorzków IG 1), marly chalk, followed by chalk with marly chalk intercalations, followed by marly chalk with frequent marl laminae with interlayers of marls. Then follows a series of intercalating marls, opokas, marly limestones and marly chalk. Only in Lublin IG 2 and Lubartów IG 2, are the uppermost Maastrichtian deposits assigned by KRASSOWSKA 1986 to the Żyrzyn Beds (POŻARYSKA 1965, 1967a). They are most probably separated, as in Żyrzyn IG 1, from the underlying deposits of the upper Maastrichtian by a hardground. In both boreholes, the upper Maastrichtian, is overlain by Lower Paleocene.

The thickest and the most completely developed section of the upper Maastrichtian has been found in borehole Gorzków IG 1. The ammonites *Hoploscaphites* aff. *constrictus crassus* (ŁOPUSKI), *Hoploscaphites* cf. *constrictus* (SOWERBY) and *Belemnella kazimiroviensis* (SKOŁOZDRÓWNA) occur in the topmost strata of this substage (over an interval of 70 m) which are represented by opokas and subordinate marls. The upper part of these deposits was correlated by KRASSOWSKA (unpublished reports 1976—1988) with the Żyrzyn Beds.

As a result of epigenetic erosion, the upper portion of the upper Maastrichtian deposits has been lost and is absent in the Piaski IG 1.

The strata occurring in Dorohucza IG 5 underwent the strongest erosion. The upper Maastrichtian is formed of marly chalk, chalk and thick marls (fig. 2). The ammonites *Hoploscaphites tenuistriatus* (KNER) and *Hoploscaphites constrictus constrictus* (SOWERBY) have been found in the chalk, whereas the marls yield *Hoploscaphites* sp. The foraminifera subzone *Bolivinoides giganteus* of the *Anomalinoides pinguis* Zone (GAWOR-BIEDOWA 1984) is absent from this borenole indicating that strata of the *Hoploscaphites constrictus crassus* Zone have been eroded.

The upper Maastrichtian deposits occurring in the south eastern part of the study area are formed in lower part of light grey marly limestones, rather soft, with varying carbonate content and, above, by white-grey, chalk-like marly limestones with remains of baculitids (Telatyn IG 1) or light grey marly and very soft chalk (Tyszowce IG 1, KRASSOWSKA 1976).

In Tyszowce IG 1, the ammonite *Hoploscaphites tenuistriatus* (KNER) has been found, at a depth of 107.0 m, and *Hoploscaphites constrictus constrictus* (SOWERBY) at a depth of 89.20 m. The presence of *Bolivinoides giganteus* HILTERMANN and KOCH indicates, however, that the higher microfaunistic zone of the upper Maastrichtian is present, despite the absence of *Hoploscaphites constrictus crassus* (ŁOPUSKI). Nevertheless, one should note that the absence of foraminifera characteristic of the uppermost upper Maastrichtian (e.g. *Cibicidoides commatus* (VASSILENKO)) suggests that these strata have been eroded.

Species indicative of the upper Maastrichtian are: *Gavelinella gankinoensis* (NECKAJA), *Gavelinella danica* (BROTZEN), *Anomalinoides pinguis* (JENNINGS), *Gavelinella sahlstroemi* (BROTZEN), *Osangularia peracuta* (LIPNIK) and *Praeglobobulimina imbricata* (REUSS). These are accompanied by *Cibicidoides involutus* (REUSS), which disappears with the end of Maastrichtian, and many others species which occur in both the lower and upper Maastrichtian (Tables 1, 2, 3). These species range through the whole Maastrichtian in the Polish Lowlands, some being present even in the Paleocene (Tables 1, 2, 3 — which is indicated by arrows). The upper Maastrichtian can be subdivided into two parts, both on the basis of foraminifera and macrofauna.

In the uppermost upper Maastrichtian *Bolivinoides giganteus* HILTERMANN and KOCH, *Paralabamina toulmini* (BROTZEN), *Pyramidina prolixa* (CUSHMAN and PARKER), *Gavelinella mariae* (JONES) and *Karreria fallax* RZEHAK occur; the two latter species occurring also somewhat lower in the profile. Considering the macrofauna, and as noted by GAWOR-BIEDOWA (1984),

and GAWOR-BIEDOWA and WITWICKA (1984), the lower part of the upper Maastrichtian, distinguished on the base of foraminifera, can be correlated with the *Belemnitella junior* Zone and the upper one corresponds to *Hoploscaphites constrictus crassus* Zone. The foraminifera indicate also that the topmost horizons of the upper part of the upper Maastrichtian are present in Gorzków IG 1. *Cibicidoides commatus* (VASILENKO), which has been found in the same part of the profile, occurs also in the Żyrzyn Beds and Paleocene in the Polish Lowlands (POŻARYSKA 1965).

The foraminiferal assemblage of the topmost strata of the Maastrichtian from Gorzków IG 1 is especially noteworthy because of its uniqueness. It contains species such as *Guembelitria ornata* sp. n., *Bolivina aleksandrae* sp. n., *Bolivina praecrenulata* sp. n., which have not been encountered in other boreholes. Fortunately, these strata also have macrofaunal documentation [*Hoploscaphites* aff. *constrictus crassus* (ŁOPUSKI) at 57.7 m, *H.* cf. *constrictus* (SOWERBY) 32.1 m, *Belemnella kazimiroviensis* (SKOŁOZDRÓWNA) at the depth 31.8 m] confirming the foraminiferal dating. So far, the Żyrzyn Beds in Poland were considered as the topmost strata of the upper Maastrichtian (POŻARYSKA 1965, 1967). In Żyrzyn IG 1 they occur above the hard ground and contain *Belemnella kazimirovensis*. They originated under rather specific sedimentary conditions and comprise fewer foraminifera (POŻARYSKA 1965) than the topmost part of the upper Maastrichtian from Gorzków IG 1. Absence of traces of solution in this borehole allows us to suppose continuous sedimentation and that the upper Maastrichtian section is complete. The Żyrzyn beds in Żyrzyn could then represent a shortened section of the topmost strata of the upper Maastrichtian. It seems to be evidenced by remains of these beds present in some localities investigated by POŻARYSKA.

In the study area, new species are rare in the upper Maastrichtian deposits in comparison with those from the Lower Maastrichtian deposits. Except for those occurring only in Gorzków, only *Praebulimina dorohuczensis* sp. n. has been encountered in these deposits. The upper Maastrichtian foraminiferal assemblage is enriched in planktic genera *Gansserina* and *Planoglobulina*.

In all the boreholes the deposits of the discussed substage belong to the *Anomalinoides pinguis* Zone, according to the zonation by GAWOR-BIEDOWA 1984. The foraminifera from both subzones have not been investigated from all the boreholes. In Dorohucza IG 5 the lower subzone *Gavelinella gankinoensis* is associated with *Hoploscaphites tenuistriatus* (KNER) (depth 100.1 m), and thus corresponds to the *Belemnitella junior* Zone. The macrofauna clearly confirms the microfaunistic zonation. The strata of the subzone *Bolivinoides giganteus* of the *Anomalinoides pinguis* Zone had been removed from the borehole Dorohucza IG 5. Both subzones have been studied in the remaining boreholes except in Lublin IG 2, where only *G. gankinoensis* was available. In the particular boreholes the topmost strata of the upper Maastrichtian had been eroded to a different extent (above).

One hundred-and-fifty-four species of foraminifera have been studied (Table 3) from the topmost strata of the Maastrichtian. The transitory Maastrichtian/Paleocene strata in Lublin IG 2 and Lubartów IG 2, unfortunately were not cored. The only planktonic genus to persist into the Tertiary (LOEBLICH and TAPPAN 1964, CARON 1985) is *Guembelitria*. Of the 20 genera of the benthic arenaceous foraminifera noted here, 17 occur also in the Tertiary (LOEBLICH and TAPPAN 1964). *Telatynella*, *Varsoviella* and *Voloshinovella* have not, so far, been found in the Tertiary. Of the 43 calcareous benthic foraminifera described, 40 genera occur also in the Tertiary (LOEBLICH and TAPPAN 1964). Only 3 genera, i.e. *Cribrebella*, *Ellipsoidella* and *Allomorphinella* have not been noted in the Tertiary deposits. As it follows from the analysis of the material from the Cretaceous/Tertiary boundary (JAEGER 1987 *in* GRAMMAN 1988: 412) the catastrophie changes of the biota at this boundary are not so obvious as it was for long supposed. According to SZYMANSKI (1987), most families of the planktic foraminifera and about half of the benthic became extinct at the end of the Maastrichtian. TAPPAN and LOEBLICH (1988)

Table 3 (a—c)

Foraminiferal zones of the Campanian and Maastrichtian deposits in Eastern Poland

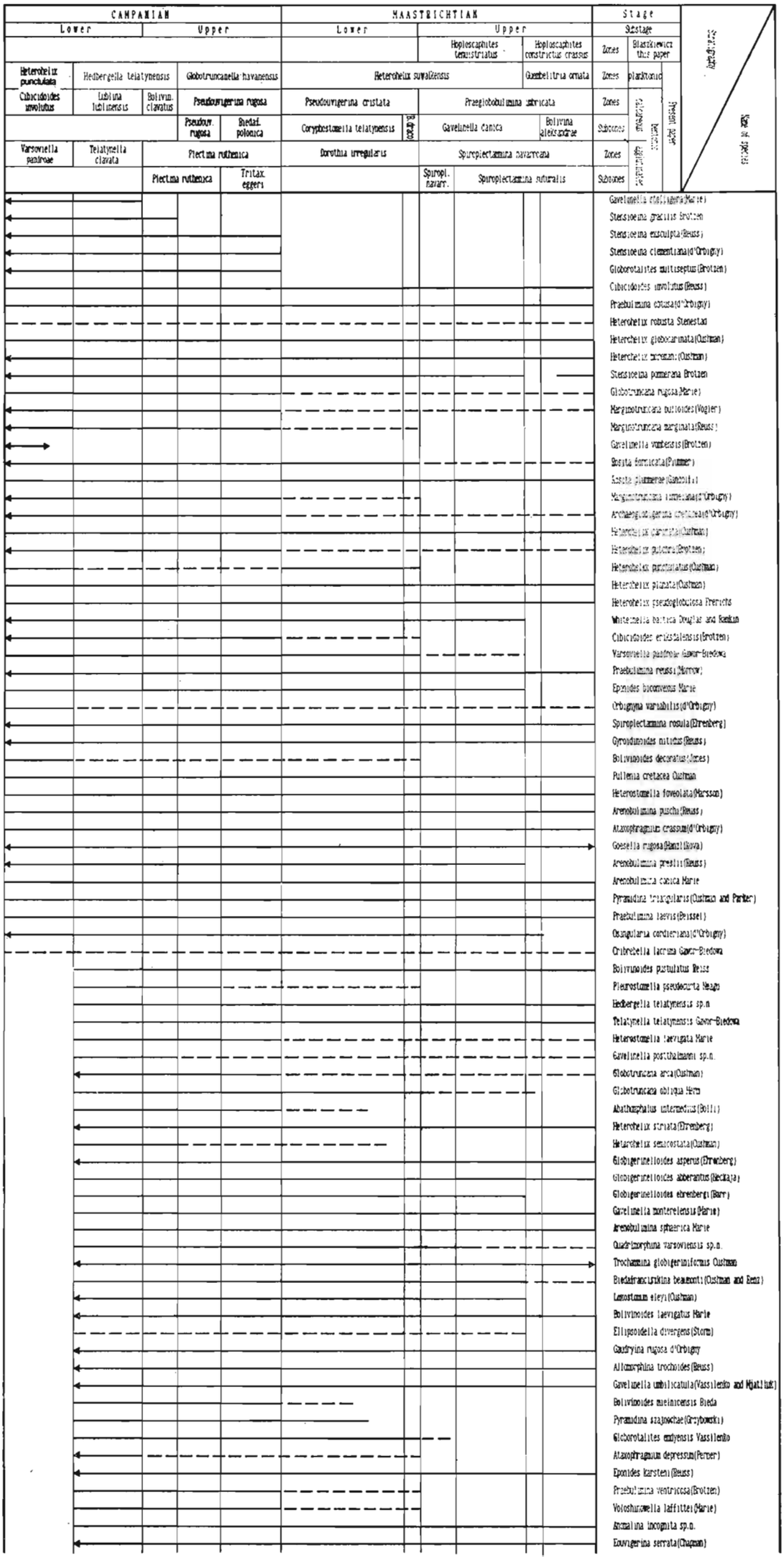


Table 3b

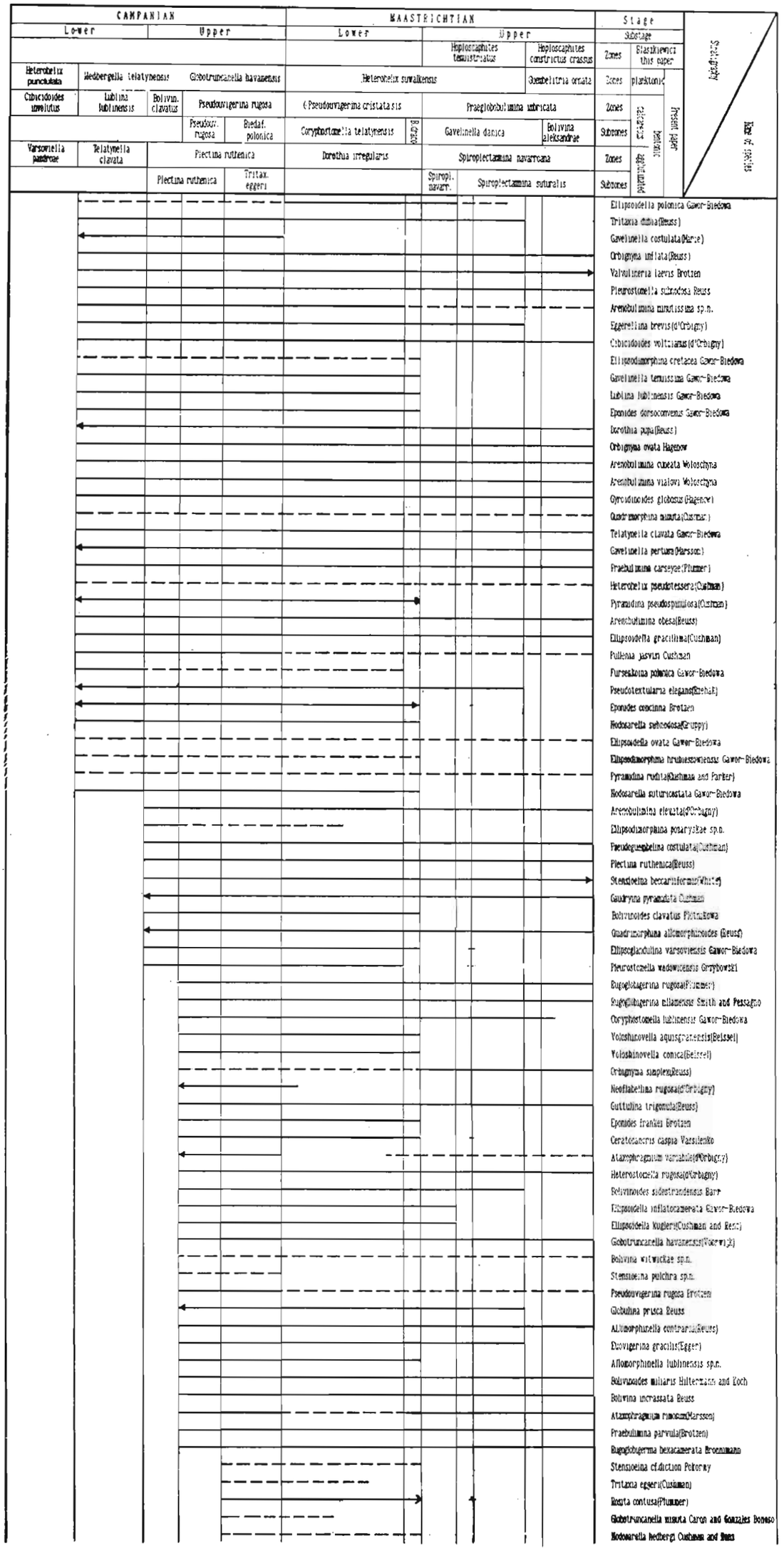
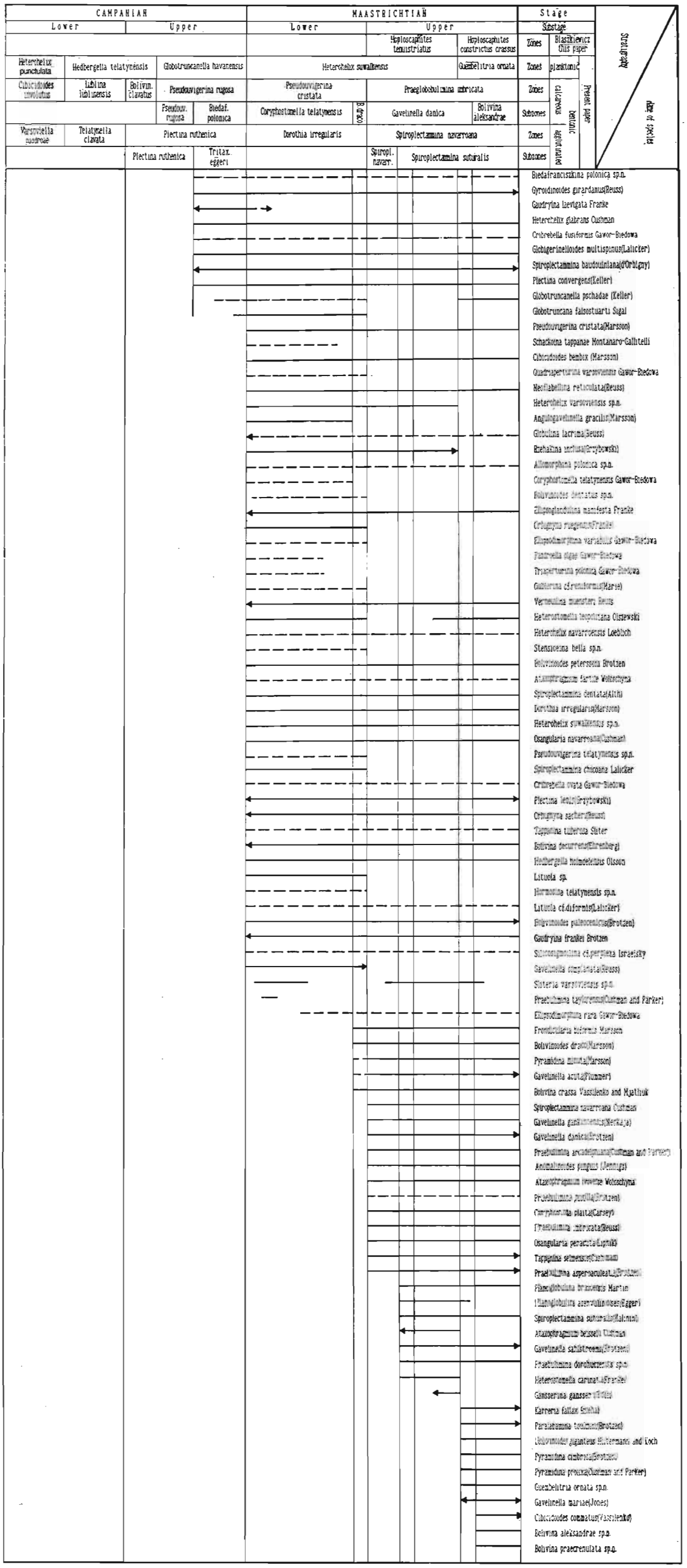

CAMPANIAN
Lower
Upper
MAASTRICHTIAN
Lower
Upper
Stage
Substage
Zones
Subzones
Planktonic foram. zones
Biostratigraphic units
Species of ostracods
Heterohelix punctulata
Hedbergella telaytnensis
Globotruncanella havanensis
Heterohelix suwalkiensis
Hoploscaphites constrictus crassus
Gansbelitria ornata
Cibicidoides umvolutus
Lublina lublinensis
Bolivin. clavatus
Pseudouvigerina rugosa
Pseudouvigerina cristatastis
Praeglobobulimina ubricata
Bolivina aleksandrae
Varsovinella paradoxa
Telatynella clavata
Plectina ruthenica
Dorothia irregularis
Spiroplectammina navarroana
Plectina ruthenica
Tritax. eggeri
Spiroplectammina suturalis
Ellipsoidella polonica Gawor-Biedowa
Tritaxia cibha(Reuss)
Gavelinella costulata(Marie)
Orbignyna inflata(Reuss)
Valvulineria laevis Brotzen
Pleurostomella subnodosa Reuss
Arenobulimina minutissima sp.n.
Eggerellina brevis(d'Orbigny)
Cibicidoides voltzianus(d'Orbigny)
Ellipsodimorphina cretacea Gawor-Biedowa
Gavelinella tenuissima Gawor-Biedowa
Lublina lublinensis Gawor-Biedowa
Eponides dorsoconvexus Gawor-Biedowa
Dorothia pupa(Reuss)
Orbignyna ovata Hagenow
Arenobulimina cuneata Woloschyna
Arenobulimina vialovi Woloschyna
Gyroidinoides globosus(Hagenow)
Quadrimorphina nanuta(Cushman)
Telatynella clavata Gawor-Biedowa
Gavelinella pertusa(Marsson)
Praebulimina carseyae(Plummer)
Heterohelix pseudotessera(Cushman)
Pyramidina pseudospumilosa(Chochran)
Arenobulimina obesa(Reuss)
Ellipsoidella gracilima(Cushman)
Pulleina jasvini Cushman
Fursenkoina polonica Gawor-Biedowa
Pseudotextularia elegans(Rzehak)
Eponides concinna Brotzen
Rodosarella subnodosa(Gruppy)
Ellipsoidella ovata Gawor-Biedowa
Ellipsodimorphina hrubieszowiensis Gawor-Biedowa
Pyramidina rudita(Cushman and Parker)
Rodosarella suturocostata Gawor-Biedowa
Arenobulimina elevata(d'Orbigny)
Ellipsodimorphina posarykae sp.n.
Pseudogaudryina costulata(Cushman)
Plectina ruthenica(Reuss)
Stensioeina beccariiformis(White)
Gaudryina pyramidata Cushman
Bolivinoides clavatus Plotnikowa
Quadrimorphina allomorphinoides (Reuss)
Ellipsoglandulina varsoviensis Gawor-Biedowa
Pleurostomella wadowicensis Grzybowski
Bugoglobigerina rugosa(Plummer)
Rugoglobigerina ellamensis Smith and Pessagno
Coryphostomella lublinensis Gawor-Biedowa
Voloshinovella aquisgranensis(Beissel)
Voloshinovella conica(Beissel)
Orbignyna simplex(Reuss)
Neoflabellina rugosa(d'Orbigny)
Guttulina trigonula(Reuss)
Eponides frankei Brotzen
Ceratocancris caspia Varsilenko
Ataxophragmium variabile(d'Orbigny)
Heterostomella rugosa(d'Orbigny)
Bolivinoides sidestrandensis Barr
Ellipsoidella inflatocamerata Gawor-Biedowa
Ellipsoidella kuglerij Cushman and Renz
Globotruncanella havanensis(Voorwijk)
Bolivina witwickae sp.n.
Stensioeina pulchra sp.n.
Pseudouvigerina rugosa Brotzen
Globulina prisca Reuss
Allomorphinella contraria(Reuss)
Eouvigerina gracilis(Egger)
Allomorphinella lublinensis sp.n.
Bolivinoides miliaris Hiltermann and Koch
Bolivina incrassata Reuss
Ataxophragmium rimosum(Marsson)
Praebulimina parvula(Brotzen)
Bugoglobigerina hexacamerata Breonimann
Stensioeina cf.diction Pokorny
Tritaxia eggeri(Cushman)
Reussella contusa(Plummer)
Globotruncanella minuta Caron and Gonzales Bonoso
Rodosarella hedbergi Cushman and Renz

Table 3c



suggested that 45% of foraminiferal genera occurring in the Cretaceous became extinct at the end of the Maastrichtian. However, 160 genera survived till the Tertiary. In the case of foraminifera it is rather difficult to speak about a rapid extinction, and it concerns not only the Cretaceous/Tertiary but also the Lower Cretaceous/Upper Cretaceous boundary. Extinction of some forms is here accompanied by the appearance of new taxa.

In the study area most of families, genera and species newly described from the area appeared during the Campanian: in the lower Campanian two new families, 5 new genera and 18 new species but in the upper Campanian only one new genus and 9 new species. The increase in rate of appearance is marked anew in the lower Maastrichtian when 4 new genera and 15 new species appeared while in the upper Maastrichtian only 4 new species and no new generaare recorded. The order of appearance and disappearance of species known also from other areas is presented in Table 3. One should also note, that some of the genera described from the Lublin Chalk occur also in the Maastrichtian deposits of Belorussia: *Telatynella*, *Varsoviella* and *Coryphostomella* (AKIMEZ, letter communication, 22 December 1988). LOEBLICH (written information) has encountered specimens of the genus *Telatynella* in the Cretaceous of western Germany.

SYSTEMATIC PART

Order **Foraminiferida** EICHWALD, 1830
Suborder **Textulariina** DELAGE et HEROUARD, 1896
Superfamily **Rzehakinacea** CUSHMAN, 1933
Family **Rzehakinidae** CUSHMAN, 1933
Genus *Rzehakina* CUSHMAN, 1927
Rzehakina inclusa (GRZYBOWSKI, 1901)
(pl. 1: 2)

1901. *Spiroloculina inclusa* GRZYBOWSKI: 260, pl. 7: 20.
1960. *Rzehakina inclusa* GRZYBOWSKI; GEROCH: 63, pl. 4: 11.
1969. *Rzehakina inclusa* (GRZYBOWSKI); GRÜN: 315, pl. 67: 1—3.
1970. *Rzehakina inclusa* (GRZYBOWSKI); NEAGU: 36, pl. 1: 21, 23.
1974. *Rzehakina epigona inclusa* (GRZYBOWSKI); HILTERMANN: 43, pl. 5: 8, 29—33, 37—41, pl. 6: 7, 18—26.
1984. *Rzehakina inclusa* (GRZYBOWSKI); GEROCH and NOWAK: pl. 3: 11, pl. 5: 26a—d.
1984. *Rzehakina inclusa* (GRZYBOWSKI); LISZKOWA and MORGIEL: 200, pl. 119: 2, 3, 4.

Material. — Ten variously preserved specimens.

Dimension (in mm):			
IG Nos.:	45700/88/F	45701/88/F	45702/88/F
length	0.672	0.768	0.696
width	0.360	0.432	0.600
thickness	0.170	0.146	0.120

Variability. — Intraspecific variability is expressed mainly in the thickness of a test (see dimensions) and a degree of visibility of chambers on the test surface. All specimens have a characteristic shape of pumpkin stone. While the test is supplied with a narrow, rounded periphery middle part of the test is smooth, without visible division into chambers, whereas outlines of poorly convex chambers can be noted on others. One can see under immersion oil that the test is evolute and comprises two coils. Each of them contains two tube-like chambers of the equal width along the whole length. They are arch-like curved, and connected in the upper and lower portions of the test. Embrional chamber elongated, centrally located.

Remarks. — GRZYBOWSKI (1901) noted that the outer whorl embraces totally inner coil, which is the main difference between the holotype and the investigated specimens. The description by LISZKOWA and MORGIEL (1984) agrees with the present specimens, the only

difference is that the younger chambers are not wider than the older ones, thus not covering older chambers in the investigated specimens. One has to stress, however, that the outer features of the investigated specimens are the same as in the specimens described and illustrated by GEROCH (1960), GEROCH and NOWAK (1984) and LISZKOWA and MORGIEL (1983) (see synonymy). Both, SEROVA (1969) and HILTERMANN (1974) included *Rzehakina inclusa* (GRZYBOWSKI) into the *Rzehakina* group with involute coiling of the test. The studied specimens display evolute test, which is well visible in immersion oil. The discussed specimens resemble *Silicosigmoilina californica* CUSHMAN et CHURCH 1929, as presented in the paper by SLITER (1968, 1: 13a—b, *non* 14, 15a—b). They differ from genus *Silicosigmoilina* CUSHMAN et CHURCH 1929 in having slit-like aperture without tooth. The specimens described by GRÜN (1969) differ from the Polish specimens in having calcareous, and not siliceous test. Only cement is siliceous in the Austrian specimens.

Distribution — Polish Lowlands: borehole Lubartów IG 2 — upper Maastrichtian; boreholes Tyszkowce IG 1, Gorzków IG 1, Telatyn IG 1 — lower Maastrichtian. Outer Carpathians — Senonian-Paleogene. Czechoslovakia: Carpathians — Upper Cretaceous-Paleocene. Romania and USSR: Carpathians — upper Senonian. Germany — Upper Cretaceous. Pacific region — Campanian-Maastrichtian.

Genus *Silicosigmoilina* CUSHMAN et CHURCH, 1929
Silicosigmoilina cf. *perplexa* ISRAELSKY, 1951
(pl. 1: 1)

Material. — Seven variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45703/88/F	45704/88/F	45705/88/F
length	0.600	0.528	0.480
width	0.312	0.240	0.240
thickness	0.194	0.170	0.120

Description. — Test siliceous, fine-grained, smooth and milk-white, with oval or quadrangular transverse section. Oval specimens have 3 chambers marked on both sides of the test. Two of them located on a margin of the test are arch-like curved, narrow, slightly convex and each occupies half of the test length. Only one chamber is marked in the middle of the test. Narrow-oval specimens display 3 chambers, which are slightly curved and poorly convex, on one side of the test, and 2 chambers on the opposite side. The both types of tests, when in immersion oil, show 5 chambers on one side and 3 or 4 chambers on the opposite side. The chambers are located in different planes. Younger chambers partly cover the older ones. Aperture with tooth, in both cases situated on a low neck.

Remarks. — Widely-oval specimens, which are apparently composed of 3 chambers, resemble mostly *Silicosigmoilina perplexa* ISRAELSKY, 1951. They differ from this last species in having a fine-grained test, in the absence of a lip on the top of apertural neck and in different stratigraphic range (upper Maastrichtian and not Upper Paleocene).

Distribution. — Poland: borehole Dorohucza 5, Lubartów IG 2, Piaski IG 1 — upper Maastrichtian; Lublin IG 2 — lower Maastrichtian.

Superfamily **Hormosinacea** HAECKEL, 1894
Family **Hormosinidae** HAECKEL, 1894
Subfamily **Hormosininae** HAECKEL, 1894
Genus *Hormosina* BRADY, 1879
Hormosina sp.
(pl. 1: 3)

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45706/88/F	45707/88/F	45708/88/F
length (without neck)	0.480	0.458	0.408
width	0.528	0.480	0.480

Description. — Test consists generally of spherical chambers, slightly flattened in their proximal and distal parts, supplied with a long neck and round aperture. Owing to the flattening the width of chambers is superior to the length (see dimensions). Opposite to the neck, there is a small opening and a trace left by the neck of the previous chamber which broke off. A test wall strongly rough and thick (which is visible in broken specimens), built of quartz grains of different size and cemented with calcareous cement.

Variability. — Intraspecific variability is expressed in a shape of chambers (oval or spherical), a degree of chamber flattening in the distal and proximal parts. The variability concerns also length differences of particular necks of chambers. Three embrional chambers have been found, showing no opening opposite to the neck.

Remarks. — The chambers of this species resemble slightly chambers of *Hormosina ovulum* (GRZYBOWSKI). They differ, however, in having rough, thick test, longer neck and in being flattened in a vertical direction.

Distribution. — Poland: borehole Telatyn IG 1, depth 181.0 — lower Maastrichtian (Lublin Chalk).

Hormosina telatynensis sp. n.
(pl. 1: 4, 5)

Holotype: Specimen IG No. 45709/88/F, pl. 1: 4.
Paratype: Specimen IG No. 45710/88/F, pl. 1: 5, and specimens 45711/88/F and 45712/88/F.
Type horizon: Lower Maastrichtian.
Type locality: Borehole Telatyn IG 1, depth 181.0 m.
Derivation of the name: from the name of the type locality.

Diagnosis. — Test composed of small quartz grains cemented with calcareous cement, uniserial, consisting of flat chambers flattened in proximal and distal part, connected with a long neck. The chamber with the neck has the shape of overturned funnel. Aperture round, located at the end of the neck.

Material. — Ten isolated chambers and two specimens consisting of two chambers.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	45709/88/F	45711/88/F	45712/88/F
length (without neck)	0.240	0.168	0.144
width	0.620	0.528	0.456

Description. — Test rough, composed of small quartz grains, cement calcareous, chambers flat, flattened in proximal and distal part, connected by a long neck. The chamber with the neck has the shape of overturned funnel. A round opening, left by the neck which broke off, is located on a flat surface of the chamber. Only chamber's periphery is flat on the opposite side, whereas the middle part forms a wide base of the narrowing upward neck. Aperture round, located on the top of the neck.

Variability. — The investigated material consists of singular chambers of broken tests. The variability is expressed in the size of chambers and the neck length. It is difficult, however, to speak about variability while not having complete specimens.

Remarks. — The specimen illustrated by VERDENIUS and HINTE (1983) pl. 3: 12 (*non* 13) under the name *Hormosina excelsa* (DYLĄŻANKA), having funnel-shaped chambers, except the embrional, may be conspecific with the discussed material. The considered species resembles *Reophax stellatus* NEAGU, 1975 in the shape of chambers, and especially the specimen presented on the pl. 5: 11. It differs from the last species in having smooth, not lobate chamber periphery and in flat proximal surface of chamber.

Distribution. — Poland: borehole Telatyn IG 1, depth 181.0 m — lower Maastrichtian (Lublin Chalk). Norwegian-Greenland Sea — Eocene-Miocene.

Superfamily **Lituolacea** de BLAINVILLE, 1827
Family **Lituolidae** de BLAINVILLE, 1827
Subfamily **Lituolinae** de BLAINVILLE, 1827
Genus *Lituola* LAMARCK, 1804
Lituola cf. *diformis* (LAMARCK), emend. MAYNC, 1952
(pl. 1: 8)

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45713/88/F	45714/88/F	45715/88/F
length	2.260	2.400	1.920
width	1.920	2.260	1.440
thickness	1.440	1.440	0.960

Description. — Test planispiral, biconvex, slightly bilaterally flattened, nearly as wide as thick, oval in outline with widely rounded periphery. Test wall thick, built of quartz grains cemented with an abundant calcareous cement. The test surface smooth or poorly rough. Separation of chambers not visible or poorly visible. Chambers interior simple. The youngest chamber tends to be erect. Aperture sieve-like, located on a slightly convex apertural surface of the ultimate chamber, consists of not numerous openings.

Variability. — Intraspecific variability concerns a degree of bilateral flattening of the test (being always small), coiling of the test (planispiral or with one chamber uniserial) and a degree of visibility of chamber separation on the test surface.

Remarks. — The shape of the test, a tendency of the ultimate chamber to be erect makes the described specimens similar to *Lituola difformis* (emend. MAYNC, 1952). They differ from the topotypes from Meudon (Paris Basin), designated by MAYNC (1952), in the absence of marked sutures. Unfortunately, the holotypes of *L. nautiloidea* (LAMARCK) and *L. difformis* (LAMARCK) from Meudon (south of Paris), have been destroyed during the second World War.

Distribution. — Poland: boreholes Piaski IG 1 and Tyszowce IG 1 — Maastrichtian (Lublin Chalk). France: Paris Basin — Campanian (*Belemnitella mucronata* Zone).

Lituola sp.
(pl. 1: 9)

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45716/88/F	45717/88/F	45718/88/F
length	4.240	3.840	3.360
width	2.260	2.030	1.680
thickness	1.920	0.960	1.200

Description. — Test initially planispiral, later recoiled, poorly bilateraly flattened. Recoiled part usually 1.5 times longer than planispiral part. Test wall thick, composed of small quartz grains cemented with a large amount of calcareous cement. Test surface rough, chambers and sutures not visible in the planispiral part, and poorly visible in the recoiled part. Chambers interior not divided. Aperture on a top of a final chamber, composed of numerous openings of various shape.

Variability. — Intraspecific variability small. It concerns a degree of flattening of the test and the length of recoiled part.

Remarks. — The discussed specimens resemble mostly *Lituola taylorensis* CUSHMAN et WATERS, 1929, in bilateral flattening of the test and its size. They differ from that species in a division into chambers and sutures invisible in the coiled part of the test, and in poorly visible in the recoiled part; they are also less bilaterally flattened. The investigated specimens resemble *L. taylorensis taylorensis* CUSHMAN et WATERS described by VOLOSHINA (1965: 53—55, pl. 2: 1a—b, w, pl. 3: 2, 4) from the upper Campanian and Maastrichtian of Crimea in not having visible chambers and septal sutures in coiled part of the test. VOLOSHINA regarded this species as associated with the Cretaceous deposits. For the Paleogene, she distinguished other subspecies of the species *L. taylorensis* CUSHMAN et WATERS.

Distribution. — Poland: borehole Piaski IG 1, depth 402.10 m — lower Maastrichtian.

Superfamily **Haplophragmiacea** EIMER et FICKERT, 1899
Family **Ammobaculinidae** SAIDOVA 1981
Subfamily **Telatynellinae** GAWOR-BIEDOWA, 1987
Genus *Telatynella* GAWOR-BIEDOWA, 1987
Telatynella clavata GAWOR-BIEDOWA, 1987
(pl. 2: 1a, b)

1987. *Telatynella clavata* GAWOR-BIEDOWA: 53, pl. 23: 6, pl. 24: 1, pl. 26: 3, 4, pl. 28: 1.

Material. — Over 150 specimens with uniserial part broken off at a different length.

Dimensions (in mm):			
IG Nos.:	45722/88/F	45723/88/F	45724/88/F
length of coiled part	0.216	0.144	0.144
width of coiled part	0.216	0.168	0.144
thickness of coiled part	0.192	0.144	0.120
length of uniserial part	0.480 (5 ch)	0.360 (4 ch)	0.240 (3 ch)
width of uniserial part in proximal part	0.144	0.120	0.096
in distal part	0.120	0.096	0.072

Variability. — Intraspecific variability small and expressed in a more of less round or oval outline of a streptospiral initial part of a test, in a degree of visibility of chambers in a coiled part, as well as in a different degree of convexity of chambers in the uncoiled part of the test, if visible at all. The initial, coiled part of the test is in all cases very poorly bilaterally flattened (see dimensions). A uniserial part of the test, connected with the coiled part, is a little wider than a distal one. No whole specimens have been found in the investigated material and its exact shape is unknown.

Distribution. — Poland: boreholes Telatyn IG 1, Lublin IG 2, Dorohucza IG 5 Piaski IG 1, Tyszowce IG 1, Lubartów IG 2 — Campanian-Maastrichtian (Lublin Chalk).

Telatynella telatynensis GAWOR-BIEDOWA, 1987
(pl. 2: 2)

1987. *Telatynella telatynensis* GAWOR-BIEDOWA: 52, pl. 23: 5a, b, pl. 26: 1, 2, pl. 28: 2.

Material. — Over 100 specimens with uniserial part broken off at various height.

Dimensions (in mm):			
IG Nos.:	45719/88/F	45720/88/F	45721/88/F
length of coiled part	0.216	0.120	0.144
width of coiled part	0.192	0.168	0.168
thickness of coiled part	0.192	0.168	0.168
length of uniserial part	0.816 (9 ch)	0.360 (5 ch)	0.240 (3 ch)
width of uniserial part	0.120	0.096	0.096

Variability. — Variability is small and concerns a degree of chamber convexity in a coiled part of the test. When chambers are considerably convex, hoof-shaped outline of this part of the test is clearly lobate, while with chambers only slightly convex it is poorly lobate. As shown by some almost total specimens, the width of the uniserial part of the test is the same along the whole length, but no fully preserved specimens are known hitherto. The uniserial parts have always been broken off at a different length. Usually specimens with a longer coiled part have also a wider uniserial part of the test, but it is not a rule (see dimensions). On the other hand, the width and thickness of the coiled part of the test are, as a rule, the same.

Distribution. — Poland: borehole Telatyn IG 1, Lublin IG 2, Dorohucza IG 5, Gorzków IG 1, Lubartów IG 2, Tyszowce IG 1 — Campanian-Maastrichtian (Lublin Chalk). In the Pinczów region also Campanian in the borehole 10/8, depth 4.40 m.

Superfamily **Spiroplectamminacea** CUSHMAN, 1927
Family **Spiroplectamminidae,** CUSHMAN, 1927
Genus *Spiroplectammina* CUSHMAN, 1927
Spiroplectammina baudouiniana (d'ORBIGNY, 1840)
(pl. 2: 9, 10)

1840. *Textularia baudouiniana* d'ORBIGNY: 46, pl. 4: 29, 30.
1964. *Textularia baudouiniana* d'ORBIGNY; KISELMAN in SUBBOTINA: 180, pl. 25: 1—12 (with synonymy).
1965. *Spiroplectammina baudouiniana* (d'ORBIGNY); POŻARYSKA: 48, pl. 2: 5 (with synonymy).
1979. *Textularia baudouiniana* d'ORBIGNY; KAPTARENKO-TSHERNOUSOVA *et al.*: 88, pl. 26: 1a, b.

Material. — Thirty partly damaged specimens.

Dimensions (in mm):			
IG Nos.:	45725/88/F	45726/88/F	45727/88/F
length	1.008	0.840	0.672
width	0.624	0.600	0.504
thickness	0.360	0.336	0.264

Variability. — Intraspecific variability is expressed in a rate (gradual or rapid) of widening of a test with the test growth, in a degree of sharpening of the test margin, in smooth or lobate outline of the test, in flat or slightly thickened septal sutures. The stable characters include: rhomboidal transverse section of the test, sharp margins, location of the maximum bulge of the test along its length axis. The largest quartz grains occur in the same region of the test.

Remarks. — Most of the investigated specimens have an initial part of the test broken off, thus making impossible the study of different generations. They were studied in the species under discussion on the Siberian material (KISELMAN *in* SUBBOTINA 1964). Totally unclear is the assignment of this species to the genus *Textularia* by KISELMAN, the more so that the initial planispiral part of the test is clearly visible in thin sections. The investigated specimens seem to be entirely conforming with the holotype.

Distribution. — Poland — Campanian-Danian (Lublin Chalk). France: Paris Basin — Campanian. USSR — Campanian-Danian. Denmark — Lower Paleocene. Netherlands — Campanian. Germany — Upper Cretaceous. Trinidad — Upper Cretaceous.

Spiroplectammina chicoana LALICKER, 1935
(pl. 1: 6, 7)

1935. *Spiroplectammina chicoana* LALICKER: 7, pl. 1: 8, 9.
1964. *Spiroplectammina chicoana* LALICKER; MARTIN: 51, pl. 2: 13a, b (with synonymy).
1968. *Spiroplectammina chicoana* LALICKER; SLITER: 46, pl. 2: 8 (with synonymy).
1985. *Spiroplectammina chicoana* LALICKER; SLITER: pl. 1: 1, 2.
1986. *Spiroplectammina chicoana* LALICKER; YASUDA: 52, pl. 3: 12a, b.

Material. — More than eighty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45728/88/F	45729/88/F	45730/88/F
length	0.720	0.792	0.600
width	0.480	0.456	0.360
thickness	0.240	0.216	0.168

Variability. — Despite a great variability this species is easy to identify due to the following features: the largest thickness of a test is along the vertical axis and rapidly decreases toward the edges which are sharp and rugged, the septal sutures are slightly elevated and thickened, and the spiral suture is thickened. The variability is expressed in a different degree of widening of the test following the test growth. When the test increases in width rapidly and strongly, the shape becomes similar to a kite. When this increase is less strong and rapid, the test is of nearly equal width along the entire biserial part. There is also a variability in a degree of incision of peripheries.

Remarks. — All the specimens conform with the holotype in the investigated assemblage. It seems that the specimen included into this species by HANZLIKOVÁ (1972: 47, pl. 9: 7) belongs to the species *Spiroplectammina costata* HUSS, 1966, as it has identical shape of the test, and sutural thickenings elongated into spines.

Distribution. — Poland — lower Maastrichtian (Lublin Chalk). USA — Campanian-Maastrichtian. Western Pacific area — presumably Maastrichtian.

Spiroplectammina dentata (ALTH, 1850)
(pl. 1: 10)

1850. *Textularia dentata* ALTH: 262, pl. 13: 13.
1970. *Spiroplactammina semicomplanata* (CARSEY); NEAGU: 41, pl. 4: 19, 20.
1972. *Semivulvulina dentata* (ALTH); HANZLIKOVÁ: 49, pl. 9: 6, pl. 10: 10 (with synonymy).
1974. *Spiroplectammina dentata* (ALTH); SZCZECHURA and POŻARYSKA: 29, pl. 1: 6, 7 (with synonymy).
1983. *Spiroplectammina dentata* (ALTH); HAGN and HERM: 621, pl. 2: 1 (with synonymy).
1983. *Spiroplectammina dentata* (ALTH); BECKMANN *et al.*: 113, pl. 4: 14.
1984. *Spiroplectammina dentata* (ALTH); LISZKOWA and MORGIEL: 207, pl. 121: 10, 11 (with synonymy).
1984. *Spiroplectammina dentata* (ALTH); NYONG and OLSSON: pl. 2: 12.
1985. *Spiroplectammina dentata* (ALTH, 1850); WEIDICH: 246, pl. 1: 10.

Material. — Over fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45731/88/F	45732/88/F	45733/88/F
length	1.200	1.032	0.600
width	0.672	0.744	0.504
thickness	0.456	0.480	0.360

Variability. — Intraspecific variability is expressed in a test size (see dimensions), in a length and width of indentations at the test margin, in a test shape (rapid to gradual widening of the test with growth) and in a profile of septal sutures ranging from flat to slightly convex. The indentations at the test margin are located on the end of chamber, one on each chamber. They could be of very different shapes, i.e. wide and long, narrow and sharp or resembling nodes.

Remarks. — The specimens under discussion resemble those illustrated by LISZKOWA and MORGIEL (1984, pl. 121: 10—11). It seems that they are entirely conforming with the holotype. The specimens determined as *Spiroplectammina dentata* (ALTH) by NAEGU (1970: 40, pl. 4: 21) belong presumably to the species *S. costata* HUSS, 1966. They are similar to that species in a test shape, in organization of chambers under acute instead of straight angle, and in elongated spines. The specimens regarded by NEAGU (1970: 41, pl. 4: 19—20) as *S. semicomplanata* (CARSEY) have all characters of *S. dentata* (ALTH).

Distribution. — Poland: Outer Carpathians (Magura, Silesian, Dukla, Subsilesian and Skole Units) — Turonian-Paleocene; Pieniny (Klippen Belt) — upper Senonian; Lublin Upland — Maastrichtian (Lublin Chalk). Czechoslovakia, Netherlands and Denmark — Upper Cretaceous. Romania — Campanian. Western Germany — lower Campanian, upper Maastrichtian, Danian. Austria, Eastern Germany, Tunisia — Paleocen. Trinidad — Maastrichtian, Paleocene. Italy — Campanian-middle Maastrichtian. France — Campanian. USSR and Egypt — Upper Cretaceous-Paleocene. USA — Campanian, Maastrichtian.

Spiroplectammina navarroana CUSHMAN, 1932
(pl. 2: 3a, b, 4a, b)

1932. *Spiroplectammina navarroana* CUSHMAN: 96, pl. 11: 14a, b.
1972. *Spiroplectammina navarroana* CUSHMAN; HANZLIKOVÁ: 47, pl. 10: 5—7 (with synonymy).

Material. — More than fifty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45734/88/F	45735/88/F	45736/88/F
length	2.472	1.128	0.960
width	0.936	0.408	0.480
thickness	0.720	0.360	0.336

Variability. — Intraspecific variability is low. It concerns mainly a length of a test (see dimensions) and a degree of chamber convexity. Specimens of two generations occur in the investigated assemblage. Specimens representing a microspheric generation B have the test initially strongly narrowed and poorly widening with growth. Specimens representing a macrospheric generation A have the test rounded and flattened in the planispiral part, whereas in the biserial part they have the same width and thickness along the whole length. Chambers are rectangular and strongly convex in all cases, in specimens of the generation B located nearly perpendicularly to the length axis of the test. Some specimens of the generation A show a constriction of the test, directly above the planispiral part.

Remarks. — The specimens of the generation B conform nearly totally with the holotype, except their size. They are several times longer, wider and thicker. The forms described by HANZLIKOVÁ (1972) conform with the specimens of the generation B in the Polish material of this species.

Distribution. — Poland — upper Maastrichtian (Lublin Chalk). USA, Czechoslovakia (Moravia) — Maastrichtian.

Spiroplectammina rosula (EHRENBERG, 1854)
(pl. 1: 11, 12)

1854. *Spiroplecta rosula* EHRENBERG: 24, pl. 32/2/: 26 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1979. *Spiroplectammina rosula* (EHRENBERG); KAPTARENKO-TSHERNOUSOVA *et al.*: 88, pl. 25: 4a, b (with synonymy).
1980. *Spiroplectammina rosula* (EHRENBERG); GAWOR-BIEDOWA: 14, pl. 1: 12 (with synonymy).

Material. — More than a hundred variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45737/88/F	45738/88/F	45739/88/F
	microspheric generation	megalospheric generation	
length	0.528	0.480	0.264
width	0.144	0.144	0.096
thickness	0.120	0.096	0.072

Variability. — Intraspecific variability is expressed in a number of chambers in a biserial part of a test (10 to 16 in each row in specimens of the microspheric generation, and 5 to 10 in specimens of the megalospheric generation), in development of septal sutures (flat, narrow, translucent or slightly depressed near the margin of the test). The test outline is lobate in the specimens with sutures poorly depressed near the test margin. In the investigated assemblage most of specimens represent the megalospheric generation on different stages of ontogenetic development, the situation being contrary to that in the deposits of Coniacian of the Nysa Trough (Sudetes) where only specimens of the microspheric generation have been noted (GAWOR-BIEDOWA 1980: 140).

Remarks. — The opinion on the systematic position of that species has been presented elsewhere (GAWOR-BIEDOWA 1980).

Distribution. — Poland: Polish Lowlands — Turonian-Maastrichtian; Sudetes — Coniacian. Europe, North and South America — Upper Cretaceous.

Spiroplectammina suturalis (KALININ, 1937)
(pl. 2: 5)

1937. *Bolivinopsis suturalis* KALININ: 15, pl. 1: 5 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1961. *Spiroplectammina suturalis* (KALININ): AKIMEZ: 75, pl. 1: 11a, b.
1965. *Spiroplectammina suturalis* (KALININ); POŻARYSKA: 49, pl. 3: 9, 10.
1974. *Spiroplectammina suturalis* (KALININ); GORBENKO; 29: pl. 1: 5a, b.
1979. *Spiroplectammina suturalis* (KALININ); KAPTARENKO-TSHERNOUSOVA *et al.*: 87, pl. 24: 3.

Material. — Fifteen well preserved specimens.

Dimensions (in mm):

IG Nos.:	45740/88/F	45741/88/F	45742/88/F
length	0.792	0.696	0.624
width	0.408	0.408	0.380
thickness	0.240	0.240	0.240

Variability. — Intraspecific variability is expressed in a number of chambers of the biserial part of a test (2 to 5 pairs), and in a degree of widening of the biserial part of the test. The test could be of the same width along the entire length or slightly wider at the height of two youngest chambers. Specimens representing different stages of ontogenetic development occur in the investigated assemblages. Common are specimens with planispiral part only.

Remarks. — The investigated specimens differ from the holotype in smaller number of chamber pairs in the biserial part of the test (2—5 pairs, probably 7 pairs in the holotype). In all other features they conform with the specimens referred to in the synonymy.

Distribution. — Poland: Polish Lowlands — upper Maastrichtian-Danian, upper Maastrichtian in the investigated area. USSR. — Maastrichtian.

Superfamily **Trochamminacea** SCHWAGER, 1877
Family **Trochamminidae** SCHWAGER, 1877
Subfamily **Trochammininae** SCHWAGER, 1877
Genus *Trochammina* PARKER et JONES, 1859
Trochammina globigeriniformis CUSHMAN, 1910
(pl. 7: 16, 17)

1910. *Trochammina globigeriniformis* CUSHMAN (*non* PARKER et JONES): 124, text-fig. 193—194.
1972. *Trochammina globigeriniformis* CUSHMAN; HANZLIKOVÁ: 50, pl. 10: 12.
1984. *Trochammina globigeriniformis* (PARKER et JONES); LISZKOWA and MORGIEL: 210, pl. 123: 1, 2.

Material. — Forty variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45743/88/F	45744/88/F	45745/88/F
length	0.528	0.408	0.312
width	0.672	0.524	0.408

Variability. — Intraspecific variability is expressed in a size of a test, and a degree of whorls convexity and their visibility on a dorsal side, resulting in this side of the test being flat or slightly conical. The first chamber of the last whorl on the ventral side may be of the same size as the two following chambers or may be very small, thus giving an impression that this whorl consists of three chambers only instead of four. Aperture semilunar or slit-like, situated at the base of the apertural surface of the youngest chamber.

Remarks. — The studied specimens are nearly identical with the CUSHMAN's specimens described under the name *Trochammina globigeriniformis* not *Lituola nautiloidea* var. *globigeriniformis* PARKER et JONES (1865), which has sieve-like aperture and represents different genus according to HANZLIKOVÁ (1972). They are nearly identical with the both, specimens from the Polish Carpathians (described by LISZKOWA and MORGIEL 1984) and Moravian Carpathians. They differ from them only in having older whorls less convex and finer quartz grains in the test.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian; Outer Carpathians (Subsilesian Unit) — Upper Cretaceous. Europe, America — Upper Cretaceous to Recent.

Superfamily **Verneuilinacea** CUSHMAN, 1911
Family **Prolixoplectidae** LOEBLICH et TAPPAN, 1985
Genus *Plectina* MARSSON, 1878
Plectina convergens (KELLER, 1935)
(pl. 7: 15)

1935. *Heterostomella convergens* KELLER: 542, pl. 1: 1, 2.
1979. *Plectina convergens* (KELLER); KAPTARENKO-TSHERNOUSOVA *et al.*: 99, pl. 32: 5 (with synonymy).

Material. — Forty five well preserved specimens.

Dimension (in mm):			
IG Nos.:	45860/88/F	45861/88/F	45862/88/F
length	0.720	0.672	0.552
width	0.408	0.456	0.384

Variability. — Variability is low and concerns the number of chamber pairs in a biserial part of the test (one or two pairs).

Remarks. — The investigated specimens are identical with the holotype in all characters, except the size. They are smaller than the specimens from the Dniepr-Donetsk Basin. KELLER

(1935) connects the size with ecological conditions, the largest specimens occurring in chalk facies. This species differs from *Plectina ruthenica* (REUSS) in a very rapid widening of a test with growth, in being poorly screw-like coiled along the vertical axis, in having longer triserial part and shorter biserial one, in nearly total absence of bilateral flattening of the test and in being widely-oval. The form described by POŻARYSKA (1965) as *Plectina? convergens* (KELLER, 1935) from the Montain deposits from Bochotnica represents different species. It differs from KELLER's species in a shape of the test and in having a long biserial part.

Distribution. — Poland — Campanian, Maastrichtian. USSR — Santonian-Maastrichtian.

Plectina lenis (GRZYBOWSKI, 1896)
(pl. 7: 5)

1896. *Spiroplecta lenis* GRZYBOWSKI: 288, pl. 9: 24, 25.
1980. *Plectina lenis* (GRZYBOWSKI); GAWOR-BIEDOWA: 20, pl. 1: 13, 14 (with synonymy).
1981. *Plectina lenis* (GRZYBOWSKI); LISZKA and LISZKOWA: 181, pl. 4: 3a, b.
1984. *Plectina lenis* (GRZYBOWSKI); LISZKOWA and MORGIEL: 222, pl. 124: 20—22 (with synonymy).

Material. — More than a hundred well preserved specimens.

Dimension (in mm):

IG Nos.:	45863/88/F	45864/88/F	45865/88/F
length	0.600	0.528	0.508
width	0.216	0.192	0.216

Variability. — It is expressed in a size of a test, in a number of chamber pairs in a biserial part of the test (4—6 chamber pairs), in a shape of the initial part of the test (sharpened or rounded) and in a degree of the test flattening in the biserial part (transverse section widely oval, nearly round in specimens with weakly inflated biserial part, and narrowly oval in specimens with strongly flattened biserial part of the test).

Remarks. — As it follows from the investigations by LISZKA and LISZKOWA (1981), who investigated foraminifera from GRZYBOWSKI's collection, GRZYBOWSKI (1896) assigned the specimens falling within the intraspecific variability range of this species to different species. The investigated specimens from the Polish Lowlands differ from those derived from the Carpathians and Sudetes in having glittering wall composed of microgranular quartz, and not of quartz grains cemented with a siliceous matrix. All other characters are identical.

Distribution. — This is the first occurrence of this species in the Polish Lowlands. Poland: Campanian-Maastrichtian (Lublin Chalk); Sudetes (Nysa Trough) — upper Turonian-Coniacian, Polish Carpathians — Turonian-Paleocene, more rarely Eocene. Romanian Carpathians— Cenomanian-Paleocene.

Plectina ruthenica (REUSS, 1851)
(pl. 7: 14)

1850. *Bulimina polystropha* REUSS; ALTH: 265, pl. 13: 19.
1851. *Gaudryina ruthenica* REUSS: 41, pl. 4: 4a, b, c.
1937b. *Plectina ruthenica* (REUSS); CUSHMAN: 105, pl. 11: 10—14 (with synonymy).
1963. *Plectina ruthenica* (REUSS); VOLOSHINA: 265, pl. 2: 7, pl. 3: 1, 2, 3 (with synonymy).
1964. *Plectina ruthenica* (REUSS); KRIVOBORSKY: 209, pl. 34: 5a, b, pl. 35: 1a, b, w, 2a, b, w, g, d.
1972. *Plectina ruthenica* (REUSS); VOLOSHINA: 88, pl. 8: 7.
1974. *Plectina ruthenica* (REUSS); GORBENKO: 33, pl. 2: 5a, b.
1979. *Plectina ruthenica* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 100, pl. 32: 6a, b.

Material. — Forty well preserved specimens.

Dimension (in mm):

IG Nos.:	45866/88/F	45867/88/F	45868/88/F
length	1.344	0.792	1.520
width	0.672	0.456	0.744

Variability. — The investigated material contains specimens in various ontogenic stages of development. The most common are tests with two chambers in a biserial part. In the biserial part of mature specimens, four pairs of chambers usually occur, but the youngest chamber tend to be uniserial. In immature specimens, an aperture is located near a suture between the youngest and preceding chamber, and may even reach the suture. It is separated from this suture in mature specimens and located nearly on the summit of the youngest chamber. The shape of aperture is oval in immature specimens, in mature ones it is sometimes oval, more often wide, fissure-like and perpendicular to a suture on the top of apertural surface. In all specimens, variability is expressed in degree of chamber convexity, especially in the youngest whorl, thus not allowing to establish the whorl number. Most probably there are 5 or 4 chambers. Chambers are better visible and in some specimens strongly convex in a distal part of the test. High variability concerns also the degree of screw-like coiling of the test in relation to its growth axis, as well as roughness of the test surface which is related with the size of quartz grains building the test wall. The largest quartz grains are situated along sutures.

Remarks. — The investigated specimens differ from those described by VOLOSHINA (1963, 1972) from the Lwów Chalk (type locality of this species) only in less convex chambers. All other characters seem to be identical. Strongly bilaterally flattened specimens are most close to REUSS's holotype.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Germany — upper Senonian. USRR — Campanian-Maastrichtian.

Family **Verneuilinidae** CUSHMAN, 1911
Subfamily **Verneuilinoidinae** SULEYMANOV, 1973
Genus *Eggerellina* MARIE, 1941
Eggerellina brevis (d'ORBIGNY, 1840)
(pl. 7: 6, 7)

1840. *Bulimina brevis* d'ORBIGNY: 41, pl. 4: 13, 14.
1972. *Eggerellinae brevis* (d'ORBIGNY); VOLOSHINA: 92, pl. 9: 2, 3, pl. 21: 2.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	45872/88/F	45873/88/F	45874/88/F
length	0.600	0.624	0.428
width	0.480	0.600	0.504

Variability. — Variability is low and concerns mainly convexity of chambers in the final whorl. In two older whorls, consisting of three chambers, similarly as in the final one, chambers and sutures are very poorly visible. Chambers are weakly convex or even very strongly convex in the final whorl, which occupies 2/3 of the total length.

Remarks. — The investigated specimens showing rounded initial part and strongly convex chamber in the final whorl are identical with the holotype. Those with a little more elongated initial part of the test and having 4 instead of 3 whorls are similar to the specimens of this species presented by VOLOSHINA (1972). The species differs from *Eggerellina intermedia* (REUSS, 1845) in being more rounded and in having less whorls (3, sometimes 4 whorls, whereas *E. intermedia* (REUSS) has 6 whorls).

Distribution. — Poland: Campanian, Maastrichtian. France: Campanian of the Paris Basin. USSR: not numerous in the Coniacian and Santonian, common in the lower Campanian.

Subfamily **Verneuilininae** CUSHMAN, 1911
Genus *Gaudryina* d'ORBIGNY, 1839
Gaudryina frankei BROTZEN, 1936
(pl. 2: 8a, b, pl. 3: 12)

1936. *Gaudryina frankei* BROTZEN: 33, pl. 1: 7a, b, text-fig. 5.
non 1984. *Gaudryina frankei* BROTZEN; HERCOGOVA: 127, pl. 2: 3, pl. 3: 3, text-fig. 14 (1—5).

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	45755/88/F	45756/88/F	45757/88/F
length	1.440	1.080	0.744
width	0.912	0.720	0.504
thickness	0.600	0.600	0.288

Variability. — It is expressed in a degree of test expansion with growth (it is always considerable, especially in triserial part of the test) and a degree of chamber convexity in both parts of the test. Chambers are more convex in narrower part of the test.

Remarks. — BROTZEN (1936) distinguished three types of the test in this species on the basis of the test size, the relation of triserial and biserial parts, the tempo of expansion of the test with growth, the number of chambers in the biserial part of the test, as well as the size of quartz grains building the test. Specimens of the BROTZEN's type 2 have been noted in the investigated material. They have strongly expanding biserial part of the test but differ in having the test wall built of fine quartz grains. This feature, however, depends on availability of particular fraction of quartz grains in the environment. The specimens included into this species by HERCOGOVA (1984), derived from the Cretaceous deposits of the Czech Massive, differ, from the investigated material in having nearly stable width of the test along their entire length, strongly incised test outline (which follows from strongly depressed furrow-like septal sutures and edge-like protruding chambers on the narrower side of the test), a small triserial part of the test as well as a strongly convex chambers. Instead, the Czech specimens display all the features of *Gaudryina sudetica* GAWOR-BIEDOWA (1980). The specimens described under the name *Gaudryina faujasi* (REUSS) by HAGN and HERM (1983), from the Lower Maastrichtian of the Bavarian Alps resemble *Gaudryina frankei* BROTZEN. Perhaps they are conspecific, but the problem remains open until the holotypes or topotypes of the both species have been restudied. If this is true then priority should be given to the name *Gaudryina faujasi* (REUSS).

Distribution. — Poland — Maastrichtian (Lublin Chalk). Sweden — Coniacian, Santonian. Probably also Germany (Bavarian Alps) — lower Maastrichtian.

Gaudryina laevigata FRANKE, 1914
(pl. 3: 1, 2)

1845. *Gaudryina rugosa* d'ORBIGNY; REUSS: 38, pl. 12: 15, 24.
1914. *Gaudryina laevigata* FRANKE: 431, pl. 27: 1, 2 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1979. *Gaudryina laevigata* FRANKE; KAPTARENKO-TSHERNOUSOVA *et al.*: 90, pl. 26: 8 (with synonymy).
1980. *Gaudryina laevigata* FRANKE; GAWOR-BIEDOWA: 16, pl. 1: 11 (with synonymy).

Material. — Thirty well preserved or partly damaged specimens.

Dimensions (in mm):

IG Nos.:	45758/88/F	45759/88/F	45760/88/F
length	1.080	0.816	0.576
width	0.744	0.384	0.456

Variability. — The intraspecific variability is small. It is expressed in a size of specimens, a degree of rounding of a test margin in triserial part and a degree of chamber convexity, both

in the triserial and biserial parts of the test. In most cases, however, the chamber surface is flat or slightly convex in the triserial part; in the biserial part it is slightly convex.

Remarks. — The investigated specimens conform with those presented by FRANKE (1914) and have similar intraspecific variability range. They differ from those derived from the Sudetes Cretaceous in having smaller biserial portion of the test and in nearly flat chamber surface in the both parts of the test. Despite large differences in a chamber convexity, the Sudetes and Polish Lowlands specimens are conspecific.

Distribution. — Poland: Wolin Island — Cenomanian-Maastrichtian (FRANKE 1925, 1928); Carpathians — lower Senonian; Sudetes (Nysa Trough) — Turonian, Coniacian. Lower Maastrichtian in the investigated area. Europe — Turonian-Maastrichtian (epicontinental and geosynclinal deposits).

Gaudryina pyramidata CUSHMAN, 1926

(pl. 3: 10)

1926. *Gaudryina laevigata* FRANKE var. *pyramidata* CUSHMAN: 587, pl. 16: 8 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1984. *Gaudryina pyramidata* CUSHMAN; HERCOGOVA: 109, pl. 2: 1, pl. 3: 7—9, text-fig. 9 (1—5) (with synonymy).

Material. — Ten well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45761/88/F	45762/88/F	45763/88/F
length	1.320	1.440	0.830
width	0.960	0.960	0.648
thickness	0.600	0.768	0.480

Variability. — Specimens at different ontogenetic stages of development have been found, i. e. some with only triserial portion and some others having from one to three pairs of chambers in a biserial part. The range of intraspecific variability agrees with that presented by HERCOGOVA (1984) who investigated this species in details.

Remarks. — The investigated specimens are identical with the holotype. They are most similar to HERCOGOVA's (1984, pl. 2: 1) specimen in the test outline, character of the triserial part of the test and chamber shape in the biserial part.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Austria. — upper Coniacian-Maastrichtian. Czechoslovakia — upper Turonian-lower Santonian. USSR — Maastrichtian. Mexico, California, Trinidad — Upper Cretaceous.

Gaudryina rugosa d'ORBIGNY, 1840

(pl. 3: 9)

1840. *Gaudryina rugosa* d'ORBIGNY: 44, pl. 4: 20, 21.
1980. *Gaudryina rugosa* d'ORBIGNY; GAWOR-BIEDOWA: 16, pl. 1: 7, 8.
1986. *Gaudryina rugosa* d'ORBIGNY; JORDAN and GASSE: 9.

Material. — Twenty well preserved or partly damaged specimens.

Dimensions (in mm):			
IG Nos.:	45764/88/F	45765/88/F	45766/88/F
length	1.392	1.320	1.128
width	0.768	0.672	0.720
thickness	0.600	0.360	0.528

Variability. — Intraspecific variability is expressed in a size of a triserial test part which may be a half or only 1/3 of its length. Variability concerns also a shape and convexity of chambers in a biserial test part, roughness of the test, and a shape of transverse section of the biserial

part of the test. Chambers of the biserial part are low, wide with rectangular outline and slightly convex surface, or nearly spherical. In the last case septal sutures are more depressed than in specimens with rectangular chambers. The test built of quartz grains of equal size or differing in size. In this last case larger grains are located near sutural regions of chambers. Transverse section rectangular or slightly oval.

Remarks. — The investigated specimens differ from the specimens occurring in the Cretaceous of the Sudetes in having more convex chamber surface, being in this feature close to the holotype and the specimens studied by AKIMEZ (1961).

Distribution. — Poland: Wolin Island — Cenomanian-Maastrichtian (FRANKE 1925, 1928); Carpathians — lower Senonian, Turonian-Maastrichtian in the investigated area; Sudetes — Turonian-Coniacian. Europe — Turonian-Maastrichtian (epicontinental and geosynclinal deposits).

Genus *Verneuilina* d'ORBIGNY, 1839

Verneuilina muensteri REUSS, 1854

(pl. 2: 6)

1854. *Verneuilina muensteri* REUSS: 71, pl. 26: 5 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1936. *Verneuilina limbata* CUSHMAN: 2, pl. 1: 2.
1975. *Verneuilina muensteri* REUSS; TEISSEYRE: 104, pl. 3: 12a—b.
1980. *Verneuilina muensteru* REUSS; HART *et al.*: 178, pl. 7, 3: 7, 8.

Material. — Thirty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45746/88/F	45747/88/F	45748/88/F
length	1.056	0.840	0.528
width	0.528	0.480	0.408

Variability. — It is expressed in a size of a test, degree of the test expansion with growth, in the presence or absence of narrow ledge-like thickenings on sutures and in a degree of incision of the test periphery. Some specimens have narrow and smooth test peripheries, other indented peripheries in result of diverging chamber terminations.

Remarks. — It seems that *Verneuilina limbata* CUSHMAN, 1936 can be included into the variability range of the discussed species. The CUSHMAN's specimens agree well with these under study which have thickenings on the sutures and indented test periphery.

Distribution. — Poland: Polish Lowlands — upper Turonian-upper Maastrichtian; Sudetes — upper Turonian-Coniacian. Czechoslovakia — Turonian, Senonian. Germany — Turonian, lower Senonian. Austria — Turonian, Santonian. England — Coniacian-lower Maastrichtian. France — Campanian. USSR — Turonian-Campanian. North America: California — Santonian.

Subfamily **Barbourinellinae** SAIDOVA, 1981

Genus *Heterostomella* REUSS, 1866

Heterostomella carinata (FRANKE, 1914)

(pl. 3: 3, 4, 5)

1914. *Gaudryina carinata* FRANKE: 431, pl. 27: 4—6 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1936. *Gaudryina carinata* FRANKE; BROTZEN: 35, pl. 1: 5a, b, c (with synonymy).
1937. *Gaudryina (Siphogaudryina) carinata* FRANKE; CUSHMAN: 76, pl. 11: 12—14.
1937. *Gaudryina (Siphogaudryina) stephensoni* CUSHMAN; CUSHMAN: 74, pl. 11: 4—6, 11.
1946. *Gaudryina (Siphogaudryina) stephensoni* CUSHMAN; CUSHMAN: 35, pl. 8: 8—11.

1954. *Gaudryina (Siphogaudryina) carinata* FRANKE; HAGN: 15, pl. 1: 17.
1961. *Heterostomella carinata* (FRANKE); AKIMEZ: 97, pl. 6: 4a, b, 5.
non 1972. *Gaudryina carinata* FRANKE; HANZLIKOVÁ: 51, pl. 11: 4.

Material. — Over hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46860/88/F	46861/88/F	46862/88/F
length	0.864	0.720	0.456
width	0.312	0.264	0.192
thickness	0.216	0.168	0.120

Variability. — It is expressed in a size of a test, its thickness, degree of concavity of walls especially in a biserial part, degree of the test expansion with growth. This widening is always gradual and small, so that edges of the test in the biserial part are nearly parallel.

Remarks. — The investigated specimens conform with those described by FRANKE (1914), but specimens having more than four edges in the biserial part are missing from the investigated material. *Heterostomella carinata* (FRANKE, 1914) seems to be conspecific with *Gaudryina stephensoni* CUSHMAN 1928 which was already noted by BROTZEN (1936). The latter species differs from the former only in having well visible chambers and sutures in both parts of the test. Specimens having well visible chambers and sutures do not differ from *G. stephensoni* in the investigated material, and it concerns both the species from Turonian and Maastrichtian. HAGN (1954: 15) noted the occurrence of specimens transitory between the discussed species and *H. leopolitana* OLSZEWSKI in the Emscherian deposits from the north-west Germany. Those specimens have the general shape of *H. leopolitana* OLSZEWSKI, but the aperture is still like *H. carinata*.

Distribution. — Poland — upper Turonian-Maastrichtian. Europe — Turonian-Senonian. North America — Campanian.

Heterostomella foveolata (MARSSON, 1878)

(pl. 3: 11)

1878. *Tritaxia foveolata* MARSSON: 161, pl. 3: 30a, b, c.
1961. *Heterostomella foveolata* (MARSSON); AKIMEZ: 100, pl. 6: 8a, b, 9 (with synonymy).
1972. *Heterostomella foveolata* (MARSSON); HANZLIKOVÁ: 53, pl. 11: 5 (with synonymy).
1974. *Heterostomella foveolata* (MARSSON); GORBENKO: 31, pl. 2: 2a, b (with synonymy).
1977. *Heterostomella foveolata* (MARSSON); OLSSON: pl. 1: I.
1979. *Heterostomella foveolata* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 92, pl. 28: 7a, b.

Material. — Thirty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45767/88/F	45768/88/F	45769/88/F
length	0.936	0.816	0.648
width	0.576	0.360	0.336

Variability. — It is expressed in a shape of transverse section of a biserial part of a test (it can be round or multiangular), in a degree of the test expansion with growth (proportionate but considerable in specimens having 6 edges in the biserial part). The specimens displaying small degree of expansion and having nearly parallel edges have only 5 edges. In some of them the sixth edge appears only in the youngest portion of the test. The edges of the test, in the case of five-edged specimens, are lower than in the specimens with six-edges, and walls between edges are flat or slightly concave. The test of such specimens is clearly angular. The specimens with six-edges have walls between edges slightly convex, causing that the test section is nearly oval. Apertural surface in angular specimens is less arched, while being more arched in the oval ones. Aperture oval on a short neck.

Remarks. — The oval specimens agree well with the holotype. The angular specimens agree with the paratype illustrated by CUSHMAN (1937, pl. 20: 17). There are both the angular and oval specimens in the synonymy cited above. AKIMEZ (1961) and other Soviet students include the angular specimens with 5 nearly parallel edges in the biserial part into *Heterostomella praefoveolata* AKIMEZ, 1961. Oval specimens are rare, whereas angular ones dominate in the investigated material from the upper Maastrichtian. Various ontogenetic stages are present in the investigated material.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Europe — Campanian-Maastrichtian. North America — Saratoga Chalk. Western Atlantic — Campanian.

Heterostomella laevigata MARIE, 1941
(pl. 4: 2, 3, 4)

1941. *Heterostomella laevigata* MARIE: 69, pl. 3: 32a—d.

Dimensions (in mm):

IG Nos.:	45770/88/F	45771/88/F	45772/88/F
length	0.576	0.480	0.508
width	0.264	0.264	0.240
thickness	0.192	0.168	0.168

Description. — Test fine-grained, sharpened at the proximal end, poorly expanding with growth, sometime slightly bent. Triserial part amounts to 3/4 of the whole length. In a biserial part usually one, sometimes two pairs of chambers. Transverse section of the triserial part triangular, of the biserial part quadrangular. Three edges run along the whole test length. One edge may disappear in some specimens at the base of the biserial part. The edges high with slightly concave walls between them. On the edges and on each of two wider walls of the test there is a row of small holes left after fistular processes that have broken off. Chambers and sutures are obscure. Strong concavity occurs on each wall of the test at the base of the two youngest chambers, resulting in formation of some kind of a collar by the chamber edges in a distal part. Apertural surface slightly convex. Oval or round aperture located on a low neck is present at its top.

Variability. — It is expressed in a test outline straight or slightly bent, in a length of triserial part (about 3/4 of the total length of specimens having one or two chamber pairs in a biserial part). Variability is also expressed in the presence or absence of small perforations on the two wider test walls, left by the fistular processes, in a degree of concavity of the test walls (sometimes considerable) at the base of the two youngest chambers; in result a kind of collar is more or less developed. Width and height of an apertural neck are also the subject to variation.

Remarks. — The description of this species presented by MARIE (1941) is rather unclear. Tendency to uniseriality, three edges running nearly along the whole test length, disappearance of the third edge in some specimens and the test shape and size indicate that the Polish specimens belong to *Heterostomella laevigata* MARIE. The most similar species are *Heterostomella boynensis* WICKENDEN, 1932 and *Heterostomella bavarica* HAGN, 1954. The first one differs from *Heterostomella laevigata* MARIE in the lack of tendency to uniseriality and in rather clearly marked sutures, if the illustrations by the author of the species and CUSHMAN (1946, pl. 11: 8—9) are reliable. *H. bavarica* HAGN resembles most closely the discussed species in all features, except for a tendency to uniseriality.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). France: Paris Basin — Campanian.

Heterostomella leopolitana Olszewski, 1875
(pl. 3: 8, pl. 4: 1)

1875. *Heterostomella leopolitana* Olszewski: 136, pl. 2: 9.
1937. *Heterostomella leopolitana* Olszewski; Cushman: 147, pl. 20: 9—11.
1957. *Siphogaudryina (Heterostomella) leopolitana* (Olszewski); Hofker: 71, text-fig. 72.
1963. *Heterostomella leopolitana* Olszewski; Voloshina: 259, pl. 1: 1, 2, 3.
1979. *Heterostomella leopolitana* Olszewski; Kaptarenko-Tshernousova *et al.*: 93, pl. 28: 4a, b.

Material. — Five well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45773/88/F	45774/88/F	45775/88/F
length	0.864	0.816	0.744
width	0.528	0.456	0.456

Variability. — It is expressed in a width of a test and height of a last chamber, as well as in the test bending and in appearance of the fifth or even sixth poorly marked rib in a biserial part of the test. Test can be straight or strongly bent. The last chamber is dome-like, more or less arched.

Remarks. — Some specimens under discussion agree with the holotype. They have the same test outline, 4 high and wide uniform ribs, concave walls, round aperture located on the top of the dome-like last chamber and rough wall build of large quartz grains. The considered species is similar to *Heterostomella carinata* (Franke) from which it differs in a location of the aperture on the summit of the dome-like arched last chamber and not at its base, in having wider test, more rapidly increasing in size as chambers added, in higher and thicker ribs and their slightly different pattern. It seems that the specimens described by Franke (1928; 144—145, pl. 13: 10) under the name *Gaudryina carinata* are conspecific with the discussed species.

Distribution. — Poland — Maastrichtian. Western Germany — upper Santonian to upper Campanian. Eastern Germany — Senonian. USSR — lower Maastrichtian.

Heterostomella rugosa (d'Orbigny, 1840)
(pl. 3: 6, 7)

1840. *Sagrina rugosa* d'Orbigny: 47, pl. 4: 31, 32.
1937. *Heterostomella rugosa* (d'Orbigny); Cushman: 147, pl. 20: 12—16, 19.
1941. *Heterostomella rugosa* (d'Orbigny); Marie: 67, pl. 3: 30a—f.
1957. *Siphogaudryina (Heterostomella) rugosa* (d'Orbigny); Hofker: 72, text-fig. 73.

Material. — Ten variably preserved specimens.

Dimensions (in mm):			
IG Nos.:	45776/88/F	45777/88/F	45778/88/F
length	1.080	0.984	0.792
width	0.629	0.480	0.432

Variability. — It is expressed in test proportion (either more or less rapid expansion of a test with growth) in test ornamentation, and in a degree of arching of the youngest chamber and aperture location. Most of the investigated specimens are oval with a circular cross section in a biserial part. Specimens with a square cross section are covered with cavities left by broken off fistular processes organized in rows, on the whole surface except for a very short triserial part. Four rows of pits occur at the base of each of the youngest chambers. The number of the rows diminuates with narrowing of the test in the proximal part. In the slenderer specimens there are four poorly raised ribs at the base of each two youngest chambers. These low ribs are covered with pits left by broken off fistular processes. The test walls between the ribs are strongly de-

pressed and the surface less wrinkled, less rough than on square-built specimens. The youngest chamber can be more or less dome-like arched. Aperture round on a top of the last chamber or slightly removed toward chamber suture.

Remarks. — The discussed species is most similar to *Heterostomella foveolata* (MARSSON). It differs in having flat, vague ribs, numerous pits left by broken off fistulate processes located near each other resulting in a characteristic rough surface of the test. It differs clearly in having the youngest chamber strongly arched and well marked.

Distribution. — Poland — upper Campanian-Maastrichtian (Lublin Chalk). England, France, Germany, Netherlands — Upper Cretaceous.

Family **Tritaxiidae** PLOTNIKOVA, 1979

Genus *Tritaxia* REUSS, 1860

Tritaxia dubia (REUSS, 1851)

(pl. 2: 7)

1851. *Verneulina dubia* (REUSS): 40, pl. 4: 3.
1937. *Tritaxia dubia* (REUSS); CUSHMAN: 26, pl. 4: 1—4 (with synonymy).
1957. *Tritaxia dubia* (REUSS); HOFKER: 67, text-fig. 68, 69.
1966. *Tritaxia dubia* (REUSS); HOFKER: 19, 1: 4, 13.

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45749/88/F	45750/88/F	45751/88/F
length	0.744	0.672	0.600
width	0.360	0.312	0.312

Variability. — Variability is small and expressed in a degree of concavity of test sides (flat or slightly concave), sharpness of the test margins and in a degree of sutures concavity (flat or slightly concave).

Remarks. — The investigated specimens nearly entirely conform with the holotype. They differ only in size and smooth test surface. Characteristic features of this species are as follows: elongated elliptical outline of the test, parallel margins, uniserial arrangement of the youngest chambers, poorly concave test sides and septal sutures, as well as round aperture located on the summit of the youngest chamber. The species under discussion resembles mostly *Clavulina trilatera* (CUSHMAN, 1926 but differ from it in its shape, in having narrow test margins along the whole test length and in less numerous chambers in uniserial part of the test.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Denmark, Netherlands, Germany — Campanian-Maastrichtian. For the first time described from the upper Maastrichtian chalk of the Lvov vicinity.

Tritaxia eggeri (CUSHMAN, 1936)

(pl. 2: 11)

1936. *Pseudoclavulina eggeri* (CUSHMAN): 17, pl. 3: 4a, b.
1937. *Pseudoclavulina eggeri* CUSHMAN: 111, pl. 15: 22—25.
1950. *Clavulinoides algeriana* ten DAM and SIGAL: 33, pl. 2: 11 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1983. *Tritaxia eggeri* (CUSHMAN); HAGN and HERM: 622, pl. 2: 7, 8, pl. 3: 3, 4.

Material. — Forty partly damaged specimens.

Dimensions (in mm):

IG Nos.:	45752/88/F	45753/88/F	45754/88/F
length	2.520	1.680	1.440
width (initial part)	0.360	0.432	0.432
width (last formed chamber)	0.432	0.480	0.480

Variability. — It is small and expressed in a degree of chambers visibility in triserial part of a test (very poorly visible or unvisible), in a length of uniserial part of the test with triangular chambers and in a number of spherical chambers in a uniserial part of the test (between 3 and 5). In the specimens with 4 chambers in uniserial part of the test the triserial part together with the uniserial one with triangular chambers amounts to a half of the test.

Remarks. — Polish specimens conform with the holotype from Germany. CUSHMAN (1936) did not mention the triangular outline of chambers in a uniserial part of the test, but on the holotype illustration (pl. 3: 4a) it is well visible. The discussed specimens are identical with those described by HAGN and HERM (1983, pl. 2: 7—8) from the Bavarian Alps also with respect to the triangular shape of chambers in the uniserial part of the test. The triserial part of the test passes into the uniserial one with triangular chambers, and next into the uniserial part with spherical chambers. The species *Clavulinoides algeriana* ten DAM et SIGAL, 1950, displays all features of the species under discussion, except for having slightly smaller length which is, however, well within the variability range (see dimensions of the investigated specimens).

Distribution. — Poland: Polish Lowlands — upper Campanian-lower Maastrichtian. Germany — lower and middle Maastrichtian. Algeria — Cretaceous-Paleocene.

Superfamily **Ataxophragmiacea** SCHWAGER, 1877
Family **Ataxophragmiidae** SCHWAGER, 1877
Subfamily **Ataxophragmiinae** SCHWAGER, 1877
Genus *Arenobulimina* CUSHMAN, 1927
Arenobulimina conica MARIE, 1941
(pl. 6: 12, 13)

1851. *Bulimina preslii* REUSS; REUSS: 39, pl. 3: 10.
1941. *Arenobulimina conica* MARIE: 48, pl. 4: 35a—d.
1963. *Arenobulimina reussi* WOLOSCHYNA: 261, pl. 1: 4, 5.
1964. *Arenobulimina preslii* (REUSS); KRIVOBORSKIJ *in* SUBBOTINA: 204, pl. 33: 1, 2, 3.
1972. *Arenobulimina (Arenobulimina) reussi* VOLOSHYNA; WOLOSCHINA: 63, pl. 2: 4.
1979. *Arenobulimina reussi* WOLOSCHYNA; KAPTARENKO-TSHERNOUSOVA *et al.*: 98, pl. 32: 4a, b.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45797/88/F	45798/88/F	45799/88/F
length	0.912	0.816	0.528
width	0.672	0.600	0.480

Variability. — It is expressed mainly in a size of specimens, degree of visibility of older whorls and the size of the youngest whorl. Initial whorls are well visible in the largest specimens, as for example the specimens from the Lwów Chalk (REUSS 1851, VOLOSHYNA 1963). They are less visible in smaller specimens such as those from the Paris Basin (MARIE 1941). In large specimens chambers are slightly convex in all whorls, and septal and spiral sutures poorly depressed. In smaller specimens the chamber surface is flat, and sutures are not depressed. The initial conical part of the test amounts to a 1/4 of the whole length. The last whorl consists of 5 chambers and amounts to 3/4 of the test length, expanding rapidly in comparison with earlier whorls. Chamber interior simple, not divided. Apertural surface flat or slightly concave near the aperture, reniform, in some specimens not very wide and high, thus the top of the test is considerably narrowed in comparison with the middle part of the last whorl. Aperture in the form of a slit forming an angle 45° with a spiral suture. The second slit may run along the spiral suture resulting in an apertural tooth.

Remarks. — It seems that the specimens described by REUSS (1851) under the name *Bulimina preslii* from the Lvov Chalk and determined as *Arenobulimina reussi* by VOLOSHINA (1963)

are conspecific with *A. conica* MARIE. The common features of all the considered specimens are: a short, conical initial part of the test and a wide rapidly increasing in size last whorl. Small differences are well within the intraspecific variability range. The considered species differs from *A. preslii*, (REUSS 1845 described from the Cretaceous deposits of Bohemian Basin in lager size and considerably higher and wider last whorl (when compared with earlier whorls). VOLOSHINA (1963: 262) reported, however, that *A. reussii* WOLOSCHYNA differs from *A. preslii*, (REUSS) 1845 in displaying gradual increase of the whorl height, thus causing that the transition from an early to the last whorl is gradual. Her illustration (1963, pl. 1: 4, 5) shows, however, rapid transition. Specimens of the species under consideration which display rather well visible initial whorls and a slightly convex chamber surface, resemble the species *A. obliqua* (d'ORBIGNY). They differ in proportions of the test, and especially in having considerable width and a little convex or flat chamber surface.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). France: Paris Basin, Campanian. USSR — Campanian-Maastrichtian (Lvov Chalk).

Arenobulimina cuneata WOLOSCHYNA, 1972
(pl. 6: 2, 3)

1972. *Arenobulimina (Pasternakia) cuneata* WOLOSCHYNA: 69, pl. 3: 8, 9.
1979. *Arenobulimina cuneata* WOLOSCHYNA; KAPTARENKO-TSHERNOUSOVA *et al.*: 95, pl. 30: 7.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	45800/88/F	45801/88/F	45802/88/F
length	1.440	1.104	0.600
width	0.648	0.528	0.312

Description. — Test large, oval, initially wedge-like with well separated initial chamber; a test is of equal width along the whole length above the initial part, and even slightly narrowed in a distal part. It is fine-grained, siliceous, a little rough, with a chamber interior not divided. Transverse section round. Whorls invisible in the wedge-like part, higher up 4—5 whorls consisting initially of 4 and further 3 chambers. Chamber outline rhomboidal, chamber surface slightly convex, septal and spiral sutures straight, slightly depressed. Apertural surface reniform, slightly flattened, aperture semiround interiomarginal or a little removed from the suture of the penultimate chamber.

Variability. — Intraspecific variability high and expressed in a test size, degree of convexity of chamber surface (rather considerable or nearly flat, especially in chambers of the youngest whorls), degree of suture depression (which is related with a chamber convexity). Variability concerns also a tendency to uniseriality. The last whorl has 3 chambers in most specimens, apertural surface is reniform, slightly flattened, with semiround aperture removed slightly from the suture between two last chambers.

Remarks. — The specimens from the Lublin Chalk are nearly identical with the holotype from the Lvov Chalk. The only difference is in the test composition which is siliceous in the specimens, while the specimens from the Lvov Chalk seem to have calcitic test, as VOLOSHINA (1972) placed this species in the subgenus *Pasternakia*.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USSR — Campanian-Maastrichtian. Germany — Upper Cretaceous (sandy chalk).

Arenobulimina elevata (d'ORBIGNY, 1840)
(pl. 5: 1, 2)

1840. *Globigerina elevata* d'ORBIGNY: 34, pl. 3: 15, 16.
1972. *Arenobulimina (Novatrix) elevata* (d'ORBIGNY); VOLOSHINA: 78, pl. 5: 3, pl. 6: 1, 2, pl. 21: 1.
1982. *Arenobulimina (Haganowella) elevata* (d'ORBIGNY 1940); FRIEG and PRICE: 55, pl. 2: 1: 1, pl. 2.2: a, b (with synonomy).
1986. *Arenobulimina (Novatrix) elevata* (d'ORBIGNY); JORDAN and GASSE: 11, pl. 1: 9—10.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45803/88/F	45805/88/F	45805/88/F
length	1.440	1.080	0.792
width	1.152	0.960	0.744

Variability. — Intraspecific variability small and concerns the test size (see dimensions), number of whorls (usually 4, less commonly 3), height of the youngest whorl occupying 1/2 or 4/5 the length of the test, and chamber convexity. Chambers are strongly convex in all whorls, or poorly convex in older whorls and strongly convex in the youngest whorl. There are always 4 chambers in a whorl.

Remarks. — The discussed specimens are identical with the holotype. They differ only in having a considerably large size, e.g. the specimens from the Paris Basin (MARIE 1941) are 0.42—47 mm long and 0.31—37 mm wide, whereas the specimens described by FRIEG and PRICE (1982) are 0.8 mm long and 0.40 mm wide.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). North-Western Europe — Cenomanian-Campanian. USSR — Cenomanian-Campanian.

Arenobulimina minutissima sp. n.
(pl. 6: 1)

Holotype: Specimen presented on pl. 6: 1, No. IG 45806/88/F.
Paratypes: specimens Nos IG 45807/88/F; 45808/88/F.
Type horizon: Lower Maastrichtian.
Type locality: Piaski IG 1 borehole, depth 402.1 m.
Derivation of the name: from the small size of a test.

Diagnosis. — Test very small, oval, elongated and weakly expanding with growth, with nearly parallel margins and with 4 chambers in the youngest whorl; chamber interior divided into chamberlets. Test wall consists of small quartz grains in a calcareous matrix.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	45806/88/F	45807/88/F	45808/88/F
length	0.264	0.216	0.168
width	0.120	0.120	0.096
thickness	0.120	0.120	0.096

Description. — Very small test consisting of small quartz grains in a calcareous matrix, fine-grained, glittering, smooth, narrow and elongated, of nearly equal width along the whole length. It displays nearly parallel margins and is oval as a whole, round or subquadrangular in transverse section and poorly increasing in size as chambers are added. The initial chamber is spherical, protruding and well visible. The test presumably consists of 5—6 very poorly visible whorls. The last whorl occupies 1/4 or 1/3 of the whole test length and consists of 4 chambers. Chambers interior in the last whorl divided into chamberlets. Chambers surface in older whorls flat, septal and spiral sutures flat, translucent or obscure. The chamber surface slightly convex

in the last whorl, sutures weakly depressed, strongly diagonal, translucent. Apertural surface reniform, very weakly convex. Aperture loop-shaped surrounded by a lip, situated at the base of the apertural surface of the last chamber.

Variability. — It is expressed in a degree of the test expansion with growth, but the test is always narrow. The height of the last whorl is either 1/4 or 1/3 the test length. Variable is also a degree of visibility of whorls in an initial part of the test, and visibility of an initial chamber.

Remarks. — In size this new species resembles *Arenobulimina minima* VASSILENKO, 1961. It differs from it in having more narrow test, higher number of whorls, considerably lower last whorl, inivisible chambers and whorls in the initial part of the test, very poorly convex chambers in the last whorl, and in smooth, glittering test surface.

Distribution. — Poland: borehole Piaski IG 1 — Campanian-Maastrichtian, Telatyn IG 1 lower Maastrichtian, Lublin IG 2 — Campanian-lower Maastrichtian.

Arenobulimina obesa (REUSS, 1851)
(pl. 6: 6a—b)

1951. *Bulimina obesa* REUSS: 40, pl. 3: 12, pl. 4: 1.
1982. *Arenobulimina (Hagenowella) obessa* (REUSS, 1851); FRIEG and PRICE: 56, pl. 2.2: c, d, e (with synonymy).
1986. *Arenobulimina (Novatrix) obesa* (REUSS); JORDAN and GASSE: 11, pl. 2: 6.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45809/88/F	45810/88/F	45811/88/F
length	0.528	0.480	0.360
width	0.528	0.552	0.480

Variability. — It is expressed in a size of a test (majority of the investigated specimens are wider than long), in a degree of visibility of the first whorl and a degree of convexity of chambers in both whorls. The first whorl may be nearly invisible and flat, or relatively well visible as a protruding node at the base of the second whorl consisting of 4 very strongly convex to poorly convex chambers. Comma-shaped aperture is situated on the apertural surface and forms an angle of about 60° with the spiral suture. There is a triangular apertural tooth in some specimens.

Remarks. — The investigated specimens are similar to the holotype. Their size is the same as that of the specimens presented by EBENSBERGER (1962) which are 0.5 mm long and 0.5 mm wide. They are considerably smaller than the specimens investigated by FRIEG and PRICE (1982, maximum length 1.2 mm, maximum width 1.5 mm). In general appearance, organization of whorls, proportion of whorls and number of chambers in the last whorl the discussed species resembles most closely the species *Trochammina globigeriniformis* CUSHMAN, 1910 (*non* PARKER and JONES 1865). It differs from the latter species in having a comma-shapped aperture and less convex chambers.

Distribution. — Poland — Campanian-Maastrichtian. Europe — Cenomanian-Maastrichtian.

Arenobulimina preslii (REUSS, 1845)
(pl. 6: 11)

1845. *Bulimina preslii* REUSS: 38, pl. 13: 72.
1980. *Arenobulimina preslii* (REUSS); GAWOR-BIEDOWA: 18, pl. 2: 1, 2 (with synonymy).
1982. *Arenobulimina (Arenobulimina) presli* (REUSS); FRIEG and PRICE: 52, pl. 2.1: d—h.
1986. *Arenobulimina (Arenobulimina) presli* (REUSS); JORDAN and GASSE: 10, pl. 1: 4—6.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45815/88/F	45816/88/F	45817/88/F
length	0.624	0.552	0.456
width	0.480	0.408	0.336

Variability. — It is expressed in a different degree of test expansion with growth and in a degree of chamber convexity. In the investigated material there occur specimens with a strongly pointed initial part of the test, that poorly increased in size as chambers were being added, which resulted in a test of nearly equal width along its whole length. Specimens displaying smaller expansion of the test have also a less pointed initial part. A chamber surface and sutures are flat in most specimens. In rare specimens the chamber surface in the last whorl is very poorly convex and sutures hardly depressed. The aperture consists of a slit running slightly diagonally in relation to a base of the last chamber and of the second fissure narrower and situated along the base of the last chamber at a small distance. This situation results in formation of the apertural tooth. In other specimens the aperture forms only one fissure diagonal in relation to the base of the last chamber. Chambers interior not divided.

Remarks. — For comparisons see description of *Arenobulimina conica* MARIE. The specimens from the Lublin Chalk differ from those investigated by FRIEG and PRICE (1982) in larger size. The specimens from the north-west Germany have maximum length equal to 0.4 mm, while maximum width equals to 0.3 mm.

Distribution. — Poland: Carpathians and Polish Lowlands — Upper Cretaceous; Sudetes — Turonian. Europe — Upper Cretaceous.

Arenobulimina puschi (REUSS, 1851)

(pl. 6: 4, 5)

1851. *Bulimina puschi* REUSS: 37, pl. 3: 6.
1937. *Arenobulimina pushi* (REUSS); CUSHMAN: 42, pl. 4: 22—25.
1979. *Arenobulimina puschi* (REUSS); KAPTARENKO-TSHERNOUSOVA, PLOTNIKOVA and LIPNIK: 97, pl. 32: 1a, b (with synonymy).
1986. *Arenobulimina (Harena) puschi* (REUSS); JORDAN and GASSE: 10, pl. 1: 7—8.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45812/88/F	45813/88/F	45814/88/F
length	0.912	0.840	0.480
width	0.384	0.456	0.312

Variability. — It is expressed in a degree of chamber convexity, depression of sutures, roughness of a test and a degree of a screw-like coiling of the test along a growth axis.

Remarks. — The investigated specimens are identical with the holotype. The characteristic features of that species are: the test width equal, or nearly equal along its whole length, the occurrence of 3 chambers in older whorls and only 3 or even 2 chambers in the youngest whorl, a rather strong test coiling along its growth axis and a rather strong convexity of chambers. The specimens with a strongly coiled test along its growth axis resemble *Plectina ruthenica* (REUSS) and can be mistaken with this species. REUSS (1851) mentioned 3 rows of chambers in all whorls of the test of this species. The fact that the initial whorls contained 4 chambers has not been noted by him.

Distribution. — Poland — Campanian — Maastrichtian (Lublin Chalk). Germany, France — Senonian. USSR — Campanian-Maastrichtian. Germany, Westphalia — Campanian.

Arenobulimina sphaerica (MARIE, 1941)
(pl. 5: 8, 9, 10)

1941. *Arenobulimina sphaerica* MARIE: 49, pl. 4: 36a—e.

Material. — Twenty five partly damaged specimens.

Dimensions (in mm):

IG Nos.:	45818/88/F	45819/88/F	45820/88/F
length	0.528	0.504	0.408
width	0.456	0.456	0.480

Variability. — It is expressed in a height of older whorls visible as low cone at the base of the test, in width and height of the last whorl, and in a convexity of chamber surface. The last whorl consists of 5 chambers with slightly convex or even entirely flat surface in most cases. Specimens with slightly convex chambers display weakly depressed septal sutures. As it follows from the measurements, width of some specimens is superior to the test height. Chambers interior not divided.

Remarks. — The investigated specimens are identical with those described from the Cretaceous of the Paris Basin by MARIE (1941). They mostly resemble *Arenobulimina conica* MARIE. They differ from the last species in being more involute, which results in a spherical shape of the test. They resemble also *Ataxophragmium crassum* (d'ORBIGNY), if not regarding low cone at a base of a test formed by the initial whorls. The species under discussion is the last link of a probable phylogenetic line leading from *Arenobulimina preslii* (REUSS) through *Arenobulimina conica* MARIE to *Arenobulimina sphaerica* MARIE.

Distribution. — Poland — Campanian-Maastrichtian. France: (Paris Basin) — Campanian.

Arenobulimina vialovi WOLOSCHYNA, 1961
(pl. 7: 9, 10)

1961. *Arenobulimina vialovi* WOLOSCHYNA: 75, pl. 2: 1a, b, w.
1972. *Arenobulimina vialovi* WOLOSCHYNA; VOLOSHINA: 85, pl. 7: 2.
1979. *Arenobulimina vialovi* WOLOSCHYNA; KAPTARENKO-TSHERNOUSOVA *et al.*: 99, pl. 32: 7.
1986. *Arenobulimina vialovi* WOLOSCHYNA; JORDAN and GASSE: 12, pl. 2: 4—5.

Material. — Eight well preserved specimens.

Dimensions (in mm):

IG Nos.:	45821/88/F	45822/88/F	45823/88/F
length	1.056	0.840	0.888
width	0.720	0.648	0.672

Description. — Test large, rough, rounded at the beginning, nearly of equal width along its whole length, and consisting of 2—3 1/2 whorls. Most probably five poorly visible chambers in the oldest whorl. A last whorl consists of 3 chambers. The chambers are strongly convex, wider than high, with depressed sutures and slightly diagonal. Apertural surface slightly convex, aperture semicircular, situated at a center of apertural surface, and touching the suture at the base of the youngest chamber. Test wall composed of large quartz grains and a small amount of calcareous matrix.

Variability. — Variability is small and expressed in a test size, degree of chamber convexity and depression of sutures, as well as in a size of quartz grains building the test wall. Chambers, however, are convex in all cases. Only chambers of the first whorl are poorly visible, so that their number is unknown; most probably there are five chambers.

Remarks. — The investigated specimens seem to be consistent with the holotype. The only difference is in a more equal width of a test along its whole length in the specimens from the Lublin Chalk.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USSR — Campanian-Maastrichtian. Germany: Westphalia — upper Campanian.

Genus *Ataxophragmium* REUSS, 1860
Ataxophragmium beisseli CUSHMAN, 1936
(pl. 4: 8, pl. 5: 6)

1936. *Ataxophragmium beisseli* CUSHMAN: 43, pl. 6: 22.
1937. *Ataxophragmium beisseli* CUSHMAN; CUSHMAN: 178, pl. 21: 19, 22, *non* 20—21.
1962. *Ataxophragmium beisseli* CUSHMAN; EBENSBERGER: 24, pl. 1: 12.
1986. *Ataxophragmium beisseli* CUSHMAN; JORDAN and GASSE: 13, pl. 3: 4.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45779/88/F	45780/88/F	45781/88/F
length	1.296	1.080	0.864
width	1.080	0.864	0.720
thickness	1.128	0.960	0.720

Variability. — It is expressed in proportion of wall components. Some specimens have nearly no quartz grains, whereas others have quartz grains of equal or various size, in most case fibrous calcite is present. It gives the impression that the test is built of sponge spicules. Poorly marked sutures between chambers are visible in some specimens, but in majority of cases they are unvisible. Also a shape and location of the aperture are the subject to variation. The aperture may be fissure-like and located at the base of the apertural surface or diagonally on this surface, connected with its base.

Remarks. — The Polish specimens are identical with the holotype. High-trochospiral coiling of the test and its outline resemble especially *Ataxiophragmium variabile* (d'ORBIGNY). It differs, however, from the last species in having chambers invisible in the whorls and a fibrous-like appearance of a test wall. In the test wall and its composition this species resembles *A. rimosum* (MARSSON) from which it differs in larger size, high trochospiral coiling, egg-like outline of the test and a tendency of the last chamber to be uniserial. *A. rimosum* (MARSSON) may represent juvenile forms of the species *A. beisseli* CUSHMAN, but this problem needs further investigation with a larger material at hand.

Distribution. — Poland — Maastrichtian (Lublin Chalk). Germany — Upper Cretaceous.

Ataxophragmium crassum (d'ORBIGNY, 1840)
(pl. 5: 11, 12)

1840. *Rotalina crassa* d'ORBIGNY: 32, pl. 3: 7, 8.
1941. *Ataxogyroidina globosa* HAGENOW; MARIE: 59, pl. 5: 50—57.
1941. *Ataxogyroidina crassa* (d'ORBIGNY); MARIE: 59, pl. 6: 59—60.
1962. *Ataxophragmoides bulloides* (BEISSEL); EBENSBERGER: 25, pl. 1: 13, text-fig. 5.
1964. *Ataxophragmoides crassus* (d'ORBIGNY); KRIVOBORSKY: 213, pl. 34: 4, pl. 36: 5, 6, 7, 8, pl. 37: 1, 2, 3, 4, 5, pl. 38: 1, 2, 3, 4.
1972. *Ataxophragmium crassum* (d'ORBIGNY); VOLOSHINA: 101, pl. 11: 4, pl. 12: 1, pl. 21: 3 (with synonymy).
1979. *Ataxophragmium crassum* (d'ORBIGNY); KAPTARENKO-TSHERNOUSOVA *et al.*: 102, pl. 34: 3.
1980. *Ataxophragmium crassum* (d'ORBIGNY); FRIEG: 237, pl. 2: 11.
1986. *Ataxophragmium crassum* (d'ORBIGNY); JORDAN and GASSE: 13, pl. 3: 1—2.

Material. — Forty variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45782/88/F	45783/88/F	45784/88/F
length	1.320	1.008	0.628
thickness	1.080	0.816	0.528

Variability. — It is expressed mostly in a degree of a test involution. Some specimens are totally involute with only one whorl visible, while others have an initial part semiinvolute so that one can see slightly marked internal whorl which is flat or poorly convex and amounts to 1.2 of the surface of the initial part of the test. Variability is also expressed in the test size, its outline (spherical or nearly spherical in effect of a slight flattening of the initial part of the test) and in a degree of convexity of chamber surfaces. Generally the chamber surface is flat. Some specimens, however, have the surface of all chambers of the last whorl, or only the two youngest chambers of a last whorl, a little convex. Height of the apertural surface is also a subject to variation.

Remarks. — The Polish specimens are identical with those described by d'ORBIGNY (1840) from the Paris Basin, as well as with all the other specimens referred to in the synonymy. In general morphology this species resembles some representatives of the genus *Gyroidinoides*, but it is arenaceous form. It should be noted that in the species *A. crassum* the coiling of the test, the test wall and the aperture are typical for the genus *Ataxophragmium*. The chamber interior is simple.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). France: Paris Basin — Senonian. Germany — Upper Cretaceous. USSR — Santonian-Maastrichtian.

Ataxophragmium depressum (PERNER, 1892)

(pl. 4: 11, 12)

1892. *Bulimina depressa* PERNER: 27, pl. 3: 3a, b.
1980. *Ataxophragmium depressum* (PERNER); GAWOR-BIEDOWA: 20, pl. 2: 14, 15 (with synonymy).
1980. *Ataxophragmium depressum* (PERNER); FRIEG: 237, pl. 2: 9, 10 (with synonymy).
1986. *Ataxophragmium depressum* (PERNER); JORDAN and GASSE: 13, pl. 3: 5—6.

Material. — Seven well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45785/88/F	45786/88/F	45787/88/F
length	0.672	0.630	0.366
width	0.528	0.540	0.312

Variability. — It is expressed mainly in width of an apertural surface and in a degree of its concavity.

Remarks. — The investigated specimens differ from conspecific forms from the Sudetes in having flat chamber surface and in flat, nearly invisible sutures marked only as shining lines. General features of this species such as coiling, reniform outline and inflation of the youngest chamber as well as degree of concavity of the apertural surface are so characteristic that even when some of these features are poorly developed, identification is very easy.

Distribution. — Poland: Wolin Island — Turonian; Sudetes — Turonian-Coniacian; Lublin Upland — Campanian-Maastrichtian. Czechoslovakia — Cenomanian-Santonian. Germany — upper Senonian. USSR — Turonian-lower Coniacian.

Ataxophragmium fartile WOLOSCHYNA, 1972
(pl. 4: 9, 10)

1972. *Ataxophragmium fartile* WOLOSCHYNA: 110, pl. 13: 5, pl. 21: 6, 7.
1979. *Ataxophragmium fartile* WOLOSCHYNA; KAPTARENKO-TSHERNOUSOVA *et al.*: 102, pl. 34: 6a, b.

Material. — Five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45788/88/F	45789/88/F	45790/88/F
length	0.600	0.576	0.456
width	0.480	0.504	0.360
thickness	0.552	0.552	0.456

Description. — Fine-grained, involute and spherical test with a poorly visible last whorl built of 4 slightly convex chambers separated by slightly depressed sutures running nearly perpendicularly to base of the last chamber on a ventral side. The sutures extend nearly parallely on a dorsal side. Apertural surface slightly convex, aperture in the form of an elongated loop located at 40° in relation to a base of the apertural surface.

Variability. — It is expressed in a degree of chamber convexity, and the convexity of apertural surface as well as in the shape of aperture. The chamber surface is slightly convex, in small specimens nearly flat. Sutures slightly depressed and nearly perpendicular to the base of the apertural surface on the ventral side. Aperture cresscent-like and diagonally oriented in relation to the base of the apertural surface.

Remarks. — The investigated specimens are almost identical with those from the Lvov Chalk. Fine-grained, shining wall of the four chambers, their arrangement and slight convexity, as well as the small convexity of the apertural surface make this species the most close to *Arenobulimina obesa* (REUSS). In chamber arrangement and degree of their convexity it resembles also *Ataxophragmium compactum* BROTZEN, which has also fine-grained test.

Distribution. — Poland — Maastrichtian. USSR — upper Campanian and Maastrichtian.

Ataxophragmium lvovense WOLOSCHYNA, 1972
(pl. 4: 6a, b, 7)

1972. *Ataxophragmium (Opertum) lvovense* WOLOSCHYNA: 113, pl. 14: 1, 2.
1979. *Ataxophragmium lvovense* WOLOSCHYNA; KAPTARENKO-TSHERNOUSOVA *et al.*: 104, pl. 35: 1a, b.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45791/88/F	45792/88/F	45793/88/F
length	1.104	0.960	0.624
width	0.840	0.792	0.504
thickness	0.816	0.840	0.528

Variability. — It is expressed in more or less egg-like shape of a test, in a degree of convexity of apertural surface and degree of inclination of a narrow loop-like aperture in relation to an edge of the last chamber. It concerns also the visibility of glittering striae on the test surface, running perpendicularly to septal sutures and parallel in relation to each other. This striation reflects an internal division of chambers. A chamber surface and sutures usually flat.

Remarks. — Only the last whorl consisting usually of 4 chambers is visible in the investigated specimens, similarly as in those from the Lvov Chalk. Spherical shape of the test caues that septal sutures of chambers touching the apertural surface with their base are nearly perpendicular to it. In the shape and nearly perpendicular (in relation to apertural surface) orientation of sutures this species approach *Ataxophragmium compactum* BROTZEN. It differs, however, in having narrow aperture and striation of chamber surface.

Distribution. — Poland — upper Maastrichtian. USSR — upper Maastrichtian.

Ataxophragmium rimosum (MARSSON, 1878)
(pl. 5: 4, 5)

1878. *Bulimina rimosa* MARSSON: 153, pl. 3: 21.
1937. *Ataxophragmium rimosum* (MARSSON); CUSHMAN: 178, pl. 21: 16—18.
1964. *Ataxophragmium rimosum* (MARSSON); KRYVOBORSKY (*in* SUBBOTINA): 216, pl. 39: 1—3, pl. 40: 3—5, pl. 41: 1—3 (with synonymy).
1972. *Ataxophragmium rimosum* (MARSSON); VOLOSHINA: 108, pl. 13: 4.
1979. *Ataxophragmium rimosum* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 104, pl. 35: 7.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45794/88/F	45795/88/F	45796/88/F
length	0.768	0.720	0.552
thickness	0.696	0.672	0.480

Variability. — It is expressed in a test outline (round or egg-like), in composition of the test (various proportion of fibrous calcite, microgranular calcite and quartz grains). This may result in rough and fibrous, or sandy with fibers or nearly smooth character of the test surface. Changing is also a degree of convexity of apertural surface and an angle between the aperture and a vertical axis of an apertural surface. Only last whorl, showing poorly visible chambers is visible outside.

Remarks. — The investigated specimens are identical with those presented by MARSSON (1878, pl. 3: 21), and derived from the lower Maastrichtian deposits of the Rügen Island. In coiling of the test this species resembles *Ataxophragmium compactum* BROTZEN, but it differs in having well visible fibers on the test surface, as well as in unvisible chambers in a whorl and in a slit-like, diagonally oriented (in relation to the growth axis of apertural surface) aperture.

Distribution. — Poland — upper Campanian-Maastrichtian (Lublin Chalk). Eastern Germany: Rügen Island — lower Maastrichtian. USSR — Campanian-Maastrichtian.

Subfamily **Varsoviellinae** GAWOR-BIEDOWA, 1987
Genus *Varsoviella* GAWOR-BIEDOWA, 1987
Varsoviella pazdroae GAWOR-BIEDOWA, 1987
(pl. 7: 1, 2)

1987. *Varsoviella pazdroae* GAWOR-BIEDOWA: 55, pl. 27: 5, pl. 28: 5, pl. 29: 2.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45824/88/F	45825/88/F	45826/88/F
length	1.128	1.080	0.936
width	0.384	0.408	0.336

Variability. — Variability is small and concerns visibility of ring-like chambers in a uniserial part of a test. When the chamber surface is poorly convex, and septal sutures are slightly concave, then the chambers are visible. Variable is also a number of chambers (from 1 to 7) in a cylindrical, uniserial part of the test, which results in a changing length ratio of a trochospiral initial part of the test to the uniserial part. In the investigated material there occur specimens on various ontogenetic stages of development. In the specimens which have developed only a wedge-shaped, trochospiral initial part of the test the aperture is oval and situated on the apertural surface near the suture separating the last and penultimate chamber. In the uniserial part of the test the aperture is terminal. Variability concerns also a curvature of the test. Most of the investigated specimens are straight, but some are bent.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Subfamily **Pernerininae** LOEBLICH et TAPPAN, 1984
Genus *Orbignyna* von HAGENOW, 1842
Orbignyna inflata (REUSS, 1851)
(pl. 6: 10)

1851. *Spirolina inflata* REUSS: 32, pl. 2: 5, 6.
1972. *Orbignyna (Ataxoorbignyna) inflata* (REUSS); VOLOSHINA: 126, pl. 18: 5, 6, pl. 22: 7, 9 (with synonymy).
1974. *Orbignyna inflata* (REUSS); GORBENKO: 33, pl. 2: 6.
1979. *Orbignyna inflata* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 106, pl. 37: 2.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45827/88/F	45828/88/F	45829/88/F
length	0.960	1.080	0.792
width	0.888	0.864	0.648
thickness	0.768	0.792	0.648

Variability. — Juvenile specimens with a well developed planispiral part of a test dominate in the investigated material. Specimens with uncoiled part of the test are rare. Variability is expressed mainly in the planispiral part of the test in both a number of chambers (4—5) and a degree of chamber convexity.

Remarks. — The species differs from other species of the genus *Orbignyna* in strongly convex chambers, especially in a coiled part of the test.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USSR — Campanian-Maastrichtian.

Orbignyna ovata HAGENOW, 1842
(pl. 6: 9)

1842. *Orbignyna ovata* HAGENOW: 46, pl. 9: 26a—d.
1961. *Orbignyna ovata* HAGENOW; AKIMEZ: 103, pl. 7: 5a, b, 6a, b (with synonymy).
1972. *Orbignyna (Orbignyna) ovata* HAGENOW; VOLOSHINA: 116, pl. 15: 4, pl. 16: 1.
1974. *Orbignyna ovata* HAGENOW; GORBENKO: 34, pl. 2: 9a, b, w.
1979. *Orbignyna ovata* HAGENOW; KAPTARENKO-TSHERNOUSOVA *et al.*: 106, pl. 36: 1a, b.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45839/88/F	45831/88/F	45832/88/F
length	0.840	0.792	0.960
width	0.720	0.712	0.600
thickness	0.720	0.576	0.600

Variability. — It is expressed in a size of a test, in a degree of visibility of striation on the outer surface resulting from the internal chamber partition. Septal sutures may be poorly depressed and visible, or invisible.

Remarks. — The investigated specimens are identical with the holotype in the oval outline of the test, in being nearly equally wide as high, in the visible striation resulting from internal partition of chambers, in the size of the last chamber and in the slightly convex and wide apertural surface. They differ in having flat, not visible sutures in most cases. They differ from the Rügen specimens in less developed striation on the test surface, while resembling in this feature the specimens from Podole, described and illustrated by VOLOSHINA (1972). The specimens from the Montian deposits from the Boryszew borehole (Poland), included by POŻARYSKA (1965: 59) into this species are too flat to represent *Orbignyna ovata* HAGENOW.

Distribution. — Poland: Wolin Island — Turonian, Campanian-Maastrichtian (Lublin Chalk). Germany: Rügen — lower Maastrichtian. USSR — Campanian-Maastrichtian.

Orbignyna ruegensis (FRANKE, 1928)

(pl. 4: 5a, b)

1928. *Litoula ovata* HAGENOW forma *ruegensis* FRANKE: 172, pl. 15: 18.
1972. *Orbignyna (Orbignyna) ovata* (HAGENOW) var. *ruegensis* FRANKE; VOLOSHINA: 117, pl. 15: 4, pl. 22: 2.
1979. *Orbignyna ovata ruegensis* (FRANKE); KAPTARENKO-TSHERNOUSOVA *et al.*: 106, pl. 40: 1a, b.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45833/88/F	45834/88/F	45835/88/F
length	1.296	1.080	0.960
width	0.912	0.768	0.720
thickness	0.672	0.600	0.600

Description. — Test bilaterally symmetrical, oval in outline slightly lobate and with 5—7 poorly visible chambers in an outer whorl. Chamber surface poorly convex, sutures slightly depressed. The surface of the youngest chambers covered near the septal sutures with lighter and darker bands running perpendicularly to the septal sutures and parallel to each other; they are the expression of internal structure of chambers. Apertural surface slightly convex, an aperture as a large fissure.

Variability. — It is expressed in a number of chambers in the outer whorl (5—7), in a size of the test, as well as in the expression of banding on the near-sutural surface of youngest chambers. Also the shape of aperture is a subject to variation ranging from a wide fissure to nearly round opening situated on the summit of apertural surface.

Remarks. — The specimens with the fissure-like aperture seem to agree with the holotype. However, FRANKE's drawing is very schematic, thus not allowing for comparisons. The specimens with approximately round aperture are nearly identical with those described by VOLOSHINA (1972) under the name *Orbignyna (Orbignyna) ovata* (HAGENOW) var. *ruegensis* (FRANKE). The investigated specimens differ from those from the Lwów Chalk only in the lack of banding near septal sutures of the oldest chambers of the outer whorl. In the investigated material there are also more spherical specimens resembling those described by VOLOSHINA (1972: 15, 4) as *Orbignyna (Orbignyna) ovata* HAGENOW. They do not display, however, banding in a near-sutural surface. It seems that such forms may represent juvenile specimens of various species of *Orbignyna*.

Distribution. — Poland — Maastrichtian (Lublin Chalk), Germany — lower Maastrichtian. USSR — upper Campanian-lower Maastrichtian.

Orbignyna sacheri (REUSS, 1851)

(pl. 5: 7)

1851. *Spirolina sacheri* REUSS: 31, pl. 2: 3, 4.
1935. *Orbignyna sacheri* REUSS; KELLER: 540, pl. 1: 7, 8.
1964. *Orbignyna sacheri* (REUSS); VOLOSHINA: 115, pl. 1: 1, 2, 3, 4.
1964. *Orbignyna sacheri* (REUSS); KRIVOBORSKY and SUBBOTINA: 220, pl. 42: 1, pl. 44: 5, pl. 45: 7—11, pl. 46: 2, 3.
1972. *Orbignyna (Orbignyna) sacheri* (REUSS); VOLOSHINA: 120, pl. 16: 2, 3, pl. 22: 1.
1974. *Orbignyna sacheri* (REUSS); GORBENKO: 34, pl. 2: 8.
1979. *Orbignyna sacheri* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 107, pl. 37: 4.

Material. — Forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45836/88/F	45837/88/F	45838/88/F
length	1.440	1.152	0.816
width	1.272	0.864	0.648
thickness	0.600	0.528	0.432

Variability. — It is expressed in a number of chambers in an outer whorl (6—8), in a degree of incision of the test outline, and in a degree of chamber convexity and depression of sutures. In the investigated material, there are both, specimens with glittering test consisting of very small quartz grains, with a flat chamber surface visible only due to a slight depression of narrow sutures, and specimens built of a slightly larger quartz grains, displaying more incised outline with clearly convex chamber surface and rather strongly depressed, sometimes furrow-like sutures. Quartz grains which are larger than those building the rest of the test may be situated in the center of the test, on the chamber surface near the sutures. Variability considers also a degree of convexity of the central part of the test, as well as the length and shape of chambers. Chambers may be of equal length along the whole width and sickle-like, or increase in height toward the margine of the test and have triangular outline.

Remarks. — No specimens with uncoiled test, regarded by REUSS (1851) as mature specimens, have been found in the investigated material. There are, however, specimens identical with those described by REUSS (1851) as juveniles. As it follows from the literature (KRIVOBORSKY and SUBBOTINA 1964), test wall in this species may be also calcareous with inclusion of singular quartz grains.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USSR — Campanian-Maastrichtian.

Orbignyna simplex (REUSS, 1851)
(pl. 5: 3)

1851. *Flabellina simplex* REUSS: 31, pl. 2: 1, 2.
1935. *Orbignyna simplex* (REUSS); KELLER: 541, pl. 1: 16, 17.
1963. *Orbignyna simplex* (REUSS); LIPNIK (*in* KAPTARENKO-TSHERNOUSOVA): 75, pl. 22: 1.
1972. *Orbignyna (Orbignyna) simplex* (REUSS); VOLOSHINA: 121, pl. 17: 4, 5 (with synonymy).
1974. *Orbignyna simplex* (REUSS); GORBENKO: 33, pl. 2: 7.
1979. *Orbignyna simplex* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 107, pl. 37: 3.

Material. — Eight well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45839/88/F	45840/88/F	45841/88/F
length	1.000	0.840	0.720
width (of the last chamber)	0.888	0.672	0.576
thickness (of the last chamber)	0.168	0.168	0.168

Description. — Test flat, rapidly but equally increasing in size as chambers are added. Initial part of a test coiled nearly planispiraly, further straight and uniserial. Chambers not visible in the coiled part. Usually 2 semilunar chambers with flat surface separated with poorly depressed sutures in the straight part. Apertural surface flat. Aperture fissure-like situated slightly below the summit of the last chamber. Test surface slightly rough, consists of quartz grains of a medium size cemented with a calcareous matrix.

Variability. — It is expressed in a size of quartz grains which influences the appearance of the test surface which may be nearly smooth when they are small and strongly rough when they are large. Variability concerns also a pattern of coiling of the initial part of the test, which can be nearly planispiral and then a whorl has the same thickness as a stright part of the test, or clearly trochospiral and then slightly raised whorl stands above one of the wider sides of the test.

Remarks. — Specimens with a slightly rough surface of the test, and which are nearly planispiral, are nearly identical with those illustrated by REUSS (1851, pl. 2: 2). No specimens with numerous chambers in the straight part of the test, such as shown by REUSS (1851, pl. 2: 1) have been found in our material.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian. USSR — Santonian-Maastrichtian

Orbignyna variabilis (d'ORBIGNY, 1840)
(pl. 6: 8)

1840. *Bulimina variabilis* d'ORBIGNY: 40, pl. 4: 12 (*non* 9, 10, 11).
1941. *Orbignyna variabilis* (d'ORBIGNY); MARIE: 26, pl. 6: 61—65.
1947. *Ataxophragmium orbignyna* formis VASSILENKO et MJATLIUK: 200, pl. 1: 4, 5, 6.
1953. *Orbignyna typica* (FRANKE); BARNARD and BANNER: pl. 9: 8.
1955. *Orbignyna aquisgranensis* (BEISSEL); LISZKA: 176, pl. 13: 3.
1972. *Orbignyna (Ataxoorbignyna) variabilis* (d'ORBIGNY): VOLOSHINA: 124, pl. 18: 2, 4, pl. 22: 5, 6.
1979. *Orbignyna variabilis* (d'ORBIGNY); KAPTARENKO-TSHERNOUSOVA *et al.*: 108, pl. 37: 7.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45842/88/F	45843/88/F	45844/88/F
length	1.320	1.120	0.840
width	0.840	0.744	0.744

Variability. — It considers a number of chambers in the last whorl (4—5) and in a straight part (3—4), as well as a degree of convexity of chamber surface. This surface is flat in most cases, some specimens, however, display slightly convex chamber surface with a little depressed sutures. The chambers are of equal height and width in the straight part, or they increase in size as chambers are added.

Remarks. — This species resembles mostly *Voloshinovella aquisgranensis* (BEISSEL) in a general shape of the test. It differs from the last species in having smooth test surface, flat chambers of drum-like shape in a straight part, flat or hardly depressed sutures and flat apertural surface. The specimens described by VOLOSHINA (1972) differ from those from Poland and France in having more rough surface, while those from England differ from these from Poland in having slightly more convex chambers in a straight part of the test.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk), Carpathians-lower Senonian. France: Paris Basin — Campanian. England — upper Campanian-lower Maastrichtian. USSR — Santonian-Campanian.

Genus *Voloshinovella* LOEBLICH et TAPPAN, 1964

Voloshinovella aquisgranensis (BEISSEL, 1891)
(pl. 7: 13)

1891. *Lituola aquisgranensis* BEISSEL: 12, pl. 3: 1—3, 9—16, 33—40, 46—54 (*non* 4—8, 41—45, pl. 16: 35), (*fide* ELLIS and MESSINA, Cat. of Foram.).
1928. *Lituola aquisgranensis* BEISSEL *f. typica* FRANKE: 172, pl. 15: 22.
1937. *Orbignyna aquisgranensis* (BEISSEL); CUSHMAN: 182, pl. 21: 31, 33 (*non* 32).
1962. *Orbignyna aquisgranensis* (BEISSEL); EBENSBERGER: 27, pl. 1, 15—18, text-fig. 7 (with synonymy).
1972. *Orbignyna (Orbignyna) aquisgranensis* (BEISSEL); VOLOSHINA: 118, pl. 17: 1, 2.

Material. — Fifteen well preserved specimens.

Dimensions (in mm):

IG Nos.:	45845/88/F	45846/88/F	45847/88/F
length	1.512	1.272	0.840
width	0.960	0.792	0.628

Variability. — It is expressed in a very weak widening of the test in a straight part, which is nearly equally wide along its whole length, or slightly narrower in a proximal part than in distal one. Variability concerns also a number and a degree of chamber convexity in both parts of the test (4—5 chambers in a coiled part and 2—5 ones in a straight part). Chambers in both parts are always convex, this convexity being strong in some specimens, similarly as depression of sutures.

Remarks. — The Polish specimens differ from those described by BEISSEL (1891) and FRANKE (1928) in having smaller number of chambers, in both the coiled and the straight parts of the test. Their shape as well as degree of chamber convexity and depression of sutures are, however, identical. Our specimens differ also from those described by VOLOSHINA (1972) in a slightly more rough surface of the test and in more convex chambers in the both parts of the test. According to EBENSBERGER (1962), who investigated over 200 specimens from Aachen, *Lituola aquisgranensis* and *L. conica* described by BEISSEL (1891) are really separate species. On the other hand, LOEBLICH and TAPPAN (1964) included BEISSEL's specimens into the genus *Voloshinovella*. EBENSBERGER (1962) considers the BEISSEL's specimens (BEISSEL 1891, pl. 3: 4, 5, 6, 8, 32) as representing *L. conica* BEISSEL. The last specimen is considered by VOLOSHINA (1972) as typical for *L. aquisgranensis conica* BEISSEL. It is not clear why VOLOSHINA (1972) uses the name *Voloshinovella aquisgranensis* (BEISSEL) for *Lituola aquisgranensis conica* BEISSEL. It is simply the species *V. conica* (BEISSEL). On the other hand, VOLOSHINA (1972) considers BEISSEL's variety *L. aquisgranensis* as a separate species and situates it in the genus *Orbignyna*.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Germany — upper Senonian. USSR — Campanian-Maastrichtian.

Voloshinovella conica (BEISSEL, 1891)
(pl. 6: 7)

1891. *Lituola aquisgranensis conica* BEISSEL: 12, pl. 3: 17—32, pl. 16: 33—35 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1928. *Lituola aquisgranensis* f. *conica* BEISSEL; FRANKE: 172, pl. 15: 23.
1937. *Orbignyna aquisgranensis* (BEISSEL); CUSHMAN: 182, pl. 21: 32 (*non* 31, 33).
1953. *Orbignyna aquisgranensis* (BEISSEL); BARNARD and BANNER: 199, pl. 9: 10.
1962. *Orbignyna conica* (BEISSEL); EBENSBERGER: 28, pl. 1: 19—22, text-fig. 8, 9^{*}_{a} (with synonymy).
1972. *Voloshinovella aquisgranensis* (BEISSEL); VOLOSHINA: 95, pl. 9: 5.
1974. *Voloshinovella aquisgranensis* (BEISSEL); GORBENKO: 35, pl. 2: 10.
1979. *Voloshinovella aquisgranensis* (BEISSEL); KAPTARENKO-TSHERNOUSOVA *et al.*: 101, pl. 33: 5.

Material. — Ten well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45848/88/F	45849/99/F	45850/88/F
length	1.704	1.680	1.248
width (last chamber)	1.416	1.200	0.840

Variability. — It considers a degree of test expansion with growth, a number of chambers in a coiled part of the test (3—5) and in a straight part (4—5), as well as a pattern of chamber addition in the straight part. In some specimens, the sizes of directly neighbouring chambers of the straight part may abruptly differ from each other, while being subequal in others, with the exception of the youngest chamber which is twice as high as the preceding one.

Remarks. — Variability in expansion of the test causes that the specimens which are conical and increasing in size as chambers are added resemble some specimens of *Voloshinovella aquisgranensis* (BEISSEL). Both BEISSEL (1891) and EBENSBERGER (1962) who studied very rich material recorded forms transitional between *V. aquisgranensis* and *V. conica* (BEISSEL). It is important that *Voloshina* (1972) included the specimens described by BARNARD and BANNER (1953) under the name *Orbignyna aquisgranensis* (BEISSEL) in the synonymy of *V. aquisgranensis* (BEISSEL). In my opinion they are conspecific with *V. conica* (BEISSEL). *V. conica* (BEISSEL) resembles mostly *V. tertia* WOLOSCHYNA in the test shape, chamber height, and degree of chamber expansion. It seems that the last species is an extreme, widely conical variant of *V. conica*.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian. Germany — Senonian. England — upper Campanian-Maastrichtian. USSR: Santonian-Campanian.

Voloshinovella laffittei (MARIE, 1956)
(pl. 7: 12)

1956. *Orbignyna laffittei* MARIE: B235, pl. 1: 7 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1972. *Voloshinovella laffittei* (MARIE); VOLOSHINA: 96, pl. 10: 3, 4, 5, pl. XXI: 5 (with synonymy).
1979. *Voloshinovella laffittei* (MARIE); KAPTARENKO-TSHERNOUSOVA *et al.*: 101, pl. 33: 2a, b.

Material. — Ten well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45851/88/F	45852/88/F	45853/88/F
length	0.960	1.080	0.320
width	1.008	1.368	0.304

Variability. — Variability is small and concerns mostly a number of chambers in a uniserial part of a test (from 4 to 5 but usually 3) and a degree of expression of the internal structure of chambers on the test surface. In the investigated material there are specimens representing different ontogenetic stages. In some stages the length of the test is smaller than its width.

Remarks. — The investigated specimens are identical in all characters with the holotype. All have a cross-shaped aperture as in the holotype. The aperture had various shape in the specimens studied by VOLOSHYNA (1972).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). France: Paris Basin — Campanian (*Belemnitella mucronata* Zone). USSR: East European Platform — Campanian.

Superfamily **Textulariacea** EHRENBERG, 1838
Family **Eggerellidae** CUSHMAN, 1937
Subfamily **Dorothiinae** BALAKHMATOVA, 1972
Genus *Dorothia* PLUMMER, 1931
Dorothia irregularis (MARSSON, 1878)
(pl. 7: 3, 4)

1878 *Plectina irregularis* MARSSON: 160, pl. 3: 28a—e.
1962. *Plectina irregularis* MARSSON; EBENSBERGER: 21, pl. 7: 7, pl. 12: 11 (with synonymy).
1970. *Gaudryina bentonensis* (CARMAN); NEAGU: 42, pl. 6: 24—27.

Material. — Twenty partly damaged specimens.

Dimensions (in mm):			
IG Nos.:	45854/88/F	45855/88/F	45856/88/F
length	2.400	1.296	0.912
width	0.408	0.350	0.336

Description. — Test long, cylindrical and slender, initially wedge-shaped, higher up of equal width along the whole length. Initial part built of 3 to 4 chambers in a whorl, final part biserial. The test below biserial part amounts from 1/3 to 1/2 of the total length. Whorls and chambers poorly discernible. Chamber surface flat or slightly convex. Chamber outline rectangular, septal sutures slightly depressed, flat and situated perpendicular to the growth axis of the test. Chambers in the biserial part low, wide and of equal height, slightly convex and well visible. Sutures straight, slightly depressed situated perpendicularly to the growth axis of the test. The most characteristic feature of this species is a screw-like coiling of the test along the whole length. Test surface is slightly rough as the test wall is composed of fine quartz grains in a calcareous matrix. Aperture semilunar situated at the base of apertural surface of the ultimate chamber.

Variability. — It is expressed in length of the initial part of the test in relation to the biserial test part (it may occupy from 1/3 to 1/2 of the whole length), in degree of visibility of

whorls and chambers in the initial part of the test in the number of chambers in the biserial part of the test (from 2 to 5 pairs), in degree of the screw-like coiling of the test (full turn or only a half).

Remarks. — The specimens under discussion seem to be identical with the holotype. Similarly as the specimens from the Rügen Island they have the shape of a narrow cylinder screw-like turned. The specimens from Romania included by NEAGU (1970) in the species *Gaudryina bentonensis* (CARMAN) show all the characters of this species. They probably differ from CARMAN's species in having more numerous chambers in initial whorls as well as in a different arrangement of chambers in the biserial part of the test and in a spiral coiling of the test along the vertical axis. The investigated species is similar to *Marssonella ellisorae* CUSHMAN but differs from it in being twice as long and screw-like coiled. The present studies of the aperture permitted attribution of the Polish specimens to the genus *Dorothia.*

Distribution. — Poland — Maastrichtian. Germany — Maastrichtian. Romania — Lower Maastrichtian.

Dorothia pupa (REUSS, 1860)
(pl. 7: 11)

1860. *Textularia pupa* REUSS: 232, pl. 13: 4 (*non* 5).
1937*b*. *Dorothia pupa* (REUSS); CUSHMAN: 78, pl. 8; 20—24 (with synonymy).
1972. *Dorothia pupa* (REUSS); HANZLIKOVÁ: 57, pl. 12: 8, pl. 13: 3, 8 (with synonymy).
1982. *Dorothia pupa* (REUSS); MCGUGAN: 404, pl. 8: 7—8.
1983. *Dorothia pupa* (REUSS); BECKMANN *et al.*: 110, pl. 4: 26.
1983. *Dorothia pupa* (REUSS); HAGN and HERM: 622, pl. 2: 11 (with synonymy).
1986. *Dorothia pupa* (REUSS); JORDAN and GASSE: 12, pl. 2: 7.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45857/88/F	45858/88/F	45859/88/F
length	0.980	0.888	0.552
width	0.504	0.528	0.432

Variability. — It is expressed in a transverse section of a test which may be either more or less wide-oval, in a number of chambers in a biserial part (one or two pairs of chambers) and in a chamber convexity. Chamber surface nearly flat or clearly convex; septal sutures and spiral suture are slightly depressed in this last case.

Remarks. — This species differs from *Dorothia crassa* (MARSSON) in having a widely-oval transverse section of a test, more cuneate initial part of the test and in having convex apertural surface of the two youngest chambers. The species *Dorothia plummeri* BROTZEN is also very similar, having, however, more convex chambers, in both the initial and biserial part of the test.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Germany — Senonian. Italy — Maastrichtian. Czechoslovakia, England, Egypt, Australia, USA — Campanian. Denmark, Netherlands — Santonian-lower Campanian. Canada — upper Campanian.

Family **Valvulinidae** BERTHELIN, 1880
Subfamily **Valvulininae** BERTHELIN, 1880
Genus *Goesella* CUSHMAN, 1933
Goesella rugosa (HANZLIKOVÁ, 1953)
(pl. 7: 8)

1953. *Marssonella rugosa* HANZLIKOVÁ: 493, pl. 2: 5, 7 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1959. *Goesella carpathica* LISZKOWA: 60, pl. 3: 9a—f.
1972. *Goesella rugosa* (HANZLIKOVÁ); HANZLIKOVÁ: 59, pl. 12: 5 (with synonymy).

1984. *Goesella rugosa* (HANZLIKOVÁ); SZCZECHURA and POŻARYSKA: 40, pl. 3: 2, 3.
1984. *Goesella rugosa* (HANZLIKOVÁ); GEROCH and NOWAK: pl. 4: 8, 13, 18.
1984. *Goesella rugosa* (HANZLIKOVÁ); LISZKOWA and MORGIEL: 221, pl. 124: 10—17.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45869/88/F	45870/88/F	45871/88/F
length	0.840	0.480	0.432
width	0.600	0.360	0.408

Variability. — Most specimens are at the biserial stage of development in the investigated material. Few specimens are mature (displaying a uniserial part). Variability is expressed in degree of roundness of the initial part of the test and in its roughness. Presented above measurements were obtained from the specimens at the biserial stage of development.

Remarks. — The discussed species has been hitherto noted in the Tethyan region. Occurrence in Poland is the first appearance of this species in the epicontinental deposits. The specimens coming from the Polish Lowlands and the Carpathians display the same variability range.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk); Carpathians — Cretaceous-Paleocene. Romanian Carpathians — Campanian. Trinidad, Spain, Austria, Slovakian Carpathians — Cretaceous-Paleocene.

Suborder **Lagenina** DELAGE et HEROUARD, 1896
Superfamily **Nodosariacea** EHRENBERG, 1838
Family **Nodosariidae** EHRENBERG, 1838
Subfamily **Nodosariinae** EHRENBERG, 1838
Genus *Cribrebella* GAWOR-BIEDOWA, 1989

Cribrebella fusiformis (GAWOR-BIEDOWA, 1987)
(pl. 8: 5)

1987. *Cribrella fusiformis* GAWOR-BIEDOWA: 57, pl. 30: 1a, b.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45878/88/F	45879/88/F	45880/88/F
length	0.768	0.480	0.288
width	0.192	0.168	0.120

Remarks. — Description, variability and remarks as in GAWOR-BIEDOWA (1987).
Distribution. — Poland — Maastrichtian (Lublin Chalk).

Cribrebella lacrima (GAWOR-BIEDOWA, 1987)
(pl. 8: 3)

1987. *Cribrella lacrima* GAWOR-BIEDOWA: 56, pl. 29: 1a—c.

Material. — Over a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45881/88/F	45882/88/F	45883/88/F
length	0.696	0.312	0.264
width	0.264	0.192	0.240

Remarks. — Description, variability and remarks as in GAWOR-BIEDOWA (1987).
Distribution. — Poland — Maastrichtian (Lublin Chalk).

Cribrebella ovata (GAWOR-BIEDOWA, 1987)
(pl. 8: 4)

1987. *Cribrella ovata* GAWOR-BIEDOWA: 58, pl. 30: 2a, b.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45884/88/F	46885/88/F	45886/88/F
length	0.744	0.720	0.384
width	0.360	0.336	0.216

Remarks. — Description, variability and remarks as in GAWOR-BIEDOWA (1987).
Distribution. — Poland — Maastrichtian (Lublin Chalk).

Subfamily **Frondicularinae** REUSS, 1860
Genus *Frondicularia* DEFRANCE, 1826
Frondicularia biformis MARSSON, 1878
(pl. 8: 1, 2)

1878. *Frondicularia biformis* MARSSON: 137, pl. 2: 17c, d.
1974. *Frondicularia biformis* MARSSON; SZCZECHURA and POŻARYSKA: 42, pl. 4: 10—12 (with synonymy).

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45875/88/F	46876/88/F	45877/88/F
length	0.576	0.490	0.470
width	0.384	0.320	0.290
thickness	0.144	0.120	0.100

Variability. — It is expressed mainly in shape of the test and height of ribs on the sutures. In the investigated material there are both, specimens with elongated tests and the narrower sides of the test nearly parallel, and the specimens with oval outline. Ribs on sutures may be nearly flat or strongly raised. It is possible that the variability of the test shape is associated with alternation of generations, but it is not certain, as the initial chamber is broken off in all the investigated specimens.

Remarks. — The description agrees with the presented by POŻARYSKA (1957, 1965). In the North America this species is described as *Frondicularia* sp. (CUSHMAN and TOOD 1946, OLSSON 1960).

Distribution. — Poland — the uppermost lower Maastrichtian-Paleocene. Carpathians — upper Maastrichtian-Paleocene. Eastern Germany, Denmark, Austria, North America — Upper Cretaceous-Paleocene.

Family **Vaginulinidae** REUSS, 1860
Subfamily **Palmulinae** SAIDOVA, 1981
Genus *Neoflabellina* BARTENSTEIN, 1948
Neoflabellina reticulata (REUSS, 1851)
(pl. 8: 11)

1851. *Flabellina reticulata* REUSS: 30, pl. 1: 22.
1977. *Neoflabellina reticulata* (REUSS); KOCH: 58, pl. 14: 9, 10.
1979. *Neoflabellina reticulata* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 110, pl. 41: 1a, b.
1981. *Neoflabellina reticulata* (REUSS); HART *et al.*: 212, pl. 7, 20: 3.
1984. *Neoflabellina reticulata* (REUSS); GAWOR-BIEDOWA and WITWICKA: 231, pl. 75: 5 (with synonymy).

Material. — Over fifty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45887/88/F	45888/88/F	45889/88/F
length	1.200	1.176	9.600
width	0.792	0.720	0.600

Variability. — It concerns mostly a test shape, which varies from a widely deltoidal to rhomboidal. The species is very characteristic in having chambers covered with numerous narrow ridges running perpendicularly to distinct raised crenulate sutures (in an evolved part of a test).

Remarks. — The description agrees with that presented by GAWOR-BIEDOWA and WITWICKA (1984). This species differs from *Neoflabellina praereticulata* HILTERMANN in more regular ornamentation covering even of the youngest chamber surface in the uniserial part of the test and nodose ornament on earliest chambers.

Distribution. — Poland: Polish Lowlands — Maastrichtian. Europe, North America, Australia — Maastrichtian.

Family **Polymorphinidae** d'ORBIGNY, 1839
Subfamily **Polymorphininae** d'ORBIGNY, 1839
Genus *Globulina* d'ORBIGNY, 1839
Globulina lacrima (REUSS, 1845)
(pl. 8: 9, 10)

1845. *Polymorphina lacrima* REUSS: 40, pl. 12: 6, pl. 13: 83.
1962. *Globulina lacrima lacrima* REUSS; EBENSBERGER: 65, pl. 4: 18 (with synonymy).
1966. *Globulina lacrima* (REUSS); HOFKER: 90, pl. 15: 30, 153, pl. 23: 126, 166, pl. 29: 65, 255, pl. 52: 48, 286, pl. 60: 35, pl. 80: 110, 115.
1968. *Globulina lacrima* (REUSS); SLITER: 77, pl. 9: 17, pl. 10: 1 (with synonymy).
1970. *Globulina lacrima lacrima* (REUSS); NEAGU: 54, pl. 12: 15.
1975. *Globulina lacrima* (REUSS); NUGLISCH: 26, pl. 8: 6.
1976. *Globulina lacrima* (REUSS); KUZINA: 104, pl. 18: 1.
1985. *Globulina lacrima* (REUSS); SLITER: pl. 4: 11.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	45890/88/F	45891/88/F	45892/88/F
length	0.576	0.456	0.360
width	0.408	0.336	0.264

Variability. — It is expressed in a test shape (elongated or oval tear), in a shape of a transverse section (wide-oval to nearly round), in a degree of expression of apertural rays and their number.

Remarks. — This species differs from *Globulina subsphaerica* (BERTHELIN) in having more elongated shape of the test, oval transverse section, and more elongated two youngest chambers. SLITER (1985) illustrated the specimen of this species resembling the species *G. subsphaerica* (BERTHELIN) in shape. In the both compared species chambers are poorly visible, with flat and translucent sutures. Some specimens of *G. subsphaerica* show slightly convex chamber surface. In the both species relic apertures of older chambers may be visible.

Distribution. — Cosmopolitan species. Poland — Upper Cretaceous. Europe and North America — Upper Cretaceous, Paleocene.

Globulina prisca (Reuss, 1862)
(pl. 8: 8)

1862. *Globulina prisca* Reuss: 79, pl. 9: 8.
1957. *Globulina prisca* Reuss; Sztejn: 75, pl. 9: 83 (with synonymy).
1967. *Globulina prisca* Reuss; Kaptarenko-Tshernousova: 94, pl. 10: 10.
1975. *Globulina prisca* Reuss; Neagu: 100, pl. 76: 34—44, 48—51, pl. 77: 1—5 (with synonymy).
1976. *Globulina prisca* Reuss; Kusina: 102, pl. 17: 6.
1979. *Globulina prisca* Reuss; Kaptarenko-Tshernousova *et al.*: 55, pl. 13: 18.

Material. — Eigth well preserved specimens.

Dimensions (in mm):

IG Nos.:	45893/88/F	45894/88/F	45895/88/F
length	0.552	0.360	0.264
width	0.168	0.168	0.144

Variability. — It is expressed mainly in degree of sharpening of an initial part of a test. Gerontic specimens have a fistulose aperture, radiate in immature specimens.

Remarks. — The material is entirely consistent with the holotype. The description agrees with this presented by Sztejn (1957).

Distribution. — Cosmopolitan species. Poland — Lower and Upper Cretaceous. Europe — Upper Jurassic-Cretaceous. North America — Lower and Upper Cretaceous.

Genus *Guttulina* d'Orbigny, 1839

Guttulina trigonula (Reuss, 1845)
(pl. 8: 7)

1845. *Polymorphina trigonula* Reuss: 40, pl. 13: 84.
1845. *Polymorphina damaecornis* Reuss: 40, pl. 13: 85.
1964. *Guttulina (Guttulina) trigonula* (Reuss); Kusina *in* Subbotina: 225, pl. 47: 8—12, pl. 48: 1, 2 (with synonymy).
1966. *Guttulina trigonula* (Reuss); Hofker: 284, pl. 60: 32, 34.
1972. *Guttulina trigonula* (Reuss); Hanzlíková: 73, pl. 17: 11, 12 (with synonymy).
1976. *Guttulina trigonula* (Reuss); Kusina: 70, pl. 6: 5—7.

Material. — Thirty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45896/88/F	45897/88/F	45898/88/F
length	0.680	0.528	0.264
width	0.648	0.480	0.240
thickness	0.408	0.360	0.168

Variability. — It concerns size of specimens, convexity of chambers and number of apertural rays. A width to length ratio is the subject to a strong variation. Chamber surface is poorly convex and sutures hardly depressed in specimens which are wider than long. In specimens which are slightly longer than wide, chambers are clearly convex, drop-like and visible not only from sides but also in initial chamber view. Test surface displays five pores visible under high magnification (1000×). Aperture radiate. The number of rays variates from 8 to 13, but is usually 10.

Remarks. — The investigated specimens are consistent with the holotype. Kuzina (*in* Subbotina 1964) investigated the aperture in this species in details, and has found that it can be multiradiate to uniradiate (one slit at the top of the youngest chamber). In the investigated material there are always 8 or more rays.

Distribution. — Cosmopolitan species. Poland — Campanian-Maastrichtian (Lublin Chalk). Europe — Upper Cretaceous, especially Campanian and Maastrichtian, sometimes Paleocene. Africa — Upper Cretaceous, Lower Tertiary.

Suborder **Robertinina** LOEBLICH et TAPPAN, 1984
Superfamily **Ceratobuliminacea** CUSHMAN 1927
Family **Ceratobuliminidae** CUSHMAN, 1927
Subfamily **Ceratobuliminae** CUSHMAN, 1927
Genus *Ceratocancris* FINLAY, 1939
Ceratocancris caspia VASSILENKO, 1961
(pl. 8: 12, 13, 14)

1961. *Ceratocancris cretacea* (CUSHMAN et HARRIS) subsp. *caspia* (VASSILENKO) subsp. n.: 100, pl. 17: 2a—w, 3a—w, 4.

Material. — Sixty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45899/88/F	45900/88/F	45901/88/F
longest diameter	0.384	0.312	0.192
shortest diameter	0.312	0.264	0.144
height	0.216	0.192	0.120

Variability. — Variability is high and concerns size of a test, its shape which is usually oval and only rarely nearly round (see measurements), the number of chambers in the youngest whorl (5 to 7) and the degree of suture depression in adumbilical part. On both sides of a test sutures are radial, nearly flat, with an exception of sutures in adumbilical part on the ventral side of the test, where they are more or less depressed.

Remarks. — The investigated specimens differ from the holotype in smaller size and in having very fine round node in a centre of umbilical depression. In some specimens, this node is connected with a flap of the ultimate chamber. Other features are the same as in the specimens from the Mangyshlak Peninsula. The investigated specimens differ from *Ceratobulimina cretacea* CUSHMAN et HARRIS (1927) from the Maastrichtian deposits of Texas in having depressed sutures in adumbilical part of a test on the ventral side (in Texas specimens sutures are slightly thickened on the ventral side), in symmetric test not inclined toward the ventral side, slit-shaped, nearly peripheral aperture extending up to the umbilicus, and not triangular extra-umbilical to umbilical. In my opinion, *Ceratocancris easpia* VASSILENKO is the separate species, and not subspecies of *Ceratocancris cretacea* (CUSHMAN et HARRIS), 1927.

Distribution. — Poland — upper Campanian, Maastrichtian (Lublin Chalk). USSR (Mangyshlak Peninsula) — upper Maastrichtian.

Suborder **Globigerinina** DELAGE et HEROUARD, 1896
Superfamily **Heterohelicacea** CUSHMAN, 1927
Family **Guembelitriidae** MONTANARO GALLITELLI, 1957
Genus *Guembelitria* CUSHMAN, 1933
Guembelitria ornata sp. n.
(pl. 9: 1a, b, 2, 3, 4)

Holotype: Specimen IG No. 46428/88/F, pl. 9: 1a, b.
Paratypes: Specimens IG Nos. 46429/88/F, 46430/88/F and 46431/88/F, presented in pl. 9: 2, 3, 4.
Type horizon: Upper Maastrichtian.
Type locality: Gorzków IG 1 borehole, depth 10.8 m.
Derivation of name: From Latin *ornatus* — ornamented.

Diagnosis. — Test very small, gradually increasing in size as chambers are added, consisting of 4 to 6 chambers in each row. Chambers spherical, tightly packed, ornamented with thin and numerous costae running parallel to a vertical axis of a test.

Material. — Over thirty variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46428/88/F	46429/88/F	46430/88/F
length	0.168	0.168	0.168
width	0.096	0.096	0.072

Description. — Test triserial, very small, gradually and slowly increasing in size as chambers are added, composed of 4 to 6 chambers in each of the three rows. Chambers are spherical, tightly packed. Chamber surface ornamented with numerous, thin costae running parallel to the growth axis of the test. The costae branch dichotomically. Chamber surface between costae as well as some costae are covered with pores (pl. 9: 1 b). Septal suture and spiral sutures poorly depressed, masked by sculpture. The youngest chamber without costae, smooth. Aperture oval with a narrow lip, extending from the top of the ultimate chamber to its base.

Variability. — Variability is low and concerns ornamentation of the three youngest chambers. These chambers may be smooth or all covered with costae, or the youngest chamber can be devoid of sculpture. In some specimens, the costae are more densely packed on three "edges" of a test.

Remarks. — The investigated species differs from other so far known species of the genus *Guembelitria* in having sculptured test. It resembles *Guembelitria cenomana* (KELLER) in small degree of the test expansion with growth and in tight packing of chambers.

Distribution. — Poland — upper Maastrichtian (Lublin Chalk) in the boreholes Gorzków IG 1 and Miechów IG 2.

Family **Heterohelicidae** CUSHMAN, 1927
Subfamily **Heterohelicinae** CUSHMAN, 1927
Genus *Heterohelix* EHRENBERG, 1843
Heterohelix carinata (CUSHMAN, 1938)
(pl. 8: 6, pl. 9: 8)

1938*a*. *Guembelina carinata* CUSHMAN: 18, pl. 3: 10.
1946. *Guembelina carinata* CUSHMAN; CUSHMAN: 105, pl. 45: 8a, b.
1957. *Heterohelix carinata* (CUSHMAN); MONTANARO GALLITELLI: pl. 31: 16.
1969. *Heterohelix pachymarginata* STENESTAD: 659, pl. 1: 15, 15a, 15b, 16, pl. 3: 5, 5a, 5b, text-fig. 14a—c.
1977. *Heterohelix carinata* (CUSHMAN); PETTERS: pl. 1: 4, 5.
1977. *Heterohelix carinata* (CUSHMAN); MASTERS: 339, pl. 1: 4, 5.

Material. — Forty variously preserved specimens.

Dimensions (in mm:)

IG Nos.:	45902/88/F	45903/88/F	45904/88/F
length	0.264	0.240	0.192
width	0.192	0.192	0.144
thickness	0.072	0.072	0.084

Variability. — It is expressed in a degree of a test expansion with growth resulting in a various test width, which is, however, always smaller than the length. Depression of septal sutures and spiral suture, as well as a degree of development of a delicate keel surrounding the initial part of the test are also the subject to variation.

Remarks. — The investigated specimens are nearly entirely consistent with the holotype, from which they differ only in the absence of costae covering the initial part of the test. In triangular outline and small thickness of the test as well as in nearly flat chambers (rectangular in outline) they resemble mostly the species *Heterohelix semicostata* (CUSHMAN) from which they differ only in having a narrow and sharp keel in the early portion of the test and in the absence

of, curved costae covering the chamber surface near the test periphery which are characteristic for *Heterohelix semicostata* (CUSHMAN). They also lack costae on the narrow test wall. The presence of the keel makes this species similar to *Heterohelix globocarinata* (CUSHMAN) which is a closely related species. The investigated species differs from the latter species in having flat test, rectangular in outline and poorly convex chambers, in smaller size and in being nearly equally thick along the whole length. MASTERS (1977: 339 and 341) stated that the entire test surface in this species is covered with continuous or discontinous costae, and basing on this observation he suggests that *Heterohelix carinata* (CUSHMAN) is derived from *Heterohelix semicostata* (CUSHMAN). However, on his illustrations (MASTERS 1977, pl. 1: 4, 5) costae are absent, the test surface is covered with numerous pores irregularly distributed. A test wall in the Polish specimens is covered with very narrow discontinuous costae, not visible under light microscope, but well visible under SEM. The specimens from Denmark, described as *Heterohelix pachymarginata* STENESTAD, similarily as the holotype of *Heterohelix carinata* (CUSHMAN), have the initial part of a test covered with fine costae.

Distribution. — Poland — Campanian-Maastrichtian. Denmark: upper Campanian — lower Maastrichtian. USA — Campanian — Maastrichtian.

Heterohelix glabrans (CUSHMAN, 1938)
(pl. 11: 7a, b, 8, 9)

1938*a*. *Gumbelina glabrans* CUSHMAN: 15, pl. 3: 1, 2.
1946. *Gumbelina glabrans* CUSHMAN; CUSHMAN: 109, pl. 46: 17, 18.
1960. *Heterohelix glabrans* (CUSHMAN); OLSSON: 26, pl. 4: 4.
1967. *Heterohelix glabrans* (CUSHMAN); PESSAGNO: 259, pl. 88: 1, 2, 10, 11.
1968. *Heterohelix glabrans* (CUSHMAN); SLITER: 94, pl. 13: 17.
1969. *Heterohelix glabrans* (CUSHMAN); STENESTAD: 656, pl. 1: 5, 6, 7, pl. 3: 2, text-fig. 10.
1972. *Heterohelix glabrans* (CUSHMAN); HANZLIKOVÁ: 90, pl. 23: 1.
1972. *Heterohelix pulchra* (BROTZEN); GOVINDAN: 168, pl. 1: 9, 10.
1972. *Heterohelix glabrans* (CUSHMAN); GOVINDAN: 169, pl. 1: 11, 12.
1977. *Heterohelix glabrans* (CUSHMAN); MASTERS: 343, pl. 1: 6, 7.
1986. *Heterohelix glabrans* (CUSHMAN); BUTT: pl. 3: 1.

Material. — Sixty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45905/88/F	45906/88/F	45907/88/F
length	0.288	0.264	0.240
breadth	0.216	0.240	0.168
thickness	0.144	0.144	0.120

Variability. — It considers a degree of test expansion with growth, a number of chambers, 4 to 5 in a planispiral part and 4 to 5 pairs in a biserial part of a test, a degree of narrowing of the test margin in a proximal part and the size of the ultimate chamber. The size of aperture is also the subject to variation.

Remarks. — In the investigated material there are specimens representing two generations, which do not differ in morphological features. The embryonal chamber size in specimens of microspheric generation B is 5.2 μm, while in macrospheric generation A the size of the chamber is 15.6 μm. Some specimens of the species under discussion coming from Poland differ from the holotype in having larger aperture. A characteristic feature of this species is flattening of chamber surface near the margin of a test, resulting in a lobate, non-keeled edge. The studied species has been described by MASTERS (1977). It differs from *Heterohelix carinata* (CUSHMAN) and *H. globocarinata* (CUSHMAN) in having edge acute and lobate but not keeled. In the investigated material no longitudinally aligned pore mounds similar to those observed by MASTERS (1977) have been, however, noted. The specimens described and illustrated by WEIDICH (1984: 77, pl. 1: 7, 11) under the name *Heterohelix glabrans* (CUSHMAN) differ from our species

in gradual but small expansion of a test with growth, in reniform chambers and rather strongly depressed sutures. They resemble rather *Heterohelix pulchra* (BROTZEN).

Distribution. — Poland — Maastrichtian. According to MASTERS (1977) it occurs in Europe, Asia, Africa, North America in Maastrichtian deposits.

Heterohelix globocarinata (CUSHMAN, 1938)
(pl. 9: 7, 12)

1938*a*. *Guembelina globocarinata* CUSHMAN: 10, pl. 2: 4, 5.
1946. *Guembelina globocarinata* CUSHMAN; CUSHMAN: 107, pl. 46: 8, 9.
1957. *Heterohelix globocarinata* (CUSHMAN); MONTANARO GALLITELLI: pl. 31: 17.
1967. *Heterohelix globocarinata* (CUSHMAN); PESSAGNO: 259, pl. 86: 5, 6.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45908/88/F	45909/88/F	45910/88/F
length	0.360	0.312	0.216
width	0.216	0.216	0.168
thickness	0.120	0.096	0.072

Variability. — Variability is low. It concerns mostly shape and convexity of chambers. In the initial part of a test, chambers are rectangular in most specimens, and their width is superior to length. Only the two youngest chambers are spherical. There are also, however, specimens in which the two or even three pairs of the youngest chambers are spherical.

Remarks. — The investigated specimens differ from the holotype in being slightly smaller, as well as in the absence of sculpture developed as fine costae, especielly in a distal part of a test. The characteristic features of this species are: periphery of the initial part of the test slightly carinate, distally distinctly indented, two youngest chambers strongly convex (nearly spherical), test width and thickness rapidly increasing with growth. All these features are consistent with the features of the holotype. The test shape, shape and degree of convexity of the two youngest chambers, high arched aperture and small costae on the chamber surface indicate closeness of *H. globocarinata* (CUSHMAN and *H. striata* (EHRENBERG). PESSAGNO (1967: 259) suggested that the range of this species, given by CUSHMAN (1946: 107), is not precise. He has found that the cells with paratypes of *H. globocarinata* contain also some other species. MASTERS (1977) regarded *H. globocarinata* as a junior synonym of the species *H. globulosa* (EHRENBERG), decision difficult to accept as even MASTERS (1977: 345) himself has noted that the margin of the test in *H. globulosa* (EHRENBERG) is rounded (not keeled) and lobate. In the species under discussion this margin is lobate only in a distal part of the test. Other features such as a rectangular outline of chambers (with the exception of two or one pairs of the youngest chambers), and nearly perpendicular orientation of septal sutures to spiral suture allow to separate these two species. It is worth of noting that the present author (GAWOR-BIEDOWA 1980: 33—34), contrary to the opinion of MASTERS (1977), considers *H. globulosa* (EHRENBERG) as synonymous with *H. striata* (EHRENBERG).

Distribution. — Poland — Campanian-Maastrichtian. USA — Campanian, Taylor Marls (Texas).

Heterohelix moremani (CUSHMAN, 1938)
(pl. 10: 6)

1938*a*. *Gumbelina moremami* CUSHMAN; 10, pl. 2: 1—2 (*non*: 3).
1977. *Heterohelix moremani* (CUSHMAN); MASTERS: 346, pl. 2: 1.
1980. *Heterohelix moremani* (CUSHMAN); GAWOR-BIEDOWA; 32, pl. 5: 3, 4.
1980. *Heterohelix moremani* (CUSHMAN); PERYT: 35, pl. 2: 3, 8.
1984. *Heterohelix moremani* (CUSHMAN); WEIDICH: 77, pl. 1: 4

Material. — Thirty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45911/88/F	45912/88/F	45913/88/F
length	0.360	0.336	0.312
width	0.192	0.192	0.180
thickness	0.144	0.108	0.120

Variability. — Variability is low and expressed in size of a test and number of chambers (from six to 8 pair, usually six pairs).

Remarks. — In the investigated material there are both specimens with planispiraly coiled initial part of a test and specimens with a biserial test. Perhaps they represent various generations of this species. The investigated specimens differ from the holotype only in having less numerous chambers (6—8 pairs, whereas the holotype has 9 pairs). The present material differs from *H. striata* (EHRENBERG) in more slender test, poorly increasing in size as chambers are added, rectangular or quadrangular test outline, nearly equal width of a test along the whole length, as well as in perpendicular arrangement of septal sutures in relation to the growth axis of the test. PESSAGNO (1967: 260) and MASTERS (1977: 346—347) regard *Guembelina washitensis* TAPPAN as a younger synonym of this species; I cannot agree with such opinion. I agree with TAPPAN (1940) that *H. washitensis* (TAPPAN) differs from *H. moremani* (CUSHMAN) in being twice as small, having poorly depressed sutures, tightly connected chambers which are poorly convex and very weak indented of a test margin, and in the stratigraphical range (Albian — Cenomanian). Without doubts, *H. washitensis* (TAPPAN) is an ancestor species of *H. moremani* (CUSHMAN). The test surface in specimens of *H. washitensis* (TAPPAN) is smooth and covered with fine pores similarly as in the specimens of *H. moremani* (CUSHMAN) from the Cenomanian deposits (DARMOIAN 1975). In the specimens from Poland, both from the Sudetes and from the Polish Lowlands, test surface is covered with very fine discontinuous costae (GAWOR-BIEDOWA 1980, pl. 2: 3, 4, PERYT 1980, pl. 2: 3, 8).

Distribution. — Poland — Turonian-Maastrichtian. Europe — Turonian-Maastrichtian. Asia, Africa, North and South America — Cenomanian-Santonian, perhaps also Campanian.

Heterohelix navarroensis LOEBLICH, 1951

(pl. 10: 7)

1844. *Spiroplecta americana* EHRENBERG: 75, (*fide* ELLIS and MESSINA, Cat. of Foram.).
1951. *Heterohelix navarroensis* LOEBLICH: 107, text-fig. 1, pl. 12: 1—3b.
1980. *Heterohelix navarroensis* LOEBLICH; PERYT: 36, pl. 3: 5, 9a, b.
1983. *Heterohelix navarroensis* LOEBLICH; WEISS: 44, pl. 1: 10—11 (with synonymy).

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45914/88/F	45915/88/F	45916/88/F
length	0.240	0.192	0.168
width	0.192	0.144	0.144
thickness	0.120	0.096	0.096

Variability. — It concerns degree of a test expansion with growth and thickness of costae on the test surface. In some specimens the test is expanding gradually and slowly, in others very rapidly at the level of the two youngest chambers. Costae very fine on all specimens, sometimes nearly unvisible.

Remarks. — The investigated specimens differ from the holotype in more rapid expansion of a test with growth, and in more delicate striation on chamber surface. Similarly as in the holotype and synonimized specimens, planispiral part of a test is very well developed. Detailed

taxonomic studies by FRERICHS and GASKILL (1978) and MASTERS (1980) indicate the existence of differences between *Textilaria americana* EHRENBERG, 1845 = *Heterohelix americana* (EHRENBERG) and *Spiroplecta americana* EHRENBERG.

Distribution. — Poland — Maastrichtian. USA — middle-upper Maastrichtian.

Heterohelix planata (CUSHMAN, 1938)
(pl. 10: 1, 2, 3)

1938*a*. *Guembelina planata* CUSHMAN: 12, pl. 2: 13, 14.
1946. *Guembelina planata* CUSHMAN; CUSHMAN: 105, pl. 45: 6, 7.
1967. *Heterohelix planata* (CUSHMAN); PESSAGNO: 261, pl. 86: 3, 4, pl. 89: 6, 7.
part. 1968. *Heterohelix pulchra* (BROTZEN); SLITER: 95, pl. 14: 4, 5 *non* pl. 14: 6, 9.
1969. *Heterohelix pulchra* (BROTZEN); DOUGLAS: 158, pl. 11: 3, 14.
part. 1972. *Heterohelix pulchra* (BROTZEN); HANZLIKOVÁ: 92, pl. 23: 11 *non* pl. 23: 10.
1974. *Heterohelix pulchra* (BROTZEN); VAPTZAROVA: 33, pl. 1: 3—7.
1975. *Heterohelix planata* (CUSHMAN); DARMOIAN: 192, pl. 1: 8.
non. 1975. *Heterohelix planata* (CUSHMAN); FRERICHS, ATHERTON and SHIVE: 300, pl. 1: 5, 6.
1977. *Heterohelix planata* (CUSHMAN); PETTERS: pl. 1: 9.
1977. *Heterohelix planata* (CUSHMAN); MASTERS: 347, pl. 2: 3.
non. 1979. *Heterohelix planata* (CUSHMAN); FRERICHS: 165, pl. 1: 3, 4.
1980. *Heterohelix planata* (CUSHMAN); PERYT: 36, 2: 9, 10, pl. 3: 13, 14.
1980. *Heterohelix planata* (CUSHMAN); PETTERS: pl. 1: 19.
1981. *Heterohelix planata* (CUSHMAN); PERYT: pl. 2: 3, 5.
1984. *Heterohelix pulchra* (CUSHMAN); LISZKOWA and MORGIEL: 256, pl. 127: 1, 2.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45917/88/F	45918/88/F	45919/88/F
length	0.432	0.335	0.264
width	0.288	0.264	0.216
thickness	0.120	0.090	0.090

Variability. — It is high and expressed in test proportions, degree of depression of septal sutures and median suture, in size of triangular depressions between chambers from various rows in the presence or absence of a fine keel surrounding the initial part of the test, and in shape and convexity of chambers. Early chambers could be rectangular with flat surface, or nearly spherical. In the distal part of the test, they can be trapezoidal or spherical and strongly convex. In some specimens the youngest chamber can be reniform. Only biserial specimens have been found in the investigated material. No specimens with a planispiral initial part of the test have been noted.

Remarks. — The investigated specimens are consistent with the holotype. MASTERS (1977: 349) stated that there is no keel in the initial part of the holotype and triangular areas between chambers represent only flattened chamber parts. The absence of depressed panels as well as the absence of well developed reniform chambers differ this species from *H. pseudotessera* (CUSHMAN). Opinion of various authors concerning these two species, as well as *H. pulchra* (BROTZEN), are differentiated. MONTANARO GALLITELLI (1957: 137, pl. 31: 20) considers the holotype of *Guembelina pseudotessera* CUSHMAN (Coll. 24417) as identical with *H. pulchra* (BROTZEN). That author does not mention about the holotype or topotypes of *H. pseudotessera* (CUSHMAN). SLITER (1968) and DOUGLAS (1969: 158) who investigated the holotype of *Guembelina planata* CUSHMAN and *G. pseudotessera* CUSHMAN in CUSHMAN's collection, expressed the opinion that they represent one species, namely *Heterohelix pulchra* (BROTZEN). MASTERS (1977), who investigated the holotype and paratypes of *H. pseudotessera* (CUSHMAN), and paralectotype of *H. pulchra* (BROTZEN) (and perhaps also the holotype *H. planata* (CUSHMAN) regards each of them as the separate species.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian; Carpathians — Senonian. USA — upper Campanian-lower Maastrichtian. Bulgaria — upper Campanian-middle Maastrichtian. Czechoslovakia — Santonian-Campanian. Iraq — Santonian-middle Maastrichtian. Nigeria — Turonian-Coniacian.

Heterohelix pseudoglobulosa FRERICHS, 1979
(pl. 10: 8)

1967. *Heterohelix reussi* (CUSHMAN); PESSAGNO: 263, pl. 85: 1—2 (*non* 3—9, pl. 86: 1, 2).
1967. *Heterohelix globulosa* (EHRENBERG); EICHER: 185, pl. 19: 11.
1970. *Heterohelix globulosa* (EHRENBERG); EICHER and WORSTELL: 296, pl. 8: 3 (*non* 4—6).
1979. *Heterohelix pseudoglobulosa* FRERICHS: 165, pl. 1: 5, 6.

Material. — More than a hundred variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45920/88/F	45921/88/F	45922/88/F
length	0.288	0.240	0.216
width	0.198	0.198	0.120
thickness	0.096	0.096	0.072

Variability. — It is low and concerns test proportions (but, the increase in test size is never rapid), convexity of chambers, depression of sutures and lobation of a test periphery.

Remarks. — The investigated specimens are identical with the holotype. In a test shape and slight increase in size of chambers as added this species resembles *H. moremani* (CUSHMAN). It also resembles *H. striata* (EHRENBERG) in having spherical chambers, strongly depressed septal sutures and in the triangular depressions between chambers, from various rows.

Distribution. — Poland — Santonian-Maastrichtian. USA — Cenomanian-Campanian.

Heterohelix pseudotessera (CUSHMAN, 1938)
(pl. 10: 4, 5)

part. 1938a. *Guembelina pseudotessera* CUSHMAN: 14, pl. 2: 19, 20, *non*. pl. 2: 21.
part. 1946. *Guembelina pseudotessera* CUSHMAN; CUSHMAN: 106, pl. 45: 16, 17, *non* pl. 45: 18—20.
1967. *Heterochelix pluchra* (BROTZEN); PESSAGNO: 262, pl. 87: 4.
1977. *Heterohelix pseudotessera* (CUSHMAN); MASTERS: 349, pl. 1: 10, 11.
1984. *Heterohelix pseudotessera* (CUSHMAN); WEIDICH: 78, pl. 1: 12.
1986. *Heterohelix pseudotessera* (CUSHMAN); BUTT: pl. 3: 4.

Material. — Forty five variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45923/88/F	45924/88/F	45925/88/F
length	0.336	0.288	0.240
width	0.216	0.216	0.192
thickness	0.090	0.090	0.072

Variability. — It is high and concerns test proportions, shape and convexity of chambers and size of the two youngest chambers. Tests which increase rapidly in size as chambers are added have a fan-like shape. Those increasing slowly in size are wedge-shaped. In all specimens, independent of their shape there is a strong bilateral flattening of a test, whereas thickness is small (see measurements). Two or three youngest chambers are reniform and occupy 1/2 to 1/3 of the total length and clearly overlap each other. Panels are developed near the spiral suture, at the chamber contact.

Remarks. — The investigated specimens are consistent with the holotype and topotype of *H. pseudotessera* (CUSHMAN) (CUSHMAN 1938*a*, pl. 2: 19, 20, *non* 21). According to many

authors (see *H. planata* in this paper) the discussed species is a junior synonym of *H. pulchra* (BROTZEN). It differs, however, from this last species in having a test rapidly increasing in size, disproportionaly large two youngest chambers in relation to earlier chambers. Stratigraphical range is difficult to precise as this species is often regarded synonymous with *H. planata* (CUSHMAN) and *H. pulchra* (BROTZEN).

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian. USA — upper Campanian. Germany — Coniacian. Libya — upper Campanian.

Heterohelix pulchra (BROTZEN, 1936)
(pl. 9: 9, 10)

1936. *Guembelina pulchra* BROTZEN: 121, pl. 9: 3a, b *non.* 2a, b.
1938*a*. *Guembelina pulchra* BROTZEN; CUSHMAN: 12, pl. 2: 12.
1938*a*. *Guembelina pseudotessera* CUSHMAN: pl. 2: 21 *non* pl. 19, 20.
1969. *Heterohelix pulchra* (BROTZEN); STENESTAD: 654, pl. 1: 1, 2, 3, pl. 3: 3, text-fig. 9a, b, c.
1970. *Heterohelix pulchra* (BROTZEN); EICHER and WORSTELL: 118, pl. 1: 1—3.
1975. *Heterohelix pulchra* (BROTZEN); DARMOIAN: 192, pl. 1: 9—15.
1975. *Heterochelix pulchra* (BROTZEN); FRERICHS, ATHERON and SHIVE: 301, pl. 1: 7, 8.
1977. *Heterohelix pulchra* (BROTZEN); PETTERS: pl. 1: 8.
1977. *Heterohelix pulchra* (BROTZEN); MASTERS: 349, pl. 2: 2.
1979. *Heterohelix pulchra* (BROTZEN); FRERICHS: 166, pl. 1: 7, 8.
1980. *Heterohelix pulchra* (BROTZEN); PERYT: 37, pl. 3: 8.
1980. *Heterohelix pulchra* (BROTZEN); PETTERS: pl. 1: 17.
1984. *Heterohelix pulchra* (BROTZEN); WEIDICH: 78, pl. 1: 5, 6, 8, 9, 13.

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45926/88/F	45927/88/F	45928/88/F
length	0.336	0.298	0.264
width	0.216	0.192	0.192
thickness	0.072	0.072	0.072

Variability. — Intraspecific variability concerns shape of chambers and degree of chamber overlap. With the exception of the two youngest, all chambers may be rectangular and very weakly embracing; in other cases all chambers, with the exception of the oldest ones, which are spherical, may be reniform and considerably embracing.

Remarks. — The investigated specimens are consistent with the holotype. PESSAGNO (1967) was correct to include the specimen illustrated by BROTZEN (1936), pl. 9: 2a—b) as a microspheric form of *Guembelina pulchra*, into a genus *Gublerina*. The species under discussion, despite of some stable characters which are apparently easy to distinguish in the species under discussion, such as a wedge-like shape of a test, gradual and slow increase of the test in size as chambers are added, rounded test margin, reniform chambers (at least the youngest), it still poses many problems. *H. planata* (CUSHMAN), *H. pseudotessera* (CUSHMAN) and *H. suwalkensis* sp. n. are closely related with this species. As observed on the present material plus about 200 specimens beyond it, *H. pulchra* (BROTZEN) changes with time. The specimens from the Maastrichtian deposits display the chambers lower and more embracing one another than the specimens from the lower Turonian. In the upper Turonian numerous mutations appear showing test rapidly increasing in size as chambers are added, and with the two youngest chambers disproportionately large. It leads to the origin of *H. planata* (CUSHMAN) and *H. pseudotessera* (CUSHMAN). In the upper Maastrichtian *H. suwalkensis* sp. n. originates.

Distribution. — As this species is variously understood it is difficult to precise its stratigraphical range. Poland: Polish Lowlands — lower Turonian-Maastrichtian. Sweden — Senonian. Denmark — Santonian. Germany — upper Turonian, Coniacian. USA — Cenomanian, Santonian-Lower Maastrichtian. Nigeria — Coniacian-Santonian. Iraq — Coniacian-Santonian.

Heterohelix punctulata (CUSHMAN, 1938)
(pl. 9: 11a, b)

1938*a*. *Guembelina punctulata* CUSHMAN: 13, pl. 2: 15, 16.
1965. *Heterohelix (Heterohelix) planeobtusa* ALILULLA: 222, pl. figs. 5a, b.
1967. *Heterohelix punctulata* (CUSHMAN); PESSAGNO: 262, pl. 86: 7—10 (with synonymy).
1968. *Heterohelix punctulata* (CUSHMAN); SLITER: 96, pl. 14: 7.
1974. *Heterohelix punctulata* (CUSHMAN); VAPTZAROVA: 31, pl. 1: 1, 2.
1975. *Heterohelix punctulata* (CUSHMAN); DARMOIAN: 193, pl. 2: 1.
1977. *Pseudoguembelina punctulata* (CUSHMAN); MASTERS: 376, pl. 5: 2.

Material. — Seventy variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45929/88/F	45930/88/F	45931/88/F
length	0.624	0.528	0.384
width	0.384	0.312	0.240
thickness	0.240	0.216	0.168

Variability. — Variability in this very characteristic species concerns mainly width of a test and pattern of increase in size as chambers are added. The initial part of the test in all specimens is very short, narrow, thin and bordered with a keel. The keel is broken off in most specimens. Above this part, the test starts to increase in size. If this increase in size is gradual and slow, the edges of the test are parallel, if it is gradual but considerable, the test margins are diverging. Among specimens with nearly parallel margins, some specimens are very wide while others much narrower.

Remarks. — The investigated specimens are nearly entirely consistent with the holotype, from which they differ only in being larger. Accessory apertures of MASTERS (1977: 332, fig. 2a) occurring on the septal suture near the spiral suture, were observed only sporadically, all of them infilled with rock. MASTERS (1977) included among other the tests totally covered with fine costae into *H. punctulata* (CUSHMAN), which made him to consider *H. robusa* STENESTAD as a junior synonym of *H. punctatula* CUSHMAN. According to the present author, *H. robusta* STENESTAD is a separate species resembling *H. punctatula* (CUSHMAN) in the test shape, pattern of the test development and chamber convexity, but differing in the test surface covered with large, densely spaced pores instead of costae. This difference has been illustrated by MASTERS himself (1977, pl. 5: 2). According to the present author, the species under discussion belongs to the genus *Heterohelix* EHRENBERG, 1843, and not to the genus *Pseudoguembelina* BRÖNNIMANN et BROWN, 1953, as it has no costae on the whole test surface. The species *Heterohelix robusta* STENESTAD is more closely related to the last genus. As MASTERS (1977) treats the species boundaries differently than the present author the stratigraphical range given by him differs from that given by the present author. ALILULLA (1965) described this species under the name *H. (Heterohelix) planeobtusa* sp. n. The problem is that it is cited from the upper? Santonian-Campanian, with no basis for the stratigraphical zonation of the deposits given. All other authors (also WEISS 1983) give the Campanian-Maastrichtian or only Maastrichtian as a stratigraphical range of this species.

Distribution. — Poland — Campanian-lower Maastrichtian. USA, Mexico, Egypt, Puerto Rico — Campanian-Maastrichtian. Cuba — upper Maastrichtian. Bulgaria — upper Campanian-lower Maastrichtian. Spain — upper Maastrichtian. USSR (Small Caucasus) —? upper Santonian-Campanian. Iraq — upper Maastrichtian.

Heterohelix robusta STENESTAD, 1968
(pl. 9: 5a, b, 6)

1968. *Heterohelix robusta* STENESTAD: 68, pl. 1: 12—14, pl. 3: 1—3 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1969. *Heterohelix robusta* STENESTAD; STENESTAD: 658, pl. 1: 17, 17a, 17b, 18, 19, pl. 2: 3, 3a, 3b, text-fig. 13a, b, c.
1980. *Heterohelix* aff. *punctulata* (CUSHMAN); PERYT: 38, pl. 7: 10, 11.

Material. — Thirty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45932/88/F	45933/88/F	45934/88/F
length	0.528	0.480	0.456
width	0.336	0.288	0.288
thickness	0.216	0.192	0.216

Variability. — It concerns mainly test proportions and ornamentation. The surface of all chambers may be covered with numerous and very fine costae and pores, in other specimens, chambers in a proximal part may be covered with slightly thicker ribs than in a distal part.

Remarks. — The investigated specimens differ from the holotype in the presence of visible pores and the costae on the test surface probably stronger. The costae are presumed to be very thin and fine on the basis of the photography of the holotype which is not quite clear in this respect. The discussed specimens are identical with those illustrated by PERYT (1980) as *H.* aff. *punctulata* (CUSHMAN). Comparison with *H. punctulata* (CUSHMAN) was presented in the description of the former species.

Distribution. — Poland — Campanian-Maastrichtian. Denmark — upper Campanian, lower Maastrichtian.

Heterohelix semicostata (CUSHMAN, 1938)
(pl. 10: 14, 15a, b)

1938a. *Guembelina semicostata* CUSHMAN: 16, pl. 3: 6.
1946. *Guembelina semicostata* CUSHMAN; CUSHMAN: 107, pl. 46: 1—5.
1967. *Heterohelix semicostata* (CUSHMAN); PESSAGNO: 263, pl. 98: 21.
1977. *Heterohelix semicostata* (CUSHMAN); MASTERS: 352, pl. 2: 4, 5 (with synonymy).

Material. — Thirty very well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45935/88/F	45936/88/F	45937/88/F
length	0.288	0.264	0.168
width	0.216	0.216	0.144
thickness	0.072	0.072	0.072

Variability. — Variability is low and expressed in the test size (see measurements), a degree of depression of septal sutures, thickness of costae on a chamber surface near the test margin, visibility or nonvisibility of a spiral suture in the youngest part of the test. In the specimens with a spiral suture of the youngest part of the test invisible, there is apparently a nonseptate area between two series of chambers, similarly as in the genus *Gublerina* KIKOINE, 1948. In some specimens costae cover the chamber surface in an initial portion, while in others they occur both in proximal and distal parts of the test. Numerous costae follow peripheral curvature of chambers. Longitudinal costae are also present on the narrow walls of the test. They are slightly thicker than on wide walls surface.

Remarks. — The investigated specimens are nearly entirely consistent with the holotype. They differ from it only in being slightly larger (holotype is 0.30 mm long and 0.20 mm wide and 0.10 mm thick). The species under discussion is an intermediate form between *Heterohelix* and *Gublerina*, which was already noted by PESSAGNO (1967: 263). I agree with MASTERS's opinion (1977), that the specimens described by NEAGU (1970: 60, pl. 14: 11) as *Gublerina ornatissima* (CUSHMAN et CHURCH) and the specimens described by GOVINDAN (1972: 170, pl. 2: 1—5) under the name *Gublerina rajagopalani* GOVINDAN are junior synonyms of the discussed species.

Distribution. — First occurrence in Poland. Poland — upper part of the lower Campanian, Maastrichtian (Lublin Chalk). USA — Campanian-Maastrichtian. Romania — upper Campanian-lower Maastrichtian. Europe, Asia, Africa, America — lower Campanian-Maastrichtian. India — lower Maastrichtian.

Heterohelix striata (EHRENBERG, 1840)

(pl. 10: 9a, b, 10)

1840. *Textularia striata* EHRENBERG: 135, pl. 4: 1 alfa, 2 alfa, 3 alfa (*non* 9 alfa) (*fide* ELLIS and MESSINA, Cat. of Foram.).
1840. *Textularia globulosa* EHRENBERG: 135, pl. 4: 2 beta, 4 beta, 5 beta, 7 beta, 8 beta (*fide* ELLIS and MESSINA, Cat. of Foram.).
1969. *Heterohelix striata* (EHRENBERG); STENESTAD: 653, pl. 1: 4, pl. 2: 1, 1a, 1b, text-fig. 7.
1971. *Heterohelix globulosa* (EHRENBERG); MORRIS: 280, pl. 7: 3.
1972. *Heterohelix globulosa* (EHRENBERG); GOVINDAN: 167, pl. 1: 1—2.
1972. *Heterohelix striata* (EHRENBERG); GOVINDAN: 168, pl. 1: 13—14.
1975. *Heterohelix striata* (EHRENBERG); FRERICHS, ATHERTON and SHIVE: 301, pl. 1: 11, 12.
1975. *Heterohelix globulosa* (EHRENBERG); FRERICHS, ATHERTON and SHIVE: 300, pl. 1: 1, 2.
1977. *Heterohelix globulosa* (EHRENBERG); MASTERS: 343, pl. 1: 8, 9.
1977. *Heterohelix striata* (EHRENBERG); MASTERS: 356, pl. 3: 2, 3.
1980. *Heterohelix striata* (EHRENBERG); GAWOR-BIEDOWA: 33, pl. 4: 7.
1980. *Heterohelix globulosa* (EHRENBERG); PERYT: 35, pl. 2: 11, 12, pl. 7: 12, *non* pl. 5: 6, 7.
1980. *Heterohelix striata* (EHRENBERG); PERYT: 39, pl. 2: 4, 5, 7, 13, pl. 5: 8, 9.
1984. *Heterohelix globulosa* (EHRENBERG); LISZKOWA and MORGIEL: 256, pl. 127: 3, 4.
1986. *Heterohelix globulosa* (EHRENBERG); BUTT: pl. 2: 4, 5.
1986. *Heterohelix striata* (EHRENBERG); BUTT: pl. 2: 8.

Material. — Two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45941/88/F	45942/88/F	45943/88/F
length	0.336	0.312	0.240
width	0.240	0.240	0.192
thickness	0.144	0.120	0.120

Variability. — It is expressed in test proportions, in size and degree of convexity of chambers, especially their two youngest pair, and in degree of development of ornamentation on the test surface. The ornamentation is developed as thin or thicker discontinous costae covering the surface of all chambers or only that of the oldest chambers. These differences are considered as specific by many authors, the strongly ornamented tests being assigned to *H. striata* (EHRENBERG), and the poorly ornamented tests *H. globulosa* (EHRENBERG). In the investigated material, there are specimens displaying either more or less ornamented test surface, all interforms being present. In this material there are only biserial specimens of microspheric generation.

Remarks. — I agree with DARMOIAN (1975) that *Heterohelix globulosa* (EHRENBERG) is synonymous with *Heterohelix striata* (EHRENBERG). The test in both species is covered with fine and poorly visible or thicker and well visible costae. In my opinion, a degree of striation development cannot be used as a basis for erecting species, because it can depend on ecological conditions, *in* PERYT (1980:40) opinion *H. globulosa* and *H. striata* do not appear simultaneously. The specimens of *H. striata* with well developed costae on all chambers, which are clearly visible despite a poor preservation of the tests occur already in the Coniacian deposits of the Sudetes (GAWOR-BIEDOWA 1980, pl. 4: 7). MASTERS (1977) includes the specimens devoid of striae, or with poorly developed striae, with flattened initial part of the test with a keel (as for example *Heterohelix globocarinata* (CUSHMAN) which is the separate species in my opinion) into *Heterohelix globulosa* (EHRENBERG). On the other hand, BUTT (1986) noted the co-occurrence of *H. striata* and *H. globulosa* in the Maastrichtian of Kajach Limestone. The stratigraphical range of *H. striata* is, according to this author, from the Lower Santonian to Maastrichtian.

Distribution. — Cosmopolitan species. Poland — Turonian-Maastrichtian. Europe, North America, South America — Turonian-Maastrichtian. Asia, Africa, Australia — Santonian-Maastrichtian.

Heterohelix suwalkensis sp. n.
(pl. 11: 1, 2, 3a, b, 4a, b, 5, 6)

Holotype: specimen IG No. 45944/88/F, in pl. 11: 1.

Paratypes: specimens IG Nos.: 45945/88/F, 45945A/88/F, 45945B/88/F, 45945C/88/F and 45945D/88/F, in pl. 11: 2, 3a, b, 4a, b, 5, 6.

Type horizon: Maastrichtian.

Type locality: Jeleniewo 1/V borehole at a depth of 276.1 m.

Derivation of the name: from the name of the region where this species has been found.

Diagnosis. — Test small, flat fan-like, resembling equilateral triangle, nearly smooth in outline, margin narrow, rounded, chambers wide and low, reniform, with nearly flat surface, strongly embracing each other especially in distal part. Sutures narrow, slightly depressed, poorly curved. Aperture low, semilunar with a narrow lip.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

	Holotype/microspheric form	Paratype/megalospheric form
IG Nos.:	45994/88/F	45945/88/F
length	0.216	0.240
width	0.168	0.168
thickness	0.048	0.048

Description. — Test small, flat, resembling in shape equilateral triangle, fan-like, considerably but gradually increasing in size as chambers are added. Test outline nearly smooth, margin slightly rounded, test wall very thin, smooth, glittering, and with small pores. The initial, planispiral part of the test very small and composed of 4 spherical chambers; biserial part consists of 6 chambers, which are initially rectangular in outline, higher up reniform and strongly embracing each other. The youngest chambers tend to be uniserial (see paratype, pl. 11: 3a). Chambers are 3 times wider than high. Sutures are translucent, narrow, very poorly depressed and weakly arched. Median suture also translucent and poorly depressed, vanishing in a distal part of the test. Aperture low, semilunar with a narrow lip.

Variability. — Specimens of two generations are present in the investigated material. The two generations do not differ from each other, except for the embryonic chamber. The latter is 5.1 μm large in microspheric generation, while being 15.6 μm large in macrospheric forms. The intraspecific variability concerns the width of the youngest chambers, which may be equal to the test width, but is usually less than this, and the presence or absence of median suture in a distal part of the test. In a distal part of the test, the chambers may be separated or fused with each other. Variability is also expressed in the number of chambers in both the planispiral portion of the test (from 3 to 5) and the biserial portion (from 6 to 8).

Remarks. — The species under discussion resembles *Heterohelix glabrans* (Cushman) in the test shape and planispirally coiled initial part of the test. It differs from the last species in fan-like test shape, reniform chambers in a biserial part, nearly flat sutures, nearly smooth, not lobate test outline. In reniform shape of chambers and smooth test surface it resembles especially *H. pulchra* (Brotzen) differing from it in fan-like shape, in chamber tendency to fuse with one another in the youngest portion of the test, in nearly smooth test outline, flat chamber surface and nearly flat sutures. The fan-like test shape and a tendency to disappearance of septal separation between chambers in the central part of the test recall very much a situation in *Gublerina* Kikoine, 1948, which has additional chambers in the younger part of the test. *H. suwalkensis* is, thus, morphologically intermediate between two genera, *Heterohelix* and *Gublerina*. In configuration of the youngest chambers this species resembles *Guembelina dagmarae* Sulejmanov, 1955, but differs from this species in the test shape, hardly lobate test outline and in lack of septal separation between chambers in the central part of the test.

Distribution. — Poland· Polish Lowlands — Maastrichtian.

Heterohelix varsoviensis sp. n.
(pl. 10: 11a, b, 12, 13)

Holotype: specimen IG No. 45946/88/F, in pl. 10: 11a, b.
Paratype IG Nos. 45947/88/F, 45948/88/F, in pl. 10: 13, 13.
Type horizon: Maastrichtian.
Type locality: Jeleniowo 1/V borehole, at a depth of 276,1 m.
Derivation of the name: after Poland's capital.

Diagnosis. — Test very small, elongated, very narrow and hardly increasing in size at the bottom, and rapidly increasing in size at the height of two youngest chamber pairs. Test outline smooth in a proximal part, poorly lobate in a distal part. The surface covered with fine, discontinous costae. Aperture semilunar and high.

Material. — Twenty five variously preserved specimens.

Dimension (in mm):

IG Nos.:	45946/88/F	45947/88/F	45948/88/F
length	0.240	0.216	0.240
width	0.144	0.144	0.120
thickness	0.096	0.096	0.072

Description. — Test very small, biserial and elongted, very narrow at the bottom up to 1/3 the total length, at the height of two pairs of the youngest chambers rapidly increasing in size, composed of 7 pairs of chambers. Test surface finely perforated covered with fine discontinous costae; test outline smooth in a proximal part and slightly lobate in a distal one. In the initial part of the test, chambers are very small, rectangular in outline with flat surface and tightly packed, slightly wider than high, separated by straight, translucent, flat sutures which are nearly perpendicular to the vertical axis of the test. The youngest chambers nearly hemispherical, separated by slightly diagonal and strongly depressed sutures. Zig-zag median suture, is flat in a proximal part of the test and slightly depressed in a distal one. Aperture semilunar, situated at the base of apertural surface of the ultimate chamber.

Variability. — It is expressed in a number of chambers (6 to 8 pairs, usually 7), in a number of chamber pairs which increase in size (usually 3, sometime 4 pairs), in a test outline and a degree of chamber convexity (quadrangular or hemispherical, the two youngest chambers are always hemispherical). The initial part of the test is slightly wider in the macrospheric forms A than in microspheric forms B. It is also rounded and not pointed.

Remarks. — The species under discussion, in small size, tightly packed chambers which are poorly convex in the initial part of the test, resembles *H. washitensis* (TAPPAN). It differs, however, from it in having the youngest chambers hemispherical, in increasing in size at the height of two pairs of the youngest chambers, in smooth outline of the proximal portion of the test and lobate outline in a distal one, and in the semilunar aperture.

Distribution. — Poland — Maastrichtian.

Genus *Planoglobulina* CUSHMAN, 1927
Planoglobulina acervulinoides (EGGER, 1899)
(pl. 11: 13)

1899. *Gümbelina acervulinoides* EGGER: 36, pl. 14: 202, 21, 22 *non* pl. 14: 14—18 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1980. *Planoglobulina acervilinoides* (EGGER); PERYT: 46, pl. 5: 5.
1983. *Planoglobulina acervulinoides* (EGGER); WEISS: 50, pl. 4: 5—7 (with synonymy).
1984. *Planoglobulina acervulinoides* (EGGER); GAWOR-BIEDOWA and WITWICKA: 257, pl. 82: 3, pl. 128: 1 (with synonymy).
1986. *Planoglobulina acervulinoides* (EGGER); BUTT: pl. 1: 8.

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45952/88/F	45953/88/F	45954/88/F
length	0.384	0.432	0.450
width	0.360	0.336	0.360
thickness	0.096	0.096	0.096

Variability. — It is expressed in test proportions.

Remarks. — This species differs from *Planoglobulina brazoensis* MARTIN in having more numerous chambers in a multiserial part of the test, more bilaterally flattened test and in less convex chambers round in outline. For remarks concerning the status of this species and its taxonomical position see WEISS (1983: 49).

Distribution. — Poland: Polish Lowlands — Maastrichtian; Carpathians — Maastrichtian. Spain — upper Maastrichtian. Bulgaria — middle and upper Maastrichtian. Libya — Maastrichtian. North America — middle and upper Maastrichtian. Australia — upper Maastrichtian. South Africa — middle and upper Maastrichtian.

Planoglobulina brazoensis MARTIN, 1972
(pl. 11: 12)

1972. *Planoglobulina brazoensis* MARTIN: 82, pl. 3: 7a—c, pl. 4: 1a—2.
1977. *Platystaphyla brazoensis* (MARTIN); MASTERS: 365, pl. 4: 3, 4.
1980. *Planoglobulina brazoensis* MARTIN; PERYT: 46, pl. 5: 4a, b.
1983. *Planoglobulina brazoensis* MARTIN; WEISS: 51, pl. 4: 1—4 (with synonymy).

Material. — Twenty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45955/88/F	45956/88/F
length	0.336	0.408
width	0.288	0.408
thickness	0.120	0.216

Variability. — In the investigated material there are specimens representing different ontogenetic stages of development i.e. having from one to three rows of chambers in multiserial portion. Intraspecific variability is expressed in either more or less convex lateral sides of the multiserial part of the test in relation to the biserial one.

Remarks. — The specimens from the investigated area resemble mostly those illustrated by WEISS (1983, pl. 4: 1—4) and display similar variability range. They differ from *P. acervulinoides* in having nearly triangular test outline, in strongly convex youngest chambers as well as in the small number of chamber rows in the multiserial part of the test.

Distribution. — Poland — Maastrichtian. North and South America, Asia, Africa, Europe — Maastrichtian.

Genus *Pseudotextularia* RZEHAK, 1891

Pseudotextularia elegans (RZEHAK 1891)
(pl. 11: 10, 11)

1891. *Cuneolina elegans* RZEHAK: 4 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1895. *Pseudotextularia varians* RZEHAK: 217, pl. 7: 1a—b, *non* 2—3.
1983. *Pseudotextularia elegans* (RZEHAK); WEISS: 61, pl. 8: 5—7 (with synonymy).
1984. *Pseudotextularia elegans* (RZEHAK); GAWOR-BIEDOWA and WITWICKA: 258, pl. 82: 1, 2, pl. 128: 2.
1986. *Pseudotextularia elegans* (RZEHAK); BUTT: pl. 2: 1, 2.

Material. — Forty variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45949/88/F	45950/88/F	45951/88/F
length	0.480	0.450	0.432
width	0.288	0.312	0.264
thickness	0.288	0.312	0.240

Variability. — Variability is high and concerns rapidity of increase in size as chambers are added (the two youngest chambers may occupy 2/3 or 1/2 of the total length), degree of bilateral flattening of a test (in some specimens the width and thickness of the test are equal at the level of two youngest chambers), thickness of costae on the test surface and height of aperture. If the youngest chamber is only slightly thicker than wide, the aperture is semilunar and high, if it is twice as thick as wide, the aperture is low and arched.

Remarks. — The high intraspecific variability of this species results in various specific names given to different morphological forms (see WEISS 1983: 61 synonymy). In the investigated material, as well as in that from the Tethyan region (WEISS 1983: 62), there occur intermediate forms between *Heterohelix globulosa* (EHRENBERG) and *Pseudotextularia elegans* (RZEHAK). The investigated specimens agree in all features with those illustrated by WEISS (1983, pl. 8: 5—7), except for having slightly thinner costae on the test surface. NASH (1981) presented the review of opinions about *P. elegans* (RZEHAK) and proposed the neotype for it (pl. 1: 1, 2). The studied specimens are consistent both with the neotype and with topotypes (pl. 1; 3—7).

Distribution. — Cosmopolitan species. Poland: Polish Lowlands — Campanian-Maastrichtian; Carpathians — Maastrichtian. Europe, Asia, Africa, North and South America — Companian-Maastrichtian.

Subfamily **Gublerininae** ALIYULLA, 1977

Genus *Gublerina* KIKOINE, 1948

Gublerina cf. *reniformis* (MARIE, 1941)

(pl. 12: 9)

Material. — Twenty variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45957/88/F	45958/88/F	45959/88/F
length	0.408	0.360	0.264
width	0.288	0.240	0.240
thickness	0.072	0.048	0.072

Description. — Test strongly bilateraly flattened, finely, evenly and coarsely perforated. Test periphery rounded, slightly lobate at the septal sutures. Initial part of the test narrow bordered with a delicate keel. In this part, chambers are very small and slightly convex with rectangular outline. Above this part, the test increases in size rather rapidly which results in its flabelliform shape. Chambers are reniform, slightly wider than high; in the middle part of the test they are not separated. Sutures straight in the narrowest portion of the test, slightly oblique in relation to the test axis, and poorly depressed. Above, the sutures are arched and rather strongly depressed; in the distal test part oblique, weakly curved and visible only near the test periphery. Middle part of the test not divided. Median suture zigzag-like and visibly only in the initial part of the test, disappears above this part. The aperture has not been preserved in the studied tests.

Variability. — It is expressed in various rapidity of increase in size of the test as chambers are added, and in size of nonseptate central area of the test. This area may extend from the half of the test length up to the top, or may occur at the height of two youngest chambers. In the last case, flat fragments of the test triangular in shape, occur near the median suture visible only below nonseptate area. The investigated specimens represent microspheric generation.

Remarks. — The specimens under discussion differ from *G. reniformis* (MARIE) in lacking striolation on the test surface, in large size and less rapid increase in size. They resemble the specimens presented by HOFKER (1978, pl. 1 : 8) under the name *G. reniformis* (MARIE) in the shape of the test and in having a keel in the initial part of the test.

Distribution. — Poland — Maastrichtian.

Subfamily **Pseudoguembelininae** ALIYULLA, 1977
Genus *Pseudoguembelina* BRÖNNIMANN et BROWN, 1953
Pseudoguembelina costulata (CUSHMAN, 1938)
(pl. 12: 10a, b, 11)

1938a. *Guembelina costulata* CUSHMAN: 16, pl. 3: 7—9.
1983. *Pseudoguembelina costulata* (CUSHMAN); WEISS: 56, pl. 6: 8—10 (with synonymy).

Material. — More than eighty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45938/88/F	45939/88/F	45940/88/F
length	0.288	0.264	0.192
width	0.144	0.168	0.120
thickness	0.072	0.072	0.072

Variability. — It is expressed in number of chambers (6 to 8), in degree of increase in size as chambers are added (either slower or more rapidly increasing in size but always slender), in the character of secondary apertures at the median zigzag suture between pairs of chambers (semilunar with a narrow lip or slit-like but always poorly visible), in degree of striation, and in different degree of development of the lip bordering interiomarginally the main semilunar aperture.

Remarks. — I agree with WEISS's (1983) opinion that *P. costulata* (CUSHMAN) is a separate species. It differs from *P. costata* (CARSEY, 1926) in having slender test, in ornamentation consisting of fine striae instead of thick costae, in poorly developed secondary apertures and in a strong bilateral flattening of the test. MASTERS (1977) considers this species as a junior synonym of *P. costata* (CARSEY).

Distribution. — Poland — upper Campanian-Maastrichtian (Lublin Chalk). USA and Atlantic — Campanian-Maastrichtian.

Superfamily **Planomalinacea** BOLLI, LOEBLICH et TAPPAN, 1957
Family **Globigerinelloididae** LONGORIA, 1974
Subfamily **Globigerinelloidinae** LONGORIA, 1974
Genus *Globigerinelloides* CUSHMAN et ten DAM, 1948
Globigerinelloides abberantus (NECKAJA, 1948)
(pl. 12: 5a, b, 6)

1948. *Globigerinella abberanta* NECKAJA; 220, pl. 2: 3a, b.
1977. *Globigerinelloides abberanta* (NECKAJA); MASTERS: 401, pl. 8: 3—5, pl. 9: 1, 2.
1980. *Globigerinelloides multispinus* (LALICKER); PERYT: 49, pl. 8: 6—8, 11, ? 9, 10 *non* 5.

Material. — More than 300 well preserved specimens.

Dimensions (in mm):

IG Nos.:	45963/88/F	45964/88/F	45965/88/F
diameter	0.288	0.264	0.192
height	0.144	0.120	0.096

Variability. — Variability is low and concerns the number of chambers in the final whorl (5 to 7, commonly 6), the outline of a test (round or oval), the size of the ultimate chamber

which can be equal to the penultimate, slightly smaller or considerably larger than the latter. It is also expressed in the presence or absence of relic apertures within an area of umbilical depression of the older chambers. Pores situated on pore-nodes which are well visible under SEM.

Remarks. — The specimens of this species have been described in the literature under different generic and specific names. This species differ from *Globigerinella messinae messinae* BRÖNNIMANN in having a round outline of the test, more numerous chambers in the final whorl (5—7, usually 6 while *Globigerinella messinae messinae* BRÖNNIMANN has 5 chamber and only rarely 6 chambers in a whorl), and in the presence of two semilunar apertures in the final chamber, situated on both sides of the test. From *Biglobigerinella multispina* LALICKER, it differs in absence of a biserial part near the end of the whorl. MASTERS (1977) regarded *Biglobigerinella multispina* LALICKER, 1948 as a junior synonym of *Globigerinelloides abberantus* (NECKAJA); I disagree with his opinion as the former species has no biserial part of the test, the feature characteristic for *G. multispinus* (LALICKER).

Distribution. — Cosmopolitan species. Poland: Polish Lowlands — Campanian-Maastrichtian; Carpathians — Maastrichtian. Europe, America — Campanian-Maastrichtian. Asia — Maastrichtian.

Globigerinelloides asperus (EHRENBERG, 1854)
(pl. 12: 7a, b, 8)

1854. *Phanerostomum asperum* EHRENBERG; 23, pl. 30: 26a, b (*fide* ELLIS and MESSINA, Cat. of Foram.).
1953. *Globigerinella aspera* (EHRENBERG); SUBBOTINA: *partim*, 86, pl. 13: 2, 4, 5, 6, 7 (*non* pl. 13: 3, 8, 9, 10, 11, 12).
1957. *Globigerinella aspera* (EHRENBERG); BUKOWY and GEROCH: 317, pl. 28: 1, 2.
1962. *Planomalina aspera* (EHRENBERG); BARR: 561, pl. 69: 4a, b (with synonymy).
1962. *Globigerinella aspera* (EHRENBERG); HERM: 49, pl. 3: 6.
1964. *Planomalina aspera* (EHRENBERG); MARTIN: 84, pl. 10: 7a—c.
1964. *Hastigerina aspera* (EHRENBERG) *digitata* SUBBOTINA: 250, pl. 54: 1a, b, w—5a, b, w.
1966. ? *Planomalina (Globigerinelloides) aspera* (EHRENBERG); SALAJ and SAMUEL: 160, pl. 7: 3a, b.
1967. *Globigerinelloides asperus* (EHRENBERG); PESSAGNO, 274, pl. 60: 4, 5.
1970. *Globigerinelloides aspera* (EHRENBERG); NEAGU: 63, pl. 25: 22, 23.
1972. *Globigerinelloides aspera* (EHRENBERG); HANZLIKOVÁ: 98, pl. 25: 1.
1975. *Globigerinelloides asperus* (EHRENBERG); FRERICHS, ATHERTON and SHIVE: 302, pl. 2: 1—3.

Material. — More than 400 well — preserved specimens.

Dimensions (in mm):

IG Nos.:	45967/88/F	45968/88/F	45969/88/F
diameter	0.264	0.240	0.168
height	0.144	0.120	0.096

Variability. — Variability is low and expressed in shape of a test outline (round or slightly oval), in degree of lobation of the test periphery which is closely dependent on degree of adhesion of chambers in the final whorl, in the number of chambers (commonly 5, rarely 6) and the rapidity of their increase in size in the final whorl.

Remarks. — The investigated specimens resemble the specimens of this species described by BUKOWY and GEROCH (1957), HANZLIKOVÁ (1972) and FRERICHS *et al.* (1975) in the test shape, the degree of chamber increase in size as chambers are added and in the shape and orientation of the final chamber. They are also very similar to *G. abberantus* (NECKAJA), from which they differ mostly in the presence of a single primary aperture. MASTERS (1977: 400) considers the species *Phanerostomum asperum* EHRENBERG as not valid, because it is not clear, according to him, if the specimen presented by EHRENBERG under this name is low trochospiral or planispiral, and if the aperture is equatorial or extends to one side or on both sides of the umbilicus. According to MASTERS (1977) this problem cannot be solved without studying to EHRENBERG's specimen; designation of the lectotype by PESSAGNO (1967) does not solve the

problem, as he has not given the description. Thus, MASTERS (1977) includes the specimens described by various authors under the name *G. asperus* (EHRENBERG) into synonymies of different species. In my opinion, the specimen from the Rügen Island illustrated by EHRENBERG (1854) under the name *Phanerostomum asperum* (pl. 30: 26a, b) represents the genus *Globigerinelloides* CUSHMAN et ten DAM, and is nearly identical with the specimen from the Maastrichtian deposits of the Lublin Chalk.

Distribution. — Cosmopolitan species. Poland, Europe, America, Asia, Australia — Upper Cretaceous.

Globigerinelloides ehrenbergi (BARR, 1962)
(pl. 12: 3a, b, 4)

1962. *Planomalina ehrenbergi* BARR: 563, pl. 69: 1a, b.
1972. *Globigerinelloides ehrenbergi* (BARR); BARR: 13, pl. 1: 4—5.
1979. *Globigerinelloides* aff. *ehrenbergi* BARR; FRERICHS: 167, pl. 2: 9, 10.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45970/88/F	45971/88/F	45972/88/F
diameter	0.264	0.216	0.168
height	0.096	0.096	0.072

Description. — Test planispiral, semievolute, with rounded and lobate outline. Wide umbilical depression occupying 1/3 of the diameter occurs on both sides of the test. Sometimes older whorl may be observed in the umbilical depression. Outer whorl consists of 7—8 spherical chambers loosely arranged, gradually increasing in size with test growth and separated from each other with radial, depressed sutures. Chamber surface hispid. Aperture equatorial, semilunar. Relic apertures in the outer whorl are visible near the umbilical depression. Lips of the relic apertures overlap like tiles.

Variability. — It is expressed in number of chambers in the final whorl (7—8), in the test evolutness, degree of adhesion of the chambers in the outer whorl and in degree of ornamentation of the chamber surface.

Remarks. — The specimens from Poland differ from the holotype in having poorly visible internal whorls. Relic apertures of chambers in the outer whorl are visible more clearly than in the holotype. The species under discussion differs from *G. asperus* (EHRENBERG) in more numerous chambers in the final whorl (7—8 instead of 5—6), in more evolute test, loose arrangement of chambers in the final whorl and in wider umbilicus. The species *G. ehrenbergi* (BARR) resembles *G. bentonensis* (MORROW) in number of chambers in the final whorl, differing from it in smaller size, more loose arrangement of chambers in the final whorl and different stratigraphic range. It resembles closely *G. alvarezi* (ETERNOD OLVERA, 1959) in the number of chambers, degree of evolutness, and arrangement of chambers in the final whorl. It seems even, that it can be a junior synonym of the species.

Distribution. — Poland — Campanian-Maastrichtian. England: White Island — Coniacian. Libya — upper Coniacian. USA — probably lower Campanian.

Globigerinelloides multispinus (LALICKER, 1948)
(pl. 12: 1a, b, 2)

1948. *Biglobigerinella multispina* LALICKER: 624, pl. 92: 1a—c, 2a, b, 3a—c, *fide* ELLIS and MESSINA, Cat. of Foram.
1949. *Biglobigerinella algeriana* ten DAM and SIGAL: 234, text-fig. 1—3, p. 235 (*fide* ELLIS and MESSINA, Cat. of Foram.)
1957. *Biglobigerinella* cf. *algeriana* ten DAM and SIGAL; BUKOWY and GEROCH: 318, pl. 28: 4—10.
1957. *Biglobigerinella multispina* LALICKER; BOLLI, LOEBLICH and TAPPAN: 25, pl. 1: 11, 12.
1962. *Planomalina multispina* (LALICKER); BARR: 563, pl. 69: 5a, b.

1962. *Planomalina (Globigerinelloides) messinae* (BRÖNNIMANN); BERGGREN: 44, pl. 8: 8a, b, c (*non* 4—7), text-fig. 6: 2a, b, 5a, b (*non*: 1a, b, 3a—c, 4a—c, 6a—c), *non* text-fig. 7.
1962. *Biglobigerinella multispina* LALICKER; HERM: 53, pl. 3: 8.
1964. *Globigerinelloides messinae* (BRÖNNIMANN); OLSSON: 174, pl. 7: 7, 8 (*non*: 6).
1964. *Biglobigerinella multispina* LALICKER; SUBBOTINA: 253, pl. 54: 10, 11, 14, 15, pl. 55: 1—8.
1967. *Globigerinelloides multispina* (LALICKER); PESSAGNO: 276, pl. 70: 1, 2, pl. 82: 10, 11 (*non* pl. 91: 1, 2).
1970. *Biglobigerinella* sp. cf. *B. algerinae* DAM et SIGALE NEAGU: 62, pl. 28: 15—18.
1972. *Globigerinelloides multispina* (LALICKER); HANZLIKOVÁ: 99, pl. 25: 4 (*non* 2—3).
1977. *Globigerinelloides multispina* (LALICKER); LINARES RODRIGUEZ: 378, pl. 1: 6.
1979. *Globigerinelloides multispina* (LALICKER); FRERICHS: 166, pl. 2: 5, 6 (*non* 7, 8).
1980. *Globogerinellodes multispinus* (LALICKER); PERYT: 49, pl. 8: 5a, b, *non* 6—8, 11, ? 9, 10.

Material. — Forty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45973/88/F	45974/88/F	45975/88/F
diameter	0.264	0.240	0.192
height of the last two chambres	0.192	0.168	0.168

Variability. — Variability is low and concerns the number of chambers in the final whorl (from 5 to 6, usually 6), size of the two youngest chambers forming biserial part of a test, width of the umbilical depression on both sides of the test (1/3 to 1/5 of the test diameter) and degree of ornamentation of the test surface with fine spines.

Remarks. — Specimens from Poland differ from the holotype in slightly smaller size (holotype — maximum diameter 0.320 mm, maximum height 0.290 mm, while the largest investigated specimens from Poland have diameter 0.264 mm and height 0.192 mm), and have less ornamented test surface. *Biglobigerinella algeriana* ten DAM et SIGAL is a junior synonym of the species under discussion in the author's opinion. Ten DAM and SIGAL (1949) listed smaller convexity of the test and the absence of spines on the test surface as features discriminating *Biglobigerinella algeriana* ten DAM et SIGAL from *Biglobigerinella multispina* LALICKER, two species which are otherwise identical. The differences in the test convexity and presence or absence of spines are here considered as a case of intraspecific variability. PERYT (1980) assigned the specimens of *Globigerinelloides abberantus* (NECKAJA) to this species.

Distribution. — Poland: Carpathians — Maastrichtian; Polish Lowlands — upper Campanian — Maastrichtian. Southern Scandinavia — uppermost Maastrichtian. Romania — upper Campanian-lower Maastrichtian. Austria — Maastrichtian. England — Campanian. USA — Campanian-Maastrichtian. Algeria — upper Senonian. USSR — Maastrichtian.

Family **Schackoinidae** POKORNY, 1958
Genus *Schackoina* THALMANN, 1932
Schackoina tappanae MONTANARO GALLITELLI, 1955
(pl. 13: 1)

1955. *Schackoina tappanae* MONTANARO GALLITELLI: 142, pl. 1: 1—10 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1977. *Schackoina tappanae* MONTANARO GALLITELLI; MASTERS: 437, pl. 17: 5, 6.

Material. — Ten variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	45976/88/F	45977/88/F	45978/88/F
longest diameter	0.216	0.192	0.168
shortest diameter (without tubospines)	0.168	0.144	0.144

Variability. — It is expressed in shape of chambers (bottle-shaped situated obliquely in relation to whorl axis or globular). The second tubospine is marked in some specimens, while in most cases only one is present.

Remarks. — The investigated specimens seem to be entirely consistent with the holotype as they have 3 chambers in the final whorl (inner whorls not visible), one tubospine on each chamber of the final whorl and they display large differences in the chamber size of the final whorl. For comparisons with other species see MONTANARO-GALLITELLI (1955: 142—143).

Distribution. — Poland — lower Maastrichtian. Italy — upper Senonian. North America — probably upper Cenomanian-Santonian.

Superfamily **Rotaliporacea** SIGAL, 1958
Family **Hedbergellidae** LOEBLICH et TAPPAN, 1961
Subfamily **Hedbergellinae** LOEBLICH et TAPPAN, 1961
Genus *Hedbergella* BRÖNNIMANN et BROWN, 1958
Hedbergella holmdelensis OLSSON, 1964
(pl. 13: 5, 6, 7)

1964. *Hedbergella holmdelensis* OLSSON: 160, pl. 1: 1—2.
non 1969. *Hedbergella holmdelensis* OLSSON; DOUGLAS: 166, pl. 9: 6—8.
non 1972. *Hedbergella holmdelensis* OLSSON; BARR: 13, pl. 1: 7a—c.
? 1972. *Hedbergella holmdelensis* OLSSON; GOVINDAN: 173, pl. 2: 14—16.
non 1975. *Hedbergella holmdelensis* OLSSON; FRERICHS and SHIVE: 310, pl. 3: 9—11.
1980. *Hedbergella crassa* (BOLLI); PERYT: 53, pl. 9: 2, 3, 4.
1984. *Hedbergella holmdelensis* OLSSON; ROBASZYNSKI *et al.*: 261, pl. 43: 1a—c.
1985. *Hedbergella holmdelensis* OLSSON; CARON: 59, pl. 25: 10—11.

Material. — More than three hundred variously preserved specimens.

Dimensions (in mm):

IG Nos.:	45979/88/F	45980/88/F
longest diameter	0.192	0.168
shortest diameter	0.144	0.144
height	0.096	0.072

Variability. — Variability is low and expressed in the rate of size increase of the last three chambers of the final whorl. In the investigated material, some specimens have these chambers increasing rapidly in size, elongated, and crescent-shaped as in the specimens illustrated by PERYT (1980, pl. 9: 2). Others show less rapid increase in size, chambers are a less elongated and trapezoidal in outline, as it is the case in the holotype presented by ROBASZYNSKI *et al.* (1984, pl. 43: 1a). Test surface may be smooth, glittering or hispid.

Remarks. — The investigated material is consistent with the holotype, as described by OLSSON (1964) and with a description of this species given by ROBASZYNSKI *et al.* (1984). The characteristic features of this species are elongated, crescent-shaped chambers at the dorsal side of the test, and very characteristic flattening of the test on the dorsal side. Except the size, the investigated specimens show no similarities with *Hedbergella planispira* (TAPPAN). Numerous authors (see synonymy) assigned the specimens having nearly spherical chambers, slightly flattened on the dorsal side, and thus similar to *Hedbergella planispira* (TAPPAN), to this species.

Distribution. — Poland — Maastrichtian. USA — according, to CARON (1985) Coniacian-Maastrichtian.

Hedbergella telatynensis sp. n.
(pl. 13: 2, 3, 4)

Holotype: specimen IG No. 45981/88/F, in pl. 13: 3.
Paratypes: IG Nos.: 45982/88/F, 45983/88/F, in pl. 13: 2, 4.
Type horizon: Campanian.
Type locality: Telatyn IG-1 borehole, depth 282,1 m.
Derivation of the name: from the name of the village where this species has been discovered.

Diagnosis. — Test small, round in outline, planoconvex, with flat dorsal side and convex ventral one, built of 2 and 1/2 of whorl, and with 6—7 chambers in the final whorl. Chambers increase in size gradually and slowly as added. The test surface hispid. Aperture arched, low and with a narrow lip.

Material. — A hundred well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	45981/88/F	45982/88/F	45983/88/F
diameter		0.144	0.192
height		0.072	0.072

Description. — Test small, circular in outline and with petaloidal incisions, planoconvex with dorsal side flat and convex ventral one. Final whorl consisting commonly of 6 to 7 chambers, rarely only 5. Older whorls which are flat and poorly visible occupy half of the test diameter. The final whorl is narrow displaying chambers gradually and slightly increasing in size as added. Chambers outline on the dorsal side trapezoidal, surface slightly convex, septal sutures poorly depressed and radial. Spiral suture poorly depressed. Chambers triangular, strongly convex, sutures poorly depressed and radial on the ventral side. Umbilicus very narrow, aperture low-arched, extraumbilical with a lip running to the umbilicus. Test periphery rounded, surface slightly hispid.

Variability. — Variability is low and expressed in degree of flattening of dorsal side (always flat, sometimes older whorls situated even slightly lower than the final one), and in the number of chambers (5 to 7) in the final whorl.

Remarks. — This species is most similar to *Hedbergella planispira* (TAPPAN) from which it differs in asymmetric, planoconvex test with invisible older whorls, less convex chambers of the final whorls on the dorsal side. It differs from *Hedbergella holmdelensis* OLSSON (to which it is similar in having dorsally flattened test) in a circular test outline, narrow final whorl, trapezoidal outline of chambers on the dorsal side as well as in a gradual and slow size increase of chambers as added and in more rounded test periphery. It differs from *Praeglobotruncana crassa* BOLLI in the number of chambers in the final whorl (in the last species there are 5 chambers), in invisible or poorly visible older whorls and a gradual increase in size of chambers in the final whorl. *Hedbergella telatynensis* sp. n. differs from *Whiteinella centennialensis* FRERICHS, which has similar test shape, chamber shape and pattern of their increase in size as added, in less numerous chambers in the final whorl (*Whiteinella centennialensis* FRERICHS has 7 to 9 chambers), in the chambers of older whorls invisible, in the flattening of the dorsal side and in the absence of a large apertural lip. It resembles *Planorotalia* (?) *praecompressa* MJATLIUK, 1970 in size of the test, number of whorls, pattern of adding of whorls and chambers in whorls, as well as in the general shape of the test. It differs from that species in having hispid test surface, flat dorsal side and more numerous chambers in the final whorl (5 to 7 but usually 6 in *Hedbergella telatynensis*; 5, to usually 6 in *Planorotalia* (?) *praecompressa* MJATLIUK).

Distribution. — Poland — Campanian-Maastrichtian.

Genus *Whiteinella* PESSAGNO, 1967
Whiteinella baltica DOUGLAS et RANKIN, 1969
(pl. 13: 8, 9, 10)

1969. *Whiteinella baltica* DOUGLAS et RANKIN: 197, fig. 9A—I.
1979. *Whiteinella baltica* DOUGLAS et RANKIN; ROBASZYNSKI and CARON: pl. 35: 1—5, pl. 36: 1—2.
1980. *Whiteinella baltica* DOUGLAS et RANKIN; PERYT: 70, pl. 23: 4—6 (with synonymy).
1980. *Whiteinella baltica* DOUGLAS et RANKIN; PETTERS: pl. 2: 11—14.
1981. *Whiteinella baltica* DOUGLAS et RANKIN; HART *et al.*: 222, pl. 7, 25: 13—15.

Material. — More than a hundred well preserved speciments.

Dimensions (in mm):

IG Nos.:	45987/88/F	45988/88/F	45989/88/F
diameter	0.264	0.216	0.168
height	0.144	0.096	0.096

Variability. — Variability is high and concerns size of a test, height of older whorls and rate of size increase of the chambers in the final whorl, as well as degree of inclination of the youngest chamber toward the ventral side of the test. Most specimens are low-trochospiral in the investigated material. In rare cases, the older whorls, are considerably higher than the final whorl. The specimens which have the youngest chamber inclined considerably toward the ventral side have also a narrow umbilicus.

Remarks. — The investigated specimens are entirely consistent with the holotype. This species resembles mostly *Hedbergella bornholmensis* DOUGLAS et RANKIN, 1969, differing from it in quadrangular test outline, 4 to 5 chambers in the final whorl and chambers gradually increasing in size in the final whorl.

Distribution. — Poland — Turonian-Maastrichtian. Denmark: Bornholm — Coniacian-lower Santonian. Czechoslovakia: Moravia — Coniacian-Santonian. England — Coniacian-Santonian. South-western part of the Baltic Sea and eastern Germany — Coniacian-Santonian. Eastern part of the Indian Ocean — Coniacian-Santonian. Nigeria — Coniacian.

Superfamily **Globotruncanacea** BROTZEN, 1942
Family **Globotruncanidae** BROTZEN, 1942
Subfamily **Globotruncaninae** BROTZEN, 1942
Genus *Gansserina* CARON, GONZALEZ DONOSO, ROBASZYNSKI et WONDERS, 1984
Gansserina gansseri (BOLLI, 1951)
(pl. 16: 4, 5, 6)

1951. *Globotruncana gansseri* BOLLI: 196, pl. 35: 1—3.
1951. *Globotruncana lugeoni* TILEV: 41, text-fig. 10—12, pl. 1: 5, 6, pl. 2: 1—12.
1977. *Globotruncana gansseri* BOLLI; MASTERS: 566, pl. 45: 1—3, fig. 116, p. 567.
1977. *Globotruncana gansseri* BOLLI; LINARES RODRIGUES: 307, pl. 38: 2—3.
1978. *Marginotruncana gansseri* (BOLLI) forma *monmouthensis* OLSSON; HOFKER: pl. 1: 18.
1980. *Globotruncana gansseri* BOLLI; WONDERS: 114, pl. 7: 1a—c.
1984. *Globotruncana gansseri* BOLLI; GAWOR-BIEDOWA and WITWICKA: 276, pl. 93: 1—3.
1984. *Gansserina gansseri* (BOLLI); ROBASZYNSKI *et al.*: 294, pl. 52: 1—5a, b, c, pl. 53: 1—3a, b, c 4a—d, 5a, b, c (with synonymy).
1986. *Globotruncana gansseri* BOLLI; BUTT: pl. 4: 1a—c.
1986. *Gansserina gansseri* (BOLLI); ALMOGI-LABIN *et al.*: 869, pl. 10: 14—17.
1987. *Globotruncana gansseri gansseri* BOLLI; EL-NAKHAL and EL-NAGGAR: 61, pl. 4: 4—6.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46013/88/F	46014/88/F	46015/88/F
diameter	0.458	0.384	0.360
height	0.240	0.190	0.240

Variability. — Variability is expressed in rapidity of chamber increase in height on a ventral side of the test, in a different degree of deflection of chambers on the ventral side, in relation to a keel separating the ventral and dorsal sides (from perpendicular to low angle), and in variously expressed ornamentation of chambers surface on the ventral side. The surface of the oldest chambers may be pustulose or smooth, while the surface of younger chambers is always smooth.

Remarks. — In the investigated material, there are specimens which are similar to *Globotruncana pettersi* (GANDOLFI, 1955) with a low peripheral angle, as well as such in which this angle approaches 90°, as for example in *Gansserina gansseri* (BOLLI, 1951). In the studied material chambers on the ventral side overlap each other slightly as in the holotype of *Globotruncana gansseri* BOLLI, 1951, pl. 35: 3. Sutures nearly radial, less depressed than in the holotype and topotypes illustrated by ROBASZYNSKI *et al.* (1984). The specimens under discussion most closely resemble the hypotype of *Gansserina gansseri* (BOLLI, 1951) from Tunisia (ROBASZYNSKI *et al.* 1984, pl. 53: 4a—d) and the specimens described by WONDERS (1980). They have, however, less pustulose, or even smooth surface of chambers on the ventral side.

Distribution. — Poland (Polish Lowlands), Spain, Czechoslovakia (Carpathians), USA — Maastrichtian. Austria — upper part of the middle Maastrichtian, upper Maastrichtian. Trinidad, Tunisia, Egypt, Turkey, Denmark — middle Maastrichtian. Pacific Ocean — upper Maastrichtian. Libya — Maastrichtian. Kuwait — middle Maastrichtian. Israel — middle and upper Maastrichtian.

Genus *Globotruncana* CUSHMAN, 1927
Globotruncana arca (CUSHMAN, 1926)
(pl. 13: 11, 12, 13)

1926. *Pulvinulina arca* CUSHMAN: 23, pl. 3: 1 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1977. *Globotruncana arca* (CUSHMAN); MASTERS: 536, pl. 38: 1, 2, 4.
1980. *Globotruncana arca* (CUSHMAN); PERYT: 71, pl. 16: 4a—c.
1984. *Globotruncana arca* (CUSHMAN); GAWOR-BIEDOWA and WITWICKA: 273, pl. 90: 3, 4, 5 (with synonymy).
1984. *Globotruncana arca* (CUSHMAN); ROBASZYNSKI *et al.*: 182, pl. 1: 2a, b, 3, pl. 4: 1a, b, c, 2—3a, b, c (with synonymy).
1986. *Globotruncana arca* (CUSHMAN); BUTT: pl. 5: 1a—b.
1986. *Globotruncana arca* (CUSHMAN); ALMOGI-LABIN *et al.*: 860, pl. 4: 11—14, pl. 11: 13—15.
1987. *Globotruncana arca* (CUSHMAN); EL-NAKHAL and EL-NAGGAR: 46, pl. 1: 10—12.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	45990/88/F	45991/88/F	45992/88/F
longest diameter	0.480	0.504	0.384
shortest diameter	0.432	0.408	0.336
height	0.384	0.240	0.216

Variability. — It is high and concerns a degree of test convexity (equally convex on both sides or with a more convex dorsal side), chamber convexity in initial whorls (strongly convex, spherical or reduced to a pustulose swelling in the central part of a chamber), and in number of chambers in the final whorl (from 5 to 8, usually 7).

Remarks. — MASTERS (1977), considers the specimens described by WITWICKA (1958) under the name *Globotruncana arca* (CUSHMAN) as erroneously assigned. After reexamination of the WITWICKA's specimens, I am sure that they represent *Globotruncana arca* (CUSHMAN). The illustration of the dorsal side of these specimens (WITWICKA 1958, pl. 18: 35a) does not demonstrate the important character of *G. arca*, the flattening of the chambers surface in the final whorl, which is obvious in the specimens. The specimens described as *Globotruncana arca* (CUSHMAN) by MC GUGAN (1982, 408, pl. 11: 4a—6b, 8a—b, *non* pl. 3: 4a—c, pl. 5: 3a—b) represent in fact *Globotruncana rugosa* (MARIE). For comparison with *Globotruncana rugosa* (MARIE) see below.

Distribution. — Cosmopolitan species. Poland: Polish Lowlands and Carpathians — upper Santonian-Maastrichtian. Kuwait — Campanian-middle Maastrichtian. Both hemispheres: most commonly Campanian-Maastrichtian.

Globotruncana falsostuarti SIGAL, 1952
(pl. 14: 1, 2, 3)

1952. *Globotruncana falsostuarti* SIGAL: 43, text-fig. 46.
1971. *Globotruncana falsostuarti* SIGAL; POSTUMA: 36, 37 (figures).
1972. *Globotruncana falsostuarti* SIGAL; BARR: 20, pl. 5: 5a—c.
1983. *Globotruncana falsostuarti* SIGAL; HAGN and HERM: 619, pl. 1: 10—12.
1984. *Globotruncana falsostuarti* SIGAL; ROBASZYNSKI *et al.*: 194, pl. 10: 1a, b, c, 2—3a, b, c.
1986. *Globotruncana falsostuarti* SIGAL; ALMOGI-LABIN et al.: 862, pl. 5: 8—12.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	45993/88/F	45994/88/F	45995/88/F
diameter	0.408	0.360	0.336
height	0.192	0.216	0.194

Variability. — Variability is low and concerns a number of chambers in the final whorl (7 to 8), a symmetry of a test (equally biconvex or slightly more convex on a dorsal or ventral side), a degree of chamber convexity in the two initial whorls (entirely flat or slightly convex) and the width of a keel band (very narrow and tilted towards the ventral side or a little wider and less tilted towards this side). The specimens with a narrow keel band, have the ventral keel less developed than the dorsal one.

Remarks. — The investigated specimens differ from the holotype only in the absence of keels approaching each other in midd-length of each chamber of the final whorl. All other features i.e. number of whorls, number of chambers in the final whorl, chambers shape in the final whorl on both test sides, width of umbilicus, umbilical system consisting of large tegilla type of sutures and test ornamentation are the same as in the holotype. Characters which differ *Globotruncana falsostuarti* from other species of this genus are given by ROBASZYNSKI *et al.* (1984: 188, 190 and 194) when discussing *Globotruncana dupeublei* CARON, GONZALEZ DONOSO, ROBASZYNSKI et WONDERS and *Globotruncana falsostuarti* SIGAL. A general shape of the test and the absence of keels approaching to each other in the middle of the chamber length in the final whorl make these specimens similar to *Globotruncana orientalis* NAGGAR, 1966, from which they differ in a number of chambers (7 to 8 in contrast to 5 to 7, rarely 8) in the final whorl.

Distribution. — Poland — uppermost Campanian-lower Maastrichtian. Algeria, Tunisia, Libya, Spain, France (Aquitanian Basin), Bavarian Alps, Northern and Southern Alps — lower and upper Maastrichtian. Israel — Maastrichtian.

Globotruncana obliqua HERM, 1965
(pl. 14: 10, pl. 15: 1, 2, 3)

1965. *Globotruncana linneiana* (d'ORBIGNY) *obliqua* HERM: 336, pl. 8: 1—4, fig. 14.
1967. *Globotruncana hilli* PESSAGNO: 343, pl. 64: 9—14, 21—23, pl. 94: 1, pl. 97: 7.
1977. *Globotruncana obliqua* HERM; MASTERS: 595, pl. 49: 4—6 (with synonymy).
1980. *Abathomphalus ? hilli* (PESSAGNO); PERYT: 88, pl. 23: 10, 11, 12.
1980. *Globotruncana obliqua* HERM; PERYT: 77, pl. 19: 7, 8, 9 (with synonymy).
1982. *Globotruncana obliqua* (HERM); ION: 135, pl. 53: 6a—d.
1983. *Globotruncana obliqua* HERM; HAGN and HERM: pl. 1: 5.
1984. *Globotruncana linneiana obliqua* HERM; ROBASZYNSKI *et al.*: pl. 14: 5a—c.
1984. *Globotruncana hilli* PESSAGNO; ROBASZYNSKI *et al.*: pl. 14: 3a, b, c.
1985. *Globotruncana obliqua* HERM; CEPEK *et al.*: pl. 2: 1, 2.
1986. *Globotruncana hilli* PESSAGNO; ALMOGI-LABIN *et al.*: 862, pl. 5: 13—15.

Material. — More than three hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	45996/88/F	45997/88/F	45998/88/F
diameter	0.480	0.450	0.384
height	0.216	0.192	0.169

Variability. — Variability concerns degree of convexity of a dorsal side of the test (slightly convex or concave in a central part, with chambers of the final whorl protruding above the central part), arrangement of chambers in the final whorl (more or less oblique in relation to the spiral suture) and chamber convexity on the dorsal side of the test.

Remarks. — Some specimens of this species resemble the representatives of the genus *Abathomphalus* BOLLI, LOEBLICH et TAPPAN in general shape. That was why the specimens of *G. obliqua* HERM, described for the first time by WITWICKA (1958) from Poland, has been assigned to *G. mayoroensis* BOLLI. PERYT (1980) assigned part of the specimens of *G. obliqua* with a well preserved umbilical system, to *Abathomphalus? hilli* (PESSAGNO). The topotype of *G. hilli* PESSAGNO (ROBASZYNSKI *et al.* 1984, pl. 14: 3a—c) is, in my opinion, a junior synonym of the species under discussion instead of being a synonim of *G. linneiana* (d'ORBIGNY), as suggested by ROBASZYNSKI *et al.* (1984). It differs from the latter species in a strongly oblique orientation of keels in relation to the whorl, in having a wide keel band tilted even towards the dorsal side of the test, in concave central part of the dorsal side of the test and in different convexity of chambers on both sides of the test.

Distribution. — Poland — Santonian-lower Campanian?, Campanian, Maastrichtian. Spain — upper Campanian. Austria — lower Maastrichtian. France — Campanian. Romania: Eastern Carpathians — lower Santonian-lower part of the upper Maastrichtian. USA, Mexico — upper Campanian-lower Maastrichtian. Tunisia — upper Campanian-lower Maastrichtian. Libya — lower Maastrichtian. Atlantic Ocean — upper Campanian, lower Maastrichtian. Israel — upper Campanian.

Globotruncana rugosa (MARIE, 1941)

(pl. 15: 4, 5a, b)

1941. *Rosalinella rugosa* MARIE: 240, pl. 36: 340a—c.
1964. *Globotruncana churchi* MARTIN: 79, pl. 9: 5a—c.
1980. *Globotruncana churchi* MARTIN; PERYT: 73, pl. 16: 3a-c.
1982. *Globotruncana arca* (CUSHMAN); MC GUGAN: 408, pl. 11: 4A—6B, 8A—B (*non* pl. 3: 4A—C, pl. 5: 3).
1984. *Globotruncana rugosa* (MARIE); ROBASZYNSKI *et al.*: 212, pl. 19: 1—2a, b, c, d, 3—4a, b, c, 5a, b, c.
1986. *Globotruncana rugosa* (MARIE); ALMOGI-LABIN *et al.*: 864, pl. 6: 14—16.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	45999/88/F	46000/88/F	46001/88/F
longest diameter	0.432	0.384	0.384
shortest diameter	0.360	0.384	0.336
height	0.336	0.216	0.192

Variability. — It concerns number of chambers in the final whorl (5 to 8), shape of chambers in the final whorl (trapezoidal to petaloidal), convexity of the dorsal side of the test and ornamentation of both chamber surface and sutures, by numerous pustules and spines on the both test sides. Degree of chambers convexity on the dorsal side is also the subject to variation. A chamber surface is either more or less convex in all whorls, or convex only in the initial whorls and flat in the final whorl.

Remarks. — In the investigated material there are specimens identical with the holotype of *Globotruncana rugosa* (MARIE) and at the same time with the holotype of *G. churchi* MARTIN, which is a junior synonym of the studied species. Specimens having the number of chambers in the final whorl smaller than the holotype, such as those illustrated by ROBASZYNSKI *et al.* (1984, pl. 19: 1, 2a, b, c, d) from the Campanian deposits of England are more common, however. Tegilla merging with one another in the umbilical area, and proximal and distal accessory apertures, have been preserved in some specimens. This species closely resembles

Golobotruncana arca (CUSHMAN) from which it differs in convex chamber surface, presence of pustules on chambers and sutures, especially those of the older whorls, and in better developed keels.

Distribution. — Poland — Campanian-Maastrichtian. Europe — Campanian. Israel — upper Campanian. North America — Santonian-Maastrichtian. South America — Campanian.

Genus *Rosita* CARON, GONZALEZ DONOSO, ROBASZYNSKI et WONDERS, 1984

Rosita contusa (CUSHMAN, 1926)

(pl. 14: 7, 8, 9)

1926. *Pulvinulina arca* var. *contusa* CUSHMAN: 23 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1971. *Globotruncana contusa* (CUSHMAN): CITA and GARTNER: pl. 2: 1, 2.
1977. *Globotruncana contusa* (CUSHMAN); MASTERS: 545, pl. 40: 1—4.
1982. *Globotruncana contusa* (CUSHMAN); MC GUGAN: 410, pl. 6: 4A—6C.
1984. *Globotruncana contusa* (CUSHMAN); GAWOR-BIEDOWA and WITWICKA: 274, pl. 91: 1—3, pl. 128: 6.
1984. *Rosita contusa* (CUSHMAN); ROBASZYNSKI *et al.*: 246, pl. 35: 5, 6, 9, pl. 36: 1, 2, pl. 37 (with synonymy).
1986. *Rosita contusa* (CUSHMAN); ALMOGI-LABIN *et al.*: 867, pl. 9: 6—11, pl. 11: 34—37.

Material. — Twenty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46002/88/F	46003/88/F
longest diameter	0.432	0.384
shortest diameter	0.432	0.360
height	0.336	0.264

Variability. — It is expressed in various degree of convexity of a test and in shape and convexity of chambers on the dorsal side of the test. Chambers globular in the initial whorls, and semilunar or polygonal with undulated or slightly convex surface in the final whorl.

Remarks. — The investigated material comprises intermediate forms between *Rosita fornicata* (PLUMMER) and *R. contusa* (CUSHMAN). There are various opinions concerning a definition of this species by various authors. ROBASZYNSKI *et al.* (1984: 248) have given the differences between *R. contusa* (CUSHMAN) from one side and *R. plicata* (WHITE), *R. patelliformis* (GANDOLFI) and *Rosita walfischensis* (TODD) from the other. MASTERS (1977) and many other authors consider these species as synonyms of *R. contusa* (CUSHMAN). The specimens of *R. contusa* (CUSHMAN) from the Polish Lowlands differ from those of the Tethyan area in having less convex test and less undulated chamber surface. They still display many characters of *R. fornicata* (PLUMMER) for which *R. contusa* CUSHMAN is probably an ancestral species.

Distribution. — Poland: Polish Lowlands — upper Campanian-Maastrichtian; Carpathians — Maastrichtian. Israel — middle and upper Maastrichtian. Both hemispheres: Maastrichtian. As far as Miners Bay, Mayne Island in the Pacific area — Maastrichtian deposits.

Rosita fornicata (PLUMMER, 1931)

(pl. 14: 4, 5, 6)

1931. *Globotruncana fornicata* PLUMMER: 198, pl. 13: 4—6.
1977. *Globotruncana fornicata* PLUMMER; MASTERS: 564, pl. 44: 4—6.
1980. *Globotruncana fornicata* PLUMMER; PERYT: 73, pl. 18: 5, 6, 7 (with synonymy).
1982. *Globotruncana fornicata* PLUMMER; ION: 134, pl. 53: 1—4a, b.
1984. *Globotruncana fornicata* PLUMMER; GAWOR-BIEDOWA and WITWICKA: 275, pl. 92, 5—7.
1984. *Rosita fornicata* (PLUMMER); ROBASZYNSKI *et al.*: 250, pl. 35: 1—4, pl. 38: 1—4 (with synonymy).
1986. *Globotruncana fornicata* PLUMMER; BUTT: pl. 6: 1a—c.
1986. *Rosita fornicata* (PLUMMER); ALMOGI-LABIN: 868, pl. 9: 12—17, pl. 11: 38—40.
1987. *Globotruncana fornicata fornicata* PLUMMER; EL-NAKHAL and EL-NAGGAR: 57, pl. 3: 6—8.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46004/88/F	46005/88/F	46006/88/F
longest diameter	0.552	0.480	0.336
shortest diameter	0.480	0.384	0.312
height	0.312	0.240	0.168

Variability. — This is a highly variable species. Variability concerns test convexity, shape of chambers and their convexity on the dorsal side of the final whorl. They may be either elongated, semilunar with surface flat, undulating or slightly convex, or petaloidal, with surface flat to slightly convex similar to *Globotruncana arca* (CUSHMAN). The ornamentation of test surface, sutures, and keels is also subject to variability.

Remarks. — The topotypes and hypotypes illustrated by ROBASZYNSKI *et al.* (1984) display the variability of this species. The investigated material consists of all types of the test illustrated by these authors.

Distribution. — Cosmopolitan species. Poland: Polish Lowlands — upper Santonian-Maastrichtian; Carpathians — upper Coniacian-lower Maastrichtian. Both hemispheres: Coniacian-Maastrichtian, usually Santonian-Maastrichtian.

Rosita plummerae (GANDOLFI, 1955)

(pl. 15: 6, 7, 8)

1955. *Globotruncana (Globotruncana) fornicata* PLUMMER subsp. *plummerae* GANDOLFI: 42, pl. 2: 3a—c, 4a—c.
1980. *Globotruncana plummerae* GANDOLFI; PERYT: 78, pl. 17: 1, 2, 3.
1982. *Globotruncana plummerae* (GANDOLFI); ION: 134, pl. 53: 8a—c.
1984. *Rosita plummerae* (GANDOLFI); ROBASZYNSKI *et al.*: 256, pl. 41: 1—6 (with synonymy).
1986. *Globotruncana plummerae* GANDOLFI; BUTT: pl. 6: 2a—c.
1986. *Rosita plummerae* GANDOLFI; ALMOGI-LABIN et *al.*: 868, pl. 9: 1—2.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46007/88/F	46008/88/F	46009/88/F
longest diameter	0.432	0.384	0.360
shortest diameter	0.360	0.360	0.312
height	0.192	0.216	0.192

Variability. — It concerns convexity of chambers in the final whorl and step of development of sutural beaded ridges between chambers of the final whorl on the dorsal side of the test. Chamber surface may be evenly and weakly convex or inflated, pustulose, cresscent-like.

Remarks. — Differences between this species and *Rosita fornicata* (PLUMMER) are given by ROBASZYNSKI *et al.* (1984: 302). MASTERS (1977) suggested that the specimens described by GANDOLFI as *Globotruncana (Globotruncana) fornicata* PLUMMER subsp. *plummerae* are the immature specimens of *Globotruncana fornicata* PLUMMER. The number of whorls in the test despite its small size, indicates that they are mature specimens.

Distribution. — Poland — Campanian-Maastrichtian. Austria — Santonian-lower Maastrichtian. Romania: Eastern Carpathians — lower Senonian-lower Maastrichtian. Israel — upper part of the lower Maastrichtian-middle Maastrichtian. USA, Mexico — Campanian-Maastrichtian. Columbia — Campanian. Libya — upper Campanian.

Subfamily **Globotruncanellinae** Maslakova, 1964
Genus *Globotruncanella* Reiss, 1957
Globotruncanella havanensis (Voorwijk, 1937)
(pl. 14: 11, pl. 15: 11, 12)

1937. *Globotruncana havanensis* Voorwijk: 195, pl. 1: 25, 26, 29 (*fide* Ellis and Messina, Cat. of Foram.).
1977. *Globotruncana havanensis* Voorwijk: Masters: 569, pl. 45: 4—6.
1980. *Globotruncanella petaloides* (Gandolfi); Peryt: 89, pl. 23: 1, 2, 3.
1984. *Globotruncanella havanensis* (Voorwijk); Gawor-Biedowa and Witwicka: 278, pl. 95: 7, 8, pl. 96: 9, pl. 128: 4a—c (*non* 3a, b).
1984. *Globotruncanella havanensis* Voorwijk; Robaszynski *et al.*: 265, pl. 44: 4, 5, 6a, b, c.
1986. *Globotruncanella havanensis* (Voorwijk); Almogi-Labin *et al.*: 869, pl. 10: 1—3.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46016/88/F	46017/88/F	46018/88/F
longest diameter	0.312	0.288	0.264
shortest diameter	0.288	0.216	0.216
height	0.120	0.120	0.096

Variability. — It is expressed in various convexity of the dorsal side of the test and in degree of peripheric lobation. The periphery is more lobate in more flattened specimens.

Remarks. — The description agrees with that of Robaszynski *et al.* (1984). The specimens described as *Globotruncana petaloides* (Gandolfi) by Peryt (1980) are built of 5 chambers in the final whorl (see Peryt 1980, pl. 23: 1, 3) which precludes their assignement to this species.

Distribution. — Poland: Polish Lowlands — upper Campanian-Maastrichtian; Carpathians — Campanian-Maastrichtian. Both hemispheres — uppermost part of Campanian, Maastrichtian.

Globotruncanella minuta Caron et Gonzalez Donoso, 1984
(pl. 16: 7, 8)

1984. *Globotruncanella minuta* Caron et Gonzalez Donoso; *in* Robaszynski *et al.*: 266, pl. 43: 5—8, a, b, c.

Material. — Fifteen variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46427/88/F	46428/88/F	46429/88/F
longest diameter	0.210	0.192	0.168
shortest diameter	0.192	0.168	0.144
height	0.120	0.096	0.072

Variability. — It is expressed mostly in number of chambers in the final whorl (from $4^1/_2$ to 5) and in convexity of the dorsal side of the test (flat to slightly convex), in the development of septal sutures between chambers of the final whorl on the dorsal side (radial poorly depressed or slightly curved and pustulose). In the latter type of sutures there are two rows of pustules on a chamber periphery in the final whorl.

Remarks. — The specimens from Poland differ from the holotype in having poorly convex dorsal side of the test, in less pustulose test surface, and in some cases also in having pustulose septal sutures on the dorsal side, as well as in the presence in such specimens of two rows of pustules on the chambers periphery in the final whorl. Size, shape and ventral side of the test are identical with those of the holotype.

Distribution. — Poland — uppermost Campanian-lower Maastrichtian (Lublin Chalk). USA: Texas — Middle Maastrichtian. North-West Pacific Ocean — upper Maastrichtian.

Globotruncanella pschadae (KELLER, 1946)
(pl. 14: 12, pl. 15: 9, 10)

1946. *Globorotalia pschadae* KELLER: 52, pl. 3: 13a—c (*fide* ELLIS and MESSINA, Cat. of Foram.).
1953. *Globorotalia pschadae* KELLER; SUBBOTINA: 204, pl. 16: 1a, b, w—6a, b, w.
1984. *Globotruncanella pschadae* (KELLER); ROBASZYNSKI *et al.*: 269, pl. 44: 7a, b, c.
1986. *Globotruncana havanensis* VOORWIJK; BUTT: pl. 5: 2a—b.
1986. *Globotruncanella pschadae* (KELLER); ALMOGI-LABIN *et al.*: 870, pl. 10: 11—13.

Material. — Ten variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46019/88/F	46020/88/F	46021/88/F
longest diameter	0.696	0.360	0.264
shortest diameter	0.336	0.312	0.192
height	0.192	0.144	0.096

Variability. — Variability is high and concerns size of a test (see measurements), number of chambers in the final whorl (5 to 6), convexity of the dorsal side of the test and keel development on the test periphery. This keel may be developed as a narrow, unperforated thickenning bordering chambers of the final whorl and extending on the septal sutures, or as a row of numerous small pustules on the chamber periphery and along the septal sutures. In some specimens there are fine pustules on the spiral suture.

Remarks. — The studied species has been regarded as a synonym of *Globotruncana havanesis* VOORWIJK. It differs from that species in having angular test periphery equipped with a narrow, smooth keel, or the keel built of small pustules. In the investigated material there are also specimens consisting of 6 chambers in the final whorl (fact noted for the first time), which makes the difference with *Globotruncanella havanensis* (VOORWIJK).

Distribution. — Poland — upper Campanian-Maastrichtian. Europe — middle and upper Maastrichtian. Libya — Maastrichtian. Israel — upper Maastrichtian.

Subfamily **Abathomphalinae** PESSAGNO, 1967
Genus *Abathomphalus* BOLLI, LOEBLICH et TAPPAN, 1957
Abathomphalus intermedius (BOLLI, 1951)
(pl. 16: 9, 10a, b, 11)

1951. *Globotruncana intermedia* BOLLI: 197, pl. 35: 7—9.
1984. *Abathomphalus intermedius* (BOLLI); ROBASZYNSKI *et al.*: 272, pl. 46: 1, 2, 3, 4 (a, b, c).
1985. *Abathomphalus intermedius* (BOLLI); CARON: 42, pl. 21: 7—9.

Material. — Over fifty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46022/88/F	46023/88/F	46024/88/F
longest diameter	0.480	0.456	0.408
shortest diameter	0.408	0.432	0.360
height	0.240	0.264	0.216

Description. — Test low trochospiral, equally biconvex or with more convex dorsal side, with lobate outline and with two keels built of nodes on the test periphery. The ventral keel less developed than the dorsal one. Chamber outline trapezoidal on both test sides. Chamber surface convex on the dorsal side with pustules in older whorls. In the final whorl there are 4—6 chambers which are less convex than those in the older whorls. Sutures between chambers poorly depressed and curved. Chamber surface on the ventral side poorly convex and considerably more pustulose than the dorsal one. Sutures strongly depressed, radial. Umbilicus corresponds to about 1/3 of the test diameter. Umbilical system consists of portici coalescing

in the center of umbilicus. Proximal accesory apertures visible. Primary aperture extraumbilical to umbilical.

Variability. — It is expressed in either more or less convex dorsal test side, in number of chambers in the final whorl (4 to 5) and in the development of the test ornamentation.

Remarks. — The studied specimens mostly resemble the specimens considered by ROBASZYNSKI *et al.* (1984, pl. 46: 3a, b, c) as intermediate between *Abathomphalus intermedius* and *A. mayaroensis*, in a convex dorsal side of the test, in a chamber shape and a convexity of chamber surface. However, the ornamentation of the investigated specimens does not follow meridional pattern on the ventral side of the test, as it does in both *A. intermedius* and *A. mayaroensis*. The studied specimens differ from *Abathomphalus mayaroensis* (BOLLI) in having more convex test, and in the absence of flattening of chamber surfaces in the final whorl near the spiral suture. In general shape of the dorsal side the specimen illustrated on pl. 16: 10 resembles the specimen of *Abathomphalus mayaroensis* illustrated by ROBASZYNSKI *et al.* (1984, pl. 46: 5a).

Distribution. — Poland — upper part of the lower Campanian, middle and Upper Maastrichtian.

Family **Rugoglobigerinidae** SUBBOTINA, 1959

Genus *Archaeoglobigerina* PESSAGNO, 1967

Archaeoglobigerina cretacea (d'ORBIGNY, 1840)

(pl. 16: 1, 2, 3)

1840. *Globigerina cretacea* d'ORBIGNY: 34, pl. 3: 12—14.
1977. *Globotruncana cretacea* (d'ORBIGNY); MASTERS: 551, pl. 41: 3, 4, pl. 42: 1.
1980. *Archaeoglobigerina cretacea* (d'ORBIGNY); PERYT: 82, pl. 21: 5, 6, 7.
1980. *Archaeoglobigerina cretacea* (d'ORBIGNY); GAWOR-BIEDOWA: 39, pl. 7: 4, 5, 6 (with synonymy).
1981. *Archaeoglobigerina cretacea* (d'ORBIONY); HART *et al.*: 180, pl. 7, 4: 4, 5.
1984. *Archaeoglobigerina cretacea* (d'ORBIGNY); GAWOR-BIEDOWA and WITWICKA: 277, pl. 92: 1—3 (with synonymy).
1984. *Archaeoglobigerina cretacea* (d'ORBIGNY); ROBASZYNSKI *et al.*: 278, pl. 47: 3—6a, b, c, pl. 48: 2, text-fig. 12b (with synonymy).

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46010/88/F	46011/88/F	46012/88/F
longest diameter	0.450	0.408	0.288
shortest diameter	0.360	0.312	0.240
height	0.264	0.216	0.144

Variability. — It concerns size (see measurements) and degree of development of keels which are built of fine spines. The keel may be present only on chambers in older whorls or also on chambers in the final whorl, with the exception of the ultimate chamber.

Remarks. — This species mostly resembles *Marginotruncana marginata* (REUSS) in the final phase of its phylogenetic development in having well marked keels on chambers of older whorls. It differs in having more convex chambers and in the absence of well developed keels on chambers of the final whorl as well as in having primary aperture umbilical.

Distribution. — Poland: Polish Lowlands, Carpathians — upper Turonian-Maastrichtian; Sudetes — Turonian-Santonian. Cosmopolitan species. Europe, Asia, Africa, South and North America — mostly Santonian-Maastrichtian, rarely Turonian-Maastrichtian.

Genus *Rugoglobigerina* BRÖNNIMANN, 1952

Rugoglobigerina hexacamerata BRÖNNIMANN, 1952

(pl. 17: 10, 11, 12)

1952. *Rugoglobigerina reicheli hexacamerata* BRÖNNIMANN: 23, pl. 2: 10—12, text-fig. 8.
1952. *Rugoglobigerina rugosa pennyi* BRÖNNIMANN: 34, pl. 4: 1—3, text-fig. 14.
1977. *Rugoglobigerina hexacamerata* BRÖNNIMANN; MASTERS: 618, pl. 56: 2, 3 (with synonymy).

1980. *Rugoglobigerina hexacamerata* BRÖNNIMANN; PERYT: 84, pl. 22: 6, 7.
1980. *Rugoglobigerina pennyi* BRÖNNIMANN; PERYT: 86, pl. 22: 10, 11, pl. 12: 6.
1981. *Rugoglobigerina pennyi* BRÖNNIMANN; PERYT: pl. 4: 1, 2, 3.
1984. *Rugoglobigerina pennyi* BRÖNNIMANN; ROBASZYNSKI *et al.*: 285, pl. 50, 1a, b, c.
1984. *Rugoglobigerina hexacamerata* BRÖNNIMANN; ROBASZYNSKI *et al.*: 282, pl. 49: 8a, b, c.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46025/88/F	46026/88/F	46027/88/F
longest diameter	0.432	0.408	0.336
shortest diameter	0.384	0.360	0.240
height	0.240	0.240	0.168

Variability. — Variability is small and concerns test convexity (nearly equally convex on both sides or with slightly more convex dorsal side) and degree of test ornamentation.

Remarks. — I agree with MASTER's (1977) opinion that *Rugoglobigerina rugosa pennyi* BRÖNNIMANN is a junior synonym of the discussed species. Specimens assigned to the both species are low trochospiral, display from 5 to 7 chambers in the final whorl, with chambers of the final whorl increasing in size gradually and only slightly as added. MASTERS (1977) investigated the holotypes of the both species and concluded that the difference between them consists in more convex chambers of the final whorl in *Rugoglobigerina rugosa pennyi* BRÖNNIMANN. The last author regards, however, that this difference has ecologic rather than genetic basis. ROBASZYNSKI *et al.* (1984) attributed the specimens displaying slightly more convex spiral side to *Rugoglobigerina pennyi* BRÖNNIMANN. In the present author's opinion, the latter specimens are within the range of intraspecific variability of the investigated species. In the studied material there are poorly biconvex specimens and such being either more or less convex on the dorsal side; the latter can not be attributed to a separate species.

Distribution. — Poland — Maastrichtian. Europe, Asia, Africa, North and South America — Maastrichtian.

Rugoglobigerina milamensis SMITH et PESSAGNO, 1973

(pl. 17: 13, 14, 15)

1973. *Rugoglobigerina milamensis* SMITH et PESSAGNO: 56, pl. 24: 4—7.
1980. *Rugoglobigerina milamensis* SMITH et PESSAGNO; PERYT: 86, pl. 22: 1, 5, 9.
1984. *Rugoglobigerina milamensis* SMITH et PESSAGNO; GAWOR-BIEDOWA and WITWICKA: 278, pl. 95: 4—6 (with synonymy).
1984. *Rugoglobigerina milamensis* SMITH et PESSAGNO: ROBASZYNSKI *et al.*: 284, pl. 50: 3a, b, c (holotype).

Material. — Over a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46028/88/F	46029/88/F	46030/88/F
longest diameter	0.450	0.432	0.384
shortest diameter	0.432	0.408	0.384
height	0.312	0.312	0.288

Variability. — Variability is low and concerns a degree of convexity of the dorsal side of the test. In spite of the variability, this side of the test is always strongly convex which follows from the fact that the size of the chambers increases rapidly in the older whorls, and that they are situated high above the chambers of the final whorl. Variability is also expressed in number of chambers in the final whorl (4—6 but usually 5) and degree and pattern of ornamentation of the chamber surface. In some specimens, the chamber surface of older whorls is covered with weakly developed costellae arranged in meridional pattern and the chambers of the final whorl may be smooth or covered with thick rugosities. Weakly developed costellae arranged in the meridional pattern cover the surface of all chambers in other specimens.

Remarks. — The Polish specimens differ from the holotype only in much weaker developed costellae. This species has the most convex test in all known species of the genus *Rugoglobigerina* BRÖNNIMANN 1952.

Distribution. — Poland, USA, Mexico, Africa, Denmark — Maastrichtian. Bulgaria — upper Campanian-Maastrichtian.

Rugoglobigerina rugosa (PLUMMER, 1926)
(pl. 17: 8, 9)

1926. *Globigerina rugosa* PLUMMER: 38, pl. 2: 10a—d (*fide* ELLIS and MESSINA, Cat. of Foram.).
1980. *Rugoglobigerina rugosa* (PLUMMER); PERYT: 87, pl. 22: 2, 3, 4, 8 (with synonymy).
1981. *Rugoglobigerina rugosa* (PLUMMER); HART *et al.*: 218, pl. 7, 23: 7—9.
1984. *Rugoglobigerina rugosa* (PLUMMER); GAWOR-BIEDOWA and WITWICKA: 278, pl. 95: 1—3 (with synonymy).
1984. *Rugoglobigerina rugosa* (PLUMMER); ROBASZYNSKI *et al.*: 288, pl. 49: 4a, b, c, 6a, b, c (with synonymy).

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46423/88/F	46424/88/F	46425/88/F
longest diameter	0.532	0.360	0.240
shortest diameter	0.384	0.302	0.240
height	0.288	0.192	0.144

Variability. — Variability is high and concerns size (see measurements), number of chambers in the final whorl (4 to 5), diameter of umbilical depression (1/3 to 1/2 of the test diameter), degree of convexity of a dorsal side (poorly convex or flat) and the test sculpture. In the investigated material, the specimens with 4 chambers and some specimens with 5 chambers in the final whorl are subrectangular in outline and in most cases the ultimate chamber is inclined toward the ventral side.

Remarks. — The studied specimens differ from the hypotype from the Lower Navarro from Texas (ROBASZYNSKI *et al.* 1984, pl. 49: 4a, b, c) in less rapid chamber increase in size in the final whorl, and in degree of ornamentation test surface.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian; Carpathians — Campanian with the exception of the lowermost part, Maastrichtian. Spain, Bulgaria, Czechoslovakia (Moravia) — Maastrichtian. USA, Mexico — Campanian, Maastrichtian. India — upper Campanian-Maastrichtian. New Guinea — Maastrichtian. Trinidad, South Africa — upper Maastrichtian. Jordania — Maastrichtian.

Suborder **Rotaliina** DELAGE et HEROUARD, 1896
Superfamily **Bolivinacea** GLAESSNER, 1937
Family **Bolivinidae** GLAESSNER, 1937
Genus *Bolivina* d'ORBIGNY, 1839
Bolivina aleksandrae sp. n.
(pl. 18: 1a, b, c, 2, 3, 4a, b)

Holotype: Specimen IG 46420/88/F, specimens in pl. 18: 4a, b.
Paratypes: Specimens IG Nos. 46421, 46422, 46423/88/F, specimens in pl. 18, 1a, b, c, 2, 3.
Type horizon: Upper Maastrichtian.
Type locality: Borehole Gorzków IG-1, depth 10.80 m.
Derivation of the name: from the name of ALEKSANDRA KRASSOWSKA, a student of the Lublin Chalk, with whom the present author cooperates.

Diagnosis. — Test nearly of the same width along the whole lenght or widest in the mid-length, narrowly oval in transverse section. Periphery with short spine on each chamber termi-

nation. There are one or two flat nodes on each chamber near the median suture. Aperture slit-like located on rather long neck curved toward the test periphery.

Material. — About twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46420/88/F	46424/88/F	46425/88/F
length	0.268	0.384	0.288
width	0.120	0.144	0.144
thickness	0.048	0.072	0.072

Description. — Test elongated, of nearly equal width along the whole length or kite-like and widest in the mid-length. Transverse section narrowly oval. Test consist of 4 to 6 pairs of narrow chambers oriented under the angle of about 35° in relation to the length axis of the test. Chamber surfaces very weakly convex and covered with fine and densely packed pores. Septal sutures weakly depressed usually not visible near the test axis. Median suture not marked or poorly visible. Small, nearly invisible nodes occur on the chamber surfaces near the test axis, one or two on each chamber. Chambers covered with numerous pustules in a proximal part. Each chamber margin equipped with one small and pointed spine on each chamber termination. Aperture slit like, on rather long curved neck.

Variability. — It concerns the test shape (see description), degree of convexity of nodes on the chamber surface near the test axis, and degree of visibility of septal sutures, as well as rugosity in the initial part of the test.

Remarks. — This species mostly resembles *Bolivina decurrens* (EHRENBERG) in having spinoses on chamber. It differs mainly in the presence of nodes on the chamber surface near the test axis terminations in rugosity of the initial part of the test, in shape of the test, in invisible median suture and septal sutures near the test axis, in aperture situated on a rather long, curved neck. It also differs in transverse section.

Distribution. — Poland: borehole Gorzków IG-1 uppermost part of the upper Maastrichtian (Lublin Chalk).

Bolivina crassa VASSILENKO et MJATLIUK, 1947

(pl. 17: 1a, b)

1947. *Bolivina incrassata* REUSS var. *crassa* VASSILENKO et MJATLIUK: 203, pl. 2: 3, 4a, b, 5a, b.
1949. *Bolivina incrassata gigantea* WICHER: 57, pl. 5: 2, 3 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1972. *Bolivina incrassata crassa* VASSILENKO et MJATLIUK; HANZLIKOVÁ: 80, pl. 19: 4 (with synonymy).
1977. *Bolivina incrassata gigantea* WICHER; KOCH: 54, pl. 14: 1, 2.
1979. *Grammostomum incrassatum crassum* VASSILENKO; KAPTARENKO-TSHERNOUSOVA *et al.*: 142, pl. 55: 4.
1984. *Bolivina gigantea* WICHER; LISZKOWA and MORGIEL: 243, pl. 126: 7.
1986. *Bolivina incrassata gigantea* WICHER; BUTT: pl. 1: 1.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46031/88/F	46032/88/F	46033/88/F
length	A. Form. 1.200	0.960	B. Form. 0.840
width	0.576	0.384	0.432
thickness	0.336	0.240	0.288

Variability. — Variability is low and mainly expressed in either more or less convex chamber surface near the median suture. A few specimens, especially of microspheric generation B, bear medium sized nodes. Variability is also expressed in degree of visibility of test perforation. If well expressed, these perforations are situated on small nodes visible under magnification 2000 (pl. 17: 1b) and organized in clear rows, which gives a striated aspect to the chamber surface. Specimens at different ontogenetic stages of development occur in the investigated material.

Remarks. — I agree with the opinion of HANZLIKOVÁ (1972) who considers *Bolivina incrassata gigantea* WICHER, 1949 as a junior synonym of *B. incrassata crassa* VASSILENKO et MJATLIUK, 1947. KOCH (1977) assigned the typical representives of *B. incrassata crassa* VASSILENKO et MJATLIUK to *B. incrassata gigantea* WICHER. The specimens assigned by KOCH (1977) to *B. incrassata crassa* VASSILENKO et MJATLIUK (p. 54, pl. 14: 3, 4) most probably represent *B. funalis* WOLOSCHYNA, 1964. The investigated specimens are entirely consistent with the description of the holotype. In my opinion, however, *B. crassa* VASSILENKO et MJATLIUK is a separate species, which differs from the species *B. incrassata* REUSS in larger size (see measurements), thicker wall, in having convex chambers near the median suture and pores situated on wart-like nodes. In *B. incrassata* REUSS the pores are not situated on the nodes but directly on the smooth test surface (pl. 19: 1b).

Distribution. — Poland: Polish Lowlands and Carpathians — upper Maastrichtian. Czechoslovakia — Maastrichtian. Germany — upper part of the lower Maastrichtian-lowermost upper Maastrichtian. Austria — Maastrichtian. USSR — upper Maastrichtian. Libya — Maastrichtian. Most probably also in the North America, but it must be studied.

Bolivina decurrens (EHRENBERG, 1854)

(pl. 17: 3, 4)

1854. *Grammostomum ? decurrens Ehrenberg*; 22, pl. 30: 17 (*fide* ELLIS et MESSINA, Cat. of Foram.).
1899. *Bolivina decurrens* (EHRENBERG); EGGER: 46, pl. 16: 17, 18.
1937*c*. *Bolivina decurrens* (EHRENBERG); CUSHMAN: 39, pl. 5: 29, 30 (with synonymy).
1946. *Bolivina decurrens* (EHRENBERG); CUSHMAN: 127, pl. 53: 12, 13.
1957. *Bolivina decurrens* (EHRENBERG); HOFKER: 232, text-fig. 287, a, b, 288, c, d, e, 292, d.
1958. *Bolivina decurrens* (EHRENBERG); BIEDA: 47, text-fig. 16 (with synonymy).
1961. *Bolivina decurrens* (EHRENBERG); AKIMEZ: 181, pl. 19: 7a, b.
1962. *Bolivina decurrens* (EHRENBERG); HILTERMANN and KOCH: 313, pl. 51: 18, 19
1963. *Bolivina decurrens* (EHRENBERG); KAPTARENKO-TSHERNOUSOVA: 112, pl. 27: 6.
1964. *Bolivina decurrens* (ENRENBERG); BARANOVSKAJA and BULINNIKOVA (*in* SUBBOTINA): 297, pl. 64: 13a, b—16a, b, 17—19.
1966. *Bolivina decurrens* (EHRENBERG); HOFKER: 39, pl. 5: 40, p. 59, pl. 10: 76, 102, p. 73, pl. 12: 26.
1968. *Bolivina decurrens* (EHRENBERG); SLITER: 87, pl. 12: 16.
?1972. *Bolivina decurrens* (EHRENBERG); BERTELS: 338, pl. 2: 1a, b, 2a, b, c, 3, 4a, b.
1972. *Bolivina decurrens* (EHRENBERG); HANZLIKOVÁ: 79, pl. 19: 3.
1974. *Bolivina decurrens* (EHRENBERG); GORBENKO: 54, pl. 9: 7a, b.
1977. *Bolivina decurrens* (EHRENBERG); KOCH: 59, pl. 14: 7, 8.
1979. *Grammostomum decurrens* (EHRENBERG); KAPTARENKO-TSHERNOUSOVA *et al.*: 142, pl. 54: 5.
1981. *Bolivina decurrens* (EHRENBERG); HART *et al.*: 180, pl. 7, 4: 6, 7.
1984. *Bolivina decurrens* (EHRENBERG); GAWOR-BIEDOWA and WITWICKA: 243, pl. 77: 6.
non 1988. *Bolivina decurrens* (EHRENBERG); KELLER: pl. 3: 9, 10.

Material. — Thirty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46034/88/F	46035/88/F	46036/88/F
length	0.552	0.504	0.432
width	0.216	0.168	0.168
thickness	0.120	0.096	0.072

Variability. — Variability is very high and concerns mainly the test shape and flattening, and indentation of its periphery. Test outline lanceolate or nearly kit-like, chambers elongated into very fine spines. Sometimes chambers tightly spaced and spines poorly visible. Micro- and megalospheric specimens display similar range of variability. In the investigated material proloculus is 0.048 mm in diameter in microspheric specimens, and 0.072 mm in diameter in macrospheric specimens. In the macrospheric specimens the initial chamber may be covered with thin spines.

Remarks. — The investigated species differs from *Bolivina incrassata* Reuss in smaller size, more flattened test, in well visible sutures, and in having delicate spines on terminations of chambers.

Distribution. — Poland: Polish Lowlands — uppermost upper Campanian-Maastrichtian; Carpathian — upper Senonian. Europe, North America — upper Campanian, Maastrichtian.

Bolivina incrassata Reuss, 1851
(pl. 19: 1a, b, 2a, b, 3a, b)

1851. *Bolivina incrassata* Reuss: 45, pl. 4: 13.
1937*c*. *Bolivina incrassata* Reuss; Cushman: 38, pl. 5: 19—28 (with synonymy).
1946. *Bolivina incrassata* Reuss; Cushman: 127, pl. 53: 8—11.
1947. *Bolivina incrassata* Reuss; Vassilenko and Mjatliuk: 202, pl. 2: 1a, b, 2a, b.
1958. *Bolivina incrassata* Reuss; Bieda: 45, text-fig. 15.
1959. *Bolivina incrassata* Reuss; Maslakova: 116, pl. 15: 11, 12.
1961. *Bolivina incrassata* Reuss; Akimez: 180, pl. 19: 4a, b, 5a, b, 6.
1962. *Bolivina incrassata* Reuss; Hiltermann and Koch: 312, pl. 51: 14—15.
1963. *Bolivina incrassata* Reuss; Kaptarenko-Tshernousova: 11, pl. 27: 7a, b.
1964. *Bolivina incrassata* Reuss; Baranovskaja and Bulimnikova: 300, pl. 65: 1a, b, w, 2a, b, w, 3a, b, w, 4—7.
1964. *Bolivina incrassata* Reuss; Martin: 90, pl. 11: 14a, b.
1966. *Bolivina incrassata* Reuss; Hofker: 39, pl. 5: 42, p. 59, pl. 10: 90, 91.
1967. *Grammostomum incrassatum incrassatum* (Reuss); Plotnikova: 86, pl. 14: 3a, b.
1968. *Bolivina incrassata* Reuss; Sliter: 88, pl. 12: 14.
1968. *Bolivina incrassata* Reuss; Barr: pl. 1: 3.
1969. *Bolivina incrassata* Reuss; Scheibnerova: 48, pl. 2: 5a, b, c.
1972. *Bolivina incrassata* Reuss; Bertels: 339, pl. 2: 5 (with synonymy).
1972. *Bolivina incrassata* Reuss; Hanzlíková: 80, pl. 19: 5, 6.
1974. *Bolivina incrassata* Reuss; Gorbenko: 54, pl. 9: 6a, b.
1976. *Bolivina incrassata gigantea* Wicher: Ascoli: pl. 5: 9.
1977. *Bolivina incrassata incrassata* Reuss; Koch: 54, pl. 14: 5, 6.
1979. *Grammostomum incrassatum* (Reuss); Kaptarenko-Tshernousova *et al.*: 142, pl. 54: 15a, b.
1981. *Bolivina incrassata* Reuss; Hart *et al.*: 180, pl. 7, 4: 8, 9.
1982. *Bolivina incrassata* Reuss; Mc Gugan: 406, pl. 2: 9—11, pl. 5: 1—2, 5.
1984. *Bolivina incrassata* Reuss; Gawor-Biedowa and Witwicka: 244, pl. 77: 7.
1985. *Bolivina incrassata* Reuss; Robaszynski *et al.*: pl. 5: 7.

Material. — Forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46037/88/F	46038/88/F	46039/88/F
length	0.960	0.792	0.744
width	0.288	0.240	0.264
thickness	0.192	0.144	0.168

Variability. — Three generations have been recognized in the investigated upper Campanian material. The specimens of the A_2 generation are short and wide along the whole test length, and have the diameter of the initial chamber (0.120 mm) larger than that in the A_1 generation. They consist usually of 7 chamber pairs. The specimens of A_1 generation have longer and more narrow test, gradually increasing in width, and consisting of 10 chamber pairs. A diameter of the initial chamber equals to only 0.072 mm. The specimens of microspheric generation B have the test narrow and pointed in the proximal part, gradually and considerably expanding with growth, consisting usually of 13 pairs of chambers. The diameter of the initial chamber is 0.024 mm. The following characters are the subject to variation in the specimens of all three generations: degree of expansion of the test with growth, the number of chambers and degree of expression of septal sutures and median suture. Usually a slight convexity of chambers near the test axis is marked in the specimens of microspheric generation B (see pl. 19: 1a). Unfortunately, no septal or median sutures are visible on the SEM pictures.

Remarks. — Most probably the holotype of this species represents the microspheric generation B. The Polish specimens of *B. incrassata* REUSS are of almost the same size as those illustrated by KOCH (1977, pl. 14: 5, 6). The similarity with *B. gigantea* WICHER suggested by KOCH's (1977, pl. 14: 1, 2) photographs is only apparent and due to a difference in magnifications.

Distribution. — Cosmopolitan species. It occurs both in the boreal and Mediterranean provinces. It is known from the uppermost Campanian and from the Maastrichtian deposits in Europe, North America, South America and Africa. Poland: Polish Lowlands and Carpathians — uppermost Campanian, Maastrichtian.

Bolivina praecrenulata sp. n.
(pl. 17: 6)

Holotype: Specimen IG Nos. 46426/88/F, in pl. 17: 6.
Paratype: Specimen IG Nos.: 46427/88/F.
Type horizon: Upper Maastrichtian.
Type locality: Borehole Gorzków IG-1, depth 10: 80 m.
Derivation of the name: From the Latin prae-before and the species name *crenulata* CUSHMAN.

Diagnosis. — Test very small, elongated, with a narrow-oval transverse section, over 1.5 times longer than wide. Test surface covered with very fine and densely spaced pores. Chambers very low, elongated and lobated. Septal sutures depressed, wavy with one or two lobes.

Material. — Five variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratype
IG Nos.:	46426/88/F	46427/88/F
length	0.216	0.192
width	0.120	0.096
thickness	0.048	0.048

Description. — Test small, biserial, over 1.5 times longer than wide, with narrow oval transverse section and lobate periphery. Test consists of 6—7 low, elongated and lobated chambers displaying finely and densely perforated, slightly convex surface. Sutures deeply depressed, wavy with one or two lobes, forming an angle about 80° with the test axis. Aperture slit-like extends from the top of the final chamber to its base and is equipped with a narrow lip.

Variability. — It is expressed in a slight torsion of the test along its vertical axis, in more or less narrow oval transverse section and in different degree of depression and waywing of sutures.

Remarks. — This species resembles *B. crenulata* CUSHMAN, 1936. It differs from the latter species in being smaller (half its size) and gradually increasing in size as chambers are added. It also differs in the absence of a furrow along the test axis and in lower chambers. According to the present author, the species of the genus *Bolivina* with wavy sutures forming lobes appear in the uppermost Maastrichtian, reaching their acme in the Eocene deposits.

Distribution. — Poland — Maastrichtian (Lublin Chalk).

Bolivina witwickae sp. n.
(pl. 18: 5, 6, 7a, b)

Holotype: Specimen IG No. 46417/88/F in pl. 18: 7a, b.
Paratypes: IG Nos. 46418/88/F, 46419/88F, in pl. 18: 5, 6.
Type horizon: Campanian.
Type locality: Orzechów IG-6 borehole, depth of 216.00 m.
Derivation of the name: From the name of the late EMILIA WITWICKA, micropaleontologist and the student of the Lublin Chalk.

Diagnosis. — Test small, slightly elongated or oval, poorly bilaterally flattened, oval in transverse section and covered with very fine ornamentation composed of a network and large pore outlets.

Material. — More then forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46417/88/F	46418/88/F	46419/88/F
length	0.144	0.156	0.168
width	0.096	0.096	0.096
thickness	0.072	0.072	0.072

Description. — Test small, oval, poorly bilaterally flattened with oval transverse section. Test outline smooth, not lobated, surface rough, covered with a very fine ornamentation composed of a network and numerous large pores. Chambers nearly invisible, poorly convex. In rare specimens with a weaker ornamentation 5 pairs of chambers are visible. Apertural surface of the last chamber smooth and poorly convex. Oval aperture runs from the top of the ultimate chamber to its base.

Variability. — It is small and expressed in test shape and in degree of development of test ornamentation. In most specimens the youngest chamber is smooth as a whole. In others, only the apertural surface of the youngest chamber is smooth and the remaining part is ornamented. Less common are the entirely ornamentated tests.

Remarks. — The studied specimens resemble mostly the specimen illustrated by WENGER (1987, pl. 8: 7, 8) as *Bolivina hebes* MACFADYEN from the uppermost Egerian of the Bavarian Alps, in type of ornamentation, test shape (elongated specimens), invisibility of sutures and nearly invisible chambers. They differ, however, from WENGER's specimens in being two times smaller, in having aperture reaching the chamber base and in absence of ornamentation on the surface of the youngest chamber in most cases. They also have different stratigraphic range.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). In the borehole Orzechów IG 6 — upper Maastrichtian; in the borehole Telatyn IG 1 — Campanian; in the borehole Michów IG 2 — lower Maastrichtian.

Genus *Tappanina* MONTANARO GALLITELLI, 1955

Tappanina selmensis (CUSHMAN, 1933)

(pl. 17: 5, pl. 19: 4a, b)

1933. *Bolivina selmensis* CUSHMAN: 58, pl. 7: 3, 4.
1968. *Tappanina selmensis* (CUSHMAN); SLITER: 89.
1974. *Tappanina selmensis* (CUSHMAN); SZCZECHURA and POŻARYSKA: 50, pl. 3: 4—6 (with synonymy).
1977. *Tappanina selmensis* (CUSHMAN); KOCH: 64, pl. 17: 8, 9 (with synonymy).

Material. — Sixty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46040/88/F	46041/88/F	46042/88/F
length	0.240	0.192	0.144
width	0.120	0.120	0.096
thickness	0.072	0.096	0.048

Variability. — Some specimens have equal width along the whole length, others are wider in the distal part. Variability also concerns the presence or absence of a narrow, high costae on sutures in the proximal part of the broader faces of the test, as well as the height of carina forming chamber termination on narrower faces of the test.

Remarks. — The study specimens differ from the holotype, as well as from the specimens described from the Paleocene of Poland (POŻARYSKA 1965, SZCZECHURA and POŻARYSKA 1974) in being slightly twisted axially. The investigated specimens differ from *Tappanina eouvigerini-*

formis (KELLER) in more slender test shape, in the concave broader faces of the test more numerous chambers (8 to 10 pairs contrary to 5 pairs in *T. eouvigeriniformis*) and in the torsion of the test, as well as in different pattern of ridges on sutures.

Distribution. — Poland: Polish Lowlands, Carpathians — Maastrichtian-Paleocene. Europe, North and South America, Asia, Australia — Upper Cretaceous-Paleocene.

Tappanina tuberosa SLITER, 1968
(pl. 19: 5, 6)

1968. *Tappanina tuberosa* SLITER: 89, pl. 13: 3.

Material. — Ten well preserved specimens.

IG Nos.:	46043/88/F	46044/88/F	46045/88/F
length	0.240	0.216	0.192
width	0.120	0.094	0.120
thickness	0.096	0.072	0.072

Description. — Test small, elongated, nearly of equal width along the whole length, and consisting of 7 to 8 pairs of chambers. Test outline slightly lobate with rounded periphery. Broader faces of the test slightly flattened, transverse section nearly rectangular. Chambers rhomboidal in outline with slightly convex surface. Septal sutures nearly perpendicular to the vertical test axis, poorly depressed, similarly as zig-zag like median suture. Chambers slightly deviating from each other on narrower faces of the test, with elevated and nodose terminal parts. Aperture slit-like, running from the top to the base of the ultimate chamber.

Variability. — It is small and expressed in chamber convexity, and rate of chamber increase in size. The rate may be slow, or much more rapid in a distal part than in the proximal one. Variability concerns also deviation of chambers from each other on narrower faces of the test, resulting in either more or less incised test outline.

Remarks. — The studied specimens differ from the holotype in slightly oblique septal sutures, less depressed median suture and in absence of small spines on broader faces of the test. This species differs from *Tappanina selmensis* (CUSHMAN) in less flattened broader faces of the test, more convex chambers without a carina on protruding parts of chambers on narrover faces of the test, and in absence of costae on sutures on the broader faces of the test.

Distribution. — Poland — Maastrichtian (Lublin Chalk). USA: California — upper Campanian-Maastrichtian.

Family **Bolivinoididae** LOEBLICH et TAPPAN, 1984
Genus *Bolivinoides* CUSHMAN, 1927
Bolivinoides clavatus PLOTNIKOVA, 1967
(pl. 19: 10, 11a, b)

1967. *Bolivinoides clavatus* LIPNIK nom. msc., PLOTNIKOVA: 96, pl. 15: 6a, b.
1979. *Bolivinoides clavatus* LIPNIK; KAPTARENKO-TSHERNOUSOVA *et al.*: 145, pl. 55: 2a, b.

Material. — Twelve variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46046/88/F	46047/88/F	46048/88/F
length	0.288	0.240	0.192
width	0.168	0.144	0.120
thickness	0.096	0.072	0.072

Description. — Test small, narrow, wedge-like, flattened, slowly expanding with growth. Test periphery narrow, rounded, lobate below the two youngest chambers. Transverse section

narrowly elliptical. Test surface rough, covered with densely spaced pores. Chambers and septal sutures, invisible with the exception of the last two youngest chambers. They appear only in immersion. A narrow, furrow-like depression is marked between two rows of thin rugged ridges or nodes situated along the test axis. The rows of ridges and nodes are also situated on the test edges except of an apertural edge. Aperture an elongate narrow opening, extending from the top of the ultimate chamber to the suture.

Variability. — It is expressed in test shape (narrow wedge-like or oval), in the test thickness (usually flat with narrowly elliptical transverse section, or sometimes slightly convex). Ornamentation near the test periphery is weakly developed in the specimens which display well developed ornamentation near the test axis.

Remarks. — The investigated species mostly resembles *Bolivinoides paleocenicus* (BROTZEN), from which it differs in a narrow wedge-like or oval test outline, rounded test periphery, invisible chambers and sutures, small size (see measurements) and different ornamentation.

Distribution. — Poland — upper Campanian-Maastrichtian. USSR — upper Campanian-Maastrichtian.

Bolivinoides decoratus (JONES, 1886)

(pl. 20: 4)

1886. *Bolivina decorata* JONES; *in* WRIGHT: 330, pl. 27: 7, 8 (*fide* ELLIS et MESSINA, Cat. of Foram.).
1941. *Bolivinoides decorata* (JONES); MARIE: 188, pl. 29: 279.
1950. *Bolivinoides decorata decorata* (JONES); HILTERMANN and KOCH: 606—610, text-fig. 2—4. no. 14—25, 27—31, 35—38, 42—45, text-fig. 5, no. 36, 71.
1954. *Bolivinoides decorata decorata* (JONES); HAGN: 74, pl. 6: 22.
1954. *Bolivinoides decorata decorata* (JONES); REISS: 155, pl. 28: 5—8, 13.
1958. *Bolivinoides decorata decorata* (JONES); BIEDA: 32, text-fig. 6a, b, c.
1959. *Bolivinoides decoratus* (JONES); MASLAKOVA: 115, pl. 14: 4, 5.
1961. *Bolivinoides decoratus* (JONES); AKIMEZ: 188, pl. 18: 17a, b, 18.
1961. *Bolivinoides decoratus decorata* (JONES); VASSILENKO: 188, pl. 39, fig. 8a, b, w, 9a, b, 10a, b.
1962. *Bolivinoides decoratus decorata* (JONES); HILTERMAAN and KOCH: 315, pl. 46: 7, tabel 19.
1963. *Bolivinoides decorata decorata* (JONES); van HINTE: 105, pl. 14: 1.
1963. *Bolivinoides decoratus* (JONES); KAPTARENKO-TSHERNOUSOVA *et al.*: 111, pl. 25: 4.
1963. *Bolivinoides decoratus* (JONES); HILTERMANN: pl. 3: 15.
1967. *Bolivinoides decoratus decorata* (JONES); PLOTNIKOVA: 89, pl. 14: 5, 6.
1966. *Bolivinoides decorata* (JONES); BARR: 231, pl. 34: 2—6, 12, pl. 35: 6—9, pl. 36: 1—5 (with synonymy).
1966. *Bolivinoides decorata* (JONES); HOFKER: 27, pl. 3: 50.
1970. *Bolivinoides* cf. *B. decoratus* (JONES); BARR: 647, pl. 100: 1—3.
1972. *Bolivinoides decoratus* (JONES); HANZLIKOVÁ: 80, pl. 19: 7—9.
1974. *Bolivinoides decoratus* (JONES); GORBENKO: 52, pl. 9: 1a, b.
1977. *Bolivinoides decoratus decoratus* (JONES); KOCH: 51, pl. 12: 5, 6.
1979. *Bolivinoides decoratus* (JONES); KAPTARENKO-TSHERNOUSOVA *et al.*: 145, pl. 55: 12.
1981. *Bolivinoides decoratus* (JONES); HART *et al.*: 180, pl. 7, 4: 12.
1984. *Bolivinoides decoratus* (JONES); GAWOR-BIEDOWA and WITWICKA: 244, pl. 78: 1.
1985. *Bolivinoides decorata* (JONES): ROBASZYNSKI *et al.*: pl. 6: 1, 2.
1986. *Bolivinoides decoratus decoratus* (JONES): JORDAN and GASSE: 15, pl. 5: 1—3.

Material. — Forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46049/88/F	46050/88/F	46051/88/F
length	0.600	0.552	0.384
width	0.192	0.192	0.144
thickness	0.072	0.096	0.048

Variability. — Variability is high and concerns test outline (wide rhomboidal to narrowly pear-shaped) and ornamentation of the test. The lobes covering the chamber surface may be separated or connected in longitudinal rows on sutures between chambers. In the distal test

part these lobes are inclined under an angle of 35° to 45° in relation to the vertical test axis, while extending nearly parallel to this axis in the proximal part. Ornamentation is lacking from chamber surface along 1/4, 1/3 or even 1/2 of the test length in a proximal part of the test. The number of finger-like outgrowths on a surface of the youngest chambers is also the subject to variation (from 3 to 5). The test is wide oval, more or less elongated in transverse section.

Remarks. — In the investigated material there are specimens identical with the lectotype of *Bolivina decorata* JONES designated by BARR (1966, pl. 36: 1). The species *B. decorata* was informally erected by JONES (1886) in his unpublished paper. WRIGHT (1886: 330, pl. 27: 7, 8) (*fide* ELLIS et MESSINA, Cat. of Foram.) was the first to publish a description and illustration of this species on the basis of his collection housed in Museum of the Zoology Department, The Queen's University, Belfast, North Ireland. BARR (1966) studied the materials of the Wright's collection and recognized them as those originally described as *B. decorata* JONES. Nine specimens of different state of preservation have been considered as syntypes of *B. decorata* and one of them the most similar to that illustrated by WRIGHT (1886) as a lectotype of this species (BARR 1966, pl. 36: 1). The studied specimens are also nearly identical and display the same range of variability as those from the Western Germany (KOCH 1977, 51, pl. 12: 5, 6).

Distribution. — Poland: Polish Lowlands, Carpathians — Campanian-Maastrichtian. Cosmopolitan species known from the Boreal and Mediterranean provinces. Occurs in Europe, North America, Asia and Africa in Campanian and Maastrichtian.

Bolivinoides dentatus sp. n.
(pl. 18: 8, 9)

Holotype: Specimen IG No. 46052/88/F in pl. 18: 8.
Paratypes: IG Nos. 46053/88/F, 46054/88/F in pl. 18: 9.
Type horizon: Lower Maastrichtian.
Type locality: Borehole Telatyn IG-1, depth of 195.0 m.
Derivation of the name: Lat. dentatus - supplied with teeth.

Diagnosis. — Test rhomboidal, narrowly elliptical in transverse section, margins narrow, sharp spinose, one spine per chamber termination.

Material. — Ten variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46052/88/F	46053/88/F	46054/88/F
length	0.384	0.264	0.240
width	0.264	0.168	0.168
thickness	0.072	0.048	0.072

Description. — Test rhomboidal in outline, narrowly elliptical in transverse section, strongly narrowed toward the periphery, consisting of 5 to 6 (the holotype) pairs of chambers, which are narrow and long oriented at 45 degree in relation to the vertical test axis. Chambers are terminated with narrow sharp spines (one per chamber). Septal sutures depressed and straight, diagonally oriented similarly as chambers. Two elongated lobes grow from the basal margin of each chamber in a proximal part of the test, and three lobes in a distal one and they are perpendicular to the suture. Initial chamber spherical and smooth, aperture loop-shaped, situated at the top of the ultimate chamber.

Variability. — Variability is high and concerns the size of the test (see measurements), lobes development and degree of spine development on chambers termination (in some specimens two or three pairs of the oldest chambers have the spines poorly developed). The lobes can be very narrow and touch or not the neighbouring chambers. If they do, they resemble *Bolivinoides sidestradensis* BARR.

Remarks. — This species mostly resembles *B. peterssoni* BROTZEN in the test shape. It differs from the latter species in compressed test, indentation of the test periphery and in ornamentation of the test surface. In strongly indented test periphery it resembles *B. paleocenicus* (BROTZEN) from which it differs in the absence of raised network of intersecting narrow ridges on the test surface.

Distribution. — Poland — lower Maastrichtian and lowermost part of the upper Maastrichtian (Lublin Chalk).

Bolivinoides draco (MARSSON, 1878)
(pl. 20: 8)

1878. *Bolivina draco* MARSSON: 157, pl. 3: 25a, b.
1926. *Bolivina rhomboidea* CUSHMAN: 19, pl. 2: 3a, b (*fide* ELLIS and MESSINA, Cat. of Foram.).
1954. *Bolivinoides draco draco* (MARSSON); POŻARYSKA: 253, text-fig. 3.
1954. *Bolivinoides decorata gigantea* HILTERMANN et KOCH; POŻARYSKA: 255, text-fig. 6.
1964. *Bolivinoides draco* (MARSSON); BARANOVSKAJA and BULINNIKOVA: 294, pl. 64: 9a, b, w (with synonymy).
1970. *Bolivinoides draco* (MARSSON); BARR: 646, pl. 99: 2, 3 (with synonymy).
1972. *Bolivinoides draco* (MARSSON); HANZLIKOVÁ: 81, pl. 9: 10, 11.
1974. *Bolivinoides draco* (MARSSON); VAPTZAROVA: 47, pl. 4: 23, 24, 25 (with synonymy).
1977. *Bolivinoides draco draco* (MARSSON); KOCH: 57, pl. 12: 2, 3.
1979. *Bolivinoides draco* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 145, pl. 55: 11a, b.
1981. *Bolivinoides draco* (MARSSON); HART *et al.*: 180, pl. 7, 4: 13.
1984. *Bolivinoides draco* (MARSSON); GAWOR-BIEDOWA and WITWICKA: 245, pl. 78: 7.
1985. *Bolivinoides draco* (MARSSON); ROBASZYNSKI *et al.*: pl. 5: 4.
1986. *Bolivinoides draco* (MARSSON); BUTT: pl. 1: 2.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46055/88/F	46056/88/F	46057/88/F
length	0.576	0.408	0.360
width	0.384	0.336	0.264
thickness	0.240	0.168	0.168

Variability. — Variability is high and expressed in the test size (widely rhomboidal in specimens which are equally high as wide or narrow rhomboidal, nearly oval), in subacute to acute, often carinate test periphery below two youngest chambers. The most variable is the test ornamentation composed of strongly developed lobes merged into the longitudinal costae that may bifurcate and either fuse or not with a central furrow to form two longitudinal costae.

Remarks. — The species under discussion descends from *Bolivinoides miliaris* HILTERMANN et KOCH. It differs from its ancestor in the absence of nodes in the proximal part of the test and in the absence of discontinous costae in a distal one. In *B. draco* (MARSSON) nodes and costae merge with one another along the axis of the test to produce two continuous ribs extending along the central furrow. BECKMANN et KOCH (1964), as well as BARR (1970) regarded that *B. dorreeni* FINLAY is a junior synonym of the discussed species. The same authors expressed the opinion that the specimens of *B. draco* (MARSSON) displaying network ornamentation have been included into the species *B. dorreeni* FINLAY. It seems, however, that *B. dorreeni* FINLAY differs from *B. draco* (MARSSON) in more oval test outline and very distinct network ornamentation. HILTERMANN (1963: 206) supposes that *Bolivinoides dorreeni* FINLAY can represent a zoogeographic race of *Bolivinoides draco* (MARSSON).

Distribution. — Poland: Polish Lowlands, Carpathians — upper Maastrichtian. Cosmopolitan species occurring in the Maastrichtian deposits of Europe, Asia, Africa, North America and Australia.

Bolivinoides giganteus HILTERMANN et KOCH, 1950
(pl. 20: 7)

1950. *Bolivinoides decorata gigantea* HILTERMANN et KOCH: 610, text-fig. 2—4, no. 49—51, 55—57, 61—63, text-fig. 5, no. 50.
1954. *Bolivinoides decorata gigantea* HILTERMANN et KOCH; EDGELL: 72, pl. 13: 4, pl. 14: 4.
1954. *Bolivinoides decorata decorata* (JONES); POŻARYSKA: 254, text-fig. 5.
1957. *Bolivinoides gigantea* HILTERMANN et KOCH; HOFKER: 267, text-fig. 320.
1958. *Bolivinoides decorata decorata* (JONES); WITWICKA: 198, pl. 9: 9a, b.
1961. *Bolivinoides giganteus* HILTERMANN et KOCH; VASSILENKO: 192, pl. 40: 1a, b.
1962. *Bolivinoides decoratus giganteus* HILTERMANN et KOCH; HILTERMANN and KOCH: 315, pl. 46: 8.
1963. *Bolivinoides decoratus giganteus* HILTERMANN et KOCH; HILTERMANN: 221, pl. 4: 1—5.
1966. *Bolivinoides gigantea* HILTERMANN et KOCH; HOFKER: 92, pl. 16: 38, 40, p. 120, pl. 18: 13, pl. 19: 42.
1970. *Bolivinoides giganteus* HILTERMANN et KOCH; BARR: 647, pl. 99: 4, 5 (with synonymy).
1972. *Bolivinoides decoratus giganteus* HILTERMANN et KOCH; HANZLIKOVÁ: 81, pl. 19: 14.
1977. *Bolivinoides decoratus giganteus* HILTERMANN et KOCH; KOCH: 63, pl. 12: 1.
1984. *Bolivinoides giganteus* HILTERMANN et KOCH; GAWOR-BIEDOWA and WITWICKA: 246, pl. 78: 3.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46058/88/F	46059/88/F	46060/88/F
length	0.720	0.600	0.504
width	0.432	0.288	0.288
thickness	0.240	0.192	0.168

Variability. — It is expressed in lobes development covering the test surface. These lobes can be merged into the longitudinal costae and extend over the surface of several chambers or can be broken at the sutures. In some specimens, a proximal part of the test is covered with strong tubercles. In most specimens, the proximal part is covered with discontinuous costae. In a distal part of the test costae are merged.

Remarks. — The species under discussion appeared splitted from its ancestor species *Bolivinoides decoratus* (JONES) in the upper Maastrichtian. In the transitory zone of the lower and upper Maastrichtian intermediate forms are common.

Distribution. — Poland: Polish Lowlands — upper part of the upper Maastrichtian. Cosmopolitan species more common in the Boreal bioprovince than in the Mediterranean one. Noted in deposits of the Middle and upper Maastrichtian of Europe, Asia, Africa, and Australia.

Bolivinoides laevigatus MARIE, 1941
(pl. 17: 2)

1941. *Bolivinoides decorata* (JONES) *laevigata* MARIE: 189, pl. 29: 281a—c.
1954. *Bolivinoides decorata laevigata* MARIE; POŻARYSKA: 256, text-fig. 9.
1957. *Bolivinoides laevigata* MARIE; HOFKER: 252, text-fig. 304(c).
1958. *Bolivinoides decorata laevigata* MARIE; WITWICKA: 200, pl. 9: 13a, b.
1961. *Bolivinoides laevigatus* MARIE; VASSILENKO: 195, pl. 40: 2, 3a—w, 5a—2, 6a—g, 9.
1961. *Bolivinoides laevigatus levigata* MARIE; VASSILENKO: 197, pl. 40: 2, 3a—w.
1962. *Bolivinoides laevigatus* MARIE; HILTERMANN and KOCH: 316, pl. 51: 10.
1963. *Bolivinoides laevigatus* MARIE; HILTERMANN: 213, pl. 2: 6—10.
1966. *Bolivinoides laevigata* MARIE; HOFKER: 27.
1967. *Bolivinoides laevigatus laevigatus* MARIE; PLOTNIKOVA: 93, pl. 14: 7a, b, w, 8a, b, w, pl. 15: 1a.
1974. *Bolivinoides laevigatus* MARIE; VOLOSHINA: 21, pl. 2: 11.
1977. *Bolivinoides laevigatus* MARIE; KOCH: 52, pl. 13: 7.
1979. *Bolivinoides laevigatus* MARIE; KAPTARENKO-TSHERNOUSOVA *et al.*: 146, pl. 55: 19a, b.
1981. *Bolivinoides laevigatus* MARIE; HART *et al.*: 182, pl. 7, 5: 1, 2.
1984. *Bolivinoides laevigatus* MARIE; GAWOR-BIEDOWA and WITWICKA: 246, pl. 78: 5.

Material. — Twenty variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	46061/88/F	46062/88/F	46064/88/F
length	0.336	0.312	0.216
width	0.240	0.216	0.144
thickness	0.120	0.096	0.072

Variability. — Variability is high and expressed in a test outline, which may be rhomboidal wide or lanceolate and narrow in a distal part of the test. Translucent, vitreous, circular to slightly elongated nodes occur usually in two, rarely one, rows on sutures on both sides of growth axis of the test at the basal margins of the chambers. Three nodes may occur on sutures of the two youngest chambers. A degree of the lateral test compression in also the subject to variation.

Remarks. — Comparison with *B. petersoni* BROTZEN is presented in description of that species. The specimens of *B. laevigatus* MARIE having narrow lanceolate outline, are similar to *B. pustulatus* REISS. They differ in lacking granulation covering the test surface near the initial chamber, and in smooth test and nodes in the distal part of the test. Both species may be more easily recognized in light microscope than on SEM pictures, which was already noted by KOCH (1977: 52).

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian, France — upper Campanian (*Belemnitella mucronata* zone). England, Netherlands — upper Campanian-lower Maastrichtian Germany — Campanian-Maastrichtian. USSR — Santonian-Maastrichtian. USA — Campanian.

Bolivinoides mielnicensis BIEDA, 1958

(pl. 20: 2)

1958. *Bolivinoides mielnicensis* BIEDA: 35, 36, text-fig. 8a—c.
1984. *Bolivinoides mielnicensis* BIEDA; GAWOR-BIEDOWA and WITWICKA: 246, pl. 79: 5.

Material. — Over a hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46652/88/F	46652A/88/F	46652B/88/F
length	0.360	0.360	0.312
width	0.240	0.236	0.192
thickness	0.120	0.236	0.096

Variability. — It is expressed in size and degree of convexity of nodes on the test surface, and in degree of visibility of septal sutures (invisible or poorly visible).

Remarks. — This species recalls *Bolivinoides laevigatus* MARIE, while differing from it in a more ovoid test outline, almost invisible sutures and larger more convex slightly elongated nodes.

Distribution. — Poland: lower Campanian — lower part of the lower Maastrichtian.

Bolivinoides miliaris HILTERMANN et KOCH, 1950

(pl. 20: 6)

1950. *Bolivinoides draco* (MARSSON) *miliaris* HILTERMANN et KOCH: 604, text-fig. 2—4, no. 26, 32—34, 39—41, 46—48, text-fig. 5, no. 39a—c.
1954. *Bolivinoides decorata* (JONES) *australis* EDGELL: 71, p. 13: 5, 6, pl. 14: 5, 6.
1954. *Bolivinoides draco miliaris* HILTERMANN et KOCH; POŻARYSKA: 254, text-fig. 4.
1954. *Bolivinoides draco miliaris* HILTERMANN et KOCH; REISS: 155, pl. 28: 9—12, 14.
1957. *Bolivinoides miliaris* HILTERMANN et KOCH; HOFKER: 267, text-fig. 322.
1958. *Bolivinoides draco miliaris* HILTERMANN et KOCH; WITWICKA: 199, pl. 19: 11a, b.

1958. *Bolivinoides peterssoni* BROTZEN; WITWICKA: 200, pl. 9: 12a, b.
1958. *Bolivinoides draco miliaris* HILTERMANN et KOCH; BIEDA: 44, text-fig. 14a—c.
1958. *Bolivinoides decorata australis* EDGELL; BIEDA: 33—35, text-fig. 7a—c.
1961. *Bolivinoides miliaris* HILTERMANN et KOCH; VASSILENKO: 200, pl. 40: 4a, b, w, pl. 41: 1a, b, w.
1962. *Bolivinoides draco miliaris* HILTERMANN et KOCH; HILTERMANN and KOCH: 317, pl. 46: 9.
1963. *Bolivinoides draco miliaris* HILTERMANN et KOCH; HILTERMANN: 222, pl. 4: 20—23.
1963. *Bolivinoides miliaris* HILTERMANN et KOCH; HINTE: 106, pl. 13: 7—8.
1964. *Bolivinoides draco miliaris* HILTERMANN et KOCH; BECKMANN and KOCH: 44, pl. 6: 21—23.
1966. *Bolivinoides miliaris* HILTERMANN et KOCH; BARR: 234, pl. 35: 4, 5.
1967. *Bolivinoides miliaris* HILTERMANN et KOCH; van HINTE: 257, pl. 1: 1, 4.
1968. *Bolivinoides draco miliaris* HILTERMANN et KOCH; SLITER: 89, pl. 13: 1.
1970. *Bolivinoides miliaris* HILTERMANN et KOCH; BARR: 650, pl. 99: 1a, b.
1977. *Bolivinoides draco miliaris* HILTERMANN et KOCH; KOCH: 56, pl. 12: 4.
1979. *Bolivinoides draco* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 146, pl. 55: 11a, b.
1981. *Bolivinoides miliaris* HILTERMANN et KOCH; HART *et al.*: 182, pl. 7, 5: 3.
1984. *Bolivinoides miliaris* HILTERMANN et KOCH; GAWOR-BIEDOWA and WITWICKA: 247, pl. 79: 4.
1985. *Bolivinoides australis* EDGELL; ROBASZYNSKI *et al.*: pl. 6: 3—6.
1988. *Bolivinoides decoratus* (JONES); SALAJ: pl. 1: 15.

Material. — Forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46064/88/F	46065/88/F	46066/88/F
length	0.576	0.456	0.360
width	0.408	0.336	0.312
thickness	0.240	0.216	0.192

Variability. — It is high and expressed in the test shape and its ornamentation. The shape of the test usually rhomboidal, as high as wide, but sometimes oval, slightly higher than wide. The rate of test expansion in ontogeny is usually rapid and steady, but some specimens display much slower rate in a proximal part of the test than in the distal part. The chamber surface is pustulose in the proximal 1/3 to 1/2 of the test length. In the more distal part it bears elongate, narrow, more or less continuous costae. The test periphery, with the exception of apertural one, is narrow, acute, in some specimens rugged and indented.

Remarks. — The variability range is the same as those presented by HILTERMANN and KOCH (1954) for the material of this species from the north-west Germany. For the relationship of *B. miliaris* see remarks concerning *B. draco* (MARSSON) p. 101 *B. decorata australis* EDGELL from the upper Campanian deposits of the north-western Australia is a junior synonym of *B. miliaris*. EDGELL (1950: 74, text-fig. 5) consider *B. decorata australis* EDGELL as the ancestor of *B. draco* (MARSSON).

Distribution. — Poland: Polish Lowlands — upper Campanian-Maastrichtian. Europe, Asia — Campanian-Maastrichtian. North America, Africa — upper Campanian-Lower Maastrichtian. Australia — upper Campanian.

Bolivinoides paleocenicus (BROTZEN, 1948)

(pl. 20: 3)

1948. *Bolivina paleocenica* BROTZEN: 66, pl. 9: 5.
1954. *Bolivinoides paleocenica* (BROTZEN); REISS: 157, pl. 30: 9—11.
1957. *Bolivinoides senonicus* JEREMEEVA: 12, pl. 1: 8a, b.
1957. *Bolivinoides paleocenica* (BROTZEN); HOFKER: 253, text-fig. 305c, e.
1958. *Bolivinoides paleocenica* BROTZEN; BIEDA: 42, text-fig. 13a, b, c (with synonymy).
1961. *Bolivinoides senonicus* DAIN; DAIN: 30, pl. 2: 8, 9.
1963. *Bolivinoides paleocenicus* (BROTZEN); HILTERMANN: pl. 3: 3.
1964. *Bolivinoides senonicus* DAIN; BARANOVSKAJA and BULINNIKOVA,: 295, pl. 54: 10, 11, 12.
1966. *Bolivinoides minsheraensis* ANSARY et EMARA: 91, pl. 2: 2a, b (ELLIS and MESSINA, Cat. of Foram.).
1970. *Bolivinoides paleocenicus* (BROTZEN); BARR: 650, pl. 99: 7a, b.
1974. *Bolivinoides senonicus* (DAIN) JEREMEEVA; GORBENKO: 53, pl. 9: 3.

1974. *Bolivinoides paleocenicus* (BROTZEN); SZCZECHURA and POŻARYSKA: 49, pl. 4: 9 (with synonymy).
1977. *Bolivinoides paleocenicus* BROTZEN; KOCH: 60, pl. 13: 1—3.
1979. *Bolivinoides senonicus* DAIN; KAPTARENKO-TSHERNOUSOVA *et al.*: 147, pl. 55: 9a, b.
1981. *Bolivinoides paleocenicus* (BROTZEN); HART *et al.*: 182, pl. 7, 5: 4.
1984. *Bolivinoides paleocenicus* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 247, pl. 79: 1.
1986. *Bolivinoides paleocenicus* (BROTZEN); YASUDA: 81, pl. 11: 1a, b.

Material. — More than a hundred variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46067/88/F	46068/88/F	46069/88/F
length	0.360	0.288	0.216
width	0.240	0.240	0.144
thickness	0.096	0.072	0.072

Variability. — It is very high and expressed in the test outline (from narrow to widely rhomboidal), in its size, degree of a periphery lobation, as well as in a degree and pattern of ornamentation of lateral sides of the test. Test periphery my be weakly lobate, or the test is strongly incised at the sutures, and the chambers are slightly elongated in dens — like processes. Ornamentation developed as thin elongated ribs situated obliquely in relation to the chamber surface may occur in medial most convex part of the test, only in its proximal part, or, also in the distal one. It is absent on the surface of the two youngest chambers. One or two nodes occur in some specimens at the base of each of two or three youngest pairs of chambers. These nodes are small, round, flat and translucent. Variability is also expressed in slower or more rapid increase in size of the two youngest chambers and their deviation from previous chambers at the test edge.

Remarks. — The specimens of this species from the USSR have been described under the name *Bolivinoides senonicus* JEREMEEVA, 1957 or *B. senonicus* DAIN, 1961. DAIN (1961: 32) compared this species with *B. paleocenicus* BROTZEN. In her opinion, the species erected by her differs from the BROTZEN species in having cuneate instead of rhomboidal outline and in lacking the ornamentation on the surface of the two youngest chambers. In the investigated material occur together specimens displaying widely rhomboidal and narrow rhomboidal outline, the latter described by DAIN as cuneate. The specimens described by the Soviet authors as *B. senonicus* fit well within the variability range of *B. paleocenicus* (BROTZEN). Perhaps, the Soviet authors were influenced by the fact that *B. paleocenicus* was described by BROTZEN (1948) from the Paleocene. However, *B. paleocenicus* has been noted in the Maastrichtian deposits of Germany by HILTERMANN (1952), and by the present author (1958) in the Maastrichtian of Poland. In DAIN 1937 noted this species in the Maastrichtian, and referred it in her not published reports under the name *B. senonicus*. For the first time a description of this species was presented in the publication of JEREMEEVA (1957), who referred to a specimen from the DAIN's collection as the holotype designated by the latter author. DAIN (1961: 31) expressed the opinion that the description of *B. senonicus* by JEREMEEVA (1957) was erroneous and presented another diagnosis and description of this species, regarding himself as the author of the species. The Soviet students consider one of these persons, or both of them, as authors of the species.

Distribution. — Poland: Polish Lowlands, Carpathians — Maastrichtian-Lower Paleocene. Europe, Asia, Africa — Maastrichtian-Paleocene. Japan — Maastrichtian Heitarozawa Formation (upper part).

Bolivinoides peterssoni BROTZEN, 1945
(pl. 19: 9)

1945. *Bolivinoides peterssoni* BROTZEN: 49, pl. 1: 10.
1954. *Bolivinoides peterssoni* BROTZEN; POŻARYSKA: 256, text-fig. 8.
1954. *Bolivinoides peterssoni* BROTZEN; REISS: 157, pl. 30: 12—14.

1961. *Bolivinoides peterssoni* BROTZEN; VASSILENKO: 198, pl. 40: 8a, b, w.
1962. *Bolivinoides peterssoni* BROTZEN; HILTERMANN and KOCH: 317, pl. 50: 16.
1963. *Bolivinoides peterssoni* BROTZEN; HILTERMANN: 213, pl. 2: 1—3.
1966. *Bolivinoides peterssoni* BROTZEN; HOFKER: 40, pl. 5: 41.
1966. *Bolivinoides peterssoni* BROTZEN; BARR: 238, pl. 38: 6.
1967. *Bolivinoides peterssoni* BROTZEN; PLOTNIKOVA: 95, pl. 15: 5a, b.
1970. *Bolivinoides peterssoni* BROTZEN; BARR: 650, pl. 99: 6a, b (with synonymy).
1977. *Bolivinoides peterssoni* BROTZEN; KOCH: 59, pl. 13: 6.
1979. *Bolivinoides peterssoni* BROTZEN; KAPTARENKO-TSHERNOUSOVA *et al.*: 146, pl. 55: 16a, b.
1981. *Bolivinoides peterssoni* BROTZEN; HART *et al.*: 182, pl. 7, 5: 5.
1984. *Bolivinoides peterssoni* BROTZEN; GAWOR-BIEDOWA and WITWICKA: 248, pl. 79: 2.

Material. — Sixty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46070/88/F	46071/88/F	46072/88/F
length	0.288	0.384	0.408
width	0.216	0.264	0.264
thickness	0.096	0.120	0.120

Variability. — It is expressed in the test outline, which can be ovally-rhomboidal or rhomboidal. Variability also concerns the size and convexity of nodose lobes, degree of narrowing and lobation of the test peripheries, except the apertural one. The size of embrional chamber, measured on the test surface in specimens of various shapes equals to 0.048 mm.

Remarks. — The investigated specimens are generally consistent with the holotype. Some of them differ from the holotype only in having three instead of two nodose lobes per chamber. Similarly as in the holotype, nodose lobes are circular in the proximal part of the test, while in the distal one they are elongate, costae-like. The present author agrees with KOCH's (1977: 52) opinion, that *B. paterssoni* is derived from *B. laevigatus* MARIE. It originated at the Campanian/Maastrichtian boundary, and differs from *B. laevigatus* MARIE in having wider, ovally-rhomboidal or rhomboidal test outline, less curved sutures, better developed nodose lobes which are also present on the initial chamber.

Distribution. — Poland: Polish Lowlands — Maastrichtian. Europe, Asia — Maastrichtian-Danian.

Bolivinoides pustulatus REISS, 1954

(pl. 19: 7, 8)

1954. *Bolivinoides pustulata* REISS: 156, pl. 29: 9—10.
1957. *Bolivinoides granulata* HOFKER: 250, text-fig. 303a—f.
1977. *Bolivinoides granulatus* HOFKER; KOCH: 52, pl. 13: 8, 9.
1981. *Bolivinoides pustulatus* REISS; HART *et al.*: 182, pl. 7, 5: 6.
1988. *Bolivinoides delicatulus* CUSHMAN; SALAJ: pl. 1: 16.

Material. — More than hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46073/88/F	46074/88/F	46075/88/F
length	0.648	0.336	0.264
width	0.168	0.192	0.144
thickness	0.072	0.096	0.096

Variability. — Variability is very high and concerns the test shape (elongated, lanceolate or oval), transverse section (always narrowly oval, even very narrow), thickness of the test periphery (narrow and slightly rounded or nearly sharp and incised) and the degree of ornamentation of the test surface. In some specimens numerous weakly raised, somewhat elongate pustules are well developed on the test surface, sometimes only in the initial part of the test.

Remarks. — The investigated specimens seem to be consistent with the holotype of *B. pustulatus* REISS. The junior synonym of this species is *B. granulata* HOFKER. HOFKER (1957,

text-fig. 303) presented in details a variability range of this species, considering it as phylogenetic variability. In the investigated material, however, one can find all these specimens together, thus separation or two subspecies of *B. granulata* in the Upper and Lower Campanian is not substantiated. The investigated specimens and those illustrated by KOCH (1977) as *B. granulatus* HOFKER, and by HART *et al.* (1981) as *B. pustulatus* REISS are conspecific, which can be easily proved thanks the SEM pictures. Much more difficult is to compare them with drawings of the holotype and paratypes of these species.

Distribution. — Poland — Campanian-Maastrichtian. Germany — uppermost lower Campanian and lowermost part of the upper Campanian. England — uppermost Middle Campanian and lowermost part of the upper Campanian. Israel — lower Campanian. Tunisia — transitory layers of the Campanian and Maastrichtian.

Bolivinoides sidestrandensis BARR, 1966
(pl. 20: 1)

1950. *Bolivinoides decorata delicatula* CUSHMAN; HILTERMANN and KOCH (*non* CUSHMAN 1927): 612, fig. 5, no. 65—67.
1954. *Bolivinoides decorata delicatula* CUSHMAN; POŻARYSKA: 255, text-fig. 7.
1958. *Bolivinoides decorata delicatula* CUSHMAN; WITWICKA: 199, pl. 9: 10.
1958. *Bolivinoides delicatula* CUSHMAN; BIEDA: 38, text-fig. 10.
1959. *Bolivinoides delicatula* CUSHMAN; MASLAKOVA: 115, pl. 14: 6.
1961. *Bolivinoides delicatula* CUSHMAN; AKIMEZ: 189, pl. 18: 19a, b.
1961. *Bolivinoides delicatula* CUSHMAN; VASSILENKO: 193, pl. 40: 7a, b, w.
1962. *Rolivinoides decoratus delicatulus* CUSHMAN; HILTERMANN and KOCH: 315, pl. 47: 5, tab. 19.
1963. *Bolivinoides delicatulus regularis* REISS; HILTERMANN: 205, pl. 3: 7, 11, 12.
1964. *Bolivinoides decoratus* (JONES); BARANOVSKAJA and BULINNIKOVA: 291, pl. 64: 5 (*non* 64: 1—4, 6—8).
1966. *Bolivinoides sidestrandensis* BARR: 239, pl. 34: 10, 11, pl. 36: 6, 9, pl. 37: 6 (with synonymy).
1967. *Bolivinoides delicatulus* CUSHMAN; PLOTNIKOVA: 90, pl. 15: 3a, b.
1974. *Bolivinoides delicatulus* CUSHMAN; GORBENKO: 53, pl. 9: 2a, b.
1977. *Bolivinoides delicatulus regularis* (REISS); KOCH: 58, pl. 13: 4, 5.
1979. *Bolivinoides delicatulus* CUSHMAN; KAPTARENKO-TSHERNOUSOVA *et al.*: 145, pl. 55: 17a, b.
1981. *Bolivinoides sidestrandensis* BARR: HART *et al.*: 182, pl. 7, 5: 7.
1984. *Bolivinoides sidestrandensis* BARR; GAWOR-BIEDOWA and WITWICKA: 248, pl. 79: 6.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46076/88/F	46077/88/F	46078/88/F
length	0.456	0.408	0.360
width	0.216	0.216	0.192
thickness	0.120	0.144	0.120

Variability. — It is expressed in the test shape (cuneate or narrowly rhomboidal), in a degree of narrowing of the test peripheries (except the apertural one) and in the development of ornamentation. In more slender cuneate specimens, the sculpture of chamber surface consists of narrow costae and depressions forming a characteristic network. In the narrowly-rhomboidal specimens, wider than those just discussed, the costae can be slightly higher. Apart from the network ornamentation, the presence of root-like outgrowths on the surface of the initial chamber and on the surface of two neighbouring chambers is characteristic for this species.

Remarks. — The investigated specimens are consistent with the holotype and show the same variability range as presented by BARR (1966). The specimens from the investigated area are also nearly identical with those described by KOCH (1977) as *B. delicatulus regularis* REISS. The specimens which were assigned by BARR (1966) to *B. sidestradensis*, were often described from Europe as *B. delicatula* CUSHMAN or as *B. regularis* REISS. REISS (1954) distinguished

the species *B. regularis* in the CUSHMAN's material from the Taylor and Navarro Formations (Companian — Maastrichtian) separating this species from *B. decorata delicatula* CUSHMAN coming from the Velasco Shale (Danian — Paleocene) from the vicinity of Santa Cruz in Mexico. REISS (1954) argued that the specimens illustrated by HILTERMANN and KOCH (1950) and HILTERMANN (1962) as *B. decorata delicatula* CUSHMAN belong to *B. regularis*, despite the fact that they differ in some details. I agree with REISS (1954) and BARR (1966) that the specimens illustrated by CUSHMAN (1946, pl. 48: 10—14) as representing *B. decorata delicatula* belong to two different species. REISS (1954) considers CUSHMAN's specimens (CUSHMAN 1946, pl. 48: 11, 12) as representing *B. regularis*. These specimens differ from the Danian and Paleocene specimens of *B. decorata delicatula* CUSHMAN, while being extremely similar to *B. decoratus* (JONES). As the holotype of *B. regularis* REISS has chosen the specimen illustrated by CUSHMAN (1946, pl. 48: 12) and deposited in the U. S. National Museum, Washington. BARR (1966) who investigated that collection, found that the holotype of *B. regularis* was very similar to *B. decoratus* (JONES). BARR (1966: 240) considers that only topotypes investigation can allow to clarify the problem if *B. decoratus* (JONES) and *B. regularis* REISS are distinct or conspecific. The specimens illustrated by HILTERMANN and KOCH (1950: 612, fig. 5 nos. 65—667) and HILTERMANN (1952: 61, 63, text-fig. 4, 5) from the Germany are not conspecific with *B. regularis* REISS contrary to REISS's (1954) opinion, but belong to *B. sidestrandensis* BARR. This problem were solved by excellent SEM pictures of *B. delicatulus regularis* REISS presented by KOCH (1977, pl. 13: 4, 5). On this basis, the presented specimen, and probably also the specimens mentioned in the papers referred to in the synonymy, belongs to *B. sidestrandensis* BARR. One should also note, that HOFKER (1957, text-fig. 305: a, b, d) includes representatives of this species into *B. peterssoni* BROTZEN. Part of the specimens illustrated by BARANOVSKAJA and BULINNIKOVA (1964, pl. 64: 5*a*, *b*) assigned to *B. decoratus* (JONES) belongs to *B. sidestrandensis* BARR.

Distribution. — Poland — Campanian-Maastrichtian. England — upper Campanian-lower Maastrichtian. Germany — Campanian-Maastrichtian. USSR — Campanian-Maastrichtian.

Superfamily **Loxostomatacea** LOEBLICH et TAPPAN, 1962
Family **Loxostomatidae** LOEBLICH et TAPPAN, 1962
Genus *Loxostomum* EHRENBERG, 1854
Loxostomum eleyi (CUSHMAN, 1927)
(pl. 26: 1, 2)

1927. *Bolivinita eleyi* CUSHMAN: 91, pl. 12: 11 (*fide* ELLIS et MESSINA, Cat. of Foram.).
1957. *Siphogaudryina (Bolivinitella) eleyi* (CUSHMAN); HOFKER: 75, text-fig. 77, 78.
1961. *Bolivinitella eleyi* (CUSHMAN); AKIMEZ: 192, pl. 19: 9a, b (with synonymy).
1964. *Loxostomum eleyi* (CUSHMAN); LOEBLICH and TAPPAN : C 736, fig. 603 (1—5).
1968. *Loxostomum eleyi* (CUSHMAN); SLITER: 112, pl. 20: 2.
1972. *Loxostomum eleyi* (CUSHMAN); HANZLIKOVÁ: 121, pl. 35: 8 (with synonymy).
1974. *Bolivinitella eleyi* (CUSHMAN); GORBENKO: 55, pl. 9: 8.
1981. *Loxostomum eleyi* (CUSHMAN); HART *et al.*: 210, pl. 7, 19: 4, 5.
1984. *Loxostomum eleyi* (CUSHMAN); OLSSON and NYONG: pl. 3: 5.
1985. *Loxostomum eleyi* (CUSHMAN); SLITER: pl. 9: 12.
1985. *Loxostomum eleyi* (CUSHMAN); WEIDICH: 247, pl. 2: 10, 11.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46172/88/F	46173/88/F	46174/88/F
length	0.348	0.312	0.288
width	0.120	0.144	0.120
thickness	0.104	0.072	0.072

Variability. — It is small and expressed in degree of test widening with growth (test is of the same width along the whole length, poorly widening with growth, or first widening and then narrowing at the height of the two youngest chambers). Variability is also expressed in degree of elongation of the ultimate chamber and in the presence or absence of ribs on sutures in the distal part of the test.

Remarks. — This species differs from *Loxostomum emscherianum* (HOFKER, 1957) in having less slender test, in the absence of elongation of the final chamber passing into the apertural neck, as well as in the absence of ornamentation in the initial part of the test. It differs from *L. planatum* (CUSHMAN, 1927) in the test proportions and in its concave wider sides.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USSR — Upper Cretaceous. France (Paris Basin) — Campanian. Czechoslovakia — Campanian Maastrichtian. Sweden — lower Senonian. Netherlands — upper Santonian-lower part of the upper Campanian. USA — Senonian. Australia. — Santonian-Campanian. Western Equatorial Pacific, borehole 585, eastern part of the Mariana Basin — Maastrichtian. Germany — Coniacian.

Superfamily **Eouvogerinacea** CUSHMAN, 1927
Family **Eouvigerinidae** CUSHMAN, 1927
Genus *Eouvigerina* CUSHMAN, 1926
Eouvigerina gracilis (EGGER, 1899)
(pl. 20: 5)

1899. *Uvigerina gracilis* EGGER *non* REUSS: 132, pl. 15: 27, 30, 31.
1957. *Eouvigerina gracilis* (EGGER); HOFKER: 277, figs. 332—334.
1966. *Eouvigerina gracilis* (EGGER); HOFKER: 38, pl. 5: 32.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46079/88/F	46080/88/F	46081/88/F
length	0.480	0.312	0.240
width	0.144	0.096	0.096

Variability. — Variability is high and expressed in the test size (see measurements), degree of the test expansion with growth, convexity of chambers, development of a biserial part of the test and a neck length. Some specimens are rounded at the base, with a biserial part short, poorly visible, chambers poorly convex in both parts of the test. In such specimens the apertural neck is short with narrow lip turened out to form a collar. Other tests are slightly pointed at the base, the biserial part is very short and occupy 1/5 of the test length, which is slightly compressed. Chambers in the biserial part loosely arranged and strongly convex, gradually but considerably expanding as added. This time the neck is high and the apertural lip rather wide. Sutures more or less depressed, depending on chambers convexity. All the investigated specimens have the whole surface pustulose.

Remarks. — HOFKER (1957) considered *Eouvigerina gracilis* CUSHMAN, *E. austinana* CUSHMAN and *Uvigerina elongata* BROTZEN as synonymous with the investigated species. Among them, *E. austinana* CUSHMAN seems to be most similar in shape to the studied species. It differs from the discussed species in nearly entirely biserial test, its smooth surface and in a slight bilateral compression. *E. gracilis* CUSHMAN should be given a new name. It differs from the studied species in well developed, long (more than a half of the length) biserial part of the test and loosely arranged chambers in the uniserial part. *E. elongata* BROTZEN differs in having wider and shorter neck situated excentrically, in smooth surface and in more spherical chambers.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Western Europe — upper Campanian-lower Maastrichtian.

Eouvigerina serrata (CHAPMAN, 1892)
(pl. 21: 2, 3, 4a, b)

1892. *Textulatia serrata* CHAPMAN: 515, pl. 15: 7.
1910. *Sagrina cretacea* HERON-ALLEN et EARLAND: 423, pl. 8: 8—10 (*fide* ELLIS et MESSINA, Cat. of Foram.).
1961. *Eouvigerina cretacea* (HERON-ALLEN et EARLAND); AKIMEZ, 194, pl. 19: 12a, b. (with synonymy).
1964. *Eouvigerina serrata* (CHAPMAN); BARR and CORDEY: 307, pl. 49: 8, 9.
1975. *Eouvigerina serrata* (CHAPMAN); NUGLISCH: 30, pl. 9: 7a, b.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46082/88/F	46083/88/F	46084/88/F
length	0.300	0.264	0.240
width	0.144	0.120	0.120
thickness	0.120	0.096	0.072

Variability. — It is expressed in the test shape, which is cuneate to nearly rectangular and subquadrate in transverse section. Variability also concerns the height and sharpness of carinae bordering chambers along septal sutures, and a degree of chambers deviation on the narrow test sides.

Remarks. — BARR and CORDEY (1964) investigated topotypes of *Textularia serrata* CHAPMAN in the collection housed in the British Museum of Natural History. They found that both the illustration and description of this species, as given by CHAPMAN, were schematic and do not permit for comparison with other species. Therefore, they designated the lectotype giving precise description. They noted that the test in the topotypes were calcareous, perforated, with terminal aperture situated on a neck supplied with a lip. In their opinion this species belongs to the genus *Eouvigerina* CUSHMAN. In the CHAPMAN's collection there are two specimens of *T. serrata*. One has a neck broken off, and it was that illustrated most probably by CHAPMAN (1892). BARR and CORDEY (1964, pl. 49: 8) have chosen this specimen as the lectotype of *Eouvigerina serrata* (CHAPMAN), and illustrated also the topotype (pl. 49: 9) showing aperture on the neck and surrounded by a lip. The investigated specimens from Poland are entirely consistent with the topotype. As is may be seen on pl. 21: 4b, the lip is turned outside and not perforated. Perforation is also lacking on the neck. BARR and CORDEY (1964) who also investigated typical specimens of *Sagrina cretacea* HERON-ALLEN et EARLAND housed in the British Museum of Natural History, consider them as conspecific with *E. serrata* (CHAPMAN). The species under discussion resembles mostly *E. americana* CUSHMAN from which it differs in less angular chambers more tightly packed on the narrower sides of the test. This species resembles also *Loxostomum aculeatum* EHRENBERG, 1854 in the test shape, a degree of chambers angularites on narrower sides of the test and in high costae bordering chambers. The schematic illustration presented by EHRENBERG, as well as the lack of its description, do not allow for decision if *T. serrata* described by CHAPMAN (1892) and *L. aculeatum* EHRENBERG are conspecific or not. The specimen described by HART *et al.* (1981; 188, pl. 7. 8: 3, 4) under the name *E. aculeata* (EHRENBERG) have all the characters of the discussed species.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). England, Ireland, France, north-western Germany — uppermost Upper Cretaceous. Czechoslovakia — Turonian-lower Santonian. USSR — Turonian-Maastrichtian.

Superfamily **Turrilinacea** CUSHMAN, 1927
Family **Turrilinidae** CUSHMAN, 1927
Genus *Praebulimina* HOFKER, 1953
Praebulimina arcadelphiana (CUSHMAN et PARKER, 1935)
(pl. 20: 11, 12, pl. 21: 1)

1935. *Bulimina arcadelphiana* CUSHMAN et PARKER: 96, pl. 15: 1a, b, 2.
1936. *Bulimina arcadelphiana* var. *midwayensis* CUSHMAN et PARKER: 42, pl. 7: 9—10.
1946. *Bulimina arcadelphiana* CUSHMAN et PARKER; CUSHMAN: 124, pl. 52: 3, 4.
1947. *Bulimina arcadelphiana* CUSHMAN et PARKER; CUSHMAN and PARKER: 85, pl. 20: 9, 10.
1972. *Praebulimina arcadelphiana* (CUSHMAN et PARKER); HANZLIKOVÁ: 76, pl. 18: 11—13.
1974. *Bulimina midwayensis* CUSHMAN et PARKER: SZCZECHURA and POŻARYSKA: 52, pl. 6: 2—7 (with synonymy).
1984. *Praebulimina arcadelphiana* (CUSHMAN et PARKER); GAWOR-BIEDOWA and WITWICKA: 242, pl. 77: 4, 5.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46085/88/F	46086/88/F	46087/88/F
length	0.528	0.480	0.456
width	0.288	0.288	0.312

Variability. — There are two varieties in the investigated material. The elongated one has all the characters of *Bulimina arcadelphina* CUSHMAN et PARKER, whereas the short one, with a spine on the initial chamber, conforms with *B. arcadelphiana* var. *midwayensis* CUSHMAN et PARKER, 1936. It seems that these varieties represent two generation of this species.

Remarks. — As both the above mentioned varieties co-occur, the differences between them follow, in my opinion, from alternation of generations and as such can not be used for erecting a new taxon.

Distribution. — Poland: Polish Lowlands and Carpathians — upper Maastrichtian-Eocene. Sweden, Denmark, Germany, Australia (Alps), Slovakia (Carpathians), USSR (Turkmenia), USA, Guatemala — upper Cretaceous-Eocene.

Praebulimina asperoaculeata (BROTZEN, 1948)
(pl. 20: 9, 10)

1948. *Bulimina aspero-aculeata* BROTZEN: 60, pl. 6: 4, pl. 10: 6, 7.
1964. *Bulimina semicostata* NUTTALL *tenuivirgata* FREIMAN: 278, pl. 61: 7a, b, w 8a, b, 9, 10.
1966. *Bulimina aspero-aculeata* BROTZEN; HOFKER: pl. 81: 135, 145, 146, 152, 153 *non* p. 255, pl. 53: 68.
?1982. *Bulimina aspero-aculeata* BROTZEN; PETTERS: 64, pl. 6: 2.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46088/88/F	46089/88/F	46090/88/F
length	0.552	0.480	0.384
width	0.244	0.240	0.144

Variability. — It concerns the test size (see measurements), development of ornamentation of chamber surface except in the youngest whorl (costae rather thick extending along 3 to 4 chambers or very fine, low and poorly visible). Chambers in all whorls strongly convex or nearly flat.

Remarks. — The investigated specimens are nearly entirely consistent with those described by BROTZEN. No specimens with spine on the initial chamber has been found; perhaps it was broken. One must add that the specimens included into synonymy have 3 chambers in a whorl. The last whorl shows a tendency to biseriality. The youngest chamber is strongly elongated in many specimens resulting in a trumpet-like shape. The specimens described by FREIMAN (1964) from Siberia (see synonymy) display all the characters of the species under discussion.

FREIMAN 1964 stated that the wall in his specimens is bilamellar with prismatic structure in both layers. In the paratypes no petrographic structure has been investigated. Many species described in the literature are similar to the investigated species. Some of them are listed by BROTZEN (1948: 60). One can also add *Bulimina pseudocacumentata* OLSSON, 1960. The whole group of species with 3 chambers in a whorl and with costate surface in the initial part of the test, occurring in the Upper Cretaceous deposits badly needs revision.

Distribution. — Poland — upper Maastrichtian. Sweden, Denmark — Paleocene. USSR (western Siberia) — upper Maastrichtian (*Spiroplectamina kasanzevi* Zone). Western Africa — Paleocene.

Praebulimina carseyae (PLUMMER, 1931)
(pl. 21, fig. 9, 10, 11)

1931. *Buliminella carseyae* PLUMMER: 179, pl. 8: 9.
1961. *Buliminella carseyae* PLUMMER; VASSILENKO: 171, pl. 38: 6a, b, w, 14a, b, w.
1961. *Buliminella gracilis* VASSILENKO: 170, pl. 38: 1a, b.
1961. *Buliminella gracilis* VASSILENKO; AKIMEZ: 174, pl. 18: 3.
1972. *Praebulimina carseyae* (PLUMMER); HANZLIKOVÁ: 76, pl. 18: 6, 14 (with synonymy).
1966. *Buliminella carseyae* PLUMMER; HOFKER: 137, pl. 20: 38, 153, pl. 24: 160.
1977. *Praebulimina carseyae* (PLUMMER); OLSSON: pl. 2: G.
1979. *Praebulimina carseyae* (PLUMMER); KAPTARENKO-TSHERNOUSOVA *et al.*: 138, pl. 54: 10a, b.
1981. *Praebulimina carseyae* (PLUMMER); HART *et al.*: 214, pl. 7, 20: 15, 16.
1982. *Praebulimina carseyae* (PLUMMER); MC GUGAN: 405, pl. 1: 3.
1984. *Praebulimina carseyae* (PLUMMER); OLSSON and NYONG: pl. 2: 11, pl. 3: 1—2.
1986. *Praebulimina carseyae* (PLUMMER); BUTT: pl. 1: 7.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46091/88/F	46092/88/F	46093/88/F
length	0.480	0.456	0.360
width	0.312	0.264	0.240

Variability. — Variability is small and expressed in the test size (see dimensions), in chambers convexity in the last whorl (poorly convex or rather strongly convex), and in a degree of spiral suture depression resulting in step-like test outline. There are also differences caused by the alternation of generations. The specimens of the microspheric generation B are slender in comparison with those belonging to macrospheric generation A (in which width of the test increases rapidly with growth and at the level of the last whorl is twice as large as it is at the level of the preceding whorl).

Remarks. — The investigated specimens differ from the holotype in slightly smaller convexity of chambers. They are very similar to the specimens from the Upper Campanian of England (see HART *et al.* 1981, pl. 7.20: 15, 16). The specimens identical with these here discussed, ranging from the Upper Turonian to Lower Santonian have been assigned by VASSILENKO (1961) to a new species *Buliminella gracilis*.

Distribution. — Poland — Campanian-Maastrichtian. Sweden — Coniacian, Santonian. England — upper Campanian, lower Maastrichtian. Germany — Campanian. Czechoslovakia — Senonian. USSR — upper Turonian-Maastrichtian. USA — Santonian, Campanian, Maastrichtian.

Praebulimina dorohuczensis sp. n.
(pl. 22: 2, 3, 4)

Holotype: Specimen IG No. 46095/88/F in pl. 22: 2.
Paratypes: Specimens IG Nos. 46094/88/F, 46096/88/F in pl. 22: 3, 4.
Type horizon: Upper Maastrichtian.
Type locality: Borehole Dorohucza 5, depth 65.4 m.
Derivation of the name: From the Dorohucza village.

Diagnosis. — Test free, hyaline, smooth, cuneate, having 3 chambers in a whorl, last whorl showing tendency to biseriality and slightly bilaterally compressed. Aperture loop-shaped, narrow, with a narrow lip extending to the suture between the two youngest chambers and then along this suture.

Material. — Forty variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46095/88/F	46094/88/F	46096/88/F
length	0.360	0.432	0.264
width	0.216	0.288	0.168

Description. — Test hyaline, smooth, very finely and evenly perforated. It is cuneated, with round transverse section in a proximal part and elliptical at the height of the last whorl; it consists of 4 whorls but only the last one is well visible occupying 2/3 of the test length. In each whorl there are 3 chambers with flat or very weakly convex surface in older whorls and slightly convex surface in the last whorl. Chambers of the last whorl tend to be arranged biserially. The two youngest chambers are elongated toward the top and slightly bilaterally compressed. Sutures in older whorls invisible, poorly depressed in the last one. Aperture loop-shaped, narrow surrounded with a narrow lip. It extends nearly from the top of a poorly convex apertural surface of the last chamber, perpendicularly to a septal suture between the two youngest chambers, and then along this suture.

Variability. — Variability is expressed in test proportions, degree of chamber convexity and suture depression (especially in the last whorl) as well as in degree of bilateral flattening of the youngest chambers in the last whorl. Specimens of two generations have been observed. These representing the megalospheric generation are rounded at the proximal part, with large proloculus well visible, and expand more rapidly with growth, but they are smaller than those of microspheric generation, which are acute at the proximal part, poorly and evenly expanding with growth.

Remarks. — The investigated species is similar to the slender specimens of *Allomorphina trochoides* (Reuss, 1845). It differs from the latter in having loop-shaped aperture on the apertural surface. The presence of the extension of the aperture on the suture in the studied species indicate a close relationship between them. This species points to relationship between superfamilies Turrilinacea Cushman, 1927 and Chilostomellacea Brady, 1881. There are no doubts that the genus *Allomorphina* Reuss, *in* Czjžek, 1849, needs a new diagnosis as it contains the species in which not only the last whorl is visible [e.g., *Allomorphina trochoides* (Reuss)].

Distribution. — Poland: borehole Dorohucza 5 — upper Maastrichtian (Lublin Chalk).

Praebulimina laevis (Beissel, 1891)
(pl. 22: 1)

1891. *Bulimina laevis* Beissel: pl. 12: 39—43 (*fide* Ellis and Messina, Cat. of Foram.).
1961. *Buliminella laevis* (Beissel); Akimez: 175, pl. 18: 4, 5 (with synonymy).
1974. *Buliminella laevis* (Beissel); Gorbenko: 50, pl. 8: 5.
1979. *Praebulimina laevis* (Beissel); Kaptarenko-Tshernousova *et al.*: 139, pl. 54: 17.
1981. *Praebulimina laevis* (Beissel); Hart *et al.*: 214, pl. 7, 21: 1, 2.
1983. *Praebulimina laevis* (Beissel); Hagn and Herm: 623, pl. 2: 18.

Material. — Sixty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46100/88/F	46101/88/F	46102/88/F
length	0.792	0.720	0.624
width	0.480	0.432	0.408

Variability. — Variability is small and expressed mainly in convexity of chambers and depression of septal and spiral sutures. Chamber surface may be totally flat (except in the two youngest chambers where it is slightly convex), or slightly convex in all chambers. In the first case sutures are flat and translucent, in the second case slightly depressed. In the investigated material there are specimens at various developmental stages.

Remarks. — BEISSEL (1891) indicated high morphological variability of this species, which results now in various treatment of that species by different authors. It is often mistaken with *P. carseyae* (PLUMMER) from which it differs in being larger, in having flat chamber surface, and flat or poorly depressed sutures. Another similar species is *P. obtusa* (d'ORBIGNY) from which the investigated species differs in larger size, different shape of the test and in less convex chambers.

Distribution. — Poland — Campanian-Maastrichtian. Germany: Aachen vicinity — upper Senonian. Bavarian Alps — Maastrichtian. France — Campanian. England — Campanian-Maastrichtian. Netherlands — upper Campanian-lower Maastrichtian. USSR — Campanian-Maastrichtian.

Praebulimina obtusa (d'ORBIGNY, 1840)

(pl. 22: 6, 7)

1840. *Bulimina obtusa* d'ORBIGNY: 39, pl. 4: 5, 6.
1941. *Buliminella obtusa* (d'ORBIGNY); MARIE: 197, pl. 30: 290.
1979. *Praebulimina obtusa* (d'ORBIGNY); KAPTARENKO-TSHERNOUSOVA *et al.*: 139, pl. 54: 8a, b (with synonymy).
1981. *Praebulimina obtusa* (d'ORBIGNY); HART *et al.*: 214, pl. 7, 21: 3, 4.

Material. — Fifty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46103/88/F	46104/88/F	46105/88/F
length	0.480	0.328	0.408
width	0.360	0.384	0.240

Variability. — In the investigated material there are two varieties of this species which probably represents two different generations. One of them has rounded test in the initial part, the other one has the test bluntly sharpened. In both cases the test consists of 4 whorls, 4 chambers per whorl. The last whorl occupy 1/2 of the test length and is strongly elongated toward the top. In the second variety, chamber surface (especially in the last whorl) is slightly more convex and sutures slightly depressed.

Remarks. — The investigated specimens differ from the holotype in more rapid expansion of the test with growth, being identical in that feature with the specimens described by MARIE (1941).

Distribution. — Poland — Campanian-Maastrichtian. France — Campanian. England — upper Campanian-lower Maastrichtian. USSR — Campanian-Maastrichtian.

Praebulimina parvula (BROTZEN, 1948)

(pl. 22: 8, 9)

1948. *Buliminella parvula* BROTZEN: 57, pl. 10: 3, 4.
1965. *Buliminella parvula* BROTZEN; POŻARYSKA: 96, pl. 15: 3 (with synonymy).

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46106/88/F	46107/88/F	46108/88/F
length	0.264	0.240	0.168
width	0.216	0.168	0.120

Variability. — The test is a very small having 4 chambers in the last whorl which can occupy 3/4 to 4/5 of the test length. Chambers in 3 older whorls are invisible or poorly visible displaying slightly convex surface. They are poorly or rather strongly convex in the last whorl, and separated with narrow translucent oblique sutures.

Remarks. — The upper Maastrichtian specimens are identical with those from the Paleocene. POŻARYSKA (1965) was not sure if the specimens from the upper Maastrichtian are identical with those from the Paleocene, as she did not find this species in the Maastrichtian and Danian deposits. The investigated specimens from the upper Maastrichtian of the Lublin region are smaller than those from the Paleocene deposits of the same area. HOFKER (1966) described (under the name *Buliminella parvula*) specimens having 3 chambers in the last whorl, which thus cannot be regarded as belonging to the BROTZEN's species.

Distribution. — Poland — upper Campanian-Maastrichtian, Paleocene. Sweden — Paleocene.

Praebulimina pusilla (BROTZEN, 1936)

(pl. 23: 11, 12)

1936. *Bulimina pusilla* BROTZEN: 127, pl. 8: 4, text-fig. 44.
1947. *Buliminella pusilla* (BROTZEN); CUSHMAN and PARKER: 57, pl. 15: 7, pl. 21: 5.
1954. *Bulimina* cf. *pseudoacuta* MARIE; HAGN: 79, pl. 7: 2.
1972. *Praebulimina pusilla* (BROTZEN); HANZLIKOVÁ: 76, pl. 18: 15.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46109/88/F	46110/88/F	46111/88/F
length	0.264	0.240	0.216
width	0.144	0.120	0.020

Variability. — In the investigated material there are specimens of two different generations. The specimens of the microspheric generation (B form) have the test sharpened initially and the last whorl occupying 1/5 of the total test length; they are similar in shape to microspheric form presented by BROTZEN (1936, text-fig. 44: 2). They differ, however, from the Swedish form in having 3 chambers in the last whorl, instead of 4 chambers as figured by BROTZEN (1936). Megalospheric forms A with a rounded initial part of a test, in which the last whorl occupy 1/4, or nearly 1/2 of the test length, are cylindrical and have 3 or 4 chambers in the last whorl, similarly as those from Sweden. Intraspecific variability is high and concerns mainly degree of convexity of chambers, especially in the last whorl, and degree of depression of septal and spiral sutures. Initial whorls are invisible in the specimens of the generation B, and the suture separating the last whorl from the preceding one is nearly flat. Chambers of the last whorl are nearly flat or only slightly convex. All whorls (3 to 4 in a test) are visible to a different degree in specimens of the generation A. A degree of convexity of chambers in all whorl varies resulting in variation of suture depression.

Remarks. — I agree with BROTZEN that the form B of the discussed species resembles *Bulimina acuta* (REUSS), whereas its form A is similar to *Bulimina imbricata* REUSS. This similarity concerns the test shape and perforated test wall. A difference is mainly in the test size. REUSS's specimens are 3 times as big as those here investigated. Additionally they show smaller height of the last whorl, nearly flat surface of chambers and smaller number of chambers in the last whorl (2 to 3 in REUSS's species).

Distribution. — Poland — Maastrichtian. Sweden — Coniacian, Santonian, perhaps also Campanian. Germany (Bavarian Alps) — uppermost lower Campanian. Czechoslovakia — Upper Cretaceous.

Praebulimina reussi (MORROW, 1934)

(pl. 21: 5, 6, 7, 8)

1845. *Bulimina ovulum* (*non B. ovula* d'ORBIGNY) REUSS: 37, pl. 8: 57, pl. 13: 73.
1934. *Bulimina reussi* MORROW: 195, pl. 29: 12 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1961. *Bulimina reussi* MORROW; VASSILENKO: 174, pl. 38: 2a, b, 7a, b.
1961. *Bulimina reussi* MORROW; AKIMEZ: 176, pl. 18: 6, 7 (with synonymy).
1972. *Praebulimina reussi* (MORROW); HANZLIKOVÁ: 77, pl. 18: 16.
1975. *Praebulimina reussi* (MORROW); STEMPROKOVA-JIROVA: 250, pl. 2: 1—3, pl. 5: 1—6a, b.

Material. — Twenty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46112/88/F	46113/88/F	46114/88/F
length	0.360	0.336	0.288
width	0.216	0.192	0.216

Variability. — There are two varieties of this species in the author collection which may correspond to two generations. The first variety has a test poorly expanding with growth and is more slender in comparison with the second one. In the first variety the last whorl amounts to maximum 2/3 of the total test length, whereas in the second stocky one which expands rapidly with growth the last whorl amounts to 3/4 of the test length. The first variety is identical with the specimen illustrated by MORROW (1934, pl. 29: 12). The second one is identical with the neotype of this species as established by STEMPROKOVA-JIROVA (1975, pl. 2: 1a, b).

Remarks. — For remarks concerning comparison with *Praebulimina venstricosa* (BROTZEN) see description of that species.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Czechoslovakia — Turonian-Coniacian. Germany — Senonian. USSR — Turonian-Maastrichtian. USA — Upper Cretaceous.

Praebulimina taylorensis (CUSHMAN et PARKER, 1935)

(pl. 22: 5a, b)

1935. *Bulimina taylorensis* CUSHMAN et PARKER: 96, pl. 15: 3a, b.
1972. *Praebulimina taylorensis* (CUSHMAN et PARKER); HANZLIKOVÁ: 77, pl. 18: 8, 9.
1985. *Praebulimina taylorensis* (CUSHMAN et PARKER); SLITER: 343, pl. 5: 8.

Material. — One specimen.

Dimensions (in mm):	
IG Nos.:	46115/88/F
length	0.264
width	0.168

Remarks. — The species was so far recorded only in the Maastrichtian of Moravia. A characteristic feature of this species is a rich ornamentation of sharp costae which merge to form a network of rectangular or polygona pattern. Only the apertural surface of the last chamber and a distal part of the preceding chamber are smooth. The investigated specimen is identical with the holotype. One should add to the description by CUSHMAN and PARKER (1935) that each whorl consists of 3 chambers and that its transverse section is a triangle with its corners rounded.

Distribution. — Poland: borehole Telatyn IG-1 — lower Maastrichtian. Czechoslovakia: Moravia — Maastrichtian. USA — Campanian (Taylor Formation). Eastern equatorial Pacific: Mariana Basin — upper Campanian.

Praebulimina ventricosa (BROTZEN, 1936)
(pl. 22: 10, 11)

1936. *Bulimina ventricosa* BROTZEN: 124, pl. 8: 1a—c, text-fig. 42, 43.
1957. *Praebulimina ventricosa* (BROTZEN); HOFKER: 184, text-fig. 223.
1979. *Praebulimina ventricosa* (BROTZEN); KAPTARENKO-TSHERNOUSOVA *et al.*: 139, pl. 53: 7a, b (with synonymy).
1981. *Praebulimina reussi* (MORROW); HART *et al.*: 214, pl. 7, 21: 5, 6.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46116/88/F	46117/88/F	46118/88/F
length	0.384	0.360	0.312
width	0.360	0.264	0.240

Variability. — Variability is small and concerns mainly the test size and convexity of chambers in a last whorl. In the investigated material there are specimens of two generations. An initial part of the test is narrow, cuneate in the specimens of the microspheric generation B, while it is rounded with the proloculus only slightly protruding or not protruding at all in megalospheric generation A.

Remarks. — The Polish specimens are entirely consistent with the holotype. BROTZEN (1936) has shown the differences between *Bulimina ovulum* REUSS, 1845 (*B. reussi* MORROW, 1934, nom. nov.) and *B. ventricosa* STEMPROKOVA-JIROVA (1975) investigated the specimens of *B. ovulum* REUSS 1845 from (Luzice — Chlomky). The specimens of *B. ovulum* REUSS used by BROTZEN (1936) for comparison with *B. ventricosa* came from Skalice village located 20 km to W from Luzice. Coniacian deposits occur there in both cases. STEMPROKOVA-JIROVA 1975 considers BROTZEN's species as junior synonym of the REUSS's species. However, she has no access to BROTZEN's Swedish specimens for comparison. Her illustrations of the specimens of *Praebulimina reussi* (MORROW) (STEMPROKOVA-JIROVA 1975 tab. 4: 1—6) coming from the type locality differ from *P. ventricosa* (BROTZEN, 1936) in features listed by BROTZEN (1936: 126—127). According to the present author's study, the specimens of *P. reussi* (MORROW) from the middle Coniacian material from Brezno (Czechoslovakia) differ from *P. ventricosa* (BROTZEN) in features listed by BROTZEN (1936).

Distribution. — Poland — Turonian-lower Maastrichtian. Sweden — Senonian. Germany — middle Santonian-lower Campanian. France, England — Campanian. USSR — Turonian-Maastrichtian.

Genus *Pseudouvigerina* CUSHMAN, 1927
Pseudouvigerina cristata (MARSSON, 1878)
(pl. 24: 6, 7)

1878. *Uvigerina cristata* MARSSON; 150, pl. 3: 20.
1927. *Pseudouvigerina plummerae* CUSHMAN: 115, pl. 23: 8 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1945. *Pseudouvigerina cristata* (MARSSON); BROTZEN: 46, text-fig. 8, A, B.
1958. *Pseudouvigerina cristata* (MARSSON); WITWICKA: 201, pl. 10: 15a—c.
1963. *Pseudouvigerina plummerae* COSMAN; KAPTARENKO-TSHERNOUSOVA *et al.*: 113, pl. 27: 8a, b, w.
1972. *Pseudouvigerina cristata* (MARSSON); HANZLIKOVÁ: 86, pl. 19, 18: 19 (with synonymy).
1974. *Pseudouvigerina plummerae* CUSHMAN; GORBENKO: 55, pl. 9: 9 (with synonymy).
1981. *Pseudouvigerina cristata* (MARSSON); HART *et al.*: 216, pl. 7, 22: 1, 2.
1984. *Pseudouvigerina plummerae* CUSHMAN; OLSSON and NYONG: pl. 3: 6.
1984. *Pseudouvigerina cristata* (MARSSON); GAWOR-BIEDOWA and WITWICKA: 250, pl. 81: 1, 2.

Material. — More than 300 well preserved specimens.

Dimensions (in mm):

IG Nos.:	46146/88/F	46147/88/F	46148/88/F
length	0.360	0.312	0.264
width	0.168	0.168	0.144

Variability. — It is expressed mostly in test ornamentation. Test surface can be smooth, or ornamented. Ornamentation can be developed as fine papillae and spines on chamber surface in the initial part of the test, or the papillae and spines may cover the surface of all chambers. Double longitudinal costae can also be the subject to variation.

Remarks. — The specimens described by CUSHMAN (1927), and later on by Soviet students, under the name *Pseudouvigerina plummerae* CUSHMAN display all the characters of *P. cristata* (MARSSON).

Distribution. — Poland: Polish Lowlands — Maastrichtian. America and Europe: Boreal and Mediterranean provinces — Maastrichtian.

Pseudouvigerina rugosa (BROTZEN, 1945)

(pl. 25: 12a, b, 13)

1945. *Pseudowigerina rugosa* BROTZEN: 47, pl. 1: 7.

1966. *Reussella rugosa* (BROTZEN); HOFKER: 38, pl. 5: 31, 59, pl. 10: 101 (with synonymy).

non 1980. *Pyramidina rugosa* (BROTZEN); BERTELS: 67, pl. 2: 14.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	46143/88/F	46144/88/F	46145/88/F
length	0.264	0.240	0.168
width	0.144	0.120	0.120

Variability. — It is small and expressed in test proportions (test of equal width along the whole length, or slightly increasing in width with growth, reaching its maximum at the height of 3 youngest chambers), in test ornamentation (fine densely spaced papillae cover the entire test surface or they are lacking on the surface of two youngest chambers), and in height of a neck equipped with round aperture on the top.

Remarks. — Specimens derived from the Lublin Chalk are entirely consistent with the holotype description. They agree with the illustrations of this species given by HOFKER (1957, 1966). The only difference is in a loop-shaped aperture and a lack of the apertural neck in HOFKER's specimens. In the investigated material, only one specimen without apertural neck occurs. HOFKER (1957: 218—219) presented his opinions concerning phylogenetic development of this species. According to him, this species should be placed, as it was already done by BROTZEN (1945), in the genus *Pseudouvigerina*. This is substantiated by the presence of the apertural neck in specimens of this species, as well as by all other features. The specimens assigned to this species by BERTELS (1980) from the middle Maastrichtian of Argentina differ from *P. rugosa* BROTZEN in having flat apertural surface with loop-shaped aperture supplied with a lip, as well as in having rather round than triangular transverse section of the test.

Distribution. — Poland — upper Campanian-Maastrichtian (Lublin Chalk). Sweden, Netherlands — Maastrichtian.

Pseudouvigerina telatynensis sp. n.

(pl. 24: 1, 2)

Holotype: Specimen IG Nos. 46149/88/F, in pl. 24: 1.

Paratypes: Specimen IG Nos. 46150/88/F, 46151/88/F, in pl. 24: 2.

Type horizon: Lower Maastrichtian.

Type locality: Borehole Telatyn IG-1, depth 239.0 m.

Derivation of the name: From the name of the village Telatyn.

Diagnosis. — Test small, elongated, with round transverse section; two youngest chambers arranged biserially. Chambers (except for the two youngest) are wider than high, convex and covered with fine spines. Aperture round situated on a low neck with a narrow lip turned inside out.

Material. — Ten well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46149/88/F	46150/88/F	46151/88/F
length	0.240	0.240	0.192
width	0.096	0.120	0.120

Description. — Test small, elongated, supplied with the protruding initial chamber very poorly and nearly equally expanding with growth along the whole length, round in transverse section. All chambers (except the two youngest) arranged triserially and tightly packed, wider than high, convex, with rectangular outline. Chamber surface covered with numerous fine papillae and spines in the proximal part. Septal sutures slightly depressed, oriented perpendicularly to the vertical test axis. The two youngest chambers may be arranged biserially, elongated toward the top and higher than wide, devoid of ornamentation. The youngest chamber turning into a narrow neck. Aperture round with a narrow collar-shaped lip.

Variability. — It is expressed in test shape, which can be elongated or barrel-shaped, in size of the two youngest chambers occupying 1/3, or 1/2 (in barrel-shaped specimens) of the test length, and in possibility of a slight twist of the test along its vertical axis.

Remarks. — The species under discussion, especially barrel-shaped specimens, resembles mostly *Pseudouvigerina californica* SLITER. It differs from the latter species in presence of ornamentation on the chamber surface. From *P. rugosa* BROTZEN it differs in having round transverse section, nearly cylindrical or barrel-shaped test, and in slightly elongated (toward the top) two youngest chambers, as well as in absence of two poorly marked edges on chamber margins.

Distribution. — Poland — Lower Maastrichtian (Lublin Chalk).

Genus *Pyramidina* BROTZEN, 1948
Pyramidina cimbrica (BROTZEN, 1945)
(pl. 23: 1, 2)

1937. *Angulogerina cimbrica* TROELSEN: *nomen nudum.*
1945. *Pseudouvigerina cimbrica* TROELSEN; BROTZEN: 47, pl. 1: 8, 9, text-fig. 8. C.
1957. *Reussella cimbrica* (TROELSEN) (BROTZEN, 1945); HOFKER: 219, text-fig. 265k, 271.
1962. *Reussela cimbrica* (TROELSEN); HILTERMANN and KOCH: 318, pl. 47: 7.
1966. *Reussela cimbrica* (TROELSEN); HOFKER: 72, pl. 13: 48—50.
1972. *Reussela cimbrica* (BROTZEN); HANZLIKOVÁ: 85, pl. 19: 20.
1977. *Reussela cimbrica* (BROTZEN); KOCH: 60, pl. 17: 10.
1984. *Pyramidina cimbrica* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 242, pl. 80: 3—5.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46122/88/F	46123/88/F	46124/88/F
length	0.288	0.240	0.192
width	0.120	0.108	0.120

Variability. — It is expressed in degree of elongation of the ultimate chamber, degree of concavity of test walls and sutures as well as in development of margins. The margins can be narrow with a narrow keel, or slightly wider, serrate in effect of a slight projection of chambers.

Remarks. — The investigated specimens differ from those described by BROTZEN (1945), HOFKER (1957, 1966) and KOCH (1977) in absence of ornamentation developed as small spines on both margins and sutures, sometimes also on chamber surface. They differ in the margins less serrate than those presented by HANZLIKOVÁ.

Distribution. — Poland: Polish Lowlands — upper Maastrichtian-Danian. Denmark, Belgium, Netherlands, Czechoslovakia — Maastrichtian. Germany — Maastrichtian, Danian.

Pyramidina minuta (MARSSON, 1878)
(pl. 23: 7, 8)

1878. *Tritaxia minuta* MARRSON: 162, pl. 4: 31.
1948. *Bulimina (Reussella) paleocenica* BROTZEN: 61, pl. 6: 5, 6.
1957. *Reussella paleocenica* BROTZEN; HOFKER: 211, text-fig. 256 *(partim)*, 258.
1965. *Bulimina paleocenica* BROTZEN; POŻARYSKA: 98, pl. 15: 4 (with synonymy).
1964. *Reussella minuta* (MARRSON); FREIMAN: 284, pl. 62: 3—12 (with synonymy).
1966. *Reussella paleocenica* BROTZEN: HOFKER: 16: 45.
1968. *Bulimina paleocenica* BROTZEN: POŻARYSKA and SZCZECHURA: 48.
1973. *Pyramidina paleocenica* (BROTZEN); GAWOR-BIEDOWA: pl. 1: 6.
1979. *Reussella minuta* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 140, pl. 54: 3 (with synonymy).

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46125/88/F	46126/88/F	46127/88/F
length	0.312	0.264	0.192
width	0.120	0.096	0.096

Variability. — It is expressed in number of whorls (usually 5—7), degree of sharpening of the initial part of the test, degree of rounding of the test margin (sometimes narrow margins with invisible chambers), in degree of chamber convexity and suture depression (chambers are never strongly convex and sutures deeply depressed). Variability also concerns incision of the test margins and elongation of the ultimate chamber resulting in narrowing of the youngest portion of the test. Some specimens are slightly twisted.

Remarks. — BROTZEN (1948: 62) considers that the species *Bulimina (Reussella) paleocenica* differs from *Tritaxia minuta* MARSSON in more slender test which is longer and displays slightly depressed sutures and clearly perforated test wall. All these characters are well within the variability range of the species *Pyramidina minuta* (MARSSON) and therefore BROTZEN's species is regarded here as a junior synonym of the species *Pyramidina minuta* (MARSSON). The discussed species is hardly changing in time. In the Maastrichtian material there are more specimens showing a very narrow and sharpened initial part of the test than in the material from the Paleocene where the specimens with slightly rounded initial part of the test dominate. It is worth of noting that HOFKER (1957, 1966) observed the presence of *Reussella paleocenica* BROTZEN already in the upper Maastrichtian deposits, while the Soviet students noted the presence of *Tritaxia minuta* MARSSON in the Maastrichtian, as they included the Paleocene representatives of this species into BROTZEN's species.

Distribution. — Poland: Polish Lowlands — upper Maastrichtian-Paleocene. Germany, Netherlands — upper Maastrichtian-Paleocene. Sweden, Denmark — Paleocene. USSR — Maastrichtian-Paleocene.

Pyramidina prolixa (CUSHMAN et PARKER, 1935)
(pl. 23: 3, 4a, b, 5)

1935. *Bulimina prolixa* CUSHMAN et PARKER: 98, pl. 15: 5a, b.
1936. *Reussella* (?) *buliminoides* BROTZEN: 137, pl. 8: 8, text-fig. 48 (partim)
1957. *Reussella prolixa* (CUSHMAN et PARKER); HOFKER: 209, text-fig. 255, 256 *(partim)*.

1961. *Reussella maastrichtica* LIPNIK: 43, pl. 2: 7a—c.
1961. *Reussella buliminoides* BROTZEN; AKIMEZ: 186, pl. 18: 12.
1964. *Bulimina omskensis* KISSELMAN: 279, pl. 61: 11—15.
1966. *Reussella prolixa* (CUSHMAN et PARKER): HOFKER: 37, pl. 5: 37, p. 58, pl. 10: 98, p. 72, pl. 13: 45.
1967. *Praebulimina prolixa* (CUSHMAN et PARKER); KENT: 1443, pl. 183: 5.
1968. *Pyramidina prolixa* (CUSHMAN et PARKER); SLITER: 86, pl. 12: 7, 8 (with synonymy).
1972. *Pyramidina prolixa* (CUSHMAN et PARKER); BERTELS: 337, pl. 1: 12a, b.
1972. *Pyramidina prolixa* (CUSHMAN et PARKER); HANZLIKOVÁ: pl. 78, pl. 19: 1.
1974. *Reussella maastrichtica* LIPNIK; GORBENKO: 52, pl. 8: 9a—b (with synonymy).
1979. *Reussella maastrichtica* LIPNIK; KAPTARENKO-TSHERNOUSOVA *et al.*: 140, pl. 54: 2a, b, w.
1982. *Praebulimina prolixa* (CUSHMAN et PARKER); PETTERS: 57, pl. 6: 1.
1986. *Bulimina prolixa* CUSHMAN et PARKER; BUTT: pl. 1: 5.

Material. — Fifty five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46128/88/F	46129/88/F	46130/88/F
length	0.240	0.192	0.168
width	0.100	0.096	0.096

Variability. — Variability is small and expressed in number of whorls (6—8), in degree of chamber convexity and suture depression (chambers round or rectangular in outline, more or less convex), and in parallel or somewhat twisted configuration of three chamber rows in relation to the vertical test axis.

Remarks. — Taking into consideration the test shape, a subtriangular outline nearly spherical chambers organized in three rows, number of whorls, and size, the species *Reussella* (?) *buliminoides* BROTZEN, 1936, *Reussella maastrichtica* LIPNIK, 1961, and *Bulimina omskensis* KISSELMAN, 1964 are regarded here as junior synonyms of the species under discussion. Subspecies of this species, differing from the nominal species in being 2 and 1/2 to 3 times higher than wide (in the nominal species it is only 2 and 1/2 times higher than wide), and in greater number of whorls (8—9 instead of 6—7), occur in both, the USA (Colorado) and Equatorial Africa (Gabon). The African subspecies is named *Bulimina (Praebulimina?) longa* KLASZ, MAGNE et RAT, 1963, the subspecies from Colorado (KENT 1969: 1444) is called *Praebulimina prolixa longa* KENT, 1967, and *Praebulimina prolixa elongata* KENT, 1969 (KENT 1969: 1441). The African subspecies differs from the American one in having convex chambers, and especially in clearly depressed apertural surface of the ultimate chamber. Slender specimens similar to the subspecies *Praebulimina prolixa elongata* KENT have been noted in the investigated material.

Distribution. — Poland — uppermost upper Maastrichtian (Lublin Chalk). Denmark, Czechoslovakia — Maastrichtian. Netherlands, Germany — uppermost Campanian. USSR — Santonian-Maastrichtian. Sweden — upper Emsherian-Lower Santonian. USA — Campanian-Maastrichtian. Argentina — Middle Maastrichtian. Libya — Lower Campanian. West Africa — Campanian-Maastrichtian.

Pyramidina pseudospinulosa (BROTZEN, 1945)

(pl. 24: 5)

1945. *Reussella pseudospinulosa* TROELSEN; BROTZEN: 46, pl. 1: 6.
1957. *Reussella pseudospinulosa* TROELSEN; (BROTZEN); HOFKER: 212, text-fig. 259, 260.
1979. *Reussella pseudospinulosa* TROELSEN; KAPTARENKO-TSHERNOUSOVA *et al.*: 141, pl. 54: 16a, b (with synonymy).
1984. *Pyramidina pseudospinulosa* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 243, pl. 77: 8, 9 (with synonymy).
non 1984. *Reussella pseudospinulosa* TROELSEN; NYONG and OLSSON: 474, pl. 3: 17.
non 1985. *Pyramidina pseudospinulosa* (TROELSEN); SLITER: 343, pl. 5: 16.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46430/88/F	46431/88/F	46432/88/F
length	0.480	0.348	0.216
width	0.312	0.288	0.120

Variability. — It concerns thickening of sutures (nearly flat to clearly elevated in the form of rather wide and high edges bordering chambers) and in degree of chamber projection on three angles of the test (tightly packed or projecting). In some specimens the initial part of the test is covered with very fine spines. The chamber surface is densely and evenly covered with fine pores on poorly concave sides of the test.

Remarks. — The name *Reussella pseudospinulosa* was mentioned by TROELSEN 1937 in the manuscript. In 1937 TROELSEN (*fide* BROTZEN 1945: 46) gave a stratigraphic range of this species in the Danish Chalk. BROTZEN 1945 was the first to illustrate and to describe the specimens of this species but he did not demonstrate their identity with the TROELSEN material. According to ICZN (1961 art. 13) BROTZEN (1945) should be regarded as the author of *Reussella pseudospinulosa*. The investigated species belongs to the genus *Pyramidina* BROTZEN, 1948, as it is shown by an aperture typical for the genus. In general shape the considered species resembles mostly *Reussella cushmani* BROTZEN, 1936, from which it differs in having less concave sides, sharp and serrate angles and the sutures evenly covered with spines. In shape of the test and sutural ornamentation it resembles also *Pyramidina szajnochae* (GRZYBOWSKI), the species which is its closest relative, differing from it in being 2 times smaller, in lacking of sharp raised limbate carinate sutures projecting from test angles to form spines. The specimens assigned to this species by NYONG and OLSSON (1984) and SLITER (1985) differ from it in having rounded, not serrate test angles and in different test shape. They belong, perhaps, to the species *Pyramidina triangularis* (CUSHMAN et PARKER).

Distribution. — Poland: Polish Lowlands — upper Turonian-Maastrichtian. Denmark — Santonian-middle Maastrichtian. Sweden — Santonian-lowermost Maastrichtian. Germany, Netherlands — Campanian. USSR: Belorussia and Dnepropetrovsk-Donetz Basin — Campanian-Maastrichtian.

Pyramidina rudita (CUSHMAN et PARKER, 1936)

(pl. 23: 6a, b)

1935. *Bulimina ornata* CUSHMAN et PARKER: 97, pl. 15: 4.
1936. *Bulimina rudita* CUSHMAN et PARKER: 45 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1936. *Reussella minima* BROTZEN: 136, pl. 8: 6, text-fig. 48 *(partim)*.
1957. *Reussella minima* BROTZEN; HOFKER: 208, text-fig. 254.
1968. *Pyramidina rudita* (CUSHMAN et PARKER); SLITER: 86, pl. 12: 12 (with synonymy).
1972. *Pyramidina minima* (BROTZEN); HANZLIKOVÁ: 78, pl. 18: 17—19.
1985. *Pyramidina rudita* (CUSHMAN et PARKER); SLITER: 343, pl. 5: 17.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	46131/88/F	46132/88/F	46133/88/F
length	0.192	0.168	0.132
width	0.096	0.084	0.072

Description. — Test very small, rapidly expanding with growth, (which results in the shape of overturned pyramid), with a triangular transverse section and widely rounded margins. It consists of 4 to 5 whorls. Chambers arranged in three rows, poorly convex, septal and spiral sutures slightly depressed. Test surface rough. Under SEM it is visible that the surface is co-

vered with numerous evenly distributed perforated nodes. Aperture slit-like situated on the top of the ultimate chamber and extends to its base.

Variability. — It is small and expressed in pyramidal or wedge-like shape of the test, and in chamber convexity.

Remarks. — The specimens of this species displaying elongated (wedge-shaped) test resemble *Pyramidina prolixa* (CUSHMAN et PARKER). They differ from that species in smaller number of whorls (4—6 instead 6—8), in poorly convex chambers and nearly invisible sutures, as well as in presence of nodes covering entire test surface. These nodes are visible only under SEM. In optical microscope the test surface appears to be rough. This roughness hides sutures. Test shape, its size, chamber shape and arrangement and number of whorls indicate that the specimens described by BROTZEN (1936) as *Reussella minima* belong in fact to *Pyramidina rudita* (CUSHMAN et PARKER). Spines or other thickenings cover only proximal part of the test in the Swedish specimens.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Sweden — Coniacian-Santonian. Netherlands, Germany — Campanian. Czechoslovakia — Maastrichtian. USA — Coniacian-Maastrichtian. Western Equatorial Pacific: in the eastern Mariana Basin — upper Campanian-Maastrichtian.

Pyramidina szajnochae (GRZYBOWSKI, 1896)
(pl. 24: 8, 9, 10)

1896. *Verneuilina szajnochae* GRZYBOWSKI: 287, pl. 9: 19.
1959. *Reussella szajnochae* (GRZYBOWSKI); LISZKOWA: 69, pl. 3: 3, 4, 5 (with synonymy).
1972. *Reussella szajnochae* (GRZYBOWSKI); HANZLIKOVÁ: 85, pl. 20: 9—11 (with synonymy).
1981. *Reussella (Pyramidina) szajnochae* (GRZYBOWSKI); LISZKA and LISZKOWA: 180, pl. 3: 9a—d.
1981. *Reussella szajnochae szajnochae* (GRZYBOWSKI); HART *et al.*: 216, pl. 7, 22: 8.
1983. *Reussella szajnochae* (GRZYBOWSKI); BECKMANN *et al.*: 113, pl. 5: 8.
1983. *Reussella szajnochae* (GRZYBOWSKI); HAGN and HERM: 623, pl. 2: 21.
1984. *Reussella szajnochae* (GRZYBOWSKI); LISZKOWA and MORGIEL: 250, pl. 126: 1—4.
1985. *Reussella szajnochae* (GRZYBOWSKI); SLITER: pl. 6: 10—12.
1988. *Reussella szajnochae* (GRZYBOWSKI); PERYT: pl. 2: 12, 13.

Material. — More than fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46140/88/F	46141/88/F	46142/88/F
length	0.816	0.600	0.480
width	0.408	0.408	0.360

Variability. — It is very high and concerns nearly all characters, especially size and ornamentation of a test. There are specimens representing two generations. Specimens of the generation B (microspheric) are larger than those of the generation A (megalospheric), and sharp at the initial part of the test and rather rapidly expanding with growth. The specimens of the generation A are stout. Variability of ornamentation is expressed in different degree of raising of sutures, and different degree of projection of the limbate suture from the test angles.

Remarks. — The investigated specimens are entirely consistent with the holotype. The species shows an aperture typical for the genus *Pyramidina* BROTZEN.

Distribution. — Poland — Campanian, sporadically lowermost Maastrichtian (Lublin Chalk); Outer Carpathians — Senonian; Pieniny (Klippen Belt) — Maastrichtian. Austria — Senonian. Czechoslovakia, USSR — Upper Senonian. Italy, Germany, Romania — Campanian-Maastrichtian. England — upper Campanian and upper Maastrichtian. Spain — Santonian-Maastrichtian. USA: California — Santonian-Campanian. Western Equatorial Pacific: eastern Marina Basin — Campanian-Maastrichtian.

Pyramidina triangularis (CUSHMAN et PARKER, 1935)
(pl. 23: 9a, b, 10)

1935. *Bulimina triangularis* CUSHMAN et PARKER: 97—98, pl. 15: 6a, b.
1961. *Reussella triangularis* (CUSHMAN et PARKER); AKIMEZ: 187—188, pl. 18: 15a, b, 16a, b (with synonymy).
1968. *Pyramidina triangularis* (CUSHMAN et PARKER); SLITER: 87, pl. 12: 11 (with synonymy).
1972. *Pyramidina triangularis* (CUSHMAN et PARKER); HANZLIKOVÁ: 78—79, pl. 18: 20, 21.
1974. *Reussella triangularis* (CUSHMAN et PARKER); GORBENKO: 51, pl. 8: 7.
1985. *Pyramidina triangularis* (CUSHMAN et PARKER); SLITER: 343, pl. 5: 18—19.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46134/88/F	46135/88/F	46136/88/F
length	0.288	0.264	0.240
width	0.192	0.168	0.168

Variability. — It is high and expressed in test proportions (tests displaying nearly equal width along the whole length dominate), in degree of chamber convexity (chambers poorly convex, or rather strongly convex and slightly overlapping each other, on both test margins and on lateral sides of the test, thus masking sutures) and in ornamentation of the initial part of the test. In the initial part of the test, the chamber surface may be covered with fine or thick evenly but irregularly distributed pores. The pores may be arranged in rows and fine spine may occur on the surface of the oldest chambers.

Remarks. — The investigated specimens differ from the holotype in lacking ribs on chamber surface in the lower part of the test. All other features are nearly identical. Polish specimens are very close to those described by AKIMEZ (1961) from the Campanian and Maastrichtian deposits of Byelorussia. The discussed species is probably conspecific with *Bulimina trigona* CHAPMAN, 1892. BARR and CORDEY (1964), who investigated CHAPMAN's collection and designated the lectotype of *B. trigona* CHAPMAN, consider that the difference between these two species is in fine elongated ribs present on the test surface in its lower part in *B. triangularis* CUSHMAN et PARKER, 1935. Thus it seems that the investigated specimens are closer to the English than to the American ones as they lack such ribs in the initial portion of the test. All the remaining characters are identical in both species. These delicate ribs originate in specimens which have pores arranged in rows. The test surface between these rows of perforations is slightly convex and forms elongated ribs. Despite the fact that the specific name *B. trigona* is older than *B. triangularis*, it can not be used according to ICZN as *nomen oblitum*. It seems that it had not been used between 1892 and 1964 i.e. over 50 years.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). USA, France — Campanian. Germany, Netherlands — Santonian-lower Campanian. England — Coniacian. Sweden — Senonian. Switzerland, Czechoslovakia — Senonian. USSR — Campanian-Maastrichtian. Western Equatorial Pacific: in the eastern part of the Mariana Basin — Campanian-Maastrichtian.

Family **Biedafranciszkinidae** fam. nov.

Type genus: *Biedafranciszkina* gen. nov.

Derivation of name: from the name and first name of the famous Polish paleontologist FRANCISZEK BIEDA

Stratigraphical and geographical range: Upper Cretaceous — lower Eocene. Poland: Lublin region, Campanian and Maastrichtian. Trinidad, upper part of the Lizard Springs Marls, upper Paleocene and lower Eocene. Germany, Austria — Paleocene.

Diagnosis. — Test high trochospiral, 3 to 4 chambers in whorl, chamber interior divided into chamberlets, surface rough covered with papillae which can be perforated at the summit.

Convex lobes visible on the test surface. Test wall calcareous, unilamellar, optically radial. Aperture loop-like situated on apertural surface.

Remarks. — In test coiling, its shape and shape and location of the aperture this family is close to family Turrilinidae CUSHMAN, 1927 and family Buliminidae JONES, 1875. It differs from them, as well as from other families of the superfamily Buliminacea JONES, 1875, in having chambers divided into chamberlets, rough test surface and perhaps in absence of tooth plate.

Genus *Biedafranciszkina* gen. nov.

Type species: *Buliminella beaumonti* CUSHMAN et RENZ, 1946.

Stratigraphical and geographical range: Upper Cretaceous — lower Eocene. Poland, Lublin region — Campanian and Maastrichtian. Trinidad, Lizard Springs Marl, upper Paleocene, lower Eocene. Germany, Austria — Paleocene.

Diagnosis: As for the family.

Biedafranciszkina beaumonti (CUSHMAN et RENZ, 1946)

(pl. 24: 3, 4a, b)

1946. *Buliminella beaumonti* CUSHMAN et RENZ: 36, pl. 6: 7a—c (*fide* ELLIS and MESSINA, Cat. of Foram.).
1962. *Buliminella beaumonti* CUSHMAN et RENZ; HILLEBRANDT: 75—76, pl. 5: 25a, b, c.

Material. — More than a hundred variously preserved specimens.

Dimensions (in mm):			
IG Nos.:	46137/88/F	46138/88/F	46139/88/F
length	0.312	0.216	0.168
width	0.216	0.168	0.144

Description. — The original description by CUSHMAN and RENZ (1946) should be supplemented by following characters: test consists of 4 whorls, initial whorls are poorly visible, final whorl occupies 2/3 of the whole length, chamber interior (especially in the final whorl) divided into chamberlets which is expressed on the surface as convex lobes, the most so at a spiral suture. Test surface rough and covered with papillae with perforation at the top. Apertural surface of the last chamber reniform and flat. Aperture with narrow lip.

Variability. — It is high and expressed in size (see dimensions), degree of roughness of the test surface, degree of convexity of lobes (well visible in all chambers, or nearly invisible), in degree of chamber convexity and septal and spiral suture depression.

Remarks. — Polish specimens are identical with the holotype. The fact that lobes are expression of the chamber division into chamberlets has been found in damaged specimens. Roughness of entire surface of the test is visible in SEM under magnification 1000× (pl. 24: 4b). In well preserved specimens, the roughness is visible also under binocular microscope under low magnifications. Test surface in this species is the same as in same planktonic foraminifera, e.g. *Rugoglobigerina*. HILLEBRANDT (1962) considers *Buliminella grata* PARKER et BERMUDEZ var. *convoluta* MALLORY, 1959 as probably synonymous with the species discussed. Lobe-like incisions on sutures in *Bulimina grata* PARKER et BERMUDEZ, 1937 may express the chamber divisions into chamberlets. If so, then this species having 4 chambers in whorl may belong to the genus *Biedafranciszkina*. The same concerns *Buliminella grata* var. *convoluta* MALLORY which is in fact very similar to *Biedafranciszkina beaumonti* (CUSHMAN et RENZ). The most similar to our species is the specimen presented by CHALILOV (1948, pl. 5: 5a, b) as *Verneuilina* sp. from the Paleocene and Eocene of Small Balkhan (USSR). The roughness of the test could be misleading for CHALILOV and may lead to assignment of his specimens to aranaceous forms. If in the future these specimens are shown to be calcareous, then it should be included in the species *B. beaumonti* (CUSHMAN et RENZ).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Germany, Austria: Bavarian Alps — Paleocene. Perhaps also USSR: Small Balkhan — Paleocene — Eocene. Trinidad — upper Paleocene — lower Eocene (upper part of the Lizard Springs Marls).

Biedafranciszkina polonica sp. n.
(pl. 25: 8, 9a, b, 10, 11)

Holotype: Specimen IG Nos.: 46411/88/F in pl. 25: 8.
Paratypes: IG Nos. 46412/88/F, 46413/88/F, 46414/88/F, in pl. 25: 9a, b, 10, 11.
Type horizon: Lower Maastrichtian.
Type locality: Lublin IG-2 borehole, depth 432.80 m.
Derivation of the name: from the name of my country Poland.

Diagnosis. — Test triserial, wedge-shaped, triangular in transverse section, corners rounded. Sutures depressed and incised as bays. Test consists of 5 to 6 whorls, covered with papillae except for distal parts of two or three youngest chambers.

Material. — Over thirty variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46411/88/F	46412/88/F	46413/88/F
length	0.312	0.336	0.192
width	0.216	0.216	0.216

Description. — Test triserial, wedge-shaped, weakly twisted along the vertical axis, rapidly and considerably (but evenly) expanding with growth. Transverse section triangular with rounded corners; test surface rough and covered with papillae. The ornamentation is absent from distal parts of two or three youngest chambers. Test consists of 5 to 6 whorls. Chambers well visible especially in younger whorls. Interior divided into chamberlets, which is expressed as convexities on the surface and results in a grape-like aspect of the test. Apertural surface poorly convex. Aperture as characteristic of the genus, extending from the top of a chamber to its base.

Variability. — It is small and expressed mainly in degree of ornamentation of the test surface. Convexities on the chamber surface expressing internal subdivision are the subject to variation. They can be elongated or oval. In the investigated material, there are specimens on different developmental stages (from 3 to 5 whorls).

Remarks. — The studied species resembles mostly *Pyramidina triangularis* (CUSHMAN et PARKER) and *Bulimina strobila* MARIE in triserial test and in its shape. It differs from both these species in displaying subdivision of chambers into chamberlets, convexities on the chambers surface, bay-shaped sutures and papillae on the test surface.

Distribution. — Poland — Maastrichtian (Lublin Chalk).

Superfamily **Buliminacea** JONES, 1875
Family **Buliminidae** JONES, 1875
Genus *Praeglobobulimina* HOFKER, 1951
Praeglobobulimina imbricata (REUSS, 1851)
(pl. 23: 13a, b, 14)

1851. *Bulimina imbricata* REUSS: 38, pl. 3: 7.
1851. *Bulimina acuta* REUSS: 38, pl. 3: 8.
1928. *Bulimina imbricata* REUSS; FRANKE: 159, pl. 14: 20.
1957. *Praebulimina kickapooensis* (COLE); HOFKER: 190, text-fig. 233, 234.
1964. *Bulimina quadrata* PLUMMER; FRIJMAN and KISELMAN *in* SUBBOTINA: 274, pl. 60: 10—16.

1964. *Bulimina imbricata* REUSS; VOLOSHINA: 120, pl. 3: 2, 3, 4, 5.
1974. *Bulimina ovata* d'ORBIGNY; SZCZECHURA and POŻARYSKA: 53, pl. 5: 13.
1979. *Praebulimina imbricata* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 138, pl. 52: 6.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46119/88/F	46120/88/F	46122/88/F
length	0.672	0.600	0.456
width	0.288	0.288	0.264

Variability. — In the investigated material there are specimens of two generation. The specimens of the microspheric generation B are higher than the specimens of the megalospheric generation A. They are sharpened at the base, spindle-shaped, consisting usually of 4 whorls. The specimens of the megalospheric generation are rounded at the base, with a visible large proloculus, they display oval outline and usually consist of 3 whorls. In the specimens of the both generations there are 3 chambers in initial whorls while in the youngest one only two. Chambers outline is rhomboidal in both cases. Chamber surface poorly convex, sometimes nearly flat. Septal sutures and a spiral suture are nearly flat to depressed. In some specimens of the megalospheric generation A sutures are striated in a proximal part of the test. A slit-shaped aperture extends from a top of the test to its base. A narrow tooth plate protruding from the aperture is visible in most specimens.

Remarks. — The investigated specimens are consistent in all features with those derived from the Lvov Chalk and illustrated by VOLOSHINA (1964) and with the REUSS's (1851) holotype of *Praeglobobulimina imbricata* which has been collected in the Lvov vicinity. The discussed species is so similar to *Bulimina ovata* d'ORBIGNY that one can suspect that they may be even conspecific. However, it differs from the holotype of *B. ovata* in less overlapping and less convex chambers, in the lower youngest whorl and in a slit-like aperture. Lack of comparative materials, especially those from the Vienna Basin precludes resolving the problem of conspecifity of these species. The specimens referred to in the synonymy and described under the names *Praebulimina kickapooensis*, *B. quadrata* and *B. ovata* seem to be identical with *Praeglobobulimina imbricata* (REUSS). *B. quadrata* PLUMMER may be a junior synonym of the discussed species.

Distribution. — Poland — upper Maastrichtian. Germany — Senonian. USSR — Maastrichtian.

Superfamily **Fursenkoinacea** LOEBLICH et TAPPAN, 1961
Family **Fursenkoinidae** LOEBLICH et TAPPAN, 1961
Genus *Coryphostoma* LOEBLICH et TAPPAN, 1962
Coryphostoma plaita (CARSEY, 1926)
(pl. 25: 7)

1926. *Bolivina plaita* CARSEY: 26, pl. 4: 2 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1931. *Loxostoma plaitum* (CARSEY); PLUMMER: 182, pl. 10: 5—7.
1937*c*. *Loxostoma plaitum* (CARSEY); CUSHMAN: 169, pl. 20: 1—4.
1946. *Loxostoma plaitum* (CARSEY); CUSHMAN: 130, pl. 54: 10—14.
1947. *Bolivina plaita* CARSEY; VASSILENKO and MJATLIUK: 204, pl. 2: 6a, b, 9a—c, 11a, b.
1957. *Bolivina plaita* CARSEY; HOFKER: 226, text-fig. 278, 279, 288a—c, 292a—c.
1961. *Bolivina plaita* CARSEY; AKIMEZ: 179, pl. 19: 1a, b, 2a, b, 3.
1962. *Bolivina plaita* CARSEY; EBENSBERGER: 78, pl. 10: 17.
1964. *Bolivina plaita* CARSEY; BARANOVSKAJA and BULINNIKOVA *in* SUBBOTINA: 301, pl. 65: 8, 9a, b, w, pl. 66: 1a, b, w, 2a, b, w, 3—5.
1964. *Coryphostoma plaita* (CARSEY); LOEBLICH and TAPPAN: C 733, fig. 600: 8a, b, 9.
1966. *Bolivina plaita* CARSEY; HOFKER: 26, pl. 3: 53, 39, pl. 6: 44.
1968. *Coryphostoma plaitum* (CARSEY); SLITER: 112, pl. 19: 13.
1970. *Bolivina plaita* CARSEY; NEAGU: 59, pl. 13: 21.

1972. *Coryphostoma plaitum* (CARSEY); BERTELS: 350, pl. 3: 13a, b.
1972. *Coryphostoma plaita* (CARSEY); HANZLIKOVÁ: 120, pl. 35: 6, 7.
1985. *Coryphostoma plaitum* (CARSEY); SLITER: 340, pl. 9: 15.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46155/88/F	46156/88/F	46157/88/F
length	0.768	0.648	0.480
width	0.168	0.120	0.144
thickness	0.144	0.096	0.096

Variability. — It is expressed in test size, tendency to uniseriality and test proportions (test expansion is always small), in chamber number in each row (8—10, usually 8), in a degree of twiting of the test along its vertical axis and in degree of suture depression.

Remarks. — The investigated specimens seem to agree with the holotype. They resemble mostly the specimens illustrated by SLITER (1968, pl. 19: 13). CUSHMAN (1931) erected *Loxostoma plaitum* (CARSEY), var. *limbosum*, which differs in having thickened sutures.

Distribution. — Poland — upper Maastrichtian (Lublin Chalk). Europe, North and South America — Campanian-Maastrichtian. Western and Equatorial Pacific: East Mariana Basin — Maastrichtian.

Genus *Coryphostomella* GAWOR-BIEDOWA, 1987

Coryphostomella lublinensis GAWOR-BIEDOWA, 1987

(pl. 25: 1, 2, 3, 4)

1987. *Coryphostomella lublinensis* GAWOR-BIEDOWA: 64, pl. 27: 1a, b, pl. 28: 4.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46158/88/F	46159/88/F	46160/88/F
length	0.446	0.432	0.288
width	0.240	0.192	0.120
thickness	0.048	0.048	0.048

Variability. — Variability is high and concerns mostly differences of a test shape (elongated and narrow, or widely oval), and degree of chamber and suture convexity. Sutures are flat or poorly depressed, or thickened in many specimens displaying wide test. These thickennings are visible on pl. 25: 1, 2. Chamber surface is flat and smooth.

Remarks. — For description and comparison see GAWOR-BIEDOWA (1987).

Distribution. — Poland — upper Campanian-lower Maastrichtian (Lublin Chalk).

Coryphostomella telatynensis GAWOR-BIEDOWA, 1987

(pl. 25: 5)

1987. *Coryphostomella telatynensis* GAWOR-BIEDOWA: 65, pl. 23: 3, 4, pl. 27: 2a, b, pl. 28: 3.

Material. — Twenty well preserved specimens.

IG Nos.:	46165/88/F	46166/88/F	46167/88/F
length	0.480	0.450	0.384
width	0.120	0.120	0.120
thickness	0.072	0.096	0.072

Variability. — It is expressed in a degree of chamber convexity and depression of sutures, in a degree of visibility of chambers in the initial part of the test, in a degree of lobation of the test outline and elongation of the distal part of the youngest chamber in form of a neck.

Remarks. — For remarks see GAWOR-BIEDOWA (1987).

Distribution. — Poland — Maastrichtian (Lublin Chalk).

Genus *Fursenkoina* LOEBLICH et TAPPAN, 1961
Fursenkoina polonica (GAWOR-BIEDOWA, 1992)
(pl. 25: 6)

1992. *Fursenkoina polonica* GAWOR-BIEDOWA: 77, pl. 1: 1, 2.

Material. — Twenty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46152/88/F	46153/88/F	46154/88/F
length	0.384	0.264	0.288
width	0.120	0.072	0.096

Variability. — It is expressed in test size, degree of chamber visibility, a degree of test twist along its length axis and in length of the two youngest chambers which can occupy 1/3 to 1/5 of the test length.

Distribution. — Poland — Campanian-lower Maastrichtian (Lublin Chalk).

Superfamily **Pleurostomellacea** REUSS, 1860
Family **Pleurostomellidae** REUSS, 1860
Subfamily **Pleurostomellinae** REUSS, 1860
Genus *Ellipsodimorphina* A. SILVESTRI, 1901
Ellipsodimorphina cretacea (GAWOR-BIEDOWA, 1992)
(pl. 26: 3)

1992. *Ellipsodimorphina cretacea* GAWOR-BIEDOWA: 78, pl. 1: 3.

Material. — Ten variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46184/88/F	46185/88/F	46186/88/F
length	0.384	0.316	0.312
width	0.096	0.120	0.120

Variability. — It is expressed in degree of flattening of the initial, biserial part of a test as well as in degree of convexity of cuneate chambers in the rest of the test. Initial part of the test is bilaterally flattened, narrow, with tess-like arrangement of chambers and cuneate chambers strongly convex. Some specimens show initial part of the test similar to that in the holotype, only poorly bilaterally flattened, and chambers well visible and poorly convex; cuneate chambers are less convex than in the specimens discussed above. Proportions of the test of all specimens are, however, usually the same and the test consists, of 3 nearly equal parts — 1/3 of its length corresponds to a biserial part, 1/3 to cuneate chambers (2 or 3 of them) and 1/3 is occupied by the ultimate chamber. The biserial part of the test and the part with cuneate youngest chambers are of equal length. In rare specimens, the part of the test with cuneate chambers is the longest.

Remarks. — In shape of chambers in uniserial part of the test, which are compressed vertically bubbles, the investigated species resembles *Ellipsodimorphina pozaryskae* sp. n. It differs from this species in having a narrow and long biserial part (in comparison with a uniserial one) and not protruding embrional chamber, in less numerous chambers in the uniserial part (3—4 instead of 3—5), and in different shape of the youngest chamber.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Ellipsodimorphina hrubieszowcensis (GAWOR-BIEDOWA, 1992)
(pl. 26: 12, 13)

1992. *Ellipsodimorphina hrubieszowcensis* GAWOR-BIEDOWA: 79, pl. 1: 4—6.

Material. — Fifteen variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46187/88/F	46188/88/F	46189/88/F
length	0.360	0.360	0.288
width (uniserial part of the tests)	0.120	0.148	0.120

Remarks. — For the remarks concerning intraspecific variability and comparisons of this very characteristic species, with other species see GAWOR-BIEDOWA 1992.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Ellipsodimorphina pozaryskae sp. n.
(pl. 26, 18, pl. 27, 3)

Holotype: specimens IG No. 46190/88/F, presented in pl. 27: 3.
Paratypes: IG Nos.: 46191/88/F, 46192/88/F, in pl. 26: 18.
Type horizon: Lower Maastrichtian.
Type locality: Borehole Gorzków IG-1, depth 519 m.
Derivation of the name: From the name of the Polish micropaleontologist KRYSTYNA POŻARYSKA.

Diagnosis. — Test elongated, rounded in transverse section, smooth; outline strongly incised. Embrional chamber protruding downward, biserial part of the test very short, uniserial part consists of strongly convex cuneate chambers, one of which can be larger than the neighbouring ones. Youngest chamber elongated with small slit-like aperture on the top.

Material. — Eight well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46190/88/F	46191/88/F	46192/88/F
length	0.504	0.576	0.360
width	0.144	0.120	0.090

Description. — Test elongated, smooth and shining, finely and equally perforated. Outline strongly incised, transverse section widely oval in the biserial part and rounded in the uniserial one. Initial part of the test short consisting of one or two pairs of convex chambers and a protruding initial chamber; it occupies 1/5 of the total length. There are 3—5 strongly convex cuneate chambers in the uniserial part of the test. Chamber increase in size unequal, the younger chambers being sometimes larger sometimes smaller than the older ones. Sutures strongly depressed. The youngest chamber elongated or domed with a small, slit-like aperture covered with narrow lip at the top.

Variability. — Intraspecific variability is high and expressed in degree of narrowing of the initial portion of the test and in the presence of one or two chamber pairs in the biserial part of the test, as well as in chamber convexity and shape, especially in the shape of the youngest chamber. Chambers are cuneate or resembling slightly compressed bubbles. The youngest chamber is narrowed in most specimens, and has its top sharp; in other specimens it is slightly convex, narrowed but not sharp at the top. Variability concerns also a shape of the test as a whole which results from the rate of chamber expansion with the test growth.

Remarks. — This species resembles *Ellipsodimorphina complanata* LIEBUS in chamber arrangement, but it differs from it in being more slender and having rounded transverse section of the test, more numerous chambers and the youngest chamber smaller and narrowed at the top. For comparison with *E. cretacea* GAWOR-BIEDOWA see description of the latter.

Distribution. — Poland — upper Campanian-lower Maastrichtian (Lublin Chalk).

Ellipsodimorphina rara (GAWOR-BIEDOWA, 1992)
(pl. 26: 11)

1992. *Ellipsodimorphina rara* GAWOR-BIEDOWA: 80, pl. 2: 4.

Material. — Fifteen well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46193/88/F	46194/88/F	46195/88/F
length	0.480	0.408	0.264
width	0.120	0.144	0.096

Variability. — The range of intraspecific variability has been discussed elsewhere (GAWOR-BIEDOWA 1992). One can only add that the size of specimens is strongly differentiated (see dimensions) and that most of the specimens have nearly equal width along the whole length.

Remarks. — For comparisons see GAWOR-BIEDOWA (1992).

Distribution. — Poland — Maastrichtian (Lublin Chalk).

Ellipsodimorphina variabilis (GAWOR-BIEDOWA, 1992)
(pl. 27: 6, 7a, b)

1992. *Ellipsodimorphina variabilis* GAWOR-BIEDOWA: 81, pl. 2: 1, 2.

Material. — Ten well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46196/88/F	46197/88/F	46198/88/F
length	0.432	0.408	0.380
width	0.120	0.120	0.096

Remarks. — For variability and remarks see GAWOR-BIEDOWA (1992).

Distribution. — Poland — lower Maastrichtian (Lublin Chalk).

Genus *Ellipsoglandulina* A. SILVESTRI, 1900
Ellipsoglandulina manifesta (FRANKE, 1928)
(pl. 27: 8a, b, 9)

1928. *Ellipsoglandulina manifesta* REUSS; FRANKE: 55, pl. 4: 32.
1946. *Ellipsonodosaria subnodosa* (GUPPY) NUTTALL; CUSHMAN: 137, pl. 56: 30, 31.
1951. *Ellipsoglandulina manifesta* (REUSS); NOTH: 68, pl. 8: 4.
1956. *Ellipsoglandulina ellisi* SAID et KENAWY: 146, pl. 4: 34.
1962. *Ellipsoglandulina manifesta* FRANKE; HILLEBRANDT: 100, pl. 7: 23, 24.

Material. — Five well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46199/88/F	46200/88/F	46201/88/F
length	0.912	0.744	0.696
width	0.360	0.360	0.336

Remarks. — The investigated specimens seem to be entirely consistent with those described as *E. manifesta* by FRANKE, 1928 (*non Glandulina manifesta* REUSS, 1851). HILLEBRANDT(1962) is right that FRANKE should be regarded as the author of the species *E. manifesta* because he separated two species — *Glandulina manifesta* REUSS (pl. 4: 28) and *E. manifesta* (REUSS) (pl. 4: 32). The above two genera differ in having various apertures.

Distribution. — Poland — Maastrichtian, perhaps also Turonian. Germany — Senonian-upper Paleocene. Austria — Senonian. Trinidad — Paleocene — Lower Eocene. Mexico — Paleocene. Egypt — Maastrichtian — Paleocene.

Ellipsoglandulina varsoviensis (GAWOR-BIEDOWA, 1992)
(pl. 26: 17, pl. 27: 18)

1928. *Ellipsoglandulina elongata* REUSS; FRANKE: 55, pl. 4: 31, 36.
1992. *Ellipsoglandulina varsoviensis* GAWOR-BIEDOWA: 82, pl. 2: 7, 8.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	46202/88/F	46203/88/F	46204/88/F
length	1.560	1.440	1.200
width	0.432	0.528	0.504

Remarks. — Specimens representing various developmental stages (from 2 to 6 chambers) have been found in the investigated material. The holotype (GAWOR-BIEDOWA 1992, pl. 2: 7) represents immature specimen. The mature specimens are the paratype illustrated by GAWOR-BIEDOWA (1992, pl. 2: 8) and that illustrated in the present paper (pl. 27: 18). For variability and remarks see GAWOR-BIEDOWA (1992).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Germany — upper Senonian.

Genus *Ellipsoidella* HERON-ALLEN et EARLAND, 1910

Ellipsoidella divergens (STORM, 1929)
(pl. 27: 1, 2)

1929. *Ellipsodimorphina divergens* STORM: 54, fig. 10 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1970. *Ellipsoidella divergens* (STORM); NEAGU: 73, pl. 31: 28—30.
1984. *Ellipsoidella divergens* (STORM); NYONG and OLSSON: 473, pl. 5: 2.

Material. — Eight well preserved specimens.

Dimensions (in mm):

IG Nos.:	46205/88/F	46206/88/F	46207/88/F
length	1.320	0.984	0.672
width	0.432	0.384	0.264

Description. — Test of nearly equal width along the whole length, only the youngest chamber wider than the rest of the test. Test outline very weakly incised or smooth, transverse section round, surface shining, smooth, finely and equally perforated. Cuneate chambers biserially arranged and closely appressed, nearly invisible in the initial part of the test. Above they are alternating (3—4 chambers). Chamber surface very poorly convex, sutures weakly depressed and straight, arranged more or less obliquely, depending on how many chambers are cuneate. The ultimate chamber domed convex, of nearly equal height and width, with slit-like aperture at the top. Roof-like lip partly covers the aperture from the top.

Variability. — It is expressed in degree of visibility of chambers in the initial part of the test and in degree of chamber convexity.

Remarks. — It seems that the specimens from Poland differ from the holotype in having the youngest chamber more convex and well separated from the preceding one.

Distribution. — Poland — Campanian — Maastrichtian (Lublin Chalk). Czechoslovakia — upper Turonian. Romania — Campanian. North America — probably Campanian--Maastrichtian.

Ellipsoidella gracillima (CUSHMAN, 1933)
(pl. 27: 4, 5a, b)

1933. *Nodosarella gracillima* CUSHMAN: 64, pl. 7: 14a, b.
1956. *Nodosarella gracillima* CUSHMAN: SAID and KENAWY: 145, pl. 4: 27 (with synonymy).
1959. *Nodosarella gracillima* CUSHMAN; LISZKOWA: 73, pl. 4: 2a, b (with synonymy).

1960. *Nodosarella gracillima* CUSHMAN; BELFORD: 75, pl. 20: 2.
1966. *Ellipsoidella gracillima* (CUSHMAN); HOFKER: 195, pl. 37: 45.
1968. *Ellipsoidella gracillima* (CUSHMAN); SLITER: 110, pl. 19: 12.
1984. *Ellipsoidella gracillima* (CUSHMAN); NYONG and OLSSON: 473, pl. 5: 6.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46208/88/F	46209/88/F	46210/88/F
length	1.040	0.916	0.552
width	0.192	0.168	0.120

Variability. — Variability is expressed in the size, in degree of chamber convexity and in pattern of arrangement and degree of depression of sutures. The initial biserial part of the test is very short, pointed or rounded which may indicate the presence of two generations i.e. micro- and megalospheric forms. There are from 3 to 7, but usually 4 chambers in the uniserial part of the test. In all specimens the chambers are slightly convex. In the specimens pointed in the initial part and having widely wedge-shaped, sutures are slightly oblique and depressed. Sutures are parallel, straight and slightly depressed in the specimens with rounded initial part and having cylindrical shape. There is a change in degree of chamber convexity between proximal and distal part of the test. Some specimens have all chambers equally convex, in others most convex but equally in convexity are the 2 or 3 youngest chambers.

Remarks. — The specimens under discussion differ from those included into this species by NOTH (1951: 68, pl. 9: 4) and by LISZKOWA (1959) in having invisible chambers and sutures in the biserial part of the test. According to HOFKER (1966: 195) slight bending and blunt termination is a characteristic feature of this species. Slight bending of the test may also be observed in the investigated specimens.

Distribution. — Poland: Polish Lowlands — Campanian-lower Maastrichtian; Carpathians — Senonian. Northern Alps — Senonian. Netherlands — Maastrichtian. USA — Upper Cretaceous. Egypt — Maastrichtian — Danian. Australia — Campanian.

Ellipsoidella inflatocamerata GAWOR-BIEDOWA, 1991

(pl. 26: 8)

1992. *Ellipsoidella inflatocamerata* GAWOR-BIEDOWA: 83, pl. 1: 7a—c.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	46211/88/F	46212/88/F
length	0.240	0.192
width	0.144	0.144
thickness	0.120	0.120

Remarks. — For variability and remarks see GAWOR-BIEDOWA (1992).

Distribution. — Poland — upper Campanian-lower Maastrichtian (Lublin Chalk).

Ellipsoidella kugleri (CUSHMAN et RENZ, 1946)

(pl. 27: 15, 16, 17)

1946. *Nodosarella kugleri* CUSHMAN et RENZ: 42, pl. 6: 30, 33 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1968. *Ellipsoidella kugleri* (CUSHMAN et RENZ); SLITER: 111, pl. 19: 9.
1970. *Ellipsoidella kugleri* (CUSHMAN et RENZ); NEAGU: 73, pl. 30: 23—25, pl. 31: 4, 5, pl. 32: 3—7.

Material. — Thirty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46213/88/F	46214/88/F	46215/88/F
length	0.552	0.384	0.336
width	0.312	0.216	0.168

Variability. — Intraspecific variability is expressed in degree of chamber convexity, especially in the biserial part of the test, but the chambers are always convex. Two generations are well represented. Test is elongated and poorly expanding with growth in megalospheric forms A, while it is stout with more convex chambers in microspheric forms B.

Remarks. — Specimens from Poland differ from the holotype in being two times smaller and in biserial arrangement of chambers in the initial part of the test in megalospheric forms. However, some megalospheric forms, in the author's material show irregularly uniserial arrangement of chambers. The investigated specimens agree entirely with the description of *Ellipsoidella kugleri* (CUSHMAN et RENZ) as given by SLITER (1968) for Californian specimens. The specimens of SLITER (1968) and NEAGU (1970) included in the species under discussion are, similarly to the Polish material, two times smaller than the holotype. Variability range is similar, both in the Polish and Romanian material.

Distribution. — Poland — Campanian-Maastrichtian. Romania — Campanian. USA, Mexico — Maastrichtian.

Ellipsoidella ovata GAWOR-BIEDOWA, 1992

(pl. 26: 16, 27: 10)

1992. *Ellipsoidella ovata* GAWOR-BIEDOWA: 83, pl. 2: 3.

Material. — Forty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46216/88/F	46217/88/F	46218/88/F
length	0.480	0.432	0.288
width of the last chamber	0.120	0.120	0.096

Remarks. — For variability and remarks see GAWOR-BIEDOWA (1992).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Ellipsoidella polonica GAWOR-BIEDOWA 1992

(pl. 27: 13)

1992. *Ellipsoidella polonica* GAWOR-BIEDOWA: 84, pl. 2: 5, 6.

Material. — Twenty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46219/88/F	46220/88/F	46221/88/F
length	1.760	0.752	0.720
width of the last chamber	0.120	0.120	0.096

Variability. — Description of variability of this species (GAWOR-BIEDOWA 1992) has to be supplemented with the observation that the size is also the subject to variation. Some specimens are twice as long as the holotype.

Remarks. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Genus *Nodosarella* RZEHAK, 1895

Nodosarella hedbergi (CUSHMAN et RENZ, 1946)

(pl. 26: 9, 10)

1946. *Nodosarella hedbergi* CUSHMAN et RENZ: 42, pl. 7: 1 (*fide* ELLIS and MESSINA, Cat. of Foram.).

Material. — Five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46222/88/F	46223/88/F	46224/88/F
length	0.840	0.768	0.624
width	0.312	0.240	0.192

Description. — Test elongated, straight, gradually increasing in width. Large spherical initial chamber is followed by 3 alternating very poorly convex wedge-shaped chambers, then by 3 to 4 chambers of nodosarid type which are strongly convex and wider than high. The youngest chamber small, hemispherical, over — lapping the preceding chamber. Sutures oblique, poorly depressed in the initial part, later perpendicular to the length axis of the test. They are strongly depressed, straight and parallel to each other between chambers of nodosarid type. Aperture developed as slightly arched slit at the top of the youngest chamber.

Variability. — Variability is low and concerns height of chambers. In most cases chambers are wider than high, but the penultimate chamber can be higher than wide. The ultimate chamber always small, hemispherical, over lapping the preceding one.

Remarks. — The investigated specimens differ from the holotype in being two times shorter and in the size of ultimate chamber which is two, or even three, times smaller than the penultimate one. Some of the specimens from Trinidad have the final chamber only slightly smaller than the preceding one. The specimens illustrated by HILLEBRANDT (1962, pl. 7: 11—13) as *Nodosarella hedbergi* CUSHMAN et RENZ seem to differ from the holotype in test outline and in unequal increase in size of chambers, as well as in very variable size of the last chamber.

Distribution. — Poland — upper Campanian-lower Maastrichtian (Lublin Chalk). Trinidad — Paleocene and lower Eocene (Lizard Spring Formation).

Nodosarella subnodosa (GUPPY, 1894)

(pl. 26: 5)

1894. *Ellipsoidina subnodosa* GUPPY: 650, pl. 41: 12 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1956. *Nodosarella subnodosa* (GUPPY); SAID and KENAWY: 146, pl. 4: 31.
1962. *Nodosarella subnodosa* (GUPPY); HILLEBRANDT: 97, pl. 7: 14, 16.
1970. *Ellipsoidella subnodosa* (GUPPY); NEAGU: 73, pl. 31: 16 (with synonymy).

Material. — Eight well preserved specimens.

Dimensions (in mm):

IG Nos.:	46225/88/F	46226/88/F	46227/88/F
length	1.224	1.052	0.432
width (of the last chamber)	0.360	0.192	0.192

Description. — Test elongated, gradually and slightly increasing in width with growth. Outline of the test incised, surface smooth and shinning, finely, densely and equally perforated. Chambers and sutures poorly visible in the initial part of the test. Other chambers, which are 4 or 5, nearly spherical; the youngest one is dome-like, sometimes higher than the preceding one. Sutures parallel to one another and strongly depressed. Aperture subterminal situated on the top of the last chamber developed as an arched slit with a lip.

Variability. — It is expressed mainly in chamber convexity and degree of suture depression. Most probably, both microspheric and megalospheric forms are present in the investigated material. Some of them have the initial part of the test rounded while others have it narrowed.

Remarks. — The investigated specimens differ from the holotype in pattern of the test widening with growth, in less numerous chambers and in nonprotruding lip. Forms described by CUSHMAN (1946: 137, pl. 56: 30, 31) as *Ellipsonodosaria subnodosa* (GUPPY) belong perhaps to *Ellipsoglandulina manifesta* FRANKE, 1928. The specimens most closely similar to the holotype are those described by SAID and KENAWY (1956) from Egypt and by NEAGU (1970) from Romania. However, all specimens reffered to in the synonymy badly need revision based on topotypes as no author refers to the initial part of the test.

Distribution. — Poland — Campanian-Maastrichtian. Romania — Campanian, Maastrichtian. Germany — Paleocene. Egypt — Paleocene.

Nodosarella suturicostata GAWOR-BIEDOWA, 1992
(pl. 26: 4)

1992. *Nodosarella suturicostata* GAWOR-BIEDOWA: 85, pl. 3: 1.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46228/88/F	46229/88/F	46230/88/F
length	1.008	0.720	0.384
width (of the last chamber)	0.120	0.120	0.096

Remarks. — For variability and remarks see GAWOR-BIEDOWA (1992).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Perhaps also Australia — Campanian.

Genus *Pleurostomella* REUSS, 1860
Pleurostomella pseudocurta NEAGU, 1970
(pl. 26: 6, 7)

1970. *Pleurostomella pseudocurta* NEAGU: 72, pl. 30: 10—22.

Material. — Twenty seven well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46175/88/F	46176/88/F	46177/88/F
length	0.600	0.504	0.384
width	0.168	0.192	0.144

Variability. — It is small and expressed in degree of chamber and suture visibility as well as in test proportions. Test consists only of biserial part. Chambers very poorly convex, in some specimens chamber surface entirely flat. In the last case, sutures are poorly translucent and flat. In specimens with slightly convex chamber surface sutures are poorly depressed.

Remarks. — Specimens from Poland most closely resemble paratypes illustrated by NEAGU (1970, pl. 30: 20, 22). They differ only in smaller size. The Polish specimens are two times smaller than the holotype and have no strongly convex spherical chambers arranged nearly uniserially.

Distribution. — Poland — upper Campanian-lower Maastrichtian. Romania (Eastern Carpathians) — Campanian.

Pleurostomella subnodosa Reuss, 1860

(pl. 26: 15)

1860. *Pleurostomella subnodosa* Reuss: 204, pl. 8: 2.
1960. *Pleurostomella subnodosa* Reuss; Belford: 70, pl. 19: 3—5.
1964. *Pleurostomella subnodosa* Reuss; Loeblich and Tappan: C 725, fig. 594, 1.
1966. *Pleurostomella subnodosa* Reuss; Hofker: 40, pl. 5: 28.
1968. *Pleurostomella subnodosa* Reuss; Sliter: 110, pl. 19: 10 (with synonymy).
1986. *Pleurostomella subnodosa* Reuss; Yasuda: 85, pl. 11: 16a, b.

Material. — Thirty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46178/88/F	46179/88/F	46180/88/F
length	0.744	0.696	0.432
width	0.312	0.192	0.192

Variability. — Variability concerns a test size, degree of visibility and length of biserial part of the test (1/4 to 1/3 of the test length), convexity of cuneate chambers in the uniserial part of the test (usually slightly convex, more rarely strongly convex), degree of depression of oblique sutures which depends on chamber convexity and size of the youngest chamber, which can be larger or considerably smaller than the preceding one. Uniserial part consists usually of 3 chambers; specimens having 2 and 4 chambers are rare.

Remarks. — Our specimens differ from Reuss's specimen from Westphalia (Reuss 1860) in smaller size (Reuss's specimen is 0.892 mm long and 0.219 mm wide). All other characters are nearly identical. Specimen described by Reuss (1851) as *Dentalina subnodosa*, and derived from the Lwów Chalk, most probably do not represent the genus *Pleurostomella* as supposed by Reuss (1860) as illustrations and description (Reuss 1851: 24, pl. 1: 9) show that they are uniserial, with the youngest chamber nearly spherical with an aperture situated almost at the top of the test.

Distribution. — Poland — Campanian-Maastrichtian. Europe — Maastrichtian. USA — Upper Cretaceous. Mexico — Campanian-Maastrichtian. Australia — Santonian-Campanian. Japan — Santonian-Campanian.

Pleurostomella wadowicensis Grzybowski, 1896

(pl. 26: 14)

1896. *Pleurostomella wadowicensis* Grzybowski: 290, pl. 10: 1.
1959. *Pleurostomella wadowicensis* Grzybowski; Liszkowa: 72, pl. 4: 1 (with synonymy).
1981. *Pleurostomella wadowicensis* Grzybowski; Liszka and Liszkowa: 183, pl. 4: 7.
1984. *Pleurostomella wadowicensis* Grzybowski; Liszkowa and Morgiel: 281, pl. 130: 1, 2.

Material. — Five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46181/88/F	46182/88/F	46183/88/F
length	1.008	0.984	1.080
width	0.385	0.384	0.456

Variability. — Intraspecific variability is expressed in degree of narrowing of the initial part of the test, which is associated with the type of generation. Independent of this narrowing, the initial part of the test is always rounded. Variability concerns also degree of chamber convexity and suture depression. In all cases, however, chamber surface is poorly convex, sutures slightly depressed or flat.

Remarks. — Specimens from the Lublin Chalk displaying narrowed initial part of the test are entirely consistent with the holotype.

Distribution. — Poland (Carpathians) — upper Campanian-Maastrichtian (Lublin Chalk). Europe, North America — Upper Cretaceous.

Subfamily **Pazdroellinae** GAWOR-BIEDOWA, 1987
Genus *Pazdroella* GAWOR-BIEDOWA, 1987
Pazdroella olgae GAWOR-BIEDOWA, 1987
(pl. 27: 19)

1987. *Pazdroella olgae* GAWOR-BIEDOWA: 60, pl. 23: 7, pl. 24: 4, pl. 26: 5.

Material. — Fifteen variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46231/88/F	46232/88/F	46233/88/F
length	1.080	0.840	0.480
width (of the last chamber)	0.360	0.360	0.216

Remarks. — For variability and remarks see GAWOR-BIEDOWA (1987).
Distribution. — Poland: borehole Telatyn IG 1 and Tyszowce IG 1 — lower Maastrichtian (Lublin Chalk).

Genus *Triaperturina* GAWOR-BIEDOWA, 1987
Triaperturina polonica GAWOR-BIEDOWA, 1987
(pl. 27: 11a, b)

1987. *Triaperturina polonica* GAWOR-BIEDOWA: 61, pl. 27: 3a, b.

Material. — Three well preserved specimens.

Dimensions (in mm):

	Paratypes	
IG Nos.:	45636A/85/F	45636B/87/F
length	0.960	1.080
width (of the last chamber)	0.120	0.120

Remarks. — For remarks and comparisons see GAWOR-BIEDOWA (1987).
Distribution. — Poland — lower Maastrichtian (Lublin Chalk).

Genus *Quadriaperturina* GAWOR-BIEDOWA, 1987
Quadriaperturina varsoviensis GAWOR-BIEDOWA, 1987
(pl. 27: 12a, b)

1987. *Quadriaperturina varsoviensis* GAWOR-BIEDOWA: 62, pl. 27: 4a, b.

Material. — Three well preserved specimens.

Dimensions (in mm):

IG Nos.:	45637B/88/F
length	1.536
width	0.552

Remarks. — The original description should be supplemented by observation that the initial part of the test is covered with root-like outgrowths. They were probably used by the animal to fix to the substrate.
Distribution. — Poland: Lublin Upland (borehole Telatyn IG 1), Białystok region, (Mielnik Village, chalk-pit near the market square) — lower Maastrichtian.

Superfamily **Discorbacea** EHRENBERG, 1838
Family **Bagginidae** CUSHMAN, 1927
Subfamily **Bagginidae** CUSHMAN, 1927
Genus *Valvulineria* CUSHMAN, 1926
Valvulineria laevis BROTZEN, 1940
(pl. 28: 1, 2)

1940. *Valvulineria laevis* BROTZEN: 32, text-fig. 7: 1a, b, c.
1961. *Valvulineria laevis* BROTZEN; VASSILENKO: 46, pl. 8: 4a, b, w.
1966. *Valvulineria (Gyroidinoides) laevis* BROTZEN; HOFKER: 185, pl. 32: 59.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46234/88/F	46235/88/F	46236/88/F
longest diameter	0.504	0.480	0.384
shortest diameter	0.432	0.432	0.336
height	0.288	0.264	0.192

Variability. — Intraspecific variability is very low. It is expressed in the test size (see dimensions) and degree of convexity of the ventral side, in comparison with the dorsal one. Usually test is equally biconvex, but, sometimes the dorsal side may be nearly flat, and ventral one convex.

Remarks. — The investigated specimens differ from the holotype in nearly invisible septal suture on both test sides, and in more narrow test periphery. In the latter feature they differ also from the specimens of this species from Mangyshlak. Forms presented by HOFKER (1966) differ from the holotype and from the Polish specimens in having nearly circular test outline, rounded test periphery and strongly depressed septal and spiral sutures. A large flap of the final chamber covers the entire umbilicus in the same way in Polish specimens as it does in the Swedish ones. Our species is most closely related to *V. lenticula* (REUSS), from which it differs in larger size, wider base of apertural surface, slightly concave apertural surface and in the large umbilical flap which covers all the umbilicus.

Distribution. — Poland — Campanian-Maastrichtian. Sweden — Maastrichtian-Danian. USSR: Mangyshlak, Russian Platform, Near-Caspian Depression — Santonian-Maastrichtian.

Family **Eponididae** HOFKER, 1951
Subfamily **Eponidinae** HOFKER, 1951
Genus *Eponides* de MONTFORT, 1808
Eponides biconvexus MARIE, 1941
(pl. 28: 3, 4, 5)

1941. *Eponides biconvexa* MARIE: 224, pl. 34: 324a—c.
1975*b*. *Eponides biconvexa* MARIE; VAPTZAROVA: 60, pl. 1: 19—21 (with synonymy).
1979. *Eponides biconvexus* MARIE; KAPTARENKO-TSHERNOUSOVA *et al.*: 116, pl. 43: 11a, b, 12 (with synonymy).

Material. — Fifty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46237/88/F	46238/88/F	46239/88/F
diameter	0.384	0.264	0.168
thickness	0.216	0.144	0.090

Variability. — It is expressed in the test size, degree of visibility of whorls on the dorsal side, in number of chambers in the final whorl (7—8), in visibility of sutures on the ventral side and in size of the umbilical boss. Only in some rare specimens chambers of the final

whorl touch each other in the umbilical area, thus covering the very narrow umbilicus. In most specimens the umbilical boss merges with umbilical parts of chambers. This boss occupies 1/3 or 1/4 of the test diameter.

Remarks. — The investigated specimens are consistent with the holotype. Differences concern the less discernible whorls on the dorsal side of the test and size of specimens, but are within the variability range.

Distribution. — Poland — Campanian — Maastrichtian. France — Campanian. USSR — Coniacian-Maastrichtian.

Eponides concinna BROTZEN, 1936
(pl. 28: 6, 7)

1936. *Eponides concinna* BROTZEN: 167, pl. 12: 4a—c.
1978. *Eponides concinnus* BROTZEN: VAPTZAROVA: 62, pl. 2: 7, 8, 9.
1979. *Eponides concinnus* BROTZEN; KAPTARENKO-TSHERNOUSOVA *et al.*: 117, pl. 44: 1a—w (with synonymy).
1980. *Eponides concinna* BROTZEN; GAWOR-BIEDOWA: 32, pl. 5: 6—8.
1981. *Eponides concinna* BROTZEN; HART *et al.*: 190, pl. 7. 9: 6, 7.

Material. — More than two hundred variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46240/88/F	46241/88/F	46242/88/F
diameter	0.336	0.288	0.264
height	0.192	0.168	0.144

Variability. — It is expressed in number of chambers in the final whorl (6 to 8), degree of chamber convexity and depression of sutures on the ventral side, as well as in the test symmetry. In the investigated material there are specimens nearly equally biconvex, others with poorly convex dorsal side and strongly convex ventral one, as well as such which have nearly flat dorsal side and strongly convex ventral one. Variability also concerns degree of petaloidal incision of the test outline.

Remarks. — The investigated specimens agree with BROTZEN's (1936) description given for the holotype. They are larger than the specimens from the Sudetes (GAWOR-BIEDOWA 1980). Specimens of this species are most closely related with the specimen described as *Eponides concinnus* BROTZEN var. *plana* VASSILENKO, 1961. Our specimens differ from this variety in less numerous chambers in the final whorl (6—8 instead 8—10), in round (and not oval) test outline and in the absence of a boss — like infilling of the umbilicus.

Distribution. — Poland — Upper Turonian-Upper Maastrichtian, Sudetes (Nysa Trough) — Upper Turonian-Lower Coniacian. Sweden — Senonian, USSR — Upper Turonian-Santonian. Bulgaria — Santonian. England — Santonian and Campanian.

Eponides dorsoconvexus GAWOR-BIEDOWA, 1992
(pl. 28: 8, 9, 10)

1992. *Eponides dorsoconvexus* GAWOR-BIEDOWA: 86, pl. 3: 2, 4.

Material. — Fifty five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46243/88/F	46244/88/F	46245/88/F
diameter	0.240	0.216	0.144
height	0.120	0.120	0.096

Remarks. — In size and planoconvex test shape it resembles *Discorbis supracretacea* SCHIJFSMA, 1946. It differs from that species in having chambers on the dorsal side invisible,

except for those of the final whorl, in the absence of umbilical boss on the ventral side, in the final whorl turned inside out (as a hat margin), and in slightly higher number of chambers in the final whorl (7—9 instead of 7—8).

Distribution. — Poland — Campanian-lower Maastrichtian (Lublin Chalk).

Eponides frankei BROTZEN, 1940
(pl. 30: 9, 10, 11)

1940. *Eponides frankei* BROTZEN: 32, pl. 8: 3a—c.
1946. *Eponides beisseli* SCHIJFSMA: 84, pl. 4: 13a—c.
1957. *Eponides beisseli* SCHIJFSMA; HOFKER: 382, text-fig. 427a—c.
1962. *Eponides beisseli* (WHITE); EBENSBERGER: 92, pl. 9: 2.
1965. *Eponides frankei* BROTZEN; POŻARYSKA: 109, pl. 21: 2a—c (with synonymy).
1966. *Eponides beisseli* SCHIJFSMA; HOFKER: 63, pl. 10: 105, 77, pl. 13: 56.
1966. *Eponides beisseli forma primitiva* HOFKER: 43, pl. 6: 57.
1966. *Eponides frankei* BROTZEN; HOFKER: 94, pl. 16: 48, 122, pl. 18: 18, 149, pl. 23: 112.
1975*b*. *Eponides frankei* BROTZEN; VAPTZAROVA: 61, pl. 1: 22, 23, 24.
1979. *Eponides frankei* BROTZEN; KAPTARENKO-TSHERNOUSOVA *et al.*: 117, pl. 44: 4a—b (with synonymy).
1981. *Eponides beisseli* SCHIJFSMA; HART *et al.*: 190, pl. 7. 9: 4, 5.
1985. *Eponides beisseli* SCHIJFSMA; ROBASZYNSKI *et al.*: pl. 5: 6.

Material. — Fifty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46246/88/F	46247/88/F	46248/88/F
diameter	0.960	0.695	0.408
height	0.624	0.408	0.240

Variability. — It is expressed in size, proportions of the test (both sides equally strongly biconvex or the ventral side less convex than the dorsal side), in presence or absence of a narrow umbilical depression on the ventral side, in number of chambers in the final whorl (6—8), in degree of visibility of whorls and chambers in the final whorl of the dorsal side, as well as in chamber convexity and degree of suture depression on the ventral side. In large specimens with more convex dorsal side, such as the BROTZEN's holotype (1940, pl. 8: 3a—c), whorls are invisible on the dorsal side due to a considerable thickening of the test wall. Three to five youngest chambers of a very narrow final whorl are only visible. Chambers are slightly convex in these specimens on the ventral side, and sutures poorly depressed. Inner whorls are slightly translucent on the dorsal side in smaller specimens, and all chambers are visible in the final whorl on the dorsal side of the test, similarly as in the specimens described by SCHIJFSMA (1946) under the name *Eponides beisseli* SCHIJFSMA.

Remarks. — Some specimens in the investigated material are entirely consistent with the holotype, others differ in presence of a narrow slit-like umbilicus on the ventral side, in poorly visible whorls on the dorsal side, smaller test size; but all these features are well within the variability range known for this species. Specimens of our species have been described under various names (see synonymy). Lack of comparative material prevents from deciding if the investigated material is conspecific with *Gyroidina beisseli* WHITE, 1928. If it is, then, according to the priority rule, it should bear the name *Eponides beisseli* (WHITE). It is worth of noting that both WHITE (1928) and SCHIJFSMA (1946) included *Rotalia* sp. (BEISSEL 1891; 73, pl. 14: 20—24) into the synonymy of their species. EBENSBERGER (1962) considered *Gyroidina beisseli* WHITE and *Eponides beisseli* SCHIJFSMA as conspecific. HOFKER (1966: 94) supposed that *Eponides frankei* BROTZEN is the youngest (in stratigraphic sense) form of the *Eponides beisseli* SCHIJFSMA group. All these data seem to indicate that the discussed forms represent one species on various phylogenetic stages of development. In fact the author is nearly convinced that this species should bear the name *Eponides beisseli* (WHITE).

Distribution. — Poland — Campanian-lower Maastrichtian. Sweden — Maastrichtian, Danian. Germany, Denmark — Campanian, Maastrichtian. USSR — Campanian-Danian. Bulgaria — Santonian, Campanian. England — upper Campanian — lower Maastrichtian. Belgium (Limburg), Netherlands — Campanian-Maastrichtian.

Eponides karsteni (REUSS, 1855)
(pl. 28: 11, 12, pl. 30: 14)

1855. *Rotalia karsteni* REUSS: 273, pl. 9: 6 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1941. *Eponides monterelensis* MARIE: 224, pl. 34: 325a—c.
1961. *Eponides karsteni* (REUSS); VASSILENKO: 77, pl. 13: 2a, b, w, 3a, b, w.
1961. *Eponides monterelensis* MARIE; AKIMEZ: 127, pl. 12: 2a, b, w.
1970. *Eponides monterelensis* MARIE; NEAGU: 70, pl. 29: 6—8.
1972*b*. *Eponides karsteni* (REUSS); VOLOSHINA: pl. 5: 3.

Material. — Eighty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46249/88/F	46250/88/F	46251/88/F
diameter	0.240	0.192	0.168
height	0.120	0.120	0.090

Variability. — It is expressed in the test size, symmetry of the test, degree of convexity of the dorsal side (more convex than the ventral one, both equally convex, or less convex than the ventral one), in degree of visibility of whorls on the dorsal side (spiral and septal sutures usually well visible and flat), in number of whorls on the dorsal side (3 to 3 and 1/2), in width of whorls (they gradually and proportionally increase in size with growth, the final whorl can be, however, much wider than the preceding one), in degree of incision of the test outline, and especially in number of chambers in the final whorl (4—8). Chambers in the specimens with smaller number of chambers in the final whorl are petaloidal, and those with higher number have the more trapezoidal shape. Ventral side of the test is more densely covered with pores than the dorsal one.

Remarks. — High intraspecific variability of this very characteristic species resulted, most probably, in erecting the species *Eponides monterelensis* MARIE, 1941 for the specimens with petaloidal chambers on the ventral side. They fall, however, into the variability range of *Eponides karsteni* (REUSS).

Distribution. — Poland — upper Turonian-Maastrichtian. Germany — Turonian-Emsherian. France — Campanian. Romania — Campanian-lower Maastrichtian. USSR — Turonian-Maastrichtian.

Superfamily **Discorbinellacea** SIGAL, 1952
Family **Parrelloididae** HOFKER, 1956
Genus *Cibicidoides* THALMANN, 1939
Cibicidoides bembix (MARSSON, 1878)
(pl. 29: 1, 2, pl. 30: 13)

1878. *Discorbina bembix* MARSSON: 167, pl. 5: 37a—d.
1972. *Gavelinopsis bembix* (MARSSON); HANZLIKOVÁ: 86, pl. 20: 12 (with synonymy).
1979. *Cibicidoides bembix* (MARSSON); KAPTARENKO-TSHERNOUSOVA *et al.*: 122, pl. 46: 5a, b, w (with synonymy).
1984. *Cibicidoides bembix* (MARSSON); GAWOR-BIEDOWA and WITWICKA: 253, pl. 96: 1, 2, 3.
1985. *Gavelinopsis bembix* (MARSSON); LISZKOWA and MORGIEL: pl. 2: 8.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46252/88/F	46253/88/F	46254/88/F
diameter	0.360	0.288	0.240
height	0.168	0.144	0.120

Variability. — It is expressed mainly in size of a boss, especially on the umbilical side and in degree of sutures thickening on the spiral (dorsal) side, as well as in number of chambers in the final whorl (9—11).

Remarks. — It resembles most closely to *Cibicides bembix* (MARSSON) var. *kasahstanica* NECKAJA, 1948, from the Upper Santonian of Kazakhstan (USSR) differing from the latter subspecies in having more convex umbilical side of the test, in not lobated, smooth and rounded test periphery and in flat chamber surface on the umbilical side.

Distribution. — Poland: Polish Lowlands, Carpathians — Maastrichtian. Germany (north-western part), Belgium, Netherlands, USSR — Maastrichtian. Czechoslovakia: Moravia — Campanian-Maastrichtian.

Cibicidoides commatus (VASSILENKO, 1954)

(pl. 31: 8—10)

1954. *Cibicides (Cibicidoides) commatus* VASSILENKO: 158, pl. 26: 2a, b, w.
1965. *Cibicides commatus* MOROZOVA: POŻARYSKA: 130, pl. 27: 3a—c.
1974. *Cibicides commatus* MOROZOVA; SZCZECHURA and POŻARYSKA: 91, pl. 21: 4, 5.

Material. — Over a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46402/88/F	46403/88/F	46404/88/F
diameter	0.792	0.528	0.456
height	0.240	0.264	0.240

Variability. — Variability is expressed in degree of convexity of both test sides (either umbilical or spiral side is more convex), size of boss, and degree of thickening of sutures on the spiral side. Chamber surface on the spiral side is covered with densely distributed pores; they are larger on the spiral than on the umbilical side. On the umbilical side there is a small boss. Septal sutures are poorly curved and depressed.

Remarks. — It differs from *C. involutus* in the presence of a large boss on the spiral side of the test, which is surrounded by sutures thickening in the form of nodes in a umbilical part, in less convex umbilical side and in subarcuate periphery. For comparisons with other species see POŻARYSKA (1965) and POŻARYSKA and SZCZECHURA (1974). The species *Cibicides (Cibicidoides) commatus* has been erected by VASSILENKO (1954) and not by MOROZOVA, as only VASSILENKO's publication fulfill the rules of ICZN (art. 80).

Distribution. — Poland: Polish Lowlands — uppermost upper Maastrichtian-Paleocene; Carpathians — Paleocene. USSR: Russian Platform — uppermost upper Maastrichtian, Danian. Probably also Austria (Alps), Denmark, Italy, England — Upper Cretaceous-Paleocene.

Cibicidoides eriksdalensis (BROTZEN, 1936)

(pl. 29: 6, 7, 8)

1936. *Cibicides (Cibicidoides) eriksdalensis* BROTZEN: 193, pl. 14: 5a—c, text-fig. 69.
1968. *Gavelinella eriksdalensis* (BROTZEN); SLITER: 123, pl. 23: 6 (with synonymy).
1974. *Cibicides eriksdalensis* BROTZEN; GORBENKO: 48, pl. 7: 6a—w (with synonymy).
1976. *Gavelinella eriksdalensis* (BROTZEN, 1936); MALUMIAN and MASIUK: 199, pl. 1: 12a—c.

Material. — Over a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46255/88/F	46256/88/F	46257/88/F
diameter	0.360	0.336	0.288
height	0.216	0.144	0.120

Variability. — It is expressed mainly in various degree of convexity of both test sides (see BROTZEN 1936: 193—194), and in various degree of convexity of septal sutures on the dorsal side of the test. The sutures can be entirely flat, nearly invisible or limbate and slightly elevated above the test surface.

Remarks. — Specimens from Poland are entirely consistent with the holotype. That species displays mostly characters of the genus *Cibicidoides* into which it is here included. In no case does it belong to the genus *Gavelinella* as assigned by SLITER (1968) and MALUMIAN and MASIUK (1976) and NYONG and OLSSON (1984: 473). An aperture in this species extends on the evolute, i.e. dorsal, side of the test. There is opposite situation in the genus *Gavelinella*.

Distribution. — Poland: Polish Lowlands — Coniacian-Maastrichtian. Sweden — lower Senonian. USSR — Coniacian-Maastrichtian. USA, Mexico — Campanian, Maastrichtian. Australia — common in Santonian-Campanian. Argentina — Upper Cretaceous.

Cibicidoides involutus (REUSS, 1851)

(pl. 29: 3, 4, 5)

1851. *Rotalina involuta* REUSS: 35, pl. 2: 14
1928. *Truncatulina involuta* REUSS; FRANKE: 177, pl. 16: 4a—c.
1941. *Cibicides voltziana* (ORBIGNY) var. *denticula* MARIE: 248, pl. 37: 348a—c, 349.
1950. *Cibicides aktulagayensis* VASSILENKO; VASSILENKO: 213, pl. 6: 1a, b, w.
1954. *Cibicides (Cibicidoides) aktulagayensis* VASSILENKO; VASSILENKO: 152, pl. 25: 1, 2 (a, b, w).
1957. *Gavelinopsis complanata* (REUSS); HOFKER: 324, text-fig. 372, 373, 374.
1961. *Cibicidoides aktulagayensis* VASSILENKO; WITWICKA: 132, pl. 6: 11.
1974. *Cibicides aktulagayensis* VASSILENKO; GORBENKO: 49, pl. 7: 8a, b, w.
1979. *Cibicidoides involutus* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 123, pl. 47: 1a, b, w.
1984. *Cibicidoides involutus* (REUSS); GAWOR-BIEDOWA and WITWICKA: 253, pl. 97: 1—3.

Material. — More than three hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46258/88/F	46259/88/F	46260/88/F
diameter	0.720	0.624	0.360
height	0.360	0.264	0.168

Variability. — It is expressed in number of chambers in the final whorl (9—11), degree of perforation of chamber walls, width of sutures on the spiral side, in the presence of a hook-like thickening, or of a broad and low boss in the center of the spiral side, and in a degree of convexity of umbilical side of the test in relation to the spiral one.

Remarks. — Various species and subspecies included into the synonymy fell within the limits of intraspecific variability.

Distribution. — Poland — Campanian-Maastrichtian. France — Campanian-Maastrichtian. Netherlands, Germany (north-western part) — Maastrichtian. Switzerland — lower upper Campanian. USSR: Russian Platform, near Black Sea Depression, Caucasus, Crimea, Powolzhe, Emba area, Mangyshlak Peninsula, western Siberia — Campanian-Maastrichtian. According to GORBENKO (1974: 49) this species occurs from the upper part of the upper Santonian to Maastrichtian in the area of Donbas and Dnepro-Donetz Basin while KAPTARENKO-TSHERNOUSOVA *et al.* (1979: 123) indicate its range from Campanian to Maastrichtian for the same region.

Cibicidoides voltzianus (d'ORBIGNY, 1840)
(pl. 29: 9, 10, 11)

1840. *Rotalina voltziana* d'ORBIGNY: 31, pl. 2: 32—34.
1946. *Cibicides voltziana* (d'ORBIGNY); SCHIJFSMA: 102, pl. 5: 6a—c (with synonymy).
1961. *Cibicidoides spiropunctata* (GALLOWAY et MORREY); WITWICKA: 133, pl. 6: 12.
1970. *Cibicidoides spiropunctatus* (GALLOWAY et MORREY); MJATLIUK: 141, pl. 56: 7a, b, w.
1974. *Cibicides spiropunctatus* GALLOWAY et MORREY; GORBENKO: 49, pl. 8: 2a, b, w (with synonymy).
1974. *Cibicides voltzianus* (d'ORBIGNY); GORBENKO: 49, pl. 8: 3a, b, w (with synonymy).
1979. *Cibicidoides voltzianus* (d'ORBIGNY); KAPTARENKO-TSHERNOUSOVA *et al.*: 124, pl. 47: 3a, b, w (with synonymy).
1981. *Cibicidoides* (?) *voltzianus* (d'ORBIGNY); HART *et al.*: 184, pl. 7. 6: 4—6.
1984. *Cibicidoides voltzianus* (d'ORBIGNY); GAWOR-BIEDOWA and WITWICKA: 254, pl. 97: 4—6.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46261/88/F	46262/88/F	46263/88/F
diameter	0.840	0.788	0.720
height	0.360	0.312	0.264

Variability. — Variability is high and concerns degree of convexity of umbonal side, size of pores on the spiral side (the last feature was the basis for erecting the species *Cibicides spiropunctatus* GALLOWAY et MORREY), size of boss on the spiral side, presence or absence of small depressions on the spiral side.

Remarks. — *Cibicides voltzianus* var. *plana* SCHIJFSMA (having flat spiral side, finer perforation on chamber surface on the spiral side and less rounded test periphery) is much less common in the investigated area of Poland than *Cibicidoides voltzianus* (d'ORBIGNY).

Distribution. — Poland — Campanian-Maastrichtian, rarely Danian. France, Sweden, Mexico — upper Senonian. Netherlands, Germany, England — upper Campanian-lower Maastrichtian. USSR — Campanian-Danian. Eastern Carpathians — Danian.

Superfamily **Nonionacea** SCHULTZE, 1854
Family **Nonionidae** SCHULTZE, 1854
Subfamily **Pulleniinae** SCHWAGER, 1877
Genus *Pullenia* PARKER et JONES, 1862
Pullenia cretacea CUSHMAN, 1936
(pl. 30: 1, 2)

1936a. *Pullenia cretacea* CUSHMAN: 75, pl. 13: 8.
1946. *Pullenia cretacea* CUSHMAN: SCHIJFSMA: 91, pl. 5: 9a—c.
1959. *Pullenia cretacea* CUSHMAN; LISZKOWA: 76, pl. 4: 8.
1960. *Pullenia cretacea* CUSHMAN: BELFORD: 88, pl. 24: 13—15.
1968. *Pullenia cretacea* CUSHMAN; SLITER: 115, pl. 21: 2.
1966. *Pullenia cretacea* CUSHMAN; HOFKER: 75, pl. 13, 63, 64.
1970. *Pullenia cretacea* CUSHMAN; NEAGU: 75, pl. 33: 7—8 (with synonymy).
1972. *Pullenia cretacea* CUSHMAN; HANZLIKOVÁ: 125, pl. 36: 5.
1984. *Pullenia cretacea* CUSHMAN; LISZKOWA and MORGIEL: 283, pl. 130: 9.
1984. *Pullenia cretacea* CUSHMAN; OLSSON and NYONG: pl. 6: 3.

Material. — Fifty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46264/88/F	46265/88/F	46266/88/F
diameter	0.288	0.240	0.204
height	0.264	0.240	0.168

Variability. — It is expressed in size of specimens, degree of bilateral compression of the test (some tests are spherical as wide as high the other are slightly compressed), in degree of

chamber convexity (slightly convex or entirely flat surface) and in depression of sutures (poorly depressed or flat).

Remarks. — The specimens under discussion differ from the holotype in more spherical test, less depressed sutures and non-lobate test periphery. Spherical test resemble *Pullenia coryelli* WHITE, from which they differ in less numerous chambers in the final whorl (5 and not 6—7). From *Nonionina quaternaria* REUSS, 1851 *recte P. quaternaria* (REUSS) from the Maastrichtian of the Lvov Chalk they differ in the number of chamber in the final whorl (5 instead of 4), in round, weakly lobate test outline and in smaller size. For the first time *P. cretacea* have been found in Europe by SHIJFSMA (1946) in the upper Campanian (upper Hervian) of the southern Limburg, near Maastricht.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian; Carpathians — Senonian. Cosmopolitan species which occurs in the Upper Cretaceous deposits of Europe, North and South America and Australia.

Pullenia jarvisi (CUSHMAN, 1936)
(pl. 30: 3, 4)

1928. *Pullenia quinqueloba* (REUSS); FRANKE: 194, pl. 18: 13a, b.
1936. *Pullenia jarvisi* CUSHMAN: 77, pl. 13: 6.
1941. *Pullenia jarvisi* CUSHMAN; MARIE: 232, pl. 35: 334a—b.
1946. *Pullenia jarvisi* CUSHMAN; CUSHMAN: 147, pl. 60: 15a, b.
1957. *Pullenia quaternaria* (REUSS); HOFKER: 430, text-fig. 486.
1964. *Pullenia jarvisi* CUSHMAN; MARTIN: 76, pl. 8: 8a, b.
1968. *Pullenia jarvisi* CUSHMAN; SLITER: 115, pl. 21: 3.
1970. *Pullenia jarvisi* CUSHMAN: NEAGU: 75, pl. 33: 1—2.
1984. *Pullenia jarvisi* CUSHMAN; OLSSON and NYONG: pl. 3: 7—9.

Material. — Twenty-five variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46267/88/F	46268/88/F	46269/88/F
diameter	0.528	0.456	0.264
height	0.384	0.360	0.144

Variability. — It is low and expressed in test size, degree of chamber convexity, in depression of sutures and corresponding degree of lobation of the test outline.

Remarks. — The specimens studied differ from the holotype in less convex chambers, in less depressed sutures, and corresponding to less lobate test outline and in absence of clear umbilical depression on both test sides. They differ from *P. cretacea* CUSHMAN in stronger bilateral flattening, more convex chambers, more clearly curved and more depressed sutures and the lobation of the test periphery. The specimens described by HOFKER (1957) as *P. quaternaria* (REUSS) display all features of the species under discussion. They differ from *Nonionina quaternaria* REUSS *recte P. quaternaria* (REUSS) mostly in more numerous chambers in the final whorl (6 instead of 4), more bilaterally flattened test, more convex chambers and more depressed sutures, in different test outline and clearly marked umbilical depression on both test sides. FRANKE (1928) assigned specimens of this species to the Eocene species *P. quinqueloba* (REUSS).

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk). Netherlands — Maastrichtian. Germany — upper Senonian. France — Campanian. Romania: Eastern Carpathians — Campanian-Maastrichtian. North and South America — Upper Cretaceous.

Superfamily **Chilostomellacea** BRADY, 1881
Family **Chilostomellidae** BRADY, 1881
Subfamily **Chilostomellinae** BRADY, 1881
Genus *Allomorphina* REUSS, 1849
Allomorphina polonica sp. n.
(pl. 31: 5a, b, 6, 7)

Holotype: Specimen IG No. 46277/88/F, in pl. 31: 5a, b.
Paratypes: Specimen IG Nos. 46278/88/F, 46279/88/F, in pl. 31: 6, 7.
Type horizon: Lower Maastrichtian.
Type locality: Telatyn IG 1, depth 236 m.
Derivation of the name: From my motherland Poland.

Diagnosis. — Test ovoid. Initial whorls low, form pointed part of the test. Final whorl consisting of 3 chambers and forms most of the test. Aperture slit-like and elongate on the wider side of the test.

Material. — Thirty well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46277/88/F	46278/88/F	46279/88/F
length	0.528	0.480	0.240
width	0.360	0.336	0.144
thickness	0.288	0.288	0.144

Description. — Test trochospiral, smooth, shining, finaly and equally perforated with widely oval transverse section. Initial whorls very low, nearly invisible and forming very short and pointed initial part of the test. The remaining part of the test is composed of 3 chambers, which rapidly increase in length as added. Final chamber is the largest and corresponds to a half of the final whorl. Chamber surface flat or very poorly convex. Sutures straight, poorly depressed or invisible and obliquely oriented in relation to the length axis of the test. Apertural surface of the ultimate chamber slightly convex, corresponds to the test summit and reaches half of the test length. Aperture slit-like and elongate, oriented slightly obliquely to the vertical test axis on the wider test side at the mid-length. It extends at the base of the apertural surface of the final chamber, along the apical part of two oldest chambers in the final whorl.

Variability. — Intraspecific variability is low and concerns only size, convexity of chambers in the final whorl, and length of the aperture.

Remarks. — *A. polonica* sp. n. differs from other species of this genus in oval shape, strongly elongated chambers in the final whorl and aperture nearly parallel to the length axis of the test.

Distribution. — Poland — Maastrichtian (Lublin Chalk).

Allomorphina trochoides (REUSS, 1845)
(pl. 27: 14, pl. 32: 13)

1845. *Globimorphina trochoides* REUSS: 36, pl. 12: 22.
1941. *Allomorphina trochoides* (REUSS); MARIE: 230, pl. 35: 331a—f (with synonymy).
1946. *Allomorphina trochoides* (REUSS) CUSHMAN et JARVIS; CUSHMAN: 145, pl. 60: 7 (with synonymy).
1969. *Globigerina trochoides* (REUSS); VOLOSHINÁ: 4, pl. 1: 1, 2, 3 (with synonymy).
1974. *Globimorphina trochoides* (REUSS); SZCZECHURA and POŻARYSKA: 94, pl. 6: 1.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46283/88/F	46284/88/F	46285/88/F
length	0.360	0.336	0.288
width	0.336	0.240	0.264
thickness	0.240	0.216	0.192

Variability. — It is high and expressed in test proportions (test spherical or cuneate), in degree of narrowing of a proximal test part (narrow and developed as a spine or slightly wider and longer, poorly rounded), as well as in size and degree of convexity of chambers in the final whorl.

Remarks. — The specimens studied differ from the holotype, and from the specimens of the same species investigated by CUSHMAN (1946), in having older whorls poorly visible, which makes them similar to the specimens described by MARIE (1941).

Distribution. — Poland: Polish Lowlands — Turonian-Maastrichtian; Carpathians — Upper Cretaceous-Eocene. Europe, Asia, Africa, America — Upper Cretaceous-Eocene.

Genus *Allomorphinella* (CUSHMAN, 1927)
Allomorphinella contraria (REUSS, 1851)
(pl. 30: 12, pl. 31: 11)

1851. *Allomorphina contraria* REUSS: 43, pl. 4: 7a, b, c.
1964. *Allomorphinella contraria* REUSS; LOEBLICH and TAPPAN: C 743, fig. 611: 2.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	46291/88/F	46292/88/F
length	0.456	0.384
width	0.360	0.312
thickness	0.360	0.288

Variability. — It is expressed in number of chambers in the final whorl (4—5), and degree of involutness of the test (last chamber occupies 2/3 or 1/2 of the test length).

Remarks. — This species is most similar to *Allomorphina cretacea* REUSS, 1851, from which it differs in being of nearly equal width and thickness, in having the youngest chamber less elongated, more numerous chambers in the final whorl, and in symmetrical orientation of the aperture on both test sides. The investigated specimens differ from the holotype only in absence of an apertural lip. Chamber periphery bordering the aperture is rounded in the material studied but does not form apertural lip.

Distribution. — Poland — upper Campanian, Maastrichtian.

Allomorphinella lublinensis sp. n.
(pl. 31: 1, 2, 3, 4)

Holotype: Specimen IG No. 46286/88/F, in pl. 31: 1.
Paratypes: Specimens IG Nos. 46287/88/F, 46288/88/F, 46289/88/F, in pl. 31: 2, 3, 4.
Type horizon: Lower Maastrichtian.
Type locality: Borehole Lublin IG 2, depth 463.0 m.
Derivation of the name: From the name of the type locality. Lublin Upland, Poland.

Diagnosis. — Test free, planispiral, involute, biconvex, more convex on the ventral side. Outline oval and weakly lobate, surface smooth, finely perforated. Aperture interiomarginal, equatorial, narrow, with a narrow lip. It is asymmetric and longer on the ventral side where it extends to the center of the test.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46286/88/F	46287/88/F	46288/88/F
length	0.432	0.480	0.360
width	0.312	0.384	0.284
thickness	0.240	0.220	0.216

Description. — Test free, planispiral and involute, poorly biconvex (slightly more convex on the ventral side). Outline oval and poorly lobate, with rounded margin. Test surface smooth, glittering, finely and evenly perforated. Both sides of the test show only final whorl consisting of 5—6 triangular chambers which rapidly increase in size as added. Last chamber is the largest one and occupies 1/3 of the whorl. Chamber surface poorly convex on both sides, nearly flat. It is slightly more convex (especially in the last chamber) on the ventral side, thus causing some asymmetry of the test. Sutures between chambers straight, translucent and poorly depressed. Aperture interiomarginal, equatorial, asymmetric, reaching the test center on the ventral side while on the dorsal one it extends to half a distance of the test margin and its center; it is narrow and located at the base of the convex apertural surface of the final chamber and supplied with a narrow lip.

Variability. — It is low and expressed in different size of specimens, degree of convexity of the youngest chamber on the ventral side, the chamber being domed or cone-shaped, as well as in degree of visibility of sutures between chambers.

Remarks. — This species differs from *Allomorphinella contraria* (REUSS) in asymmetry of test, in asymmetric aperture which is longer on the ventral side than on the dorsal one, in more numerous chambers in a whorl (5—6 instead of 3—4 in *A. contraria*), in smaller final chamber, and in weakly lobate test outline.

Distribution. — Poland: Polish Lowlands, boreholes Lublin IG 2, Telatyn IG 1 — upper Campanian-lower Maastrichtian.

Family **Quadrimorphinidae** SAIDOVA, 1981
Genus *Quadrimorphina* FINLAY, 1939
Quadrimorphina minuta (CUSHMAN, 1936)
(pl. 30: 7, 8)

1936. *Allomorphina minuta* CUSHMAN: 72, pl. 13: 3.
1949. *Allomorphina minuta* CUSHMAN: CUSHMAN: 62, pl. 11: 7 (with synonymy).
1957. *Allomorphina minuta* CUSHMAN; HOFKER: 198, text-fig. 242.
1984. *Allomorphina minuta* CUSHMAN; NYONG and OLSSON: pl. 4: 7, 8.

Material. — Ten well preserved specimens.

Dimensions (in mm):

IG Nos.:	46270/88/F	46271/88/F
length	0.168	0.144
width	0.144	0.144
thickness	0.072	0.072

Variability. — It is low and expressed in ovate or nearly circular test outline (see measurements), in umbilicus width (relatively wide or totally closed) and in the number of chambers in the final whorl (3 or 4).

Remarks. — Our specimens are nearly entirely consistent with the holotype. Most of them, however, have 4 instead of 3 chambers in the final whorl, which makes the difference with the holotype. This feature makes them close to the specimens of *Q. minuta* as illustrated by NEAGU (1970: 75, pl. 32: 24, 25). Absence of a flap of the final chamber which covers umbilical depression distinguish the investigated specimens from the Romanian forms.

Distribution. — Poland — Campanian-Maastrichtian. Netherlands, Germany — lower Santonian, upper Campanian. USA — Santonian-Maastrichtian.

Quadrimorphina varsoviensis sp. n.
(pl. 30: 5, 6)

Holotype: Specimen IG No. 46272/88/F, in pl. 30: 5.
Paratype IG No. 46273/88/F, in pl. 30: 6.
Type horizon: Campanian.
Type locality: Borehole Telatyn IG 1, depth 282.1 m. Lublin Upland, Poland.
Derivation of the name: From the capital of Poland, Warszawa.

Diagnosis. — Test small, triangular in outline, bilaterally compressed. Three chambers visible on ventral side; final chamber with a narrow lip which covers aperture.

Material. — Twenty well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46272/88/F	46273/88/F	46274/88/F
lenght	0.168	0.168	0.144
width	0.144	0.120	0.120
thickness	0.096	0.072	0.072

Description. — Test small, shinning, triangular in outline, bilaterally compressed. Three slightly convex chambers visible on ventral side. The youngest chamber conical; the largest one occupies half of the whorl. Aperture covered with a narrow lip. Dorsal side smooth, slightly convex in the central part. This convexity is formed by older whorls. Chambers are visible only in the final whorl. Chamber's outline triangular, surface flat or poorly convex. Septal sutures on both sides of the test straight, short and flat or poorly depressed.

Variability. — Variability of this very characteristic species is expressed in different size and shape of chambers on the dorsal side of the test and in width of the apertural lip. Increase in size of chambers as added can be considerable but proportional, or the oldest chamber in the last whorl can be disproportionaly small in comparison with others and finger-like elongated. The apertural lip is narrow, elongated, covering the aperture along the whole length in most specimens, or it can be tongue-like.

Remarks. — This species resembles mostly *Quadrimorphina minuta* (CUSHMAN), from which it differs in triangular outline, nearly flat chamber surface on both side of the test, in absence of umbilical depression and in flat spiral suture.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Family **Globorotalitidae** LOEBLICH et TAPPAN, 1984
Genus *Globorotalites* BROTZEN, 1942
Globorotalites emdyensis VASSILENKO, 1961
(pl. 32: 1, 2, 3)

1961. *Globorotalites emdyensis* VASSILENKO: 60, pl 10: 3a—w, 4a—w.
1974. *Globorotalites emdyensis* VASSILENKO; GORBENKO: 37, pl. 3: 5a—w.
1979. *Globorotalites emdyensis* VASSILENKO; KAPTARENKO-TSHERNOUSOVA *et al.*; 114, pl. 42: 9a—w.
1981. *Globorotalites hiltermanni* KAEVER: HART *et al.*: 198, pl. 7, 13: 10, 11.

Material. — Forty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46293/88/F	46294/88/F	46294/88/F
longest diameter	0.600	0.552	0.408
shortest diameter	0.528	0.480	0.360
height	0.320	0.288	0.192

Variability. — It is expressed mainly in degree of convexity of a dorsal test side which can be flat, equally or less convex than the ventral one. The ventral side is a low cone with a wide

base. Specimens with both sides nearly equally convex resemble *Eponides* more than *Globorotalites*. This similarity is stressed by the absence of the umbilical depression and localization of the aperture in some specimens near the test margin, and not along the whole apertural surface of the last chamber.

Remarks. — The specimens studied are nearly entirely consistent with the holotype. They differ from the specimens from the Mangyshlak Peninsula only in lacking suture thickening. Sutures are always flat, smooth, wide and curved on the dorsal side, while being flat or poorly depressed and nearly radial on the ventral one.

G. emdyensis differs from *G. michelinianus* (d'ORBIGNY) and *G. multiseptus* (BROTZEN) in having biconvex test. *G. hiltermanni* KAEVER, 1961, illustrated by HART *et al.* (1981) is identical with *G. emdyensis* VASSILENKO. If the holotype of *G. hiltermanni* KAEVER, 1961 is definitely shown to be conspecific with *G. emdyensis* VASSILENKO, 1961, then the problem of priority will appear. Solving this problem is premature as yet. Both species have been described (independently) in the same year. HART *et al.* (1981) do not refer to the paper by KAEVER (1961), thus the present author was not able to use it. It has not been also reported by ELLIS and MESSINA, Cat. of Foram.

Distribution. — Poland — Campanian-Maastrichtian. USSR — upper Campanian-lower Maastrichtian. England — upper Campanian.

Family **Osangulariidae** LOEBLICH et TAPPAN, 1964
Genus *Osangularia* BROTZEN, 1940
Osangularia cordieriana (d'ORBIGNY, 1840)

(pl. 33: 7, 8, pl. 34: 13)

1940. *Rotalina cordieriana* d'ORBIGNY: 33, pl. 3: 9, 10, 11.
1980. *Osangularia cordieriana* (d'ORBIGNY); GAWOR-BIEDOWA: 41, pl. 6: 11, 12 (with synonymy).
1981. *Osangularia cordieriana* HART *et al.*: 212, pl. 7. 20: 4—6.
1982. *Osangularia cordieriana* Mc GUGAN: 414, pl. 2: 7a—c.
1984. *Osangularia cordieriana* (d'ORBIGNY); OLSSON and NYONG: pl. 5: 12—14.
1984. *Osangularia cordieriana* (d'ORBIGNY); NYONG and OLSSON: pl. 1: 4.
1985. *Osangularia cordieriana* (d'ORBIGNY); SLITER: 10: 6—8, 10—12.
1986. *Osangularia cordieriana* (d'ORBIGNY; YASUDA: 92, pl. 13: 12a, c.

Material — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46312/88/F	46313/88/F	46314/88/F
longest diameter	0.432	0.384	0.288
shortest diameter	0.336	0.384	0.252
height	0.192	0.192	0.132

Variability. — In most of the study specimens, the dorsal side is more convex than the ventral one. Variable is the test outline (circular or oval), degree of visibility of chambers and sutures on the ventral side of the test. In many specimens no sutures, and thus no chambers are visible on the ventral side of the test. Large umbilical boss is visible in all specimens on the ventral side.

Remarks. — The present material is nearly entirely consistent with that described by BIEDA 1958 as *O. cordieriana* (d'ORBIGNY) from Mielnik (Poland). The investigated specimens differ from those from Mielnik in less numerous chambers in the last whorl (7—9 whereas 9—10 in specimens from Mielnik), and in the oval outline of some specimens. The species *Osangularia cordieriana* (d'ORBIGNY) differs from *O. navarroana* (CUSHMAN) in having narrower keel, less numerous chambers in the final whorl (7—9 and not 10—11), in presence of large raised umbilical boss on the ventral side, smaller convexity of the ventral side and less marked sutures on the ventral side. D'ORBIGNY (1840) found 7 chambers in the final whorl in his holotype of

Rotalina cordieriana (recte Osangularia cordieriana) from the Cretaceous of the Paris Basin. On the other hand, MARIE (1941) found 9—11 chambers in the final whorl of this species from the same region.

Distribution. — Poland: Polish Lowlands — Turonian-Maastrichtian; Sudetes — Coniacian. Cosmopolitan species. Europe: Boreal Province — Turonian-Maastrichtian; Mediterranean Province — Campanian-Maastrichtian. North America — Santonian-Maastrichtian. Pacific Ocean, equatorial area — Maastrichtian. Japan — Campanian-Paleocene.

Osangularia navarroana (CUSHMAN, 1938)

(pl. 33: 1, 2, 3)

1938b. *Pulvinulinella navarroana* CUSHMAN: 66, pl. 11: 5a, b, c.
1940. *Osangularia lens* BROTZEN: 30, pl. 8: 1a, b, c.
1964. *Osangularia lens* BROTZEN; LOEBLICH and TAPPAN: C 752, fig. 615 (1, 2).
1974. *Osangularia cordieriana navarroana* (CUSHMAN); SZCZECHURA and POŻARYSKA: 99, pl. 21: 1 (with synonymy).
1979. *Osangularia navarroana* (CUSHMAN); KAPTARENKO-TSHERNOUSOVA *et al.*: 118, pl. 45: 2 (with synonymy).
1981. *Osangularia navarroana* (CUSHMAN); HART *et al.*: 212, pl. 7. 20: 7, 8.
1984. *Osangularia lens* BROTZEN; NYONG and OLSSON: pl. 7: 7, 8.
1985. *Osangularia navarroana* (CUSHMAN); SLITER: pl. 10: 13, 17—18.

Material. — More than hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46315/88/F	46316/88/F	46317/88/F
longest diameter	0.398	0.360	0.288
shortest diameter	0.360	0.336	0.264
height	0.180	0.188	0.144

Variability. — It is expressed in size, degree of convexity of both sides of the test (equally convex or one side more convex than the other), and in width of the keel bordering the test. Chambers are triangular in outline and slightly convex on the ventral side and flat on the dorsal side.

Remarks. — The study specimens are nearly entirely consistent with the holotype. They differ from the American specimens in smaller size (longer diameter equals to 0.398—0.288 mm in our material while being 0.550—0.500 mm in the American specimens. Height equals to 0.188—0.144 mm in the investigated specimens and 0.220—0.200 mm in the American ones and in the number of chambers ranging up to 11 in the final whorl (in the American specimens 10). The specimens attributed by BROTZEN 1940 to *O. lens* display all characters of the species *O. navarroana* (CUSHMAN) and they are conspecific in the present author's opinion. The specimens of *O. navarroana* (CUSHMAN) are often described as *O. lens* BROTZEN in Europe, but the former name has priority.

Distribution. — Poland: Polish Lowlands, Carpathians — Maastrichtian-Paleocene. Cosmopolitan Cretaceous and Paleocene species known from all continents.

Osangularia peracuta (LIPNIK, 1961)

(pl. 33: 4, 5, 6)

1961. *Eponides peracutus* LIPNIK: 53, pl. 4: 3a, b, 4b, c.
1963. *Eponides peracutus* LIPNIK; KAPTARENKO-TSHERNOUSOVA *et al.*: 89, pl. 26: 4a, b, 5a, w.

Material. — Thirty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46318/88/F	46319/88/F	46320/88/F
diameter	0.240	0.216	0.144
height	0.120	0.120	0.096

Description. — Test small, glittering, finely perforated (more densely on the ventral side), with circular and smooth outline. Ventral side nearly flat while dorsal one convex. Test consists of 2—2$^1/_2$ whorls; 7—12 trapezoidal flat chambers are visible in the final whorl. Septal sutures flat and slightly curved on both sides. Spiral suture flat, narrow and translucent. Small umbilical boss protruding slightly in the center of the ventral side. Test periphery carinate, sometimes developed as translucent frill. Aperture interiomarginal and areal, V-shaped typical for the genus (see pl. 33: 4).

Variability. — Variability is rather high and concerns the test size, number of chambers in the final whorl (7—12), the test symmetry (flat biconvex or biconvex with more convex dorsal side) and size of umbilical boss.

Remarks. — The specimens from Poland are identical with the holotype. They differ only in being slightly larger. *Eponides vitreus* WOLOSCHYNA is most probably a junior synonym of the investigated species. The holotype of both species should be reinvestigated by their authors. It seems that the holotype of *E. vitreus* WOLOSCHYNA represents simply the specimens with exceptionally flat ventral side. As aperture is poorly visible the latter species has erroneously been attributed by VOLOSCHINA to the genus *Eponides*.

Distribution. — Poland — upper Maastrichtian. USSR — Maastrichtian.

Family **Heterolepidae** GONZALES-DONOSO, 1969
Genus *Anomalinoides* BROTZEN, 1942
Anomalinoides pinguis (JENNINGS, 1936)
(pl. 34: 7, 8, 9)

1931. *Anomalina grosserugosa* (GÜMBEL); PLUMMER: 201, pl. 14: 9.
1936. *Anomalina pinguis* JENNINGS: 37, pl. 5: 1 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1942. *Anomalinoides plummerae* nov. nom. BROTZEN: 23, fig. 7 (3).
1948. *Anomalina* ex. gr. *rubiginosa* CUSHMAN; NECKAJA: 221, pl. 3: 5a, b.
1954. *Cibicides (Anomalinoides) pinguis* subs. *pinguis* (JENNINGS); VASSILENKO: 143, pl. 23: 3a, b, w.
1954. *Cibicides (Anomalinoides) pinguis*(JENNINGS) subs. *neckajae* VASSILENKO: 144, pl. 23: 4a, b, w, 5.
1961. *Anomalinoides pinguis* subs. *pinguis* (JENNINGS); WITWICKA: 131, pl. 5: 10a—c.
1964. *Anomalinoides pinguis* (JENNINGS); LOEBLICH and TAPPAN: C 755: 619 (1).
1977. *Anomalinoides pinguis* (JENNINGS); OLSSON: pl. 4: F, G.
1979. *Anomalinoides pinguis neckaja* VASSILENKO; KAPTARENKO-TSHERNOUSOVA *et al.*: 132, pl. 50: 6a, b, w.
1980. *Anomalinoides pinguis* (JENNINGS); BERTELS: 75, pl. 5: 4a, b, 5.
1984. *Gavelinella pinguis* (JENNINGS); OLSSON and NYONG: pl. 1: 1—5.
1984. *Anomalinoides pinguis* (JENNINGS); GAWOR-BIEDOWA: pl. 4: 10, 11.
1984. *Anomalinoides pinguis* (JENNINGS); GAWOR-BIEDOWA and WITWICKA: 290, pl. 100: 9, pl. 101: 4, pl. 114: 10.

Material. — Eighty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46327/88/F	46328/88/F	46329/88/F
diameter	0.432	0.408	0.288
height	0.240	0.216	0.168

Variability. — It is low and expressed in number of chambers in the final whorl (8—10), degree of evolutness of the dorsal test side and development of septal sutures on both test sides. Sutures are rather wide, translucent, flat or slightly raised, meeting in the center of dorsal side where they form irregular, hook-like thickening; on the ventral side they meet in the middle, forming small node in some specimens.

Remarks. — Both, *Cibicides (Anomalinoides) pinguis* (JENNINGS) subsp. *neckaja* VASSILENKO, 1954 from the Upper Cretaceous of western Siberia and *Anomalinoides pinguis* (JENNINGS) *latiperiferatus* MJATLUK, 1970 from the Paleocene of the Carpathians (Pokucie) fit into the variability range of the investigated species. The first of the subspecies mentioned above

differs from the discussed species in the relatively flat sutures on the dorsal test side and in presence of a flat thickening in its center. The second subspecies differs from the nominal species in more circular test periphery and more evolute dorsal side of the test. All the features mentioned above are well within the variability range of this species.

Distribution. — Poland — upper Maastrichtian. USA — Maastrichtian. Western Atlantic — Maastrichtian. USSR — upper Senonian — Paleocene. Argentina — middle Maastrichtian.

Family **Gavelinellidae** HOFKER, 1956
Subfamily **Gyroidinoidinae** SAIDOVA 1981
Genus *Gyroidinoides* BROTZEN, 1942
Gyroidinoides girardanus (REUSS, 1851)
(pl. 32: 10a, b, 11, 12)

1851. *Rotalina girardana* REUSS: 73, pl. 5: 34 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1926. *Rotalia soldani* (d'ORBIGNY) var. *subangulata* PLUMMER: 154, pl. 12: 1a—c (*fide* ELLIS and MESSINA, Cat. of Foram.).
1953. *Gyroidina subangulata* (PLUMMER); MJATLIUK: 59, pl. 4: 3, 4 (a—b, w).
1965. *Gyroidinoides subangulata* (PLUMMER); POŻARYSKA: 108, pl. 18: 1a—c.
1966. *Gyroidinoides subangulata* (PLUMMER); HOFKER: 139, pl. 21: 55, 207, pl. 39: 43, pl. 40: 72, 289, pl. 61: 64, 336, pl. 83: 200.
1972. *Gyroidinoides girardanus* (REUSS); HANZLIKOVÁ: 128, pl. 37: 10 (with synonymy).
1974. *Gyroidinoides girardanus* (REUSS); SZCZECHURA and POŻARYSKA: 101, pl. 10: 2 (with synonymy).

Material. — Over one hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46299/88/F	46300/88/F	46301/88/F
diameter	0.408	0.264	0.216
height	0.240	0.192	0.120

Variability. — It is expressed in the test size (see measurements), development of the test margin (narrow, rounded or developed as a narrow keel marked especially in the initial part of the whorl). Width of the test margin is closely related to the orientation of the final whorl in relation to the earlier whorls on the dorsal test side. Test margin is narrowed and rounded in the case of the final whorl situated in the same plane as the earlier whorls. If the final whorl protrudes slightly above earlier whorls, the test margin is narrow and keeled.

Remarks. — *Rotalia girardana* REUSS seems to be conspecific with *Rotalia soldani* (d'ORBIGNY) var. *subangulata* PLUMMER. In both these species the number of chambers is nearly identical in the final whorl (8—9 in the first case and 10 in the second), which is well within the variability range. The final whorl protrudes slightly above the earlier whorls on the dorsal test side, test margin is bluntly angular in both species, chamber surface flat, umbilicus narrow and deep, aperture slit-like and extending along apertural surface of the ultimate chamber. As it follows from the comparison of the both species, dorsal side of the test is flat or slightly concave in *Rotalia girardana* REUSS, while being flat or slightly convex in *Rotalia soldani* (d'ORBIGNY) var. *subangulata* PLUMMER. In the study material there are both, specimens with a flat dorsal side slightly concave and the other having it poorly convex in the central part. However, in each case a narrow margin of the outer whorl protrudes to a various degree above the inner whorls (which form a flat, slightly concave or poorly convex dorsal test side). The whorls are flat, nearly invisible, with the flat, nearly invisible spiral suture. The narrow umbilicus on the ventral side is obscured by umbilical apertural flaps. The top of each chamber surrounding umbilical depression in many specimens is developed as pearl-like thickening, pl. 32: 10a, b.

Distribution. — Poland. Polish Lowlands — Maastrichtian-Campanian; Carpathians — Paleocene-Oligocene. Cosmopolitan species. Europe — Upper Cretaceous-Paleocene. Asia, Africa — Paleocene-Oligocene. North America — Upper Cretaceous-Eocene.

Gyroidinoides globosus (HAGENOW, 1842)
(pl. 32: 7, 8, 9)

1842. *Nonionina globosa* (HAGENOW: 574 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1953. *Gyroidina globosa* (HAGENOW); MJATLIUK: 64, pl. 4: 1a, b, w (with synonymy).
1961. *Gyroidinoides turgidus* (HAGENOW); AKIMEZ: 116, pl. 10: 4a, b, w.
1972. *Gyroidinoides globosus* (HAGENOW); HANZLIKOVÁ: 129, pl. 37: 3 (with synonymy).
1977. *Gyroidinoides globosus* (HAGENOW); OLSSON: pl. 3: E, F.
1986. *Gyroidina globosa* (HAGENOW); YASUDA: 91, pl. 13: 9a—c (with synonymy).

Material. — Over one hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46302/88/F	46303/88/F	46304/88/F
diameter	0.744	0.672	0.576
height	0.552	0.450	0.384

Variability. — It is expressed in number of chambers in the final whorl (6—8), in degree of convexity of older whorls in comparison to the final whorl on the dorsal test side, in degree of depression of spiral and septal sutures on both test sides, as well as in degree of development of umbilical depression. In the specimens with older whorls strongly protruding above the final whorl the test looks like high trochospirally coiled. Older whorls are invisible, covered with a test secondary substance and occupy 2/3 of the test diameter. Slightly depressed spiral suture is marked in such specimens only between two final whorls, and is most strongly depressed at the base of the three youngest chambers. The youngest chamber is slightly declined toward the ventral side and its adumbilical portion covers nearly totally a narrow umbilical depression. In the specimens with less convex dorsal side, there is a poorly depressed spiral suture which can be seen between all three whorls, while septal sutures are slightly more depressed, especially on the ventral side. The narrow open umbilicus is not obscured by umbilical apertural flaps. A narrow slit-like aperture extends along the apertural surface of the ultimate chamber in all specimens. A narrow lip is developed at the base of the apertural surface in some specimens, extending along the whole length of the apertural surface of the last chamber, or only along 2/3 of its length starting from the umbilicus.

Remarks. — There is a question whether the species *Nonionina globosa* HAGENOW, 1842 and *Rotalia turgida* (1842) both from the Cretaceous of the Rügen Island, are conspecific or not. On the basis of the Polish material they seem to be. MJATLIUK (1953) separates these two species, including the more spherical forms with less convex dorsal side, poorly marked spiral suture and more narrow and slightly rounded (but not concave) apertural surface to the first of these species.

Distribution. — Cosmopolitan species. Poland — Campanian-Maastrichtian. Europe, Asia, Africa, North America — Upper Cretaceous-Paleocene.

Genus *Sliteria* gen. n.

Type species: *Sliteria varsoviensis* sp. n.

Derivation of the name: From the name of the American micropaleontologist W. V. SLITER.

Stratigraphical and geographical range: Poland — (Lublin Upland, Holy Cross Mts. and southern Baltic near the Łeba High) — Maastrichtian. USA, Mexico — middle and upper Campanian.

Species assigned: *Sliteria varsoviensis* sp. n., *Gyroidinoides quadratus martini* SLITER, 1968.

Diagnosis. — Test free, low trochospiral, ventral side involute, dorsal one semiinvolute; only final whorl visible. Ventral side with umbilicus obscured by short tongue-like umbilical flaps projecting from the umbilical margin of the chambers. Dorsal side with a depression in the center. Test margin rounded. Chambers on the ventral side coarsely perforate near the umbilicus. Sutures flat, nearly radial. Chambers with nodose ornamentation on the dorsal

side. Suture slightly raised and ended with spines near the depression in the central part of this side. Aperture interiomarginal with a narrow lip, extending also under tongue-like flaps on the ventral side. Test, smooth, finely perforated (with the exception of large nearumbilical pores on the ventral side). Wall and septa trilamellar. Outer and inner part of the wall is optically fibrous, inner one is prismatic.

Remarks. — The genus *Sliteria* gen. n. resembles the genus *Gyroidinoides* BROTZEN, 1942 in the shape of the test. It differs from the latter in having concave and sculptured dorsal side of the test and invisible older whorls there, in coarsely perforate chamber surface on the ventral side near the umbilicus and optically fibrous test wall. It resembles genera *Stensioeina* BROTZEN, 1936 and *Gavelinella* BROTZEN, 1942 in having umbilical flaps projecting from umbilical margin of chambers and covering the umbilicus. It differs from those of the two genera in having a semiinvolute dorsal side, invisible whorls on the dorsal side, deep concavity in the center of the dorsal side with ornamentation and in optically fibrous test wall. It differs from the genus *Melonis* de MONTFORT, 1808 (resembling it in low trochospiral coiling of the test) in presence of flaps projecting from umbilical margin of chambers covering the umbilicus on the involute side, in aperture extending to the involute side under tongue-like umbilical flaps of chambers, in ornamentation of chambers surface and in heigher sutures on semiinvolute side and in optically fibrous test wall.

Sliteria varsoviensis sp. n.

(pl. 33: 9, 10, 11, 12, 13)

Holotype: Specimen IG No. 46305/88/F, in pl. 33: 11.
Paratypes: IG Nos. 46306/88/F, 46307/88/F, 46308/88/F, 46309/88/F in pl. 33: 9, 10, 12, 13.
Type horizon: Maastrichtian.
Derivation of the name: From the latin name of the Polish capital Warszawa.

Diagnosis. — As for the genus.

Material. — Fifty variously preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46305/88/F	46306/88/F	46307/88/F
diameter	0.216	0.240	0.144
height	0.168	0.168	0.120

Description. — Test small, free, low trochospiral, consisting of 2 to $2^1/_2$ whorls. Ventral side involute, convex, dorsal semiinvolute and slightly flattened, concave in the center and with invisible older whorls. Test periphery rounded. Only final whorl consisting of 7—9 chambers (gradually increasing in size as added) is visible. Chamber surface flat on the ventral side and poorly convex on the dorsal one. A narrow umbilicus is almost completely obscured by chambers flaps. Chamber surface coarsely perforate near the umbilicus. Sutures nearly radial, flat and translucent on the ventral side. On the dorsal one rather deep concavity of the test in which the older whorls are hidden; it occupies 1/3 of the test diameter and is surrounded by slightly convex chambers of the final whorl. Chamber surface may be covered by a nodose ornamentation. Sutures nearly radial with a thin ridge ended with a spine near the concavity. The youngest chamber strongly inclined toward the dorsal side. Aperture slit-like, with a narrow lip located at the base of trapezoidal, apertural surface flat or poorly convex. It extends on the ventral side under the umbilical flaps projecting from chambers margins.

Variability. — It is expressed in size of the test (see measurements), in number of chambers in the final whorl (7—9) and in presence or absence (or various number) of papillae covering chamber surface on the dorsal side. It also concerns the development of ridges on sutures and spines at their tips on the dorsal test side, degree of inclination of the youngest chamber toward

the dorsal side (it can be also located symmetrically on both sides of the test), size of pores on chamber surface in the adumbilical part on the ventral side of the test, as well as the apertural surface which can be flat or poorly convex.

Remarks. — The specimens described by SLITER (1968) under the name *Gyroidinoides quadratus martini* show all the characters of the genus *Sliteria*. The species mentioned above differ from *Sliteria varsoviensis* in having slightly flattened ventral side, nearly invisible flaps projecting from chamber margins on the ventral side, in slightly larger size and in the lack of differentiation of pore size on the ventral test side. All other features are identical.

Distribution. — Poland: Lublin Upland, borehole Tyszowce IG 1; the Holy Cross Mountains region, borehole Senislawice — Chwalibogowice 10S, depth 83.5 m; boreholes from southern Baltic — Maastrichtian.

Genus *Stensioeina* BROTZEN, 1936

Stensioeina beccariiformis (WHITE, 1928)

(pl. 37: 9, 10, 11)

1928. *Rotalia beccariiformis* var. WHITE: 287, pl. 39: 4 (*non* 3) (*fide* ELLIS and MESSINA, Cat. of Foram.).
1945. *Pseudovalvulineria vombensis* BROTZEN: 50 *(part)*, pl. 1: 12 (*non* 13, *non* text-fig. 9).
1947. *Gyroidyna caucasica* SUBBOTINA: 100, pl. 3: 23—25.
1974. *Stensioeina beccariiformis* (WHITE); SZCZECHURA and POŻARYSKA: 116, pl. 24: 1—7; pl. 27: 4, 5 (with synonymy).
1984. *Stensioeina beccariiformis* (WHITE); GAWOR-BIEDOWA and WITWICKA: 303, pl. 110: 4, 6.

Material. — Over one hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46386/88/F	46387/88/F	46388/88/F
diameter	0.336	0.288	0.240
height	0.144	0.144	0.120

Variability. — It concerns degree of visibility of whorls on the dorsal side (all whorls well visible or poorly visible older whorls and well visible final whorl), degree of visibility of septal sutures on both sides (on the ventral side initially flat then depressed in the final part of the whorl on the dorsal side, flat and visible in all whorls or only poorly visible in the final whorl). Variability also concerns size of pores covering chamber surface on the ventral side, and size of calcareous plate which covers the umbilicus.

Remarks. — For comparison with *Gavelinella vombensis* (BROTZEN) see description of that species (p. 173). SZCZECHURA and POŻARYSKA (1974), when comparing the material from Paleocene (Velasco Fm.) of Mexico, Denmark and Crimea, have found that both *Gyroidina caucasica* SUBBOTINA, 1947, and specimens illustrated by HOFKER (1966) as *Discorynopsis parvula* (ten DAM), are the junior synonyms of *S. beccariiformis* (WHITE). The specimens of *S. beccariiformis* (WHITE) derived from the Lublin Chalk most closely resemble the Danish ones, illustrated by SZCZECHURA and POŻARYSKA (1974, pl. 24: 5—7).

Distribution. — Poland: Polish Lowlands — upper Campanian-Danian; Carpathians — upper Senonian-Paleocene. Europe, Asia, North and South America, Australia — Upper Cretaceous-Paleocene.

Stensioeina bella sp. n.

(pl. 38: 9a—c)

Holotype: Specimen IG No. 46400/88/F, in pl. 38: 9a—c.
Type horizon: Lower Maastrichtian.
Type locality: Borehole Tyszowce IG 1, depth 200.0 m.
Derivation of the name: Lat. *bella* — beautiful.

Diagnosis — Test biconvex with more convex dorsal side. Ventral side similar to *S. gracilis* BROTZEN. The dorsal resembling flower with narrow petals.

Material. — Five well preserved specimens.

Dimensions (in mm):

	Holotype	Paratype
IG Nos.:	46400/88/F	46401/88/F
diameter	0.288	0.216
height	0.168	0.096

Description. — Test biconvex, with more convex dorsal side. Test outline circular, lobate. The dorsal side of the test resembles a flower with narrow petals. The final whorl, consisting of 10—12 narrow, petaloidal chambers with flat surface, is visible on the dorsal side. Older whorls invisible, covered with numerous small nodes; they occupy 1/3 of the test diameter. Septal sutures narrow, developed as sharp, low ridges arched and tile-like arranged. Spiral suture invisible. The ventral side poorly convex. Chamber surface flat, except of the ultimate chamber where it is convex. Sutures between chambers flat on the ventral side. Umbilicus very narrow and covered with tongue-like flaps of nearumbilical part of chambers, or by calcareous plates. Test periphery narrow, sharp and rugged.

Variability. — It is expressed in degree of convexity of the dorsal side, in width of the final whorl on the dorsal side and in degree of visibility of septal sutures on the ventral side.

Remarks. — The investigated species resembles mostly the specimen illustrated by HOFKER (1966, pl. 29, fig. 57a—c) as *Rotorbinella mariei* (van BELLEN) (*non Parella mariei* van BELLEN, 1946) in raised and rugged ridges developed on sutures on the dorsal side, as well as in a test outline. It differs from HOFKER's specimen in having ventral side typical for the genus *Stensioeina*. For comparison with *S. pulchra* sp. n. see its description (p. 162).

Distribution. — Poland — lower Maastrichtian (Lublin Chalk).

Stensioeina cf. *dictyon* POKORNÝ, 1958

(pl. 38: 3, 4)

Material. — Five well preserved specimens.

Dimensions (in mm):

IG Nos.:	46383/88/F	46384/88/F	46385/88/F
diameter	0.312	0.321	0.312
height	0.144	0.120	0.120

Variability. — Test can be equally biconvex, or ventral side is more convex than the dorsal one, the latter being sometimes flat. Variability also concerns degree of development of ornamentation of the dorsal side of the test.

Remarks. — The investigated specimens resemble *Stensioeina dictyon* POKORNÝ in regular pattern of ornamentation of the dorsal side. This pattern, however, is less sharply expressed than in the holotype. They also differ from *S. dictyon* POKORNÝ in considerably less convex, or even flat, dorsal test side. TRÜMPER (1968) suspects the specimens of POKORNÝ of being simply extreme variants of *S. gracilis* BROTZEN, a species occurring in the same samples from Czechy. In the Polish material specimens similar to the species *S. dictyon* POKORNÝ, do not occur together with specimens of the species *S. gracilis* BROTZEN.

Distribution. — Poland — uppermost upper Campanian-lower Maastrichtian.

Stensioeina clementiana (d'ORBIGNY, 1840)

(pl. 39: 4, 5, 6)

1940. *Rosalina clementiana* d'ORBIGNY: 37, pl. 3: 23—25.

1941. *Discorbis clementiana* (d'ORBIGNY), var. *costata* MARIE: 214, pl. 33: 313a—c.

1941. *Discorbis clementiana* (d'ORBIGNY), form *typica* MARIE: 213, pl. 33: 312a—c.

1954. *Stensioeina annae* POŻARYSKA; 265, text-fig. 24A—D, 25A—C.
1958. *Stensioeina annae* POŻARYSKA; WITWICKA: 207, pl. 13: 24a—c.
1958. *Stensioeina annae* POŻARYSKA; BIEDA: 52, text-fig. 20a—c.
1972. *Anomalina (Pseudovalvulineria) clementiana* (d'ORBIGNY); VAPTZAROVA: 86, pl. 2: 1—3.
1977. *Gavelinella clementiana* (d'ORBIGNY); KOCH: 46, pl. 2: 4—6 (with synonymy).
1979. *Pseudovalvulineria clementiana clementiana* (d'ORBIGNY); KAPTARENKO-TSHERNOUSOVA *et al.*: 129, pl. 49: 2a, b, w (with synonymy).
1981. *Gavelinella clementiana* (d'ORBIGNY); HART *et al.*: 194, pl. 7. 11: 1—3.
1981. *Gavelinella clementiana clementiana* (d'ORBIGNY); EDWARDS: 394, pl. 58: 3—5.
1981. *Gavelinella clementiana costata* (MARIE); EDWARDS: 396, pl. 57: 14—16, pl. 58: 1, 2.
non 1982. *Anomalinoides clementiana* (d'ORBIGNY); MC GUGAN: 420, pl. 10: 11a—b.
1984. *Stensioeina clementiana* (d'ORBIGNY); GAWOR-BIEDOWA and WITWICKA: 304, pl. 110: 7—9.
1985. *Gavelinella clementiana* (d'ORBIGNY); ROBASZYNSKI *et al.*: pl. 4: 1a—b, 2a—b.
1986. *Gavelinella clementiana* (d'ORBIGNY); JORDAN and GASSE: 18, pl. 6: 2, 4, 6, 8.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46380/88/F	46381/88/F	46382/88/F
diameter	0.744	0.696	0.480
height	0.408	0.384	0.240

Variability. — It is expressed mainly in degree of ornamentation of the dorsal side and in size of umbilicus on the ventral one, and in its ornamentation. Low and rounded, or high and rugged ribs of the dorsal side can be developed only on septal sutures of older whorls, or also on the septal sutures in the initial part of the final whorl. Hook-like thickenning consisting of the test substance is present in the center of a narrow umbilical depression, or, rather wide umbilical depression is covered with calcareous plates.

Remarks. — The investigated species differs from *Discorbis (recte Stensioeina) clementiana* d'ORBIGNY var. *laevigata* MARIE in having septal sutures raised on the dorsal side, and in the sutures raised near the umbilicus in the initial part of the whorl on the ventral side. It differs from *Anomalina (recte Stensioeina) pseudoexcolata* KALININ, 1937 in less sculptured dorsal side. I also assigned the species *D. (recte S.) clementiana* var. *costata* MARIE, 1941 to *Stensioeina clementiana* (d'ORBIGNY). The specimens of the former species, having septal sutures slightly more raised and rugged on the dorsal side than in the case of *Rosalina (recte Stensioeina) clementiana* d'ORBIGNY, fall into the variability range of *Stensioeina clementiana*. They resemble mostly *A. (recte S.) pseudoexcolata* KALININ.

The described species is assigned by various authors to different genera. It seems, however, that it shares most characters with the genus *Stensioeina* BROTZEN, 1936, (raised and rugged sutural ridges on the dorsal side, umbilicus covered with calcareous plates, and planoconvex test). It cannot be assigned to the genus *Gavelinella*, as its chambers are not terminated near the umbilicus with flaps covering the umbilicus.

Distribution. — Poland (Polish Lowlands), England — upper part of Santonian-Campanian. France, Germany — Campanian. Netherlands, USSR — Santonian-Campanian. Switzerland — lower part of upper Campanian. Bulgaria — Santonian — lower Maastrichtian.

Stensioeina exsculpta (REUSS, 1860)

(pl. 38: 5, 6, 7)

1860. *Rotalia exsculpta* REUSS: 222, pl. 11: 4a—c.
1934. *Gyroidina exsculpta* (REUSS); DAIN: 40, pl. 4: 44.
1954. *Stensioeina exsculpta* (REUSS); POŻARYSKA: 264, text-fig. 22a—c.
1958. *Stensioeina exsculpta* (REUSS); BIEDA: 49, text-fig. 17a—c.
1958. *Stensioeina exsculpta* (REUSS); WITWICKA: 205, pl. 11: 19a—c.
1961. *Stensioeina mursataiensis* VASSILENKO: 66, pl. 11: 5a, b, w.
1970. *Stensioeina exsculpta* (REUSS); JANOWSKAJA and BUKATSCHUK: 122, pl. 3: 3a, b, w.

1977. *Stensioeina exsculpta exsculpta* (REUSS); KOCH: 40, pl. 11: 9—11 (with synonymy).
1979. *Stensioeina exsculpta* (REUSS); KAPTARENKO-TSHERNOUSOVA *et al.*: 115, pl. 43: 7a, b, w.
non 1981. *Stensioeina exsculpta exsculpta* (REUSS); HART *et al.*: 218, pl. 7. 23: 11—13.
1984. *Stensioeina dictyon* POKORNÝ; NYONG and OLSSON: pl. 1: 12, 13.
1984. *Stensioeina exsculpta* (REUSS); GAWOR-BIEDOWA and WITWICKA: 304, pl. 110: 10, pl. 111: 1, 2 (with synonymy).

Material. — More than fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46389/88/F	46390/88/F	46391/88/F
diameter	0.432	0.360	0.240
thickness	0.168	0.144	0.096

Variability. — It is expressed mainly in height of sutural ridges on the dorsal side and in presence or absence of short ribs or nodes on the dorsal surface of the chambers. Ribs and nodes appear on the dorsal side of the stratigraphically younger specimens. In specimens from the lower Coniacian the chamber surface is smooth and sutural ridges are not rugged. Specimens from the upper Coniacian and Santonian display short ribs and nodes on the chamber surface, whereas ridges on sutures become thinner and slightly rugged. The Campanian specimens show gradually increasing number of ribs and nodes on chamber surface. Simultaneously there is a slight increase in height and a change of shape of the ventral test side, approaching slightly the shape of *Stensioeina pommerana* BROTZEN.

Remarks. — The name *Stensioeina mursataiensis* VASSILENKO 1961 is a junior synonym of the investigated species. The upper Santonian specimens from the Mangyshlak Peninsula differ from the holotype of *Rotalia (recte Stensioeina) exsculpta* REUSS from the Senonian of Germany only in the shape of the ventral side and in slightly wider umbilicus making it close to *S. pommerana* BROTZEN. Specimens derived from the Atlantic coast of New Jersey and Delaware (USA), and illustrated by NYONG and OLSSON (1984, pl. 1: 12, 13) as *Stensioeina dictyon* POKORNÝ, display all features of the species under discussion. They differ from *S. dictyon* POKORNÝ in lacking a characteristic pattern on the dorsal side.

The specimens with granulated dorsal side described from the Santonian of England by HART *et al.* (1981) as *S. exsculpta exsculpta* (REUSS), do not represent this species. As they have sharp test margin and the dorsal side like that of *S. gracilis* BROTZEN, they cannot be assigned also to *S. granulata* (OLBERTZ).

Distribution. — Poland: Polish Lowlands — Coniacian-Campanian; Sudetes — Coniacian-Santonian; Carpathians — Coniacian-lower Campanian. Germany — Coniacian--Santonian, rare in lower Campanian. Czechoslovakia — Coniacian-lower Campanian. USA — Campanian-Maastrichtian? USSR — Coniacian-lower Maastrichtian. France — Senonian. Sweden — lower Santonian. Netherlands — middle Santonian-lower Campanian.

Stensioeina gracilis BROTZEN, 1945

(pl. 37: 12, pl. 38: 10, 11)

1945. *Stensioeina exsculpta* var. *gracilis* BROTZEN: 52, pl. 1: 15a—c.
1968. *Stensioeina exsculpta gracilis* BROTZEN; TRÜMPER: 26, pl. 9: 2, pl. 10: 1—3, pl. 11: 1, 2, 5, 12: 9—10, pl. 17: 12—15 (with synonymy).
1957. *Stensioeina exsculpta* var. *aspera* HOFKER: 349, text-fig. 401—403.
1957. *Stensioeina exsculpta* var. *aspera* mut. *infirma* HOFKER: 350, text-fig. 404.
1958. *Stensioeina exsculpta gracilis* BROTZEN; BIEDA: 50, text-fig. 18a—c.
partim 1963. *Stensioeina exsculpta* (REUSS); van HINTE: 108, pl. 14: 5a—c (*non* 4a—c).
1972. *Stensioeina exsculpta gracilis* BROTZEN; HANZLIKOVÁ: 135, pl. 40: 3—5 (with synonymy).
1972. *Stensioeina exsculpta gracilis* BROTZEN; VOLOSHINA: 115, pl. 4: 2a, b, w.
1974. *Stensioeina exsculpta* (REUSS); GORBENKO: 38, pl. 3a, b, w.
1977. *Stensioeina exsculpta gracilis* BROTZEN; KOCH: 44, pl. 11: 5—8.
1981. *Stensioeina exsculpta gracilis* BROTZEN; HART *et al.*: 220, pl. 7. 24: 1—3.
1984. *Stensioeina exsculpta gracilis* BROTZEN; GAWOR-BIEDOWA and WITWICKA: 305, pl. 111: 6—8 (with synonymy).

Material. — More than fifty well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46392/88/F	46393/88/F	46394/88/F
diameter	0.408	0.384	0.240
height	0.240	0.192	0.120

Variability. — See TRÜMPER (1968).

Remarks. — The specimens of *Stensioeina exsculpta gracilis* BROTZEN were named *S. exsculpta* (REUSS) by HILTERMANN and KOCH (1962). This mistake caused some confusion in the literature. Some typical representatives of *S. gracilis* BROTZEN has been described as *S. exsculpta* (REUSS). In my opinion, *S. gracilis* BROTZEN is a separate species, and not a subspecies of *S. exsculpta* (REUSS). It differs from the latter in raised trochospiral coil on the dorsal side, in an ornamentation consisting of high rugged ridges on the septal and spiral sutures, as well as in a sharply keeled test margin which is turned out to the ventral side. Both these species closely related to each other appear nearly simultaneously in the Coniacian of the Polish Lowlands. Therefore *S. gracilis* BROTZEN cannot be derived from *S. exsculpta* (REUSS) as suggested by TRÜMPER (1968) who derives *S. gracilis* from the phylogenetic lineage of *S. exsculpta* (REUSS) during the upper Santonian. HOFKER (1957) described the test of different convexity of the dorsal side (within the variability range of this species) as *S. exsculpta* var. *aspera* and *S. exsculpta* var. *aspera* mut. *infirma*.

Distribution. — Poland: Polish Lowlands — Coniacian (except the lowermost part)-Campanian; Sudetes — Coniacian-Santonian. Sweden — Emsherian-lower Campanian. Germany — upper part of the lower Santonian-lowermost part of the upper Campanian. England — Santonian-Middle Campanian. Czechoslovakia — Santonian-lower Campanian. Austria — Coniacian-lower Campanian. USSR — Coniacian-Maastrichtian.

Stensioeina pommerana BROTZEN, 1936

(pl. 39: 1, 2, 3)

1936. *Stensioeina pommerana* BROTZEN: 166.
1940. *Stensioeina labyrinthica* CUSHMAN et DORSEY: 3, pl. 1: 5a—c.
1940. *Stensioeina pommerana* BROTZEN; CUSHMAN and DORSEY: 2, pl. 1: 4a—c.
1945. *Stensioeina pommerana* BROTZEN; BROTZEN: 51, pl. 1: 14.
1968. *Stensioeina pommerana* BROTZEN; TRÜMPER: 14, pl. 4—7, pl. 12, text-fig. 3—6 (with synonymy).
1972. *Stensioeina pommerana* BROTZEN; HANZLIKOVÁ: 135, pl. 40: 6, 7 (a—c).
1977. *Stensioeina pommerana* BROTZEN; KOCH: 51, pl. 11: 1—4.
1979. *Stensioeina pommerana* BROTZEN; KAPTARENKO-TSHERNOUSOVA *et al.*: 115, pl. 43: 6a, b, w.
1981. *Stensioeina pommerana* BROTZEN; HART *et al.*: 220, pl. 7. 24: 10—12.
1984. *Stensioeina pommerana* BROTZEN; NYONG and OLSSON: 7: 16, 17.
1984. *Stensioeina pommerana* BROTZEN; GAWOR-BIEDOWA and WITWICKA: 307, pl. 111: 9, pl. 112: 7, 8.
1985. *Stensioeina pommerana* BROTZEN; ROBASZYNSKI *et al.*: pl. 4: 3a, b.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46395/88/F	46396/88/F	46397/88/F
diameter	0.552	0.384	0.264
height	0.216	0.168	0.120

Remarks. — According to TRÜMPER (1968) the most important specific characters are: perforation of the ventral side, covering of the umbilicus with calcareous plates, dome-like shape of the ventral side and large size of the test.

Distribution. — Poland: Polish Lowlands — upper Santonian-Maastrichtian; Carpathian — upper Senonian. Sweden — Santonian-Maastrichtian. Austria, Germany, England, France, USSR, Czechoslovakia, North America — Campanian-Maastrichtian.

Stensioeina pulchra sp. n.
(pl. 38: 1, 2)

Holotype: Specimen IG No. 46398/88/F, in pl. 38: 1.
Paratype: Specimen IG No. 46399/88/F, in pl. 38: 2.
Type horizon: Upper Campanian.
Type locality: Borehole Telatyn IG 1, depth 282.1 m. Lublin Upland.
Derivation of the name: From Lat. *pulchra* — beautiful.

Diagnosis. — Test planoconvex, with flat dorsal side and convex ventral one. The ventral side resembles *Stensioeina pommerana* BROTZEN. The final whorl consists of 10—11 chambers. Older whorls masked on the dorsal side. Chambers semilunar on the dorsal side; the youngest chambers tile-like arranged; septal sutures covered with thin ridges which extend to the ventral side.

Material. — Five well preserved specimens.

Dimensions (in mm):

	Holotype	Paratype
IG Nos.:	46398/88/F	46399/88/F
diameter	0.288	0.288
height	0.146	0.124

Description. — Test planoconvex, with a flat dorsal side and dome-like convex ventral one. The test outline circular or slightly oval, lobate. The ventral side with visible final whorl consisting of 10—11 narrow chambers showing poorly convex surface which is coarsely perforate. Chambers are tile-like arranged near the test margin, and terminated with tongue-like flaps near the umbilicus. Sutures poorly depressed and curved. The umbilicus occupying 1/4 to 1/3 of the test diameter, covered with calcareous plates. The final whorl occupies 2/3 of the test diameter on the dorsal side. Older whorls are masked by an ornamentation developed as small nodes and ledges. Chambers of the final whorl are semilunar with flat surface, tile-like in the younger portion of the whorl. Spiral suture invisible, septal sutures curved, developed as a narrow ridge extending slightly to the ventral side.

Variability. — It is low and expressed in number of chambers in the final whorl, as well as in width of the umbilicus on the ventral side of the test.

Remarks. — The ventral side of the investigated specimens resembles mostly *Stensioeina pommerana* BROTZEN. The new species differs from the latter in the narrower poorly convex chambers on the ventral side, in smooth non-keeled test periphery and ornamentation of the dorsal side which is similar to that of *S. bella* sp. n. *S. pulchra* sp. n. differs from *S. bella* in planoconvex test, in the ventral side resembling that in *S. pommerana* BROTZEN (but not *S. gracilis*), in less numerous chambers in the final whorl and in their different shape.

Distribution. — Poland: borehole Telatyn IG 1 — Campanian.

Subfamily **Gavelinellinae** HOFKER, 1956
Genus *Angulogavelinella* HOFKER, 1957
Angulogavelinella gracilis (MARSSON, 1878)
(pl. 34: 1, 2, 3)

1878. *Discorbina gracilis* MARSSON: 166, pl. 4: 34.
1945. *Pseudovalvulineria gracilis* (MARSSON); BROTZEN: 50, pl. 1: 11.
1947. *Gyroidina? stellaria* VASSILENKO et MJATLIUK: 206, pl. 1: 7a—c.
1954. *Pseudovalvulineria gracilis* (MARSSON); POŻARYSKA: 267, text-fig. 26.
1953. *Stensioeina stellaria* (VASSILENKO); MJATLIUK: 73, pl. 7: 4a, b, w.
1957. *Pseudovalvulineria gracilis* (MARSSON); BUKOWY and GEROCH: 318, pl. 28: 17a—d.
1957. *Angulogavelinella gracilis* (MARSSON); HOFKER: 366, text-fig. 419, 420.

1958. *Pseudovalvulineria gracilis* (MARSSON); WITWICKA: 203, pl. 10: 17a—c.
1961. *Stensioeina stellaria* (VASSILENKO); AKIMEZ: 123, pl. 11: 4a, b, w.
1961. *Stensioeina gracilis* (MARSSON) *stellaria* (VASSILENKO); VASSILENKO: 72, pl. 12: 6a, b, w.
1964. *Angulogavelinella gracilis* (MARSSON); LOEBLICH and TAPPAN: C 755, text-fig. 620: 1a—c, 2.
1972. *Angulogavelinella gracilis* (MARSSON); VOLOSHINA: 115, pl. 4: 5a, b, w.
1972. *Anomalina (Pseudovalvulineria) gracilis* (MARSSON); VAPTZAROVA: 91, pl. 3: 7, 8, 9.
1974. *Stensioeina stellaria* (VASSILENKO); GORBENKO: 38, pl. 3: 9a, b, w.
1974. *Angulogavelinella gracilis* (MARSSON) HOFKER; ZAPALOWICZ: 200, fig. 2, fig. 4.
1984. *Angulogavelinella gracilis* (MARSSON); GAWOR-BIEDOWA: pl. 4: 1, 2, 3.
1984. *Angulogavelinella gracilis* (MARSSON); GAWOR-BIEDOWA and WITWICKA: 291, pl. 102: 1—3.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46330/88/F	46331/88/F	46332/88/F
diameter	0.600	0.528	0.384
height	0.240	0.144	0.168

Variability. — It is expressed in the test symmetry (equally biconvex or either ventrally or dorsally more convex), in degree of visibility of spiral and septal sutures on the dorsal side (wide and translucent, flat or poorly convex), as well as in development of sutures on the ventral side (flat near the test margin and slightly depressed near the umbilicus, or raised ledge-like near the umbilicus and forming a characteristic star-like ornamentation).

Remarks. — The specimens with star-like ornamentation in the test center, and with slightly elevated sutures on the dorsal side are assigned, by the Soviet students, to the species *Gyroidina? stellaria* VASSILENKO et MJATLIUK. Already VOLOSHINA (1972: 115—116) noted that *Gyroidina? stellaris* VASSILENKO et MJATLIUK is in fact a junior synonym of *A. gracilis* (MARSSON).

Distribution. — Poland: Polish Lowlands — lower Maastrichtian; Carpathians — higher lower Maastrichtian. Germany, Sweden, Bulgaria — Maastrichtian. USSR — upper Campanian-lower Maastrichtian.

Angulogavelinella grodnensis (AKIMEZ, 1961)

(pl. 34: 4, 5, 6)

1961. *Eponides grodnoensis* AKIMEZ: 129, pl. 12: 4a, b, w.

Material. — Forty variously preserved specimens.

Dimensions (in mm):

IG Nos.:	46333/88/F	46334/88/F	46335/88/F
diameter	0.432	0.408	0.336
height	0.240	0.216	0.192

Description. — Test outline circular, weakly lobate. It is biconvex (slightly more convex on a dorsal side) and bordered with a narrow, slightly rounded keel. It consists of 3—4 whorls, having 6—7 chambers in the final whorl. The two youngest whorls are visible on the evolute dorsal side. Whorls are narrow, spiral and septal sutures translucent. Chambers poorly visible, narrow, separated by strongly curved sutures. Chambers of the final whorl visible only on the ventral side. Chamber outline triangular, surface slightly convex and covered with densely spaced and rather large pores. Thickened umbilical part of sutures forms small a star-shaped ornamentation covering the umbilicus. Septal sutures slightly depressed or flat, narrow, translucent, straight or slightly curved. Aperture interiomarginal, arched or developed as a slit oriented perpendicularly to the suture; it occurs about the midway between the umbilicus and periphery.

Variability. — In the study material, there are specimens with the dorsal and ventral sides nearly equally convex, and some other having strongly convex dorsal and nearly flat ventral

side. In most specimens only two youngest whorls are visible on the dorsal side. Only rare specimens display 3—4 narrow whorls. Intraspecific variability is also expressed in degree of chamber convexity on the ventral side and in size of pores occurring on the chamber surface. The chambers are slightly convex, especially 2—3 youngest ones, or totally flat. Degree of depression of sutures is strongly correlated with the degree of chamber convexity. The sutures are flat between chambers displaying flat surface. In some specimens they are nearly radial, in others sickle-like curved, in all translucent. The star-shaped ornamentation covering the umbilicus can be either more or less distinct.

Remarks. — The investigated specimens are nearly identical in all features with the holotype from the Grodno Chalk. Degree of development of such features as porosity of a ventral test side, expression of spiral and septal sutures on both test sides can depend on the preservation state. It seems probable, that *Eponides sibiricus* NECKAJA, 1948, and the specimens assigned to *E. moskvini* (KELLER) by VASSILENKO (1961) from the Mangyshlak Peninsula are conspecific. They differ from the specimens described by AKIMEZ under the name *Eponides grodnensis* only in better visible whorls on the dorsal side, and in more curved sutures on the ventral one. To be sure of this fact one has to reinvestigate their holotypes or paratypes. If they are really conspecific, then the name *sibiricus* has the priority.

Distribution. — Poland — Campanian. Lituania — upper Campanian-Maastrichtian.

Genus *Anomalina* d'ORBIGNY, 1826

Anomalina incognita sp. n.

(pl. 34: 14, 15)

Holotype: Specimen IG No. 46321/88/F, in pl. 34: 14.
Paratypes: Specimens IG Nos.: 46322/88/F, 46323/88/F, in pl. 34: 15.
Type horizon: Upper Maastrichtian.
Type locality: Borehole Telatyn IG 1, depth 246.0 m Lublin Upland.
Derivation of the name: Latin: *incognita* — unknown.

Diagnosis. — Test free, equally biconvex, smooth, finely perforated and involute. The final whorl including 7—10 chambers visible on both sides. Umbilicus very narrow present on both sides of the test. Aperture peripheral with narrow lip extending on both sides to the umbilicus.

Material. — Fifty well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46321/88/F	46322/88/F	46323/88/F
diameter	0.240	0.216	0.196
height	0.120	0.096	0.096

Description. — Test free, equally biconvex, smooth and finely and evenly perforated, planispiraly coiled, involute, with smooth and circular outline, and widely rounded periphery. Only the final whorl (consisting of 7—10 trapezoidal chambers) is visible on both sides. In the initial part of the final whorl chambers flat, poorly convex. Sutures narrow and poorly curved and flat between chambers in the initial part of the whorl; in the final part they are radial and poorly depressed. Umbilicus very narrow, sometimes indistinct on both test sides. Apertural surface of the last chamber poorly convex with an interiomarginal equatorial aperture and a narrow lip at its base, extending to the umbilicus on both test sides.

Variability. — It is low and concerns size of the test (see measurements), test outline (circular or slightly oval), number of chambers visible in the last whorl (from 7 to 10) as well as width of umbilical depression on both sides (it can occupy 1/6 or 1/7 of the test diameter).

Remarks. — The investigated species resembles mostly *Anomalina bentonensis* MORROW, 1934 in test outline, test symmetry, pattern of coiling and rounded test periphery. It differs from that species in more narrow umbilical depression, in poorly convex chambers and poorly depressed sutures as well as in smaller size. In number of chambers in the final whorl and the test size *A. incognita* sp. n. resembles *A. (Pseudovalvulinerina) nana* AKIMEZ, 1961, from which it differs in planispiral involute coiling and in lacking flaps projecting from chambers on the ventral side. In small size, circular test outline *A. incongita* sp. n. slightly resembles *A. (P.) santonica* AKIMEZ, 1961. It differs from that species in equally biconvex test, identical sutures and chambers on both sides, in extension of the aperture on both test sides and in lacking chamber flaps in the umbilicus on both sides of the test.

Distribution. — Poland — Campanian-Maastrichtian (Lublin Chalk).

Genus *Gavelinella* BROTZEN, 1942

Gavelinella acuta (PLUMMER, 1926)

(pl. 34: 10, 11, 12)

1926. *Anomalina ammonoides* var. *acuta* PLUMMER: 149, pl. 10: 2 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1973. *Anomalina (Brotzenella) praeacuta* VASSILENKO; VAPTZAROVA: 33, pl. 3: 7, 8, 9 (with synonymy).
1974. *Anomalina acuta* PLUMMER: SZCZECHURA and POŻARYSKA: 103, pl. 26: 1—3, 6, 7 (with synonymy).
1974. *Anomalina praeacuta* VASSILENKO; GORBENKO: 46, pl. 7: 2a, b (with synonymy).
1984. *Gavelinella praeacuta* (VASSILENKO); GAWOR-BIEDOWA and WITWICKA: 299, pl. 107: 7, 8.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46336/88/F	46337/88/F	46338/88/F
diameter	0.480	0.360	0.336
highness	0.144	0.144	0.120

Remarks. — The specimens from Polish Lowlands differ from those from Midway Formation (Paleocene) from Texas in absence of pearl-shaped thickenings at the ends of sutures around the umbilicus. The specific characters are less distinct in the Polish specimens than in the American ones.

Distribution. — Poland: Polish Lowlands — uppermost lower Maastrichtian-Paleocene; Carpathians — Paleocene. Sweden, Bulgaria, USSR, Netherlands, Germany, Denmark — upper Maastrichtian-Paleocene. This species is known from all the continents mostly from epicontinental facies — Upper Cretaceous-Eocene.

Gavelinella complanata (REUSS, 1851)

(pl. 35: 1, 2, 33)

1851. *Gavelinella complanata* REUSS: 36, pl. 3: 3.
1945. *Cibicides complanata* (REUSS); BROTZEN: 55, pl. 2: 4a—c, 5a—c.
1954. *Anomalina (Anomalina) complanata* REUSS; VASSILENKO: 57, pl. 2: 3a, b, w, 4a, b, w.
1961. *Anomalina complanata* REUSS; WITWICKA: 122, pl. 1: 1.
1961. *Anomalina (Anomalina) complanata* REUSS; AKIMEZ: 136, pl. 13: 3a, b, w.
1963. *Anomalina (Anomalina) complanata* REUSS; KAPTARENKO-TSHERNOUSOVA *et al.*: 91, pl. 27: 1a, b, w.
1973. *Anomalina (Anomalina) complanata* REUSS; VAPTZAROVA: 35, pl. 2: 16, 17, 18.
1984. *Gavelinella complanata* (REUSS, 1851); GAWOR-BIEDOWA and WITWICKA: 293, pl. 103: 7—9.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46339/88/F	46340/88/F	46341/88/F
diameter	0.504	0.458	0.408
height	0.168	0.168	0.168

Variability. — It is expressed (in this nearly flat species having only more convex dorsal side) in degree of visibility of all whorls on the dorsal side. Inner whorls may be covered with a secondary test substance which forms a flat boss, as in the specimen illustrated by BROTZEN (1945, pl. 2: 5a, c). A small node is either present or absent in umbilicus of the ventral side.

Remarks. — According to AKIMEZ (1961; 137) *Anomalina pseudopapillosa* KALININ, 1937 (*non* CARSEY) from the Maastrichtian deposits of Aktiubinsk region (Kazakhstan), is a junior synonym of the investigated species.

Distribution. — Poland: Polish Lowlands — Maastrichtian. Sweden — Maastrichtian. USSR — upper Campanian-Maastrichtian.

Gavelinella costulata (MARIE, 1941)

(pl. 35: 4, 5, 6)

1941. *Discorbis lorneiana* var. *costulata* MARIE: 216, pl. 34: 315a—c.
1947. *Anomalina ammonoides* (REUSS) var. *crassisepta* VASSILENKO et MJATLIUK: 208, pl. 3: 5a—c, 6.
1973. *Anomalina (Gavelinella) costulata* (MARIE); VAPTZAROVA: 24, pl. 1: 10—12.
1974. *Anomalina costulata* (MARIE); GORBENKO: 43, pl. 5: 8a, b, w (with synonymy).
1979. *Gavelinella costulata* (MARIE); KAPTARENKO-TSHERNOUSOVA *et al.*: 126, pl. 48: 3a, b, w.
1981. *Gavelinella lorneiana* (d'ORBIGNY) *sensu stricto*; EDWARDS: 396, pl. 56: 1—5.
1984. *Gavelinella costulata* (MARIE); GAWOR-BIEDOWA and WITWICKA: 294, pl. 104: 6—8.

Material. — Over fifty well prescrved specimens.

Dimensions (in mm):

IG Nos.:	46342/88/F	46343/88/F	46344/88/F
diameter	0.576	0.552	0.528
height	0.312	0.288	0.264

Remarks. — According to MARIE (1941), the specimens differing from *Discorbis lorneiana* (d'ORBIGNY) in presence of thickenings on sutures in the middle portion of the final whorl of the dorsal side, are assigned to *D. lorneiana* var. *costulata*. HART *et al.* (1981), on the other hand, included the specimens with thickened sutures on the dorsal side of the final whorl (except for the suture between the two youngest chambers) in the species *Gavelinella lorneiana* (d'ORBIGNY). They gave, however, neither synonymy nor variability range of this species. Therefore, it is difficult to guess what is their opinion about *D. lorneiana* var. *costulata* as described by MARIE (1941). EDWARDS (1981) included *D. (recte Gavelinella) lorneiana* d'ORBIGNY var. *costulata* MARIE into synonymy of the species *G. lorneiana* (d'ORBIGNY) *sensu stricto*. In his opinion, this forms fit well within the variability range of the species *G. lorneiana* (d'ORBIGNY). The present author agrees that this forms may represent only intraspecific variability. They are treated here as a distinct species, following in it the Soviet students (see synonymy), and neglecting the fact that MARIE (1941) who knew well *Rosalina (recte Gavelinella) lorneiana* d'ORBIGNY from the Cretaceous of the Paris Basin, had distinguished this variety.

To this species HOFKER (1966) assigned only specimens without thickened sutures on the dorsal test side.

Distribution. — Poland: Polish Lowlands — Coniacian-lower Maastrichtian. France — upper Campanian. England — uppermost Turonian-Maastrichtian. Bulgaria — Campanian. USSR — Coniacian-Maastrichtian.

Gavelinella danica (BROTZEN, 1940)

(pl. 35: 11, 12, 13)

1940. *Cibicides danica* BROTZEN: 31, fig. 7: 2a—c.
?1954. *Anomalina (Anomalina) grandis* VASSILENKO: 68, pl. 4: 4a, b, w.
1962. *Gavelinella danica* (BROTZEN); HILTERMANN and KOCH: 322, pl. 46: 5—6, tab. 19.

1961. *Anomalina danica* (BROTZEN); WITWICKA: 123, pl. 1: 2a—c.
1963. *Anomalina (Anomalina) danica* (BROTZEN); KAPTARENKO-TSHERNOUSOVA *et al.*: 142, pl. 30: 5a, b, w.
1966. *Gavelinella danica* (BROTZEN); HOFKER: 41, pl. 6: 51, pl. 61, pl. 11: 120, 121, p. 76, pl. 14: 71, p. 196, pl. 36: 29, p. 227, pl. 43: 86, p. 243, pl. 48: 30, p. 258, pl. 84: 218, 220—222.
1970. *Anomalina danica* (BROTZEN); MJATLIUK: 134, pl. 57: 1, 2a, b, w, pl. 58: 1, 2.
1973. *Gavelinella danica* (BROTZEN); GAWOR-BIEDOWA: pl. 4: 6a, b.
1974. *Anomalina danica* (BROTZEN); SZCZECHURA and POŻARYSKA: 105, pl. 29: 2—5 (with synonymy).
1984. *Gavelinella danica* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 294, pl. 104: 4, 5.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46345/88/F	46346/88/F	46347/88/F
diameter	0.696	0.552	0.384
height	0.480	0.240	0.192

Remarks. — Specimens similar to the study material have been described by VASSILENKO (1954) as *Anomalina (Anomalina) grandis* from the Danian deposits of the Mangyshlak Peninsula. According to the author, they differ from *G. danica* (BROTZEN) in having the outline of the test oval (instead of circular), in presence of a boss on the dorsal side and in equal size of pores over the entire test surface. However, most specimens of *G. danica* (BROTZEN) are oval with small pores invisible on the surface of the three oldest chambers of the final whorl. But, some have entire surface of all chambers covered with pores of equal size. All the characters listed by VASSILENKO (1954: 68, 1961: 108) as discriminative between two species are the subject to variability within one species *G. danica. Anomalina (A.) grandis* VASSILENKO is thus most probably conspecific with *G. danica* (BROTZEN).

Distribution. — Poland: Polish Lowlands — upper Maastrichtian-Paleocene; Eastern and Western Carpathians — Paleocene. Sweden, Denmark, Netherlands, Germany, Bulgaria — upper Maastrichtian-Paleocene. England, USSR Russian Platform, Caucasus, Crimea — Paleocene.

Gavelinella gankinoensis (NECKAJA, 1948)

(pl. 35: 14, 15, 16)

1948. *Cibicides gankinoensis* NECKAJA: 222, pl. 3: 2a—c.
1954. *Cibicides (Anomalinoides?) gankinoensis* NECKAJA; VASSILENKO: 145, pl. 24: 1a, b, w.
1955. *Cibicides gankinoensis* NECKAJA; BALAKHMATOVA: 44, pl. 4: 1a, b.
1957. *Gavelinella incerta* HOFKER: 308, text-fig. 364.
1962. *Cibicides (Cibicidoides) propinquus* PLOTNIKOVA: 55, pl. 2: 8a, b, w.
1966. *Gavelinella incerta* HOFKER; HOFKER: 76, pl. 14: 74.
1979. *Cibicidoides propinquus* PLOTNIKOVA; KAPTARENKO-TSHERNOUSOVA *et al.*: 124, pl. 46: 9a, b, w.
1984. *Gavelinella gankinoensis* NECKAJA; GAWOR-BIEDOWA: pl. 4: 7—9.
1984. *Gavelinella gankinoensis* NECKAJA; GAWOR-BIEDOWA and WITWICKA: 295, pl. 104: 9, pl. 105: 7, 8.

Material. — More than fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46348/88/F	46349/88/F	46350/88/F
diameter	0.306	0.384	0.264
height	0.192	0.192	0.120

Variability. — It is expressed in convexity of the dorsal side in relation to the flat ventral one, in degree of depression of septal sutures on the dorsal side (flat or poorly depressed), in size of pores and degree of thickening of sutures near the umbilicus on the ventral side. The dorsal side is smooth, glittering and very finely perforated, contrary to the ventral one.

Remarks. — The species *Gavelinella incerta* described by HOFKER (1957) corresponds to *G. gankoinensis* (NECKAJA) in oval shape, flat ventral side and convex but not conical dorsal one, in very narrow (in comparison with the final whorl) older whorls, densely spaced and large

pores on the flat chamber surface, and in slightly thickened and wide septal sutures near the umbilicus on the ventral side. The specimens described by PLOTNIKOVA as *Cibicides (Cibicidoides) propinquus* differ (according to that author) from the investigated species only in less rounded test periphery and less convex last chambers. These features fit well into the intraspecific variability of *Gavelinella gankinoensis* (NECKAJA).

Distribution. — Poland (Polish Lowlands), Germany, Denmark, Netherlands — upper Maastrichtian. USSR — Campanian-Maastrichtian.

Gavelinella mariae (JONES, 1852)

(pl. 35: 7, 8, 9, 10)

1852. *Rosalina mariae* JONES: 267, pl. 16: 13 (*fide* ELLIS and MESSINA, Cat. of Foram.).
1974. *Cibicides mariae* (JONES); SZCZECHURA and POŻARYSKA: 87, pl. 25: 7—11 (with synonymy).
1979. *Anomalina ? ekblomi* (BROTZEN); KAPTARENKO-TSHERNOUSOVA *et al.*: 120, pl. 46: 4a, b, w (with synonymy).
1981. *Cibicides (Cibicidina) mariae* (JONES); MURRAY *et al.*: 248, pl. 8. 4: 17—19.
1984. *Gavelinella ekblomi* (BROTZEN); GAWOR-BIEDOWA: 295, pl. 104: 1—3 (with synonymy).

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46351/88/F	46352/88/F	46353/88/F
diameter	0.312	0.264	0.240
height	0.120	0.120	0.096

Remarks. — Due to comparative material from the Paleocene (Thanetian) of England, as well as from the Paleocene of Texas and Sweden, SZCZECHURA and POŻARYSKA (1974) identified *Rosalina mariae* JONES and established its numerous synonyms, *Cibicides ekblomi* BROTZEN, 1948 among them. But, they did not designate a lectotype of *Rosalina mariae*. The holotype of this species has been lost, as it follows from ELLIS and MESSINA in Catalogue of Foraminifera. The schematic illustration in JONES 1852 is not very helpful in identification. The problem of generic affiliation of this species remains unsolved. The study species display features of the genus *Gavelinella* BROTZEN, 1942, which include umbilicus partially closed by a subtriangular umbilical flaps projecting from each chamber on the ventral (involute) test side. Only the spiral semi-involute side is different. The investigated species belongs to the group of the genus *Gavelinella* which includes *G. complanata* (REUSS), *G. gankoinensis* (NECKAJA) and *G. danica* (BROTZEN), all of them having very narrow older whorls in comparison with the youngest whorl. This results in apparent, only partial evolutness of the dorsal (spiral) side of the test.

Distribution. — Poland: Polish Lowlands — upper Maastrichtian-Paleocene; Carpathians — Paleocene. England, Sweden, Denmark, Austria, France — Paleocene. USSR, Germany, Bulgaria — upper Maastrichtian-Paleocene. USA — Paleocene.

Gavelinella monterelensis (MARIE, 1941)

(pl. 36: 1, 2)

1941. *Anomalina monterelensis* MARIE: 243, pl. 37: 432a—c.
1966. *Gavelinopsis monterelensis* (MARIE); HOFKER: 29, pl. 3: 60.
1972. *Gavelinella monterelensis* (MARIE); HANZLIKOVÁ: 131, pl. 29: 3.
1973. *Anomalina (Brotzenella) monterelensis* MARIE; VAPTZAROVA: 30, pl. 3: 13, 14, 15.
1974. *Anomalina monterelensis* MARIE; GORBENKO: 45, pl. 6: 6a, b, w.
1979. *Brotzenella monterelensis* (MARIE); KAPTARENKO-TSHERNOUSOVA *et al.*: 125, pl. 47: 7a, b, w (with synonymy).
1981. *Gavelinella monterelensis* (MARIE); HART *et al.*: 196, pl. 7. 12: 1—3.
1981. *Gavelinella monterelensis* (MARIE); EDWARDS: 397, pl. 58: 15—17.
1984. *Gavelinella monterelensis* (MARIE); GAWOR-BIEDOWA: pl. 3: 7—9.
1984. *Gavelinella monterelensis* (MARIE); GAWOR-BIEDOWA and WITWICKA: 298, pl. 106: 1—3 (with synonymy).
1985. *Gavelinella monterelensis* (MARIE); ROBASZYNSKI *et al.*: pl. 5: 5a, b.

Material. — Two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46354/88/F	46355/88/F	46356/88/F
diameter	0.552	0.528	0.432
height	0.192	0.216	0.144

Variability. — It is low and concerns size of an umbilical boss on the ventral side and spiral side boss which can be more or less distinct, broad and low.

Remarks. — *Anomalina menneri* KELLER resembles very much the investigated species in general test shape, shape and size of umbilical boss on the ventral side, in presence of the boss on the dorsal side and in number of chambers in the final whorl (12—14). It most probably is its junior synonym. To solve the problem one has to investigate the topotype of *A. menneri* KELLER. EDWARDS (1981) regarded *Cibicides voltziana* (d'ORBIGNY) var. *plana* SCHIJFSMA, 1946, as a synonym of the investigated species. The former subspecies cannot be synonymous with *Gavelinella monterelensis* (MARIE), as it displays densely spaced, numerous and well visible pores on the flat spiral test side whereas *G. monterelensis* (MARIE) has large and densely spaced pores on the ventral (involute) test side. An aperture which also extends on the more evolute (dorsal) side in *Cibicides (recte Cibicidoides) voltziana* (d'ORBIGNY) var. *plana* SCHIJFSMA precludes its assignment to the genus *Gavelinella.*

Distribution. — Poland: Polish Lowlands — uppermost lower Campanian-Maastrichtian. France, England — uppermost lower Campanian-upper Campanian. Switzerland — lower part of the upper Campanian. Czechoslovakia (Carpathians) — Campanian. Bulgaria — Campanian-Maastrichtian. Belgium (Limburg), Netherlands (Limburg) — upper Campanian-lower Maastrichtian. USSR: Donbas — upper part of the lower Campanian-upper Campanian; Byelorussia, Wolhyno-Podolian Plate, Mangyshlak Peninsula, Dnepr-Donbas Depression — upper Campanian; Crimea, northern Caucasus — Campanian-Maastrichtian.

Gavelinella pertusa (MARSSON, 1878)

(pl. 36: 6, 7)

1978. *Discorbina pertusa* MARSSON: 166, pl. 4: 35a—d.
1942. *Gavelinella costata* BROTZEN: 43, pl. 1: 3.
1954. *Anomalina (Gavelinella) pertusa* (MARSSON) emend BROTZEN; VASSILENKO: 80, pl. 8: 3a, b, w (with synonymy).
1961. *Gavelinella pertusa* (MARSSON); WITWICKA: 127, pl. 3: 6a—c.
1966. *Gavelinella pertusa* (MARSSON); HOFKER: 28, pl. 3: 57a—c.
1973. *Anomalina (Gavelinella) pertusa* (MARSSON); VAPTZAROVA: 25, pl. 2: 1—3.
1981. *Gavelinella pertusa* (MARSSON); HART *et al.*: 196, pl. 7. 12: 4—6.
1981. *Gavelinella pertusa* (MARSSON); EDWARDS: 397, pl. 56: 7—9.
1984. *Gavelinella pertusa* (MARSSON); GAWOR-BIEDOWA and WITWICKA: 298, pl. 107: 1—3.
1986. *Gavelinella pertusa* (MARSSON); JORDAN and GASSE: 19, pl. 7: 6—9.

Material. — Over two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46357/88/F	46358/88/F	46359/88/F
diameter	0.360	0.312	0.240
height	0.120	0.120	0.096

Variability. — It is expressed mainly in number of chambers in the final whorl (11—15) and in degree of convexity of sutures in the final whorl on both test sides.

Remarks. — I consider, following HAGN 1954 that *Gavelinella costata* BROTZEN, 1942 is a junior synonym of *G. pertusa* (MARSSON), as the only difference between them is in more raised septal sutures on the dorsal side in *G. costata* BROTZEN.

Distribution. — Poland: Polish Lowlands — Campanian-Maastrichtian. Germany, Sweden, Netherlands — Campanian-Maastrichtian. England — Coniacian-Maastrichtian. France — upper Campanian. Bulgaria — Maastrichtian — Danian (uncommon). USSR — Campanian-Danian.

Gavelinella postthalmanni sp. n.
(pl. 37: 3, 4, 5, pl. 38: 8)

Holotype: Specimen IG No. 46360/88/F, in pl. 37: 4.
Paratypes: Specimens IG Nos. 46361/88/F, 46362/88/F, in pl. 37: 3, 5.
Type horizon: Campanian.
Type locality: Borehole Tyszowce IG 1, depth 330.0 m. Lublin Upland, Poland.
Derivation of the name: From the latin post — after and the species name *thalmanni*.

Diagnosis. — The only difference with respect to *G. thalmanni* (BROTZEN) is that the new species has both, chamber surface and sutures on the dorsal side, smooth and devoid of ornamentation.

Material. — More than a hundred well preserved specimens.

Dimensions (in mm):

	Holotype	Paratypes	
IG Nos.:	46360/88/F	46361/88/F	46362/88/F
diameter	0.336	0.288	0.194
height	0.170	0.120	0.076

Destribution — Test resembles *G. thalmanni* (BROTZEN) in general shape. Ventral side is involute, flat, umbilicus very narrow, covered by subtriangular umbilical flaps. Chamber surface flat, coarsely perforate. Sutures slightly curved, flat or very poorly convex. Test outline nearly circular, periphery rounded. Dorsal side evolute and consisting of 2 or 2 and 1/2 whorls. Final whorl corresponds to 2/3 of the test diameter, it is convex and comprises 10—12 slightly convex chambers. Chambers in older whorls invisible. Sutures flat and poorly curved in the initial part of the final whorl, in the final one poorly depressed, radial. Aperture interiomarginal, arched, supplied with a rather wide lip and extending to the ventral side beneath umbilical flaps.

Variability. — It is expressed in test size, number of chambers in the final whorl (10—12), degree of chamber convexity on the dorsal side (all chambers very poorly convex or poorly convex in the initial portion and strongly convex in the final part of the final whorl), in pattern of sutures development, especially on the dorsal side (sutures flat or poorly depressed between chambers, or flat in the initial part of whore while rather strongly depressed in the final one). Sutures may be slightly thickened in some specimens on the ventral side.

Remarks. — The investigated species is probably derived from *G. thalmanni* (BROTZEN), from which it differs only in absence of raised rugose ribs and nodose ornamentation on the dorsal side. General test shape and lack of ornamentation on chambers and sutures on the dorsal side make it close to *Anomalina (Pseudovalvulineria) thalmanniformis* PLOTNIKOVA, 1962. It looks nearly homeomorphic with that species. It differs from *A. (P.) thalmanniformis* PLOTNIKOVA in more numerous chambers in the final whorl (10—12 instead 8—10), in chambers of the older whorls invisible on the dorsal side, and in the stratigraphical range [the investigated species range from Campanian to Maastrichtian, while *A. (Pseudovalvulineria) thalmanniformis* PLOTNIKOVA occurs in Cenomanian]. It seems that the species *A. (P.) thalmanniformis* PLOTNIKOVA is the first member, while *G. postthalmanni* (BROTZEN) the final one of the phylogenetic lineage, in which *G. thalmanni* (BROTZEN) occupies the intermediate position. The latter species occurs in Poland from the Coniacian to the lower Santonian, while in England from the Coniacian to the lower part of the upper Campanian. The initial member

of this lineage i.e. *A. (P.) thalmanniformis* PLOTNIKOVA and the final one i.e. *G. postthalmanni* sp. n. are devoid of test ornamentation. Raised rugose ribs on sutures and papillae on chamber surface on the dorsal test side had been developed only in *G. thalmanni* (BROTZEN).

Distribution. — Poland — Campanian-Maastrichtian.

Gavelinella sahlstroemi (BROTZEN, 1948)

(pl. 36: 11, 12, 13)

1948. *Cibicides sahlstroemi* BROTZEN: 85, pl. 17: 1.
1966. *Gavelinella sahlstroemi* (BROTZEN); HOFKER: 197, pl. 36: 27.
1970. *Anomalina inoceramoviensis* MJATLIUK: 131, pl. 54: 2, 3, 4 (a, b, w).
1973. *Gavelinella sahlstroemi* (BROTZEN); GAWOR-BIEDOWA: pl. 4: 2.
1974. *Cibicides sahlstroemi* BROTZEN; SZCZECHURA and POŻARYSKA: 89, pl. 8: 5 (with synonymy).
1984. *Gavelinella sahlstroemi* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 299, pl. 107: 4—6.

Material. — More than two hundred preserved specimens.

Dimensions (in mm):

IG Nos.:	46365/88/F	46366/88/F	46367/88/F
diameter	0.192	0.168	0.146
height	0.072	0.048	0.072

Variability. — It is expressed in development of the dorsal side (flat or slightly concave), size of pores on a chamber surface of the ventral side, development of sutures on the ventral side (flat and wide or slightly raised) and in height of ribs on spiral and septal sutures on the dorsal side. The ribs on septal sutures in older whorls are absent or poorly developed in some specimens.

Remarks. — *Anomalina inoceramoviensis* MJATLIUK corresponds entirely to the investigated species in the test shape, test symmetry, width of sutures on the dorsal side, and in the development of ribs on sutures. It differs, however, in equal size of pores on chamber surface on both sides. The pores are very fine and invisible on the dorsal side in the investigated species, whereas the test surface is glittering. SZCZECHURA and POŻARYSKA (1974) noted the presence of *Gavelinella sahlstroemi* (BROTZEN) in the Paleocene of the Polish Carpathians, which may suggest that the specimens described by MJATLIUK (1970) from the Maastrichtian deposits of Eastern Carpathians as *A. inoceramoviensis* MJATLIUK belong to the investigated species, despite some differences caused by the preservation state.

Distribution. — Poland: Polish Lowlands — upper part of the upper Maastrichtian-Paleocene; Carpathians — Paleocene. Sweden, Denmark, Netherlands, England — upper part of the upper Maastrichtian-Paleocene. Perhaps also Eastern Carpathians-Maastrichtian.

Gavelinella stelligera (MARIE, 1941)

(pl. 36: 3, 4, 5)

1941. *Planulina stelligera* MARIE: 245, pl. 37: 344a—c.
1947. *Planulina schloenbachi* (REUSS) var. *kalinini* VASSILENKO et MJATLIUK: 213, pl. 3: 9a—c.
1961. *Pseudovalvulineria stelligera* (MARIE); WITWICKA: 129, pl. 4: 8a—c.
1972. *Anomalina (Pseudovalvulineria) stelligera* (MARIE); VAPTZAROVA: 93, pl. 3: 10—12.
1974. *Anomalina stelligera* (MARIE); GORBENKO: 44, pl. 6: 3a, b, w (with synonymy).
1981. *Gavelinella stelligera* (MARIE); HART *et al.*: 196, pl. 7. 12: 10—12.
1984. *Gavelinella spissocostata* CUSHMAN; OLSSON and NYONG: pl. 3: 11—13.
1984. *Gavelinella stelligera* (MARIE); GAWOR-BIEDOWA and WITWICKA: 301, pl. 109: 1—3.
1986. *Gavelinella stelligera* (MARIE); SOLAKIUS and LARSSON: 19, pl. 1: 6—8.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46368/88/F	46369/88/F	46370/88/F
diameter	0.576	0.480	0.336
height	0.264	0.168	0.144

Variability. — It is expressed in size of chamber flaps arranged in stellate pattern on the ventral side, in height of ribs on septal sutures on both sides, as well as is width of the final whorl on the dorsal side (it is associated with degree of evolutness of that side of the test). The sutures may be depressed or flat between 3 or 4 younger chambers and not thickened on ventral side.

Remarks. — The specimens included in the species *Planulina schloenbachi* (REUSS) var. *kalinini* by VASSILENKO et MJATLIUK (1947) display all the features of the investigated species. Only umbilical flaps are less developed in the specimens from the Emba region of Kazakhstan than in the holotype from the *Belemnitella mucronata* Zone of the Paris Basin. VASSILENKO (1954) considered *P. schloenbachi* (REUSS) var. *kalinini* VASSILENKO et MJATLIUK as a junior synonym of the species *Gavelinella stelligera* (MARIE). This last species also occurs in New Jersey and Maryland (USA), and has been illustrated by OLSSON and NYONG (1984, pl. 3: 11—13) under the name *G. spissocostata* CUSHMAN. The illustrated specimens differ, however, from *P. spissocostata* CUSHMAN, 1938 in having umbilical flaps which cover the umbilicus on the ventral test side, and which are arranged as in *G. stelligera* (MARIE).

Distribution. — Poland: Polish Lowlands — Coniacian-lower Campanian, sometimes also in the lowermost part of the upper Campanian. France — Campanian. Denmark — Coniacian-lower Campanian. England — upper Senonian-Middle Campanian. Bulgaria — Santonian-Campanian. USA — upper Campanian. USSR-Kazakhstan (Emba region), Donbas, Mangyshlak Peninsula, Byelorussia, Wolhyn-Podole Plate, Dnepr-Donetsk Depression — Santonian-lower Campanian; Crimea and North Caucasus — Santonian-Maastrichtian.

Gavelinella tenuissima GAWOR-BIEDOWA, 1992

(pl. 37: 6, 7, 8)

1992. *Gavelinella tenuissima* GAWOR-BIEDOWA: 87, pl. 3: 5, 6.

Material. — Over one hundred well preserved specimens.

Dimensions (in mm):			
IG Nos.:	46371/88/F	46372/88/F	46373/88/F
longest diameter	0.264	0.240	0.168
shortest diameter	0.216	0.216	0.148
height	0.072	0.072	0.072

Distribution. — Poland: Lublin Chalk, Campanian — Maastrichtian.

Gavelinella umbilicatula (VASSILENKO et MJATLIUK, 1947)

(pl. 36: 14, pl. 37: 1, 2)

1947. *Anomalina ammonoides* (REUSS) var. *umbilicatula* VASSILENKO et MJATLIUK: 208, pl. 1: 8a, b, c.
1954. *Anomalina (Gavelinella) umbilicatula* MJATLIUK; VASSILENKO: 78, pl. 7: 4a, b, w.
1956. *Gavelinella pertusa maestrichtiensis* HOFKER: 73, pl. 8: 60a, b, c.
1959. *Anomalina umbilicatula* MJATLIUK; MASLAKOVA: 100, pl. 6: 7.
1960. *Gavelinella limbata* OLSSON: 35, pl. 5: 17—19.
1961. *Gavelinella umbilicatula* (MJATLIUK); WITWICKA: 126, pl. 3: 5a—c.
1961. *Anomalina (Gavelinella) umbilicatula* MJATLIUK; AKIMEZ: 140, pl. 13: 6a, b, w.
1966. *Gavelinella pertusa* subsp. *maestrichtiensis* HOFKER; HOFKER: 41, pl. 6: 60, 75, pl. 14: 69a—c, 70a—c.
1970. *Anomalina (Gavelinella) umbilicatula* MJATLIUK; JANOWSKAJA and BUKATSCHUK: 136, pl. 6: 3a, b, w.

1970. *Gavelinella umbilicatula* (MJATLIUK); MJATLIUK: 136, pl. 54: 10a—c.
1973. *Anomalina (Gavelinella) umbilicatula* MJATLIUK; VAPTZAROVA: 24, pl. 1: 13—15.
1974. *Gavelinella umbilicatula* (MJATLIUK); SZCZECHURA and POŻARYSKA: 112, pl. 28: 1a—c.
1984. *Gavelinella umbilicatula* (MJATLIUK); GAWOR-BIEDOWA and WITWICKA: 302, pl. 109: 7—9.
1985. *Gavelinella pertusa* (MARSSON); SOLAKIUS and LARSSON: 18, pl. 3: 1—3.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46374/88/F	46375/88/F	46376/88/F
diameter	0.504	0.480	0.426
thickness	0.240	0.192	0.192

Variability. — It is expressed in a test shape (circular to oval), development of the test periphery (rounded to subacute), in rate of increase of chamber height on the ventral side (gradual increase of size of all chambers or rapid increase of size of the youngest chambers), in size of the last chamber and height of thickenings on sutures, especially on the ventral side.

Remarks. — The investigated species differs from *Gavelinella pertusa* (MARSSON) in test symmetry (ventral side higher than the dorsal one), in increase of chamber height with growth in the final whorl on the ventral test side, in more narrow umbilicus and more convex ultimate chamber. The both species compared are closely related. VASSILENKO (1954) assigned the species *G. costata* BROTZEN, 1942 to *G. umbilicatula* (VASSILENKO et MJATLIUK 1947), the species which is considered here, in accordance with HAGN (1954) and EDWARDS (1981) treat *G. costata* opinions, as a junior synonym of *G. pertusa* (MARSSON) (see p. 169). The species *G. pertusa maestrichtiaensis* HOFKER, 1956 and *G. limbata* OLSSON, 1960 are here considered as synonymous with the investigated species, as they display similar pattern of the chamber increase in height in the final whorl on the ventral side, have the same size and convexity of the ultimate chamber and much wider final whorl in comparison with older ones (on the dorsal side).

Distribution. — Poland: Polish Lowlands — Coniacian-Maastrichtian; Carpathians — Paleocene. Denmark — Coniacian-Maastrichtian. Netherlands, Germany — Maastrichtian--Danian. Bulgaria — Santonian-Maastrichtian. USSR — Santonian-Maastrichtian, sometime Coniacian. USA — Danian.

Gavelinella vombensis (BROTZEN, 1945)

(pl. 36: 8, 9, 10)

1945. *Pseudovalvulineria vombensis* BROTZEN: 50, pl. 1: 13 (*non* 12): text-fig. 9.
1947. *Anomalina infrasantonica* BALAKHMATOVA; VASSILENKO and MJATLIUK: 210, pl. 3: 2a—c, 3a—b.
1970. *Anomalina (Pseudovalvulineria) infrasantonica* BALAKHMATOVA; JANKOWSKAJA and BUKATSCHUK: 129, pl. 5: 2a, b, w.
1972. *Anomalina (Pseudovalvulineria) infrasantonica* BALAKHMATOVA; VAPTZAROVA: 95, pl. 4: 1—3.
1979. *Pseudovalvulineria infrasantonica* (BALAKHMATOVA); KAPTARENKO-TSHERNOUSOVA *et al.*: 130, pl. 50: 1a, b, w (with synonymy).
1981. *Lingulogavelinella* sp. cf. *L. vombensis* (BROTZEN); HART *et al.*: 210, pl. 7. 19: 1—3.
1981. *Gavelinella vombensis* (BROTZEN); EDWARDS: 404, pl. 56: 16—18, pl. 57: 1—3.
1981. *Gavelinella praeinfrasantonica* (VASSILENKO et MJATLIUK); EDWARDS: 400, pl. 56: 13—15.
1984. *Gavelinella vombensis* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 303, pl. 109: 4—6.

Material. — More than two hundred well preserved specimens.

Dimensions (in mm):

IG Nos.:	46377/88/F	46378/88/F	46379/88/F
diameter	0.552	0.480	0.408
height	0.288	0.240	0.168

Variability. — It is low and concerns mainly convexity, shape and size of a smooth boss covering the inner whorls on the dorsal (spiral) side, and in length and width of thickenings on sutures on the ventral side. Sutures are rather wide and raised, especially from the mid-

length to the umbilicus, except the sutures between the three youngest chambers; they can be also thickened only in the umbilical area and form a characteristic stellate pattern. This variability is well illustrated by the specimens from southern England presented by EDWARD (1981, pl. 56: 16—18, pl. 57: 1—3).

Remarks. — The specimens assigned by EDWARDS (1981) to *G. praeinfrasantonica* (VASSILENKO et MJATLIUK) are in fact poorly preserved specimens of *G. vombensis* (BROTZEN). They show all the features of the latter species (pl. 56: 13—15 and 56: 16—18). VASSILENKO et MJATLIUK (1947: 211) considered the species *Anomalina praeinfrasantonica* VASSILENKO et MJATLIUK as the species ancestral to *A. infrasantonica* BALAKHMATOVA (= *G. vombensis* (BROTZEN). According to the present author *A. praeinfrasantonica* VASSILENKO et MJATLIUK can not be ancestral *G. vombensis* (BROTZEN). EDWARDS (1981) assigned to *G. vombensis* the specimens illustrated under this name by BROTZEN (1945) in pl. 1: 13a—c, text-fig. 9 and the specimen from pl. 1: 12a—c of the same author which probably belongs to the species *Stensioeina beccariformis* (WHITE). The latter species was probably unknown to EDWARDS. It differs from the species studied in having biconvex to plano-convex test, all whorls and chambers visible on the dorsal side, in lacking a dorsal boss, in having flat sutures on the ventral side of the test as well as in being half of its size. The specimens described by HART *et al.* 1981 as *Lingulogavelinella* sp. cf. *L. vombensis* (BROTZEN), from the Coniacian — Santonian deposits of England represent in fact poorly preserved specimens of the species *Gavelinella vombensis* (BROTZEN).

Distribution. — Poland: Polish Lowlands — upper part of Turonian-Campanian. Sweden — Turonian-lower Campanian. England, Bulgaria, USSR — Coniacian-Santonian.

Genus *Paralabamina* HANSEN, 1970

Paralabamina toulmini (BROTZEN, 1948)

(pl. 32: 4, 5, 6)

1948. *Eponides toulmini* BROTZEN: 78, pl. 10: 16.
1959. *Eponides* sp. MORGIEL: 137, pl. 14: 8a—c.
1961. *Globoratalites perforatus* VASSILENKO: 61, pl. 10: 5a, b, w.
1968. *Eponides toulmini* BROTZEN; POŻARYSKA and SZCZECHURA: 72, pl. 15: 1—4 (with synonymy).
1970. *Globoratalites perforatus* VASSILENKO; MJATLIUK: 126, pl. 37: 2a, b, w.
1973. *Eponides toulmini* BROTZEN; GAWOR-BIEDOWA: pl. 3: 2a, b.
1974. *Paralabamina toulmini* (BROTZEN); SZCZECHURA and POŻARYSKA: 97, pl. 18: 2—4 (a—c) (with synonymy).
1984. *Paralabamina toulmini* (BROTZEN); GAWOR-BIEDOWA and WITWICKA: 284, pl. 97: 9, pl. 98: 4, 5.

Material. — More than fifty well preserved specimens.

Dimensions (in mm):

IG Nos.:	46296/88/F	46297/88/F	46298/88/F
longest diameter	0.360	0.264	0.240
shortest diameter	0.288	0.216	0.216
height	0.240	0.144	0.120

Variability. — For variability of this species see POŻARYSKA and SZCZECHURA (1968, pl. 15: 1—4).

Remarks. — For discussion of the synonyms see POŻARYSKA (1965), POŻARYSKA and SZCZECHURA (1968) and SZCZECHURA and POŻARYSKA (1974). The specimen described as *Globorotalites perforatus* VASSILENKO by MJATLIUK (1970) from the Danian deposits of the Eastern Carpathians shows all the features of the species under discussion.

Distribution. — Poland: Polish Lowlands — upper Maastrichtian — Paleocene; Carpathians — Paleocene. Netherlands, Belgium, France (Paris Basin and Pyrenees), Sweden, Germany, Slovakian Carpathians, USSR, Greenland — Upper Cretaceous-lower Eocene.

Family **Lublinidae** GAWOR-BIEDOWA, 1987
Genus *Lublina* GAWOR-BIEDOWA, 1989
Lublina lublinensis (GAWOR-BIEDOWA, 1987)
(pl. 39: 7, 8, 9)

1987. *Lublinella lublinensis* GAWOR-BIEDOWA: 66, p. 23: 8, pl. 24: 2, 3, pl. 25: 1—3, pl. 26: 7a—c, pl. 28: 7.

Material. — Over 400 well preserved specimens.

Dimensions (in mm):

IG Nos.:	46408/88/F	46409/88/F	46410/88/F
diameter	0.288	0.240	0.216
height	0.144	0.096	0.096

Remarks. — The specimens of this species from the Tyszowce IG 1 borehole differ from those from the Lublin IG 2 borehole in having thicker test wall. It results in poor visibility of whorls and chambers on the evolute, dorsal side of the test. Chambers and sutures on the ventral, involute side of the test, are well visible, but not so distinct as in the specimens from the Lublin IG 2 borehole. Umbilical node and supplementary aperture as in the specimens from the type locality.

Distribution. — Poland — Campanian, lower Maastrichtian (Lublin Chalk).

REFERENCES

ABDEL-KIREEM, M. R. 1986. Planktonic Foraminifera and stratigraphy of the Tanjero Formation (Maastrichtian), north-eastern Iraq. — *Micropaleontology*, 32, 215—231.

[AKIMEZ, V. S.] АКИМЕЦ, В. С. 1961. Стратиграфия и фораминиферы верхнемеловых отложений Белоруссии. — *Палеонт. Страт. БССР*, **3**, 1—245.

[AKIMEZ, V. S.] АКИМЕЦ В. С. 1985. Уточнение и детализаця зонального расчленеиия маастихтских отложений Белоруссии по фораминиферам. Геологическое строение и развите территории БССР. — Сборник Научных Трудов, 112—132. Минск.

[AKIMEZ, V. S., BENIAMOWSKIJ, V. N., GLABKOVA, V. I., KOPAEVITZ, L. F. and NAJDIN, D. P.] АКИМЕЦ, В. С., БЕНЬЯМОВСКИЙ, В. Н., ГЛАБКОВА, В. И., КОПАЕВИЧ, Л. Ф., НАЙДИН, Д. П. 1983. Бентосные фораминиферы и белемниты кампана и маастрихта восточного прикаспия. — *Бюл. Моск. Общ. Испыт. Природ.*, Отд. Геологический, **58**, 1, 113—126.

[ALILULLA, Ch.] АЛИЮЛЛА, Х. 1965. О состоянии изученности семейства Heterohelicidae и пути его дальнейшего изучения. — *Вопр. микропал. А. Н. СССР*, **9**, 215—228.

[ALILULLA, Ch.] АЛИЮЛЛА, Х. 1980. Микроморфологические признаки позднемеловых планктоных фораминифер. — *Пал. Журнал*, **3**, 14—18.

ALMOGI-LABIN, A., REISS, Z. and CARON, M. 1986. Senonian Globotruncanidae from Israel. — *Ecl. Geol. Helvetiae*. 79, 849—895.

ALTH, A. 1850. Geognostisch-paläontologische Beschreibung der nächsten Umgebung von Lemberg. — *Haiding. Naturwiss. Abhandl.*, 3, Abt. 2, 171—284.

[ANDREJEVA, L. P. and VOLOSHINA, A. M.] АНДРЕЕВА, Л. П., ВОЛОШИНА, А. М. 1983. Новые данные о кампанских фораминиферах юго-западного края Волыно-Повольской плиты. — *Палеонт. Сб.*, **20**, 11—19.

ASCOLI, P. 1976. Foraminiferal and ostracod biostratigraphy of the Mesozoic-Cenozoic, Scotian Shelf, Atlantic Canada. — *In*: 1-st International Symposium on Bentonic Foraminifera of Continental Margins. Schafer, C. T. and Pelletier, B. R. (eds.), Maritime Sediments Spec. Publ. **1**, 653—771.

Bailey, H. W., Gale, A. S., Mortimore, R. N., Święcicki, A. and Wood, C. J. 1984. Biostratigraphical criteria for the recognition of the Coniacian to Maastrichtian stage boundaries in the Chalk of north-west Europe, with particular reference to southern England. — *Bull. Geol. Soc. Denmark*, **33**, 31—39.

Bailey, H. W. and Hart, M. B. 1979. The correlation of the Early Senonian in Western Europe using Foraminiferida. — Aspekte der Kreide Europas. IUGS A, **6**, 159—169.

[Balachmatova, V. T., Lipman, R. Ch. and Romanowa, V. I.] Балахматова, В. Т., Липман, Р. Х., Романова, В. И. 1955. Характерные фораминиферы мела и палеогена западно-сибирской низменности. — *ВСЕГЕЙ*, **2**, 3—106.

Bandy, O. L. 1967. Cretaceous planktonic foraminiferal zonation. — *Micropaleontology*, 13, 1—31.

[Baranovskaja, O. F. and Bulinnikova, S. P.] Барановская, О. Ф., Булынникова, С. П. 1964, *In*: Н. Н. Субботина (ред.), Род. Bolivinoides Фораминиферы меловых и палеогеновых отложехий Западно-Сибирской низменности. — *Тр. ВНИГРИ*, **234**, 290—297.

Barnard, T. and Banner, F. T. 1953. Arenaceous Foraminifera from the Upper Cretaceous of England. — *Quart. J. Geol. Soc. Lond.*, 109, 173—216.

Barr, F. T. 1962. Upper Cretaceous planktonic foraminifera from the Isle of Wigth, England. — *Palaeontology*, **4**, 552—580.

Barr, F. T. 1966*a*. The foraminiferal genus *Bolivinoides* from the Upper Cretaceous of the British Isles. — *Palaeontology*, **9**, 220—243.

Barr, F. T. 1966*b*. Upper Cretaceous foraminifera from the Ballydeenlea Chalk, Country Kerry, Ireland. — *Palaeontology*, **9**, 492—510.

Barr, F. T. 1967. *Bolivinoides culverensis* new name for the Campanian foraminifer *B. hiltermanni* Barr. — *Contr. Cushm. Found. Foram. Res.*, **18**, 136.

Barr, F. T. 1968*a*. Late Cretaceous planktonic foraminifera from the costal area east of Susa (Apollonia) north-eastern Libya. — *J. Paleont.*, **42**, 308—321.

Barr, F. T. 1968*b*. Upper Cretaceous stratigraphy of Jabal al Akhdar, northern Cyrenaica. *In*: Barr, F. T. (ed.), Geology and Archeology of northern Cyrenaica, Libya. — Petrol. Explor. Soc. Libya, 131—147.

Barr, F. T. 1970. The Foraminiferal genus *Bolivinoides* from the Upper Cretaceous of Libya. — *J. Paleont.*, **44**, 642—654.

Barr, F. T. 1972. Cretaceous biostratigraphy and planktonic foraminifera of Libya. — *Micropaleontology*, **18**, 1—46.

Barr, F. T. and Cordey, W. G. 1964. Some Upper Cretaceous Foraminifera from the Chapman Collection (1892). — *J. Paleont.*, **38**, 306—310.

Bettenstaedt, F. and Wicher, C. A. 1955. Stratigraphic correlation of Upper Cretaceous and Lower Cretaceous in the Tethys and Boreal by the aid of microfossils. — World Petrol. Congr., 4th Rome, Proc., Sec. I/D, 5, (ed.), Carol Colombo, Rome, 493—516.

Bé, A. W. H. 1977, 1: An ecological, zoogeographic and taxonomic review of recent planktonic foraminifera. — *Oceanic Micropaleontology*, **1**, (ed.), Ramsay, A. T. S., Academic Press, 1—88.

Beckmann, J. P. 1953. Die Foraminiferen der Oceanic Formation (Eocaen — Oligocaen) von Barbados, Kl. Antillen. — *Ecl. Geol. Helvetiae*, **46**, 301—412.

Beckmann: J. P., Bolli, H. M., Kleboth, P. and Proto Decima, F. 1983. Micropaleontology and biostratigraphy of the Campanian to Paleocene of the Monte Giglio, Bergamo Province, Italy. — *Mem. Sci. Geol.*, 35, 91—172.

Beckmann, J. P. and Koch, W. 1964. Vergleiche von *Bolivinoides*, *Aragonia* und *Tappaniny* (Foraminifera) aus Trinidad (West-indien) und Mitteleuropa. — *Geol. Jb.*, **83**, 31—61.

Belford, D. J. 1960. Upper Cretaceous foraminifera from the Toolonga Calcilutite and Gingin Chalk, Western Australia. — *Bull. Dept. Nat. Dev. Bur. Miner. Resour., Geol. Geoph.*, **57**, 5—198.

Berger, W. H. 1969. Planktonic foraminifera: Basic morphology and ecologic implications. — *J. Paleont.*, **43**, 1369—1383.

Berggren, W. A. 1962. Some planktonic foraminifera from the Maastrichtian and type Danian stages of Southern Scandi navia. — *Acta. Univ. Stockh., Stockholm Centr. Geol.*, **9**, 1—107.

Bertels, A. 1972. Buliminacea y Cassidulinacea (Foraminiferida) guias del Cretacico Superior (Maastrichtiano Medio) y Terciario Inferior (Daniano Inferior) de la Republica Argentina. — *Rev. Esp. Microp.*, **4**, 327—353.

Bertels, A. 1980. Estratigrafia y foraminiferos (Protozoa) bentonicos del limite Cretacico-Terciarico en el area tipo de la formacion Jaguel, provincia del Neuquen, Republica Argentina. — Actas II Congr. Argentino paleont. biostr., I Congr. Latinoamericano de Paleont., **2**, 47—90.

Bieda, E. 1958. Otwornice przewodnie i wiek kredy piszącej Mielnika. — *Biul. Inst. Geol.*, **121**, 17—89.

Birkelund, T., Hancock, J. M., Hart, M. E., Rawson, P. F., Remane, J., Robaszyński, F., Schmid, F. and Surlyk, F. 1984. Cretaceous stage boundaries — Proposals. — *Bull. Geol. Denmark*, **33**, 3—20.

Błaszkiewicz, A. 1979. Stratigraphie du Campanien et du Maastrichtien de la vallée de la Vistule Moyenne à l'aide d'Ammonites et de Belemnites. — Aspecte der Kreide Europas. IUGS A, **6**, 473—485.

Błaszkiewicz, A. 1980. Campanian and Maastrichtian Ammonites of the middle Vistula river valley, Poland: A stratigraphic-paleontological study. — *Pr. Inst. Geol.*, **92**, 4—63.

Błaszkiewicz, A. 1984*a*. Rząd Nautilida Agassiz. *In*: Budowa Geologiczna Polski, 3, Atlas skamieniałości przewodnich i charakterystycznych, 2c, Mezozoik, Kreda, 369—371.

BŁASZKIEWICZ, A. 1984*b*. Rząd Belemnitida Naef. *In*: Budowa Geologiczna Polski, 3, Atlas skamieniałości przewodnich i charakterystycznych, 2c, Mezozoik, Kreda, 398—410.

BŁASZKIEWICZ, A. and SZYMAKOWSKA, F. 1984. Rząd Ammonitida Zittel. *In*: Budowa Geologiczna Polski, 3, Atlas skamieniałości przewodnich i charakterystycznych, 2c, Mezozoik, Kreda, 371—398.

BOLLI, H. M. 1951. The genus *Globotruncana* in Trinidad, B. W. I. — *J. Paleont.*, **25**, 187—199.

BOLLI, H. M. 1957. The genera *Praeglobotruncana*, *Rotalipora*, *Globotruncana* and *Abathomophalus* in the Upper Cretaceous of Trinidad, B. W. I. — *Bull. U. S. Nat. Mus.*, **215**, 51—60.

BOLLI, H. M., LOEBLICH, A. R. and TAPPAN, H. 1957. Planktonic foraminiferal families Hantkeninidae, Orbulinidae, Globorotaliidae and Globotruncanidae. — *Bull. U. S. Nat. Mus.*, **215**, 3—50.

BRÖNNIMANN, P. 1952. Globigerinidae from the Upper Cretaceous (Cenomanian — Maestrichtian) of Trinidad, B. W. I. — *Bull. Amer. Paleont.*, **34**, 1—70.

BROTZEN, F. 1936. Foraminiferen aus dem schwedischen, unstersten Senon von Eriksdal in Schonen. — *Sver. Geol. Unders.*, C, 396, Ars. 30, 1—206.

BROTZEN, F. 1940. Flinträннans och Trindel-Rännans Geologi. — *Sver. Geol. Unders.*, C, **435**, 34, 1—33.

BROTZEN, F. 1942. Die Foraminiferengattung *Gavelinella* nov. gen. und die Systematik der Rotaliiformes. — *Sver. Geol. Unders.*, C, 451, **36**, 1—60.

BROTZEN, F. 1945. De geologiska resultaten fran borrningarna vid Höllviken. — *Sver. Geol. Unders.*, *C*, **465**, 38, 1—64.

BROTZEN, F. 1948. The Swedish Paleocene and its Foraminiferal fauna. — *Sver. Geol. Unders.*, *C*, **493**, 42, 1—140.

[BUGROVA, E. M.] БУГРОВА, Э. М. 1986. Количественная оценка и унификация некоторых морфологических признаков Аномалинацией. — *Вопр. Микропалеонтологии.*, **28**, 51—59.

BUKOWY, S. and GEROCH, S. 1957. O wieku zlepieńców egzotykowych w Kruhelu Wielkim (On the age of exotic conglomerates at Kruhel Wielki near Przemyśl, Carpathians). — *Rocz. Pol. Tow. Geol.*, **26**, 297—329.

BUSULINI, A., DIENI, I., MASSARI, F., PEJOVIĆ, D. and WIEDMANN, J. 1984. Nouvelles données sur la Crétacé supérrieur de la Sardaigne Orientale. — *Cretaceous Research*, **5**, 243—258.

BUTT, A. A. 1986. Upper Cretaceous biostratigraphy of the Sirte Basin, Northern Libya. — *Rev. paleobiol.*, 5, 175—191.

CARON, M. 1966. Globotruncanidae du Crétacé supérieur du synclinal de la Gruyère (Préalpes medianes, Suisse). — *Rev. Micropal.*, **9**, 68—93.

CARON, M. 1985. 4 Cretaceous planktic foraminifera. — *In*: Cook, A. H., Harland, W. B., Hughes, N. F., Putnis, A., Sclater, J. G. and Thomson, M. R. A. (eds), Plankton stratigraphy, Cambridge, 17—86.

ČEPEK, P. KÖTHE, A., WEISS, W. and WOLFART, R. 1985. Paleogeographic evolution of the Atlantic Ocean during the Late Cretaceous. A synthesis of micropaleontological and lithological date from the Deep Sea Drilling Project and from adjacent continental areas. — *Geol. Jb.* **62**, 3—89.

[CHALILOV, D. M.] ХАЛИЛОВ, Д. М. 1948. Статигрнфия верхнемеловых и палеогеновых отложений Малого Балхана по фауне форомининфєр. Азербайджанский научно-ислед. инст. по добыче нефты. Азнефтеиздат, Баку-Ленинград, 3—92.

CHAPMAN, F. 1892. Microzoa from the Phosphatic Chalk of Taplow. — *Quart. J. Geol. Soc. London*, **48**, 514—518.

CIEŚLIŃSKI, S. and WYRWICKA, K. 1970. Kreda obszaru lubelskiego (The Cretaceous of the Lublin region; in Polish only). *In*: Malicki, A. (ed.), Przewodnik XLII Zjazdu Polsk. Tow. Geol., 56—74, Wyd. Geol., Warszawa.

CIMERMAN, F. DROBNE, K. and OGORELEC, B. 1988. Benthic Foraminiferal assemblages from oozes in Veliko Jezero Bay (Mljet Island) and from Lenga submarine cliff (Middle Adriatic Sea). — *Rev. Paléobiol.*, Vol. Spéc., 2, *Benthos'* 86, 741—753.

CITA, M. S. and GARTNER, Jr. 1971. Deep sea Upper Cretaceous from the Western North Atlantic. — Proc. II Planktonic Conference, Roma 1970, 287—319.

CUSHMAN, J. A. 1932. Textularia and related forms from the Cretaceous. — *Contr. Cushman Lab. Foram. Res.*, **8**, 86—97.

CUSHMAN, J. A. 1933. New American Cretaceous Foraminifera. — *Contr. Cushman Lab. Foram. Res.*, **9**, 49—64.

CUSHMAN, J. A. 1936*a*. Cretaceous foraminifera of the family Chilostomellidae. — *Contr. Cushman Lab. Foram. Res.*, **12**, 71—78.

CUSHMAN, J. A. 1936*b*. New genera and species of the families Verneuilinidae and Valvulinidae and of the subfamily Virgulininae. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **6**, 1—71.

CUSHMAN, J. A. 1937*a*. A monograph of the foraminiferal family Verneuilinidae. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **7**, 1—157.

CUSHMAN, J. A. 1937*b*. A monograph of the foraminiferal family Valvulinidae. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **8**, 1—210.

CUSHMAN, J. A. 1937*c*. A monograph of the subfamily Virgulininae of the foraminiferal family Buliminidae. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **9**, 1—228.

CUSHMAN, J. A. 1937*d*. A few new species of American Cretaceous foraminifera. — *Contr. Cushman Lab. Foram. Res.*, **13**, 100—105.

CUSHMAN, J. A. 1938*a*. Cretaceous species of Gümbelina and related genera. — *Contr. Cushman Lab. Foram. Res.*, **14**, 2—28.

CUSHMAN, J. A. 1938*b*. Some new species of rotaliform foraminifera from the American Cretaceous. — *Contr. Cushman Lab. Foram. Res.*, 14, 66—71.

CUSHMAN, J. A. 1943. Some new foraminifera from the Tertiary of the island of St. Croix. — *Contr. Cushman Lab. Foram. Res.*, **19**, 90—93.

CUSHMAN, J. A. 1946. Upper Cretaceous foraminifera of the Gulf Coastal region of the United States and adjacent areas. — *U. S. Geol. Surv. Prof. Pap.*, **206**, 1—241.

CUSHMAN, J. A. and DORSEY, A. L. 1940. The genus *Stensioeina* and its species. — *Contr. Cushman Lab. Foram. Res.*, **16**, 1—6.

CUSHMAN: J. A. and PARKER, F. L. 1935. Some American Cretaceous Buliminas. — *Contr. Cushman Lab. Foram. Res.*, **11**, 96—101.

CUSHMAN, J. A. and PARKER, F. L. 1936. Some American Eocene Buliminas. — *Contr. Cushman Lab. Foram. Res.*, **12**, 39—45.

CUSHMAN, J. A. and PARKER, F. L. 1947. *Bulimina* and related foraminiferal genera. — *Geol. Surv. Prof. Pap.*, **210-D**, 55—176.

CUSHMAN, J. A. and RENZ, H. H. 1946. The foraminiferal fauna of the Lizard Springs Formation of Trinidad, B. W. I. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **18**, 1—48.

CUSHMAN, J. A. and TODD, R. 1946. A foraminiferal fauna from the Paleocene of Arkansas. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **22**, 45—65.

CUSHMAN, J. A. and TODD, R. 1949. Species of the genera *Allomorphina* and *Quadrimorphina*. — *Contr. Cushman Lab. Foram. Res.*, Spec. Publ., **25**, 59—72.

[DAIN, L. G.] ДАИН, Л. Г. 1934. Фораминиферы верхнеюрских и меловых отложений месторождения Джаксы-бад Темирского района. — *Тр. НГРИ*, **43**, 3—62.

[DAIN, L. G.] ДАИН, Л. Г. 1961. Некоторые виды фораминифер меловых отложений Шумихинского Района Челябинской Области. — *Тр. ВНИГРИ*, **170**, 4—37.

DARMOIAN, S. A. 1975. Planktonic foraminifera from the Upper Cretaceous of southeastern Iraq; Biostratigraphy and systematics of the Heterohelicidae. — *Micropaleontology*, **21**, 185—214.

DOUGLAS, R. G. 1969. Upper Cretaceous planktonic foraminifera in northern California. Part 1 — Systematics. — *Micropaleontology*, **15**, 151—209.

DOUGLAS, R. G. 1972. Paleozoogeography of Late Cretaceous planktonic foraminifera in North America. — *Journ. Foram. Res.*, **2**, 14—34.

DOUGLAS, R. G. 1973. Bentonic foraminiferan biostratigraphy in the Central North Pacific, Leg 17, Deep Sea Drillings Project. Initial Reports of the DSDP, 47, Washington.

DOUGLAS, R. G. and RANKIN, C. 1969. Cretaceous planktonic foraminifera from Bornholm and their zoogeographic significance. — *Lethaia*, **2**, 185—217.

EBENSBERGER, H. 1962. Stratigraphische und mikropaläontologische Untersuchungen in der Aachener Oberkreide, besonders der Maastricht-Stufe. — *Palaeontographica* A, **120**, 1—120.

EDGELL, H. S. 1954. The stratigraphical value of *Bolivinoides* in the Upper Cretaceous of Northwest Australia. — *Contr. Cushman Lab. Foram. Res.*, **5**, 68—76.

EDGELL, H. S. 1957. The genus *Globotruncana* in northwest Australia. — *Micropaleontology*, **3**, 101—126.

EDWARDS, P. G. 1981. The foraminiferid genus *Gavelinella* in the Senonian of North-West Europe. — *Paleontology*, **24**, 391—416.

EGGER, J. G. 1899. Foraminiferen und Ostracoden aus den Kreidemergeln der Oberbayerischen Alpen. — *Abh. K. bayer. Akadem. Wiss.*, Cl. **2**, 21, 1—230.

EICHER, D. L. 1967. Foraminifera from Belle Fourche Shale and equivalents, Wyoming and Montana. — *J. Paleont.*, **41**, 167—188.

EICHER, D. L. and WORSTELL, P. 1970. Cenomanian and Turonian foraminifera from the Great Plains, United States. — *Micropaleontology*, **16**, 269—324.

ELLIS, B. F. and MESSINA, A. R. 1940—1983. Catalogue of Foraminifera. — Amer. Mus. Nat. Hist. Spec. Publ. New York.

EL-NAKHAL, H. A. and EL-NAGGAR, Z. R. 1987. The genus *Globotruncana* from the subsurface Upper Cretaceous of Kuwait, Arabia. — *Palaeontographica*, **197**, 39—84.

[EREMEEVA, A. I.] ЕРЕМЕЕВА, А. И. 1957. Некоторые новые виды фораминифер из меловых и третичных отложений восточного склона Урала. — *Вопросы страт. Тр. Горно-геол. инст. Урал. фил. АН. СССР*, **4**, 28, 9—15.

FRANKE, A. 1925. Die Foraminiferen der pommerschen Kreide. — *Abh. geol. — palaeont. Inst. Univ. Greifswald*, **6**, 3—96.

FRANKE, A. 1928. Die Foraminiferen der Oberen Kreide Nord- und Mitteldeutschlands. — *Abh. Preuss. Geol. Landesanst., N. F.*, **111**, 1—207.

[FREIMAN, E. W. *In*: SUBBOTINA, N. N.] ФРЕЙМАН, Е. В. *In*: СУББОТИНА, Н. Н. 1964. Фораминиферы меловых и палеогеновых отложений Западно-Сибирской Низменности. Отряд Buliminida. — *Тр. ВНИГРИ*, **234**, 266—287.

FRERICHS, W. E. 1979. Planktonic foraminifera from the Sage Breaks Shale, Centennial Valley, Wyoming. — *Journ. Foram. Res.*, **9**, 159—184.

FRERICHS, W. E., ATHERTON, C. C. and SHIVE, P. N. 1975. Planktonic foraminifera from the Chalky Members of the Niobrara Formation, Centennial Valley, Wyoming. — *Journ. Foram. Res.*, **5**, 294—312.

FRERICHS, W. E. and GASKILL, Ch. H. 1978. *Textilaria americana* Ehrenberg: type species of *Heterohelix*. — *Journ. Foram. Res.*, **8**, 143—146.

FRIEG, C. 1980. Neue Ergebnisse zur Systematic sandschaliger Foraminiferen im Cenoman des südwestlichen Münsterlandes. — *Paläont. Z.*, **54**, 225—240.

FRIEG, C. and PRICE, R. J. 1982. The subgeneric classification of *Arenobulimina*. — Contribution to the IUGS (IGCP) project „Mid-Cretaceous Events", with national promotion from the Deutsche Forschungsgemeinschaft. Paper no. 5 of the working group et Münster, West Germany.

GANDOLFI, R. 1942. Ricerche micropalcontologiche e stratigrafiche sulla Scaglia e sul Flysch cretacici dei dintorni di Balerna (Canton Ticino). — *Riv. Ital. Paleont.*, **48**, suppl. mem. 4, 1—160.

GANDOLFI, R. 1955. The genus *Globotruncana* in Northeastern Colombia. — *Bull. Amer. Paleontol.*, **36**, 1—118.

GAWOR-BIEDOWA, E. 1969. The genus *Arenobulimina* CUSHMAN from the Upper Albian and Cenomanian of the Polish Lowlands. — *Rocz. Pol. Tow. Geol.*, **39**, 73—102.

GAWOR-BIEDOWA, E. 1972. The Albian, Cenomanian and Turonian foraminifers of Poland and their stratigraphic importance. — *Acta Palaeont. Polonica*, **17**, 3—155.

GAWOR-BIEDOWA, E. 1973. Stratygrafia paleocenu z otworu Iława na podstawie badań mikropaleontologicznych (with English summary). — *Kwart. Geol.*, **17**, 124—130.

GAWOR-BIEDOWA, E. 1980. Turonian and Coniacian foraminifera from the Nysa Trough, Sudetes, Poland. — *Acta Palaeont. Polonica*, **25**, 3—54.

GAWOR-BIEDOWA, E. 1984. Foraminiferal zonation of the Upper Cretaceous deposits in Poland (except for the Carpathians and Sudeten). — Benthos'83; 2nd Int. Sym. Benthic Foraminifera (Pau, April 1983). Pau and Bordeaux, 213—223.

GAWOR-BIEDOWA, E. 1987. New benthic foraminifers from the Late Cretaceous of Poland. — *Acta Palaeont. Polonica*, **32**, 49—71.

GAWOR-BIEDOWA, E. 1989. New names for foraminiferal homonyms. — *J. Paleont.*, **63**, 257.

GAWOR-BIEDOWA, E. 1992. New foraminifera of the Campanian and Maastrichtian in the Lublin region (eastern, Poland). — *Kwart. Geol.*, **36**, 1—15.

GAWOR-BIEDOWA, E. and WITWICKA, E. 1984. Fauna — Bezkręgowce. Typ Protista. — *In*: Budowa Geologiczna Polski, 3, Atlas Skamieniałości Przewodnich i charakterystycznych, 2c, Mezozoik, Kreda, 187—308.

GEROCH, S. 1960. Zespoły mikrofauny z kredy i paleogenu serii śląskiej w Beskidzie Śląskim (Microfaunal assemblages from the Cretaceous and Paleogene silesian Unit in the Beskid Śląski Mts., Western Carpathians). — *Biul. Inst. Geol.*, **153**, 7—138.

GEROCH, S. and NOWAK, W. 1984. Proposal of zonation for the Late Tithonian — Late Eocene, Based upon arenaceous foraminifera from the Outer Carpathians, Poland. — Benthos'83; 2nd Int. Symp. Benthic Foraminifera (Pau, April 1983), Pau and Bordeaux, 225—239.

[GORBENKO, V. F.] ГОРБЕНКО, В. Ф. 1974. *In*: Атлас верхнемеловой фауны Донбасса. Тип Protozoa — Простейшие, класс Sarcodina — Саркодовые, Подкласс Foraminifera — Фораминиферы. — Мин. Высш. Сред. Спец. Обр. УССР, Комм. Горномет. инст., 26—61.

GOVINDAN, A. 1972. Upper Cretaceous planktonic foraminifera from the Pondicherry area, south India. — *Micropaleontology*, **18**, 160—193.

GOVINDAN, A. and SASTRI, V. V. 1983. Upper cretaceous arenaceous foraminifera from the Godavari-Krishna Basin, Andhra Pradesh, India. — Proceedings of the First Workshop on the Arenaceous Foraminifera 7.—9. September 1981, **108**, 33—56.

[GRIGELIS, A. A., AKIMEZ, V. S. and LIPNIK, E. S.] ГРИГЯЛИС, А. А., АКИМЕЦ, В. С. ЛИПНИК, Е. С. 1980. Филогенезы бентосных фораминифер- основа зональной стратиграфии верхнемеловых отложений (на примере восточно-европейской платформы). — *Вопросы Микропалеонт.*, **23**, 145—160.

GRIMSDALE, T. F. and MORKHOVEN, F. P. C. M. 1955. The ratio between pelagic and benthonic foraminifera as a means of estimating depth of deposition of sedimentary rocks. World Petrol. Congr., 4th Rome, Proc., Sec. I/D, 4, (ed.), Carlo Colombo, Rome, 473—491.

GRÜN, W. 1969. Flysch microfauna of the Hagenbach Valley (Northern Vienna Woods), Austria. — *Rocz. Pol. Tow. Geol.*, **39**, 305—334.

GRZYBOWSKI, J. 1896. Otwornice czerwonych ilów z Wadowic. — *Rozpr. Akad. Um., Wydz. Mat.-Przyr.*, **30**, 261—308.

GRZYBOWSKI, J. 1901. Otwornice warstw inoceramowych okolicy Gorlic. — *Rozpr. Akad. Um., Wydz. Mat.-Przyr.*, **41**, 219—288.

HAGENOW, F. 1842. Monographie der rügenschen Kreideversteinerungen. — *N. Jb. Miner.*, **3**, 1—48.

HAGN, H. 1954. Die Foraminiferen der Pinswanger Schichten (Unteres Obercampan). Ein Beitrag zur Mikropaläontologie der helvetischen Oberkreide Südbayerns. — *Palaeontographica*, **104**, 1—119.

HAGN, H. and HERM, D. 1983. Die Foraminiferen der Inoceramen-Mergel (Buntmergelserie, Ultrahelvetikum, Unter Maastricht) des Moos-Grabens SE Siegsdorf (Oberbayern). — *Zitteliana*, **10**, 2. Symposium Kreide München 1982, 613—635.

HANZLIKOVÁ, E. 1972. Carpathian Upper Cretaceous Foraminiferida of Moravia (Turonian-Maastrichtian). — *Rozpr. UUG*, **39**, 1—160.

HART, M. B. 1980. A water depth model for the evolution of the planktonic Foraminiferida. — *Nature*, **286**, 252—254.

HART, M. B. 1987. Cretaceous foraminifera from Deep Sea Drilling Project. Initial Reports of the DSDP, 95, 245—251, Washington.

HART, M. B. 1988. Cretaceous smaller benthonic foraminifera; A review. — *Rev. Paléob.*, vol. Spéc., **2**, Benthos'86, Third International Symposium on Benthic Foraminifera, Genève, 283—287.

HART, M. B. and BAILEY, H. W. 1979. The distribution of planktonic Foraminiferida in the Mid-Cretaceous of NW Europe. — *In*: Aspekte der Kreide Europas, IUGS, ser. A, **6**, 527—542, Stuttgart.

HART, M. B., BAILEY, H. W., FRETCHER, B. N., PRICE, R. J. and ŚWIĘCICKI, A. 1981. 7 Cretaceous. *In*: Jenkins, D. G. and Murray, J. W. (eds), Stratigraphical Atlas of Fossil Foraminifera. Horwood, Chichester, 149—227.

HART, M. B. and BALL, K. C. 1986. Late Cretaceous anoxic events, sea-level changes and the evolution of the planktonic foraminifera. — *In*: Summerhayes, C. P. and Shackleton, N. J. (eds), North Atlantic Palaeoceanography, Geological Society Special Publication, **21**, 67—78.

HART, M. B. and ŚWIĘCICKI, A. 1987. Micropalcontology of carbonate environments. — Published by Ellis Horward Ltd., Chichester, 121—137.

HART, M. and ŚWIĘCICKI, A. 1988. The genus *Gavelinella* Brotzen, 1942, in the Cretaceous strata of the U. K. — *Rev., Paléob.*, Vol. Spéc., 2, Benthos'86, Third International Symposium on Benthic Foraminifera, Genève, 289—294.

HART, M. B., WEAVER, P. P. E., CLEMENTS, R. G., BURNETT, J. A., TOCHER, B. A., BATTEN, D. J., LISTER, J. K. and MAC LENNAN, A. M. 1987. The Isle of Wight. Cretaceous. — Mesozoic and Cenozoic stratigraphical Micropalaeontology of the Dorset Coast and Isle of Wight, Southern England. Field Guide for the XXth. European Micropalaeontological Colloquium. (eds) Lord, A. R. and Brown, P. R., British Micropalaeontological Society Guide Book 1, 88—149.

HELLER, I. and MORYC, W. 1984. Stratygrafia utworów kredy górnej przedgórza Karpat. — *Biul. Inst. Geol.*, **346**, Z badań geologicznych w Karpatach, 24, 63—116.

HERCOGOVÁ, J. 1984. Die Gattung *Gaudryina* in der Kreide der Böhmischen Masse. — *Sbor. geol. véd. paleont.*, **26**, 83—138.

HERM, D. 1962. Stratigraphische und mikropaläontologische Untersuchungen der Oberkreide im Lattengebirge und im Nierental (Gosaubecken von Reichenhall und Salzburg). — *Bayer. Akad. Wiss., Math. — Nat. Kl., Abh.*, n. ser., **104**, 1—119.

HERM, D. 1965. Micropaläontologisch-stratigraphische Untersuchungen im Kreiderflysch zwischen Deva und Zumaya (Prov. Guizpúzcoa, Nordspanien). — *Deutsche Geol. Ges. Zeit.*, **115**, 277—348.

HILLEBRANDT, A. 1962. Das Paleozän und seine Foraminiferenfauna im Becken von Reichenhall und Salzburg. — *Bayer. Akad. Wiss., Math.-Nat. Kl., Abh.*, n. ser., **108**, 9—182.

HILTERMANN, H. 1952. Stratigraphische Fragen des Campan und Maastricht unter besonderer Berücksichtigung der Mikropaläontologie. — *Geol. Jb.*, **67**, 47—66.

HILTERMANN, H. 1963. Zur Entwicklung der Benthos-Foraminifere *Bolivinoides*. — *In*: Evolutionary Trends in Foraminifera, Koenigswald, G. H. R., Emeis, J. D., Buning, W. L. and Wagner, C. W. (eds), Elsevier Publishing Company, 198—223.

HILTERMANN, H. 1974. *Rzehakina epigona* und Unterarten dieser Foraminifere. — *Palaeont. Z.*, **48**, 36—56.

HILTERMANN, H. and KOCH, W. 1950. Taxonomie und Vertikalverbreitung von Bolivinoides-Arten im Senon Nordwestdeutschlands. — *Geol. Jb.*, **64**, 595—632.

HILTERMANN, H. and KOCH, W. 1962. Oberkreide des nördlichen Mitteleuropa. — *In*: Leitfossilien der Mikropaläontologie, 299—338.

HINTE, J. E. 1963. Zur Stratigraphie und Mikropaläontologie der Oberkreide und des Eozäns des Krappfeldes (Kärnten). — *Jb. Geol. Bundesanst., Sonderb.*, **8**, 1—147.

HINTE, J. E. 1967. *Bolivinoides* from the Campanian type section. — *Koninkl. Nederlandse Akad. Wetensch. Proc.*, B, **70**, 254—263.

HINTE, J. E. 1972. The Cretaceous time scale and planktonic-foraminiferal zones. — *Koninkl. Nederlandse Akad. Wetensch. Proc.*, **75**, 1—8.

HINTE, J. E. 1976. Cretaceous time scale. — *Am. Assoc. Petrol. Geol. Bull.*, **60**, 498—516.

HOFKER, J. 1956. Die Pseudotextularia-Zone der Bohrung Maasbühl I und ihre Foraminiferen-Fauna. — *Paläont. Z.*, **30**, Sonderheft, 59—79.

HOFKER, J. 1957. Foraminiferen der Oberkreide von Nordwestdeutschland und Holland. — *Beih. Geol. Jb.*, **27**, 1—464.

HOFKER, J. 1966. Maestrichtian, Danian and Paleocene Foraminifera. — *Palaeontographica*, **10**, 1—376.

HOFKER, J. 1978. Analysis of a large succession of samples through the upper Maastrichtian and the Lower Tertiary of Drill Hole 47. 2, Shatsky Rise, Pacyfic, D. S. D. P. — *Journ. Foram. Res.*, **8**, 46—75.

HULTBERG, S. U., BJÖRN, A. and MALMGREN, B. A. 1986. Dinoflagellate and planktonic foraminiferal paleobathymetrical indices in the Boreal uppermost Cretaceous. — *Micropaleontology*, **32**, 316—323.

HUSS, F. 1962. Distribution of benthonic and planktonic foraminifera in the Upper Cretaceous sediments of NW Poland. — *Acta Geol. Polonica*, **12**, 1, 113—157.

ION, J. 1983. Étude micropaléontologique (Foraminifères planctoniques) du Crétacé supérieur de Tara Birsei (Carpates Orientales). — *Memoires*, 31, 5—167.

[JANOVSKAJA, G. A. and BUKATSCHUK, P. D.] ЯНОВСКАЯ, Г. А., БУКАТЧУК, П. А. 1970. Стратиграфия и фауна фораминифер меловых отложений Молдавской ССР. — Палеонтология и стратиграфия мезокайнозоя Молдавской ССР, 91—158.

JORDAN, H. and GASSE, W. 1986. Bio- und lithostratigraphisch-fazielle Untersuchungen des glaukonitisch-sandigen Santon und Campan im südwestlichen Münsterland. — *Geol. Paläont. Westf.*, **6**, 7—49.

[KAPTARENKO-TSHERNOUSOVA, O. K., GOLJAK, L. M., ZERNETZKIJ, B. F., KRAEVA, E. R. and LIPNIK, E. S.] КАПТАРЕНКО-ЧЕРНОУСОВА, О. К., ГОЛЯК, Л. М., ЗЕРНЕСКИЙ, Е. Р., КРАЕВА, Е. Я., ЛИПНИК, Е. С. 1963. Атлас характерных фораминифер юры, мела и палеогена платформенной части Украины. — *Инст. Геол. Наук Акад. Наук Укр. ССР, Стратигр. Палеонт.*, **45**, 3—200.

[KAPTARENKO-TSHERNOUSOVA, O. K., PLOTNIKOVA, L. F. and LIPNIK, E. S.] КАПТАРЕНКО-ЧЕРНОУСОВА, О. К., ПЛОТНИКОВА, Л. Ф., ЛИПНИК, Е. С. 1979. Фораминиферы мела Украины. — Инст. Геол. Акад. Наук Укр. ССР, Палеонт. Справочник, 3—256.

[KELLER, B. M.] КЕЛЛЕР, Б. М. 1935. Микрофауна верхнего мела Анепровско-Донецкой впадины и некоторых других сопредельных областей, БМОИП, отд. геол., **13**, 522—558.

[KELLER, B. M.] КЕЛЛЕР, Б. М. 1946. Фораминиферы верхнемеловых отложений Сочинского района, БМОИП, отд. геол., **21**, 83—108.

KELLER, G. 1988. Biotic turnover in benthic foraminifera across the Cretaceous/Tertiary boundary at El Kef, Tunisia. — *Palaeogeogr., Palaeoclimatol., Palaeoecol.*, **66**, 153—171.

KENT, H. C. 1967. Microfossils from the Niobrara Formation (Cretaceous) and equivalent strata in Northern and Western Colorado. — *J. Paleont.*, 41, 1433—1456.

KENT, H. C. 1969. *Praebulimina prolixa elongata*, new name for *Praebulimina prolixa longa* Kent. — *J. Paleont.*, **43**, 1441.

[KISSELMAN, Je. N.] КИСЕЛЬМАН, Е. Н. 1964. *In*: СУББОТИНА Н. Н. Фораминиферы меловых и палеогеновых отложений Западно-Сибирской Низменности. Отряд Textulariida. — *Тр. ВНИГРИ*, **234**, 153—187.

KLASZ, I., MAGNÉ, J. and RÉRAT, D. 1963. Quelques formes nouvelles de Buliminidae caractéristiques du Crétacé Supérieur du Gabon (Afrique Équatoriale). — *Rév. Micropal.*, **6**, 145—152.

KOCH, W. 1977. Stratigraphie der Oberkreide in Nordwestdeutschland (Pompeckjsch Scholle); Teil 2. Biostratigraphie in der Oberkreide und Taxonomie von Foraminiferen. — *Geol. Jb., A*, **38**, 11—128.

[KOPAEVITZ, L. F., BENIAMOVSKIJ, V. H. and NAIDIN, D. P.] КОПАЕВИЧ, Л. Ф., БЕНЬЯМОВСКИЙ, В. Н. НАЙДИН, А. П. 1987. Граница нижнего и верхнего маастрихта в европейской палеобиогеографической области. — *Бюл. Моск. О-Ва Испытателей Природы. Отд. Геол.*, **62**, 43—58.

KRASSOWSKA, A. 1976. Kreda między Zamościem, Tomaszowem Lubelskim a Kryłowem. — *Biul. I. G.*, 201, 51—101.

KRASSOWSKA, A. 1981*a*. Korelacja geofizyczna utworów kredy we wschodniej części Wyżyny Lubelskiej i na południowym Podlasiu. — *Przeg. Geol.*, **29**, 538—542.

KRASSOWSKA, A. 1981*b*. Charakterystyka osadów kredy na obszarze Lubelskiego Zagłębia Węglowego. — *Kwart. Geol.*, 25, 703—716.

KRASSOWSKA, A. 1982. Pozycja fauny w stosunku do kompleksów geofizycznych wydzielonych dla kredy centralnej części regionu lubelskiego. — *Przeg. Geol.*, **30**, 269—273.

KRASSOWSKA, A. 1986. Kreda górna i paleocen dolny okolic Lublina. — *Kwart. Geol.*, 30, 559—574.

[KRYVOBORSKY, V. V. and SUBBOTINA, N. N. *In*: SUBBOTINA, N. N,] КРИВОБОРСЛИЙ, В. В., СУББОТИНА Н. Н. 1964, *In*: СУББОТИНА, Фораминиферы меловых и палеогеновых отложений Западно-Сибирской Низменности. Род. Orbignyna. — *Тр. ВНИГРИ*, **234**, 218—221.

[KUSINA, V. I. *In*: SUBBOTINA, N. N.] КУЗИНА, В. Н. 1964. *In*: СУББОТИНА. Н. Н. Фораминиферы меловых и палеогеновых отложений Западно-Сибирской низменности. Подсемейство Polymorphininae. — *Тр. ВНИГРИ*, **234**, 225—236.

[KUSINA, V. I.] КУЗИНА, В. Н. 1976. Фораминиферы семейства Polymorphinidae СССР. — *Тр. ВНИГРИ*, **359**, 3—163.

KÜPPER, I. 1964. Mikropaläontologische Gliederung der Oberkreide des Beckenuntergrundes in den oberösterreichischen Molassebohrungen. — *Mitt. Geol. Ges.*, **56**, 591—643.

LINARES RODRIGUEZ, D. 1977. Foraminiferos planctónicos del Cretácico superior de las Cordilleras Béticas (Sector Central). — Univ. Malaga, 1—410.

[LIPNIK, O. S.] ЛИПНИК, О. С. 1961. Фораминиферы и стратиграфия верхньокрейдовых видкладив Днипровско-Донецкой Западыны. — *Труды ИГН. Страт. Палеонт.*, 35, 5—65.

[LIPNIK, O. S.] ЛИПНИК, О. С. 1969. Некоторые новые верхнемеловые фораминиферы Днепровско-Донецкой впадины. — *Палеонт. Сб.*, **6**, 11—14.

LISZKA, S. 1955. Otwornice niższego senonu okolic Krakowa (Foraminifera of the Lower Senonian in the vicinity of Cracov). — *Rocz. Pol. Tow. Geol.*, **23**, 165—190.

LISZKA, S. and LISZKOWA, J. 1981. Revision of J. Grzybowski's paper (1896) „Foraminifera of the red clays from Wadowice". — *Ann. Soc. Geol. Pol.*, **51**, 153—208.

LISZKOWA, J. 1959. Mikrofauna warstw z egzotykami z Bachowic. — *Biul. Inst. Geol.*, 131, Z badań geologicznych w Karpatach, 2, 39—96.

LISZKOWA, J. and MORGIEL, J. 1984. Fauna-Bezkręgowce. Typ Protista. *In*: Budowa Geologiczna Polski, 3, Atlas Skamieniałości Przewodnich i Charakterystycznych, 2c, Mezozoik, Kreda, 187—308.

Liszkowa, J. and Morgiel, J. 1985. Contribution to the knowledge of the foraminifera of the Frydek type facies in the Polish Outer Carpathians. — *Kwart. Geol.*, **29**, 65—84.

Lobo, A. F. and Nestler, H. 1986. *Heterohelix* (planktonische Foraminiferen) in paläozänen Sedimenten der VR Mocambique. — *Geol. Z., Wiss.*, **12**, 77—81.

Loeblich, A. R. 1951. Coiling in the Heterohelicidae. — *Contr. Cushman Lab. Foram. Res.*, **2**, 106—110.

Loeblich, A. R. and Tappan, H. 1964. Protista 2, Sarcodina chiefly „Thecamoebians" and Foraminiferida. *In*: Moore, R. C. (ed.), Treatise on Invertebrate Paleontology, Part C, Protista 2, 1/2 C1-C 900. Geological Soc. Amer. and University of Kansas, Lawrence (Kansas).

Loeblich, A. R. and Tappan, H. 1984. Suprageneric classification of the Foraminiferida (Protozoa). — *Micropaleontology*, **30**, 1—70.

Loeblich, A. R. and Tappan, H. 1988, Foraminiferal genera and their classification. — Van Nostrand Reinhold. 970 pp.

Loeblich, A. R., Tappan, H. Beckmann, J. P., Bolli, H., Montanaro Gallitelli, E. and Troelsen, C. J. 1957. Studies in Foraminifera. — *Bull., U. S. Nat. Mus.*, **215**, 1—323.

Malumian, N. and Masiuk, V. 1976. Foraminiferos de la formacion Cabeza de León (Cretácico superior, Tierra del Fuego, Rep. Argentina). — *Rev. Asoc. Geol. Argentina*, **31**, 180—202.

Marie, P. 1941. Les foraminiféres de la craie a *Belemnitella mucronata* du Bassin de Paris. — *Mém. Mus. Nat. Hist. Natur.*, N. ser., **12**, 1—296.

Marsson, Th. 1878. Die Foraminiferen der weissen Schreibkreide der Insel Rügen. — *Mitt. nat. Ver. Neu-Vorpommern und Rügen*, **10**, 115—196.

Martin, L. 1964. Upper Cretaceous and Lower Tertiary foraminifera from Fresno Country, California. — *Jb. Geol. B.-A., Sonderb.*, **9**, 1—128.

[Maslakova, N. I.] Маслакова, Н. И. 1959. Фораминиферы. *In*: Атлас верхнемеловой фауны северного Кавказа и Крыма. — *Тр. ВНИИГАЗ*, 87—129.

[Maslakova, N. I.] Маслакова, Н. И. 1977. Зональная схема верхнего мела юга СССР по глоботрунканидам и методы её разработки. — *Акад. Наук. СССР, Вопросы Микропалеонтологии*, **19**, 77—98.

[Maslakova, N. I.] Маслакова, Н. И. 1983. К ревизии позднемеловых планктонных фораминифер семейства Marginotruncanidae. — Систематика, морфология и екология современной и ископаемой микрофауны. — *Тр. ИГГ*, **559**, 23—30.

Masters, B. A. 1977. Mesozoic planktonic foraminifera. A world-wide review and analysis. — Oceanic Micropaleontology. (ed.), Ramsay, A. T. S., Academic Press, 1, 301—731.

Masters, B. A. 1980. Reevaluation of selected types of Ehrenberg's Cretaceous planktonic foraminifera, — *Ecl. Geol. Helvetiae*, **73**, 95—107.

Maync, W. 1952. Critical Taxonomic study and nomenclatural revision of the Lituolidae based upon the prototype of the family, *Lituola nautiloidea* Lamarck, 1804. — *Contr. Cushman Lab. Found. Foram. Res.*, **3**, 35—56.

Mc gugan, A. 1982. Upper Cretaceous (Campanian and Maastrichtian) foraminifera from the upper Lambert and Northumberland formations, Gulf Islands, British Columbia, Canada. — *Micropaleontology*, **28**. 399—430.

[Mjatliuk, E. V.] Мятлюк, Е. В. 1953. Спириллиниды, Роталиниды, Эпистоминиды и Астеригериниды. — *Тр. ВНИГРИ*, 71, 1—273.

[Mjatliuk, E. V.] Мятлюк, Е. В. 1970. Фораминиферы флишевых отложений восточных Карпат. — *Тр. ВНИГРИ*, **282**, 1—360.

Montanaro Gallitelli, E. 1957. A revision of the foraminiferal family Heterohelicidae. — *U. S. Nat. Mus. Bull.*, **215**, 133—154.

Morgiel, J. 1959. Mikrofauna iłów babickich. — *Biul. Inst. Geol.*, **131**, Z badań geologicznych w Karpatach, 2, 111—147.

Morris, R. W. 1971. Upper Cretaceous foraminifera from the upper Mancos Formation, the Mesaverde Group, and the basal Lewis Formation, northwestern Colorado. — *Micropaleontology*, **17**, 257—296.

Murray, J. W. 1973. Distribution and ecology of living benthic foraminiferids. — Publ. Heinemann Educational Books Limited, 1—247, London.

Naidin, D. P. 1979. Vergleichende Stratigraphie der oberen Kreide der Russischen Tafel und West-Europas. — Aspekte der Kreide Europas. IUGS Series A, **6**, 497—510.

Nash, S. 1981. A neotype for the Cretaceous genus *Pseudotextularia* Rzehak, 1891. — *Jour. Foram. Res.*, **11**, 70—75.

Neagu, Th. 1970. Micropaleontological and stratigraphical study of the Upper Cretaceous deposits between the Upper Valleys of the Buzau and Riul Negru rivers (Eastern Carpatians). — *Mém. Inst. Geol. Géoph.*, 12, 1—109.

Neagu, Th. 1975. Monographie de la faune des Foraminiféres Éocretacés du Couloir de Dimbovicioara, de Codlea et des Monts Persani (Couches de Carhaga). — *Mém. Inst. Geol. Géoph.*, **25**, 1—141.

[Neckaja, A. I.] Нецкая, А. И. 1948. О некоторых фораминиферах верхнесенонских отложений западной Сибири. — *Тр. ВНИГРИ*, нов. сер. **31**, 211—225.

Noth, R. 1951. Foraminiferen aus Unter- und Oberkreide des österreichischen Anteils an Flysch, Helvetikum und Vorlandvorkommen. — *Jb. Geol. Bundesanst., Sonderb.*, **3**, 1—91.

Nuglisch, K. 1975. Foraminiferen aus der subherzynen Oberkreide. — *Freiberg. Forschung.*, C 309, Geowiss. — Paläont., **5**, 7—69.

Nyong, E. E. and Olsson, R. K. 1984. A paleoslope model of Campanian to Lower Maestrichtian foraminifera in the North American Basin and adjacent Continental Margin. — *Marine Micropaleontology*, **8**, 437—477.

Odébòdé, M. O. O. 1986. *Heterohelix reymenti* n. sp., a new planktonic foraminiferal species from the Mid-Cretaceous of southern Nigeria. — *N. Jb. Paläont.*, **10**, 613—620.

Olsson, R. K. 1960. Foraminifera of latest Cretaceous and earliest Tertiary age in the New Jersey Coastal Plain. — *J. Paleontology*, 34, 1—58.

Olsson, R. K. 1964. Late Cretaceous planktonic foraminifera from New Jersey and Delaware. — *Micropaleontology*, **10**, 157—188.

Olsson, R. K. 1977. Mesozoic Foraminifera-Western Atlantic. — Stratigraphic micropaleontology of Atlantic basin and Borderlands. Developments in Palaeontology and Stratigraphy, (ed.) Swain, F. M., Elsevier Scientific Publishing Company, **6**, 205—230.

Olsson, R. K. and Nyong, E. E. 1984. A paleoslope model for Campanian — Lower Maastrichtian foraminifera of New Jersey and Delaware. — *Jour. Foram. Res.*, **14**, 50—68.

Olszewska, B. 1980. Stratygrafia osadów kredy górnej i paleogenu w centralnej części jednostki dukielskiej na podstawie otwornic. — *Biul. Inst. Geol.*, **326**, Z badań geologicznych w Karpatach, 20, 59—107.

Olszewska, B. 1983. Interpretacja paleoekologiczna otwornic kredy i paleogenu polskich Karpat zewnętrznych. — *Biul. Inst. Geol.*, **346**, Z badań geologicznych w Karpatach, 24, 7—49.

Olszewski, S. 1875. Zapiski paleontologiczne. Otwornice (Foraminifera) marglu kredowego kotliny lwowskiej. — *Spraw. Kom. Fizjogr. Akad. Um.*, **9**, 1—136.

Orbigny, A. d'. 1840 Mémoire sur les Foraminifères de la Craie blanche du Bassin de Paris. — *Mém, Soc. Geol. France*, **4**, 1—51.

Perner, J. 1892. Foraminifery českého cenomanu. — *Palaeontogr.* Bohem., 1, 1—65.

Peryt, D. 1980. Planktic foraminifera zonation of the Upper Cretaceous in the middle Vistula river valley, Poland. — *Palaeont. Polonica*, **41**, 3—101.

Peryt, D. 1981. Planktonic foraminifers and the age of chalk from Mielnik (East Poland). — *Bull, Acad. Pol. Scienc.*, **29**, 137—142.

Peryt, D. 1983. Planktonic foraminiferal zonation of Mid-Cretaceous of the Annopol anticline (Central Poland). — *Zitteliana*, **10**, 575—583.

Peryt, D. 1988. Paleoecology of Middle and Late Cretaceous foraminifers from the Lublin Upland (SE Poland). — *Rev. Paléob.*, Vol. Spéc., 2, Benthos'86, Third International Symposium on Benthic foraminifera, Genève, 311—321.

Pessagno, E. A., Jr. 1960. Stratigraphy and micropaleontology of the Cretaceous and lower Tertiary of Puerto Rico. — *Micropaleontology*, **6**, 87—110.

Pessagno, E. A., Jr. 1967. Upper Cretaceous planktonic foraminifera from the western Gulf Coastal Plain. — *Palaeontogr. Americana*, 5, 245—445.

Petters, S. W. 1977. Upper Cretaceous planktonic foraminifera from the subsurface of the Atlantic Coastal Plain of New Jersey. — *J. Foram. Res.*, **7**, 165—187.

Petters, S. W. 1980. Biostratigraphy of Upper Cretaceous foraminifera of the Benue Trough, Nigeria. — *J. Foram. Res.*, **10**, 191—204.

Petters, S. W. 1982. Central West African Cretaceous-Tertiary benthic foraminifera and stratigraphy. — *Palaeontographica*, A. **179**, 1—104.

Petters, S. W., El-Nakhal, H. A. and Cifelli, R. 1983. *Costellagerina*, a new Late Cretaceous globigerine foraminiferal genus. — *Jour Foram. Res.*, **13**, 247—251.

[Plotnikova, L. F.] Плотникова, Л. Ф. 1976. Милководни верхньокрейдови фораминиферы платформеной частыны УРСР. — Инст. Геол. Наук Акад. Наук. Укр. РСР, 5—108.

(Plotnikova, L. F.) Плотникова, Л. Ф. 1967. Gaudriyadhella новый род з родыны Ataxophragmiidae. — *Доп. АНУРСР*. Сер. Б. **2**, 115—117.

Plummer, H. J. 1931. Some Cretaceous Foraminifera in Texas. — *Bull. Univ. Texas*, 3101, 109—203.

Pokorný, V. 1958. K určeni stári kridovych ulozenin na Pavlovskych kopcich. — *Časopis min. geol.*, **3**, 299—315.

Pokorný, V. 1960. Microstratigraphie et biofaciès du flysch Carpathique de la Moravie mèridionale (Tchècoslovaque). — *Rev. Pétrol. Inst. Français*, **15**, 1099—1141.

[Poroschina, L. A.] Порошина, Л. А. 1985. Новый род Chalilovella (Foraminifera) из нижнемеловых отложений Азербайджана, — *Вопросы Микропалеонт., Акад. Наук СССР*, **27**, 96—102.

Postuma, J. A. 1971. Manual of planktonic Foraminifera. Elsevier, 3—420, Amsterdam, London, New York.

Pożaryska, K. 1954. O przewodnich otwornicach z kredy górnej Polski środkowej (The Upper Cretaceous index Foraminifera from Central Poland). — *Acta Geol. Polonica*, **4**, 249—276.

Pożaryska, K. 1957. Lagenidae du Crétacé Supérieur de Pologne. — *Palaeont. Polonica*, **8**, 1—190.

Pożaryska, K. 1965. Foraminifera and biostratigraphy of the Danian and Montian in Poland. — *Palaeont. Polonica*, **14**, 1—156.

Pożaryska, K. 1967*a*. Badania warstw pogranicznych kredy i trzeciorzędu w Polsce pozakarpackiej (Cretaceous-Tertiary transition beds in Poland (except for the Carpatians)). *Kwart. Geol.*, **11**, 661—672.

Pożaryska, K. 1967*b*. II. The Upper Cretaceous and the Lower Paleocene in Central Poland. — *Biul. Inst. Geol.*, **211**, 41—67.

Pożaryska, K. and Brochwicz-Lewiński, W. 1974. Współczesne ujęcie zagadnienia prowincji paleobiogeograficznych. — *Post. Nauk Geol.*, **6**, 5—46.

Pożaryska, K. and Peryt, D. 1979. The Late Cretaceous and Early Paleocene foraminiferal „Transitional Province" in Poland. — Aspecte der Kreide Europas, IUGS, A, **6**, 293—303, Stuttgart.

Pożaryska, K. and Szczechura, J. 1968*a*. Foraminifera from the Palaeocene of Poland, their ecological and biostratigraphical meaning. — *Paleont. Polonica*, **20**, 7—107.

Pożaryska, K. and Szczechura, J. 1968*b*. The Cretaceous-Tertiary boundary in Poland, excluding the Carpathians. — Proceed. IPU, 23 International Geol. Congress — Prague, 423—430.

Pożaryska, K. and Witwicka, E. 1983. Stratigraphic studies on the Upper Cretaceous in Central Poland. — *Zitteliana*, **10**, 97—105.

Pożaryski, W. and Witwicka, E. 1956. Globotrunkany kredy górnej Polski środkowej. — *Biul. I. G.*, **102**, 5—30.

Pożaryski, W. 1960. Zjawisko twardego dna w profilu kredy Mielnika. — *Kwart. Geol.* **4**, 1, 105—112.

Price, R. J. 1977. The evolutionary interpretation of the Foraminiferida *Arenobulimina*, *Gavelinella*, and *Hedbergella* in the Albian of Nort West Europe. — *Palaeontology*, **20**, 503—526.

Reiss, Z. 1954. Upper Cretaceous and Lower Tertiary *Bolivinoides* from Israel. — *Contr. Cushman Lab. Foram. Res.*, **5**, 154—164.

Reiss, Z. 1988. Assemblages from a Senonian high productivity sea. — *Rev. Paléobiol.*, Vol. Spéc., **2**, Benthos'86, Third International Symposium on Benthic Foraminifera, Genève, 323—332.

Reuss, A. E. 1845. Die Versteinerungen der böhmischen Kreideformation, 1—128, Stuttgart.

Reuss, A. E. 1851. Die Foraminiferen und Entomostraceen des Kreidemergels von Lemberg. — *Naturwiss. Abh.*, **4**, 17—52.

Reuss, A. C. 1860. Die Foraminiferen der westphälischen Kreideformation. — *Sitsber. Math. — Nat. Cl. K. Akad. Wiss.*, **40**, B, 147—238.

Robaszyński, F. 1987. Biostratigraphy and events at the Campanian-Maastrichtian boundary. — *Ann. Soc. Geol. Belgique*, **109**, 325—331.

Robaszyński, F., Bless, M. J. M., Felder, P. J., Foucher, J. C., Légoux, O., Manivit, H., Meessen, J. P. M. Th. and van der Tuuk, L. A. 1985*a*. La limite Campanien-Maastrichtien dans le Limbourg belgo-néerlandais. — *Geol. Médit.*, **10**, 59—72.

Robaszyński, F., Bless, M. J. M., Felder, P. J. (Sjeuf), Foucher, J. C., Legoux, O., Manivit, H., Meessen, J. P. M. Th. and van der Tuuk, L. A. 1985*b*. The Campanian-Maastrichtian boundary in the chalky facies close to the Type-Maastrichtian area. — *Bull. Centres Rech. Explor.* — Prod. Elf-Aquitaine, **9**, 1—113.

Robaszyński, F. and Caron, M. 1979. Atlas of Mid-Cretaceous planktonic foraminiferida (Boreal Sea and Tethys). — *Cah. Micropaléont.*, **1**, 1—185; **2**, 1—181.

Robaszyński, F., Caron, M., Gonzales Donoso, J. M. and Wonders, A. H. 1984. Atlas of Late Cretaceous Globotruncanids. — *Rev. Micropal.*, **26**, 3—4, 145—305.

Said, R. and Kenawy, A. 1956. Upper Cretaceous and Lower Tertiary foraminifera from northern Sinai, Egypt. — *Micropaleontology*, **2**, 105—173.

Salaj, J. 1988. Benthic foraminifers of the Archaeoglobitruncana kefiana zone from the basal Maastrichtian in the area of El Kef (Tunisia). — *Rev. Paléobiol.*, Vol. Spéc., **2**, Benthos'86, Third International Symposium on Benthic Foraminifera, Genève, 333—338.

Salaj, J. and Samuel, O. 1966. Foraminifera der Westkarpaten-Kreide. — Geol. Úst. Dionyza Stúra, 1—291.

Salaj, J. and Samuel, O. 1984. Microbiostratigraphical division of West-Carpathian Mesozoic and Paleogene. — Západné Karpaty, sér. paleontológia, 9, Geol. Úst. Dionyza Stúra, 11—71.

Scheibnerová, V. 1969. Middle and Upper Cretaceous microbiostratigraphy of the Klippen Belt (West Carpathians). — *Acta Geol. Geogr. Univ. Comen. Geol.*, **17**, 5—98.

Scheibnerová, V. 1971*a*. Implication of deep-sea drilling in the Atlantic for studies in Australia and New Zealand. Some new views on Cretaceous and Cainozoic palaeogeography and biostratigraphy. — *Search*, **2** (7), 251—254.

Scheibnerová, V. 1971*b*. Palaeoecology and palaeogeography of Cretaceous deposits of the great Artesian Basin (Australia). — *Records Geol. Surv. New South Wales*, **12**, 15—48.

Scheibnerová, V. 1976. Cretaceous Foraminifera of the Great Australian Basin. — *Mem. Geol. Survey N. South Wales, Palaeont.*, **17**, 1—110.

Schijfsma, E. 1946. The foraminifera from the Hervian (Campanian) of Southern Limburg. — *Mededeel. Geol. sticht.*, **C 5**, 5—174.

[Serova, M. Y.] Серова, М. Я. 1969. Comparison of characteristics of Rzehakinidae in the Carpathian region and Pacific province. — *Rocz. Pol. Tow. Geol.*, **39**, 225—240.

[Serova, M. Y.] Серова, М. Я. 1987. Фораминиферы и биостатиграфия северной Пацифики на рубеже мела и палеогена. — Акад. Наук СССР, Московск. Общест. Испытат. Природы, 7—144.

Sigal, J. 1952. Aperçu stratigraphique sur la micropaléontologie du Crétacé. — XIX congr. Géol. Inst., Monogr. rég., Sér. 1, Algérie, 26, 1—45, Alger.

Sliter, W. V. 1968. Upper Cretaceous foraminifera from Southern California and Northwestern Baja California, Mexico. — *Univ. Kansas Paleont. Contr.*, **49**, Protozoa, 7, 1—141.

Sliter, W. V. 1985. 9. Cretaceous redeposited benthic foraminifers from deep sea drilling project site 585 in the East Mariana Basin, Western Equatorial Pacific, and implications for the geologic history of the region. — *Init. Rep. Deep Sea Drill. Proj.*, **89**, 327—361.

Sliter, W. V. 1986. Maastrichtian foraminifers from near Lake Nacimiento California — their paleoenvironmental interpretation and regional correlation. — Cretaceous and Lower Tertiary rocks near Lake Nacimiento, California: Pacific Section S. E. P. M., **49**, 17—24.

Sliter, W. V. and Premoli Silva, I. 1984. Autochthonous and displaced (allochthonous) Cretaceous benthic foraminifers from Deep Sea Drillings Project Leg 77, Sites 535, 536, 537, 538, and 540, Gulf of Mexico. — *Init. Rep. Deep Sea Drill. Proj.*, **77**, 593—627.

Sissingh, W. 1978. Microfossil biostratigraphy and stage-stratotypes of the Cretaceous. — *Geol. en. Mijnbouw*, **57**, 433—440.

Smit, J. 1982. Extinction and evolution of planktonic foraminifera after a major impact at the Cretaceous-Tertiary boundary. — *Soc. Geol. Amer., Spec. Paper*, **190**, 329—352.

Solakius, N. and Larsson, K. 1986. Foraminifera and biostratigraphy of the Arnager Limestone, Bornholm, Denmark. — DGU, C, **5**, 3—35.

Solakius, N. and Salaj, J. 1985. Foraminiferids from the Maastrichtian of Enfidaville, northeastern Tunisia. — *N. Jb. Geol. Paläont.*, Abh., **170**, 229—241.

Soliman, H. A. 1972. New Upper Cretaceous foraminifera from Soviet Carpathian (USSR). — *Rév. Micropal.*, **15**, 35—44.

Smith, Ch. C. and Pessagno, E. A., Jr. 1973. Planktonic foraminifera and stratigraphy of the Corsicana Formation (Maastrichtian), North Central Texas. — *Cushman found. Foram. Research*, Spec. Publ., **12**, 1—68.

Šteмproková-Jírová, D. 1975. The genus *Praebulimina* (Foraminifera) from the Upper Cretaceous of Bohemia, Czechoslovakia. — *Acta Univ. Carolinae, Geologica*, **3**, 249—259.

Stenestad, E. 1969. The genus *Heterohelix* Ehrenberg, 1843 (Foraminifera) from the Senonian of Denmark. — *In*: Bronnimann, P. and Renz, H. H. (eds.), Proc. First. Intern. Conf. Plankt. Microfoss., 2, 644—662.

[Subbotina, N. N.] Субботина, Н. Н. 1947. Фораминиферы датских и палеогеновых отложений Северного Кавказа. Микрофауна нефтяных месторождений Кавказа, Embы и Средней Азии. — *ВНИГРИ*, 49—147.

[Subbotina, N. N.] Субботина, Н. Н. 1953. Глобигериниды, Ханткенииды и Глобороталиииды. — *Тр. ВНИГРИ, нов. сер.*, **76**, 1—294.

[Subbotina, N. N.] Субботина, Н. Н. 1964. *In* Субботина, Род Hastigerina Thomson, 1876. Фораминиферы меловых и палеогеновых отложений Западно-Сибирской низменности. — *Тр, ВНИГРИ*, **234**, 249—251.

[Sulejmanov, I. S.] Сулейманов, И. С. 1955. Новый род Gubkinella и два новых вида семейства Heterohelicidae из верхнего сенона юго-западних Кызыл-Кумов. — *Докл. Акад. Наук СССР*, **102**, 623—624.

Sujkowski, Z. 1931. Petrografia kredy Polski. Kreda z głębokiego wiercenia w Lublinie w porównaniu z kredą niektórych innych obszarów Polski (Étude pétrographique du Crétacé en Pologne). — *Sprawozd. Państw. Inst. Geol.*, **6**, 485—628.

Szczechura, J. and Pożaryska, K. 1974. Foraminiferida from the Paleocene of Polish Carpathians (Babica Clays). — *Palaeont. Polonica*, **31**, 3—142.

[Szimanskij, V. N.] Щиманский, В. Н. 1987. Историческое развитие Биосферы. — Зволюця и биоценотические кризисы. Изд. „Наука", Москва, 5—45.

Tappan, H. and Loeblich, A. R., Jr. 1988. Foraminiferal evolution, diversification, and extinction. — *J. Paleont.*, **62**, 695—714.

Teisseyre, B. 1975. Stratygrafia mikropaleontologiczna górnej kredy rowu Nysy (Sudety środkowe). — *Rocz. Pol. Tow. Geol.*, **45**, 81—136.

Tilev, N. 1951. Étude des Rosalines maestrichtiennes (genre *Globotruncana*) du Sud-Est de la Turquie (Sondage de Ramandag). — *Publ. Inst. Etud. Rech. Min. Turquie,) B*, **16**, 3—101.

Trümper, E. 1968. Variationsstatistische Untersuchungen an der Foraminiferen-Gattung *Stensioeina* Brotzen. — *Geologie*, **17**, 1—103.

Vaptzarova, J. 1972. Podrod Pseudovalvulineria (Foraminifera) ot gornata kreda na centralna sevierna i seviero zapadna Bułgaria. — *Biul. Geol. Inst., ser. paleont.* **21**, 83—102.

Vaptzarova, J. 1973. Predstaviteli na podrodovete *Gavelinella, Brotzenella* i *Anomalina* ot gornata kreda na sevierna Bulgaria. — *Biul. Geol. Inst., ser. paleont.*, **22**, 21—42.

Vaptzarova, J. 1974. Foraminifères des sédiments maestrichtiens de type carpathique de la Bulgarie Nord-Ouest. — *Biul. Geol. Inst., ser. paleont.*, **23**, 31—56.

Vaptzarova, J. 1975*a*. Foraminifères planctoniques et zones au Campanien de la Bulgarie du Nord-Ouest. — *Bulgarian Acad. Scienc., Palaeont. Stratigr., Lithol.*, **1**, 19—32.

Vaptzarova, J. 1975*b*. Formes benthoniques du Campanien de la Bulgarie du Nord-Ouest. — *Bulgarian Acad. Scienc., Palaeont., Stratigr., Litholog.*, **2**, 57—72.

Vaptzarova, J. 1976. Zonation du Crétacé supérieur du type carpathique en Bulgarie du Nord-Ouest d'après les Foraminifères planctoniques. — *Geol. Balcanica*, **6**, 93—109.

VAPTZAROVA, J. 1978. Foraminifères du Coniacien et du Santonien de la Bulgarie du Nord-Ouest. — *Bulgarian Acad. Scienc., Palaeont. Stratigr., Lithol.*, **8**, 55—68.

VAPTZAROVA, J. 1980. Zonation du Crétacé supérieur du type de la plate-forme en Bulgarie du Nord d'après les Foraminifères. — *Geol. Balcanica*, **10**, 45—68.

VAPTZAROVA, J. 1982. *Globorotalites emdyensis* Vassilenko, 1961 (Foraminifera) ot gornija kampan na Centralna Sievierna Bulgaria. — *Bulgarian Acad. Scienc. Palaeont., Stratigr., Lithol.*, **16**, 27—58.

[VASSILENKO, V. P.] ВАСИЛЕНКО, В. П. 1950. Фораминиферы палеоцена центральной части Днепровско-Донецкой владины. — *Тр. ВНИГРИ*, нов. сер., **51**, Микрофауна СССР, **5**, 177—224.

[VASSILENKO, V. P.] ВАСИЛЕНКО, В. П. 1954. Аномалиниды. — *Тр. ВНИГРИ*, нов. сер., **80**, Ископаемые фораминиферы СССР, 1—203.

[VASSILENKO, V. P.] ВАСИЛЕНКО, В. П. 1961. Фораминиферы верхнего мела полуострова Мангышлака. — *Тр. ВНИГРИ*, **171**, 3—487.

[VASSILENKO, V. P. and MJATLIUK, E. V.] ВАСИЛЕНКО, В. П., МЯТЛЮК, Е. В. 1947. Фораминиферы и стратиграфия верхнего мела южноэмбенского района. — Микрофауна нефтяных месторождений Кавказа, Эмбы и Средней Азии. — *Тр. ВНИГРИ*, 161—221.

VERDENIUS, J. G. and HINTE, J. 1983. Central Norwegian-Greenland Sea: Tertiary arenaceous foraminifera, biostratigraphy and environment. — *Proceed. First Workshop on Arenaceous Foraminifera* 7. — 9. September 1981, **108**, 173—207.

VISSER, A. M. 1951. Monograph on the foraminifera of the type-locality of the Maastrichtian (South-Limburg, Netherlands). — *Leidse Geol. Meded.*, **16**, 197—359.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1961. Некоторые новые виды верхнемеловых фораминифер Волыно-Подольской плиты. — *Палеонт. Сб. Львовского Геол. Общества*, **1**, 71—84.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1963. Некоторые виды верхнемеловых фораминифер окрестностей г. Львова. — *Тр. Укр. НИГРИ*, **5**, Геология и нефтегазоность территории УССР, 259—273.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1964. Пересмотр нескольких видов верхнемеловых фораминифер впервые описанных из окрестностей г. Львова. — *Тр. Укр. НИГРИ*, **9**, 113—126.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1965. Виды рода *Lituola* Lam. (Foraminifera) из верхнемеловых и палеоценовых отложений Украины. — *Палеонт. Сб. Львовского Госуд. Университета*, **2**, 51—59.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1967. Восем видов атаксофрагмиид (фораминиферы) из верхнемеловых и палеоценовых отложений восточного Крыма. — *Палеонт. Сб., Львовского Госуд. Университета*, **4**, 50—57.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1969. Виды семейства Chilostomellidae (Фораминиферы) из верхнемеловых отложений Волино-Подолии. — *Палеонт. Сб., Львовского Госуд. Университета*, **6**, 3—10.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1972*a*. Атаксофрагмииды верхнемеловых отложений Волыно-Подольской окраины русской платформы. — *Тр. Укр. НИГРИ*, **27**, 55—130.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1972*b*. К изучению верхнемеловых роталиид (Foraminifera) Волыно-Подолии. — Вопросы Геологии Нефтегазоносных регионов Украины. Укр. НИГРЯ, 110—121.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1974. Обзор родов верхнемеловых булиминацей (фораминиферы) на материале Вольно-Подолии. — *Палеонт. Сб.*, **10**, 17—22.

[VOLOSHINA, A. M.] ВОЛОШИНА, А. М. 1977. Особенности кампан-маастрихтской фауны фораминифер у границы с предкарпатским прогибом. — *Палеонт. Сб.*, **14**, 10—13.

WEIDICH, K. F. 1984. Feinstratigraphie, Taxonomie planktonischer Foraminiferen und Paläokologie des Foraminiferengesamtfauna der Kalkalpinen tieferen Oberkreide (Untercenoman — Untercampan) der Bayerischen Alpen. — *Bayer. Akad. Wiss. Math. — Naturwiss.* Abh., NF., **162**, 1—151.

WEIDICH, K. F. 1985. Stratigraphie der Branderfleck-Schichten (Untercenoman — Untercampan) in den Bayerischen Kalkalpen. — Schriftenreihe der Erdwissenschaftlichen Kommissionen, **7**, 221—261.

WEIDICH, K. F. 1990. Die kalkalpine Unterkreide und ihre Foraminiferenfauna. — *Zitteliana* **17**, 1—312.

WEISS, W. 1983. Heterohelicidae (seriale planktonische Foraminiferen) der tethyalen Oberkreide (Santon bis Maastricht). — *Geol. Jb.*, A, **72**, 3—93.

WENGER, W. F. 1987. Die Foraminiferen des Miozäns der bayerischen Molasse und ihre stratigraphische sowie paläogeographische Auswertung. — *Zitteliana*, **16**, 173—340.

WITWICKA, E. 1958. Stratygrafia mikropaleontologiczna kredy górnej wiercenia w Chełmie. — *Biul. Inst. Geol.*, **121**, Z badań mikropaleontologicznych, 3, 177—267.

WITWICKA, E. 1961. Stratygrafia mikropaleontologiczna kredy górnej wiercenia w Łukowie. — *Biul. Inst. Geol.*, **156** 113—148.

WONDERS, A. A. H. 1980. Middle and Late Cretaceous planktonic foraminifera of the Western Mediterranean Area. — *Bull. Utrecht Micropaleont.*, **24**, 7—157.

WRIGHT, C. A. and APTHORPE, M. 1976. Planktonic foraminiferids from the Maastrichtian of the northwest shelf, Western Australia. — *J. Foram. Research*, **6**, 228—240.

YASUDA, H. 1986. Cretaceous and Paleocene Foraminifera from northern Hokkaido, Japan. — *Tohoku Univ. Sci. Rep.*, 2nd. ser. (Geol.), **57**, 1—101.

ZAPAŁOWICZ, B. 1975. A taxonomic study of *Angulogavelinella gracilis* (Marsson) Hofker. — *Bull. Acad. Pol. Scien.*, ser. Sci. Terre, **22**, 197—206.

ZAPAŁOWICZ-BILAN, B. 1982*a*. Foraminiferal zones from the Upper Cretaceous in Lublin Coal Basin. — *Bull. Acad. Pol. Sci.*, ser. Geol., **29**, 261—269.

ZAPAŁOWICZ-BILAN, B. 1982*b*. Foraminiferal biofacies of the Upper Cretaceous of the Lublin Coal Basin. — *Geologia*, **7**. Zeszyty Naukowe, 5—39.

PLATES

PLATE 1

1. *Silicosigmoilina* cf. *perplexa* ISRAELSKY; specimen IG 46450/88/F, × 100, Dorohucze IG 5 borehole, depth 41 m, upper Maastrichtian.
2. *Rzehakina inclusa* (GRZYBOWSKI); specimen IG 46451/88/F, × 86, Tyszowce IG 1 borehole, depth 235 m, lower Maastrichtian.
3. *Hormosina* sp.: specimen IG 46452/88/F, × 78, Telatyn IG 1 borehole, depth 181 m, lower Maastrichtian.

4, 5. *Hormosina telatynensis* sp. n.; 4 — specimen IG 45709/88/F, holotype, × 120; 5 specimen IG 45710/88/F, paratype composed of two chambers, × 86, Telatyn IG 1 borehole, depth 181 m, lower Maastrichtian.

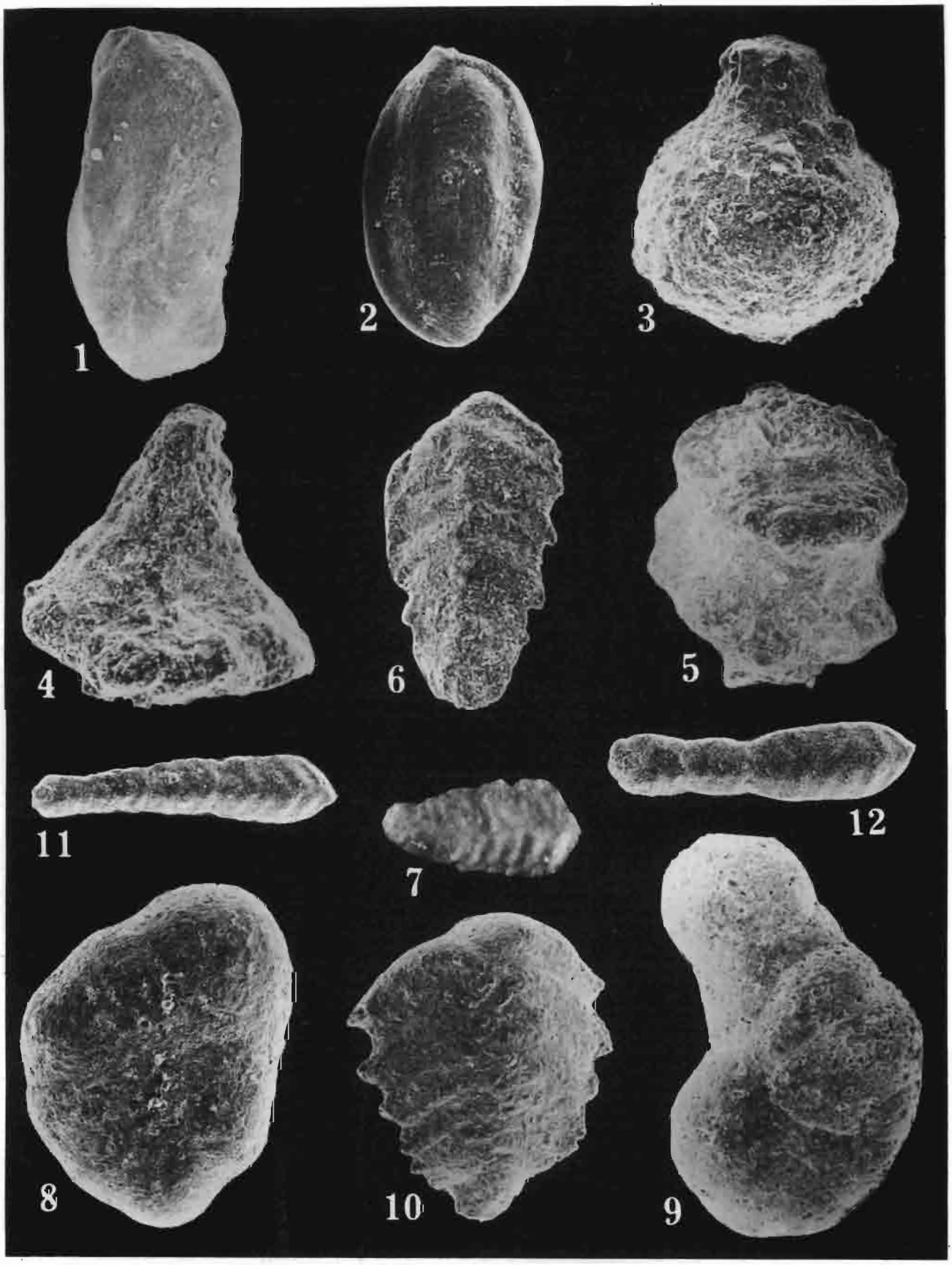
8. *Lituola* cf. *diformis* (LAMARCK) emend. MAYNC; specimen IG 46454/88/F, × 26, Piaski IG 1 borehole, depth 402.10 m, lower Maastrichtian.
9. *Lituola* sp.; specimen IG 46455/88/F, × 24, Piaski IG 1 borehole, depth 402.10 m, lower Maastrichtian.

6, 7. *Spiroplectammina chicoana* LALICKER; 6 — specimen IG 46456/88/F, × 110; 7 — specimen IG 464457/88/F, × 90, Telatyn IG 1 borehole, depth 227 m, lower Maastrichtian.

10. *Spiroplectammina dentata* (ALTH); specimen IG 46458/88/F, × 86, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

11, 12. *Spiroplectammina rosula* (EHRENBERG); 11 — specimen IG 46459/88/F, microspheric generation B, × 78; 12 — specimen IG 46460/88/F, megalospheric generation A, × 78, Lublin IG 2 borehole, depth 497.80 m, upper Campanian.

Fig. 7 light microscope photographs
Figs. 1—6 and 8—11 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 2

1*a*, *b*. *Telatynella clavata* GAWOR-BIEDOWA; specimen IG 46461/88/F; *a* — general view, × 90; b — paratype, × 240, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

2. *Telatynella telatynensis* GAWOR-BIEDOWA; specimen IG 46462/88/F, paratype, × 160, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

3*a*, *b*; 4*a*, *b*. *Spiroplectammina navarroana* CUSHMAN; side (*a*) and edge (*b*) views; 3*a*, *b* — specimen IG 46463/88/F, megalospheric form, × 30; 4*a*, *b* — specimen IG 46464/88/F, microspheric form, × 32, Tyszowce IG borehole, depth 110 m, upper Maastrichtian.

5. *Spiroplectammina suturalis* (KALININ); specimen IG 46465/88/F, × 30, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

6. *Verneuilina muensteri* REUSS; specimen IG 46467/88/F, × 66, Telatyn IG 1 borehole, depth 486 m, upper Campanian.

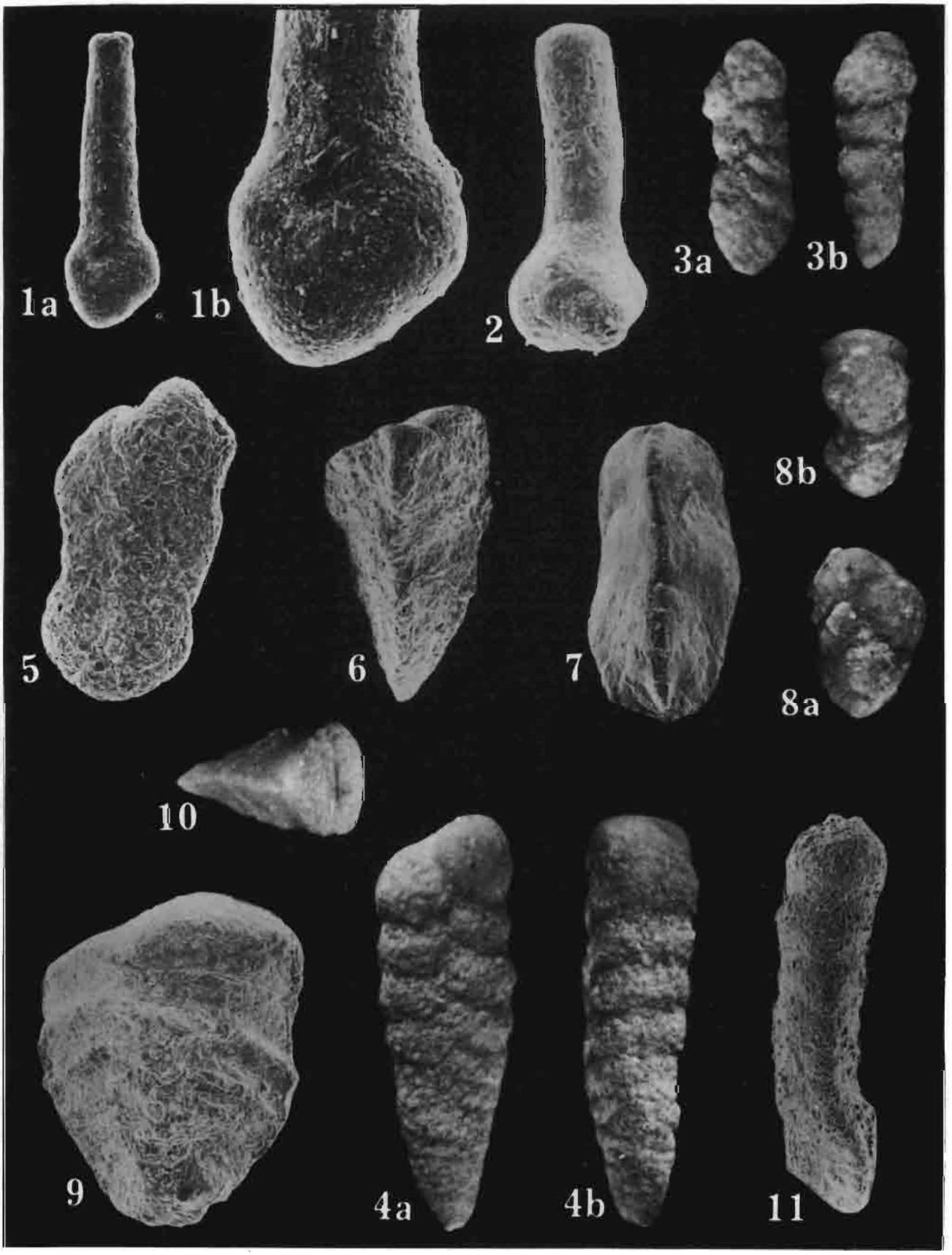
7. *Tritaxia dubia* (REUSS); IG 46467/88/F, X 66, Lublin IG 2 borehole, depth 486 m, upper Campanian.

8*a*, *b*. *Gaudryina frankei* BROTZEN; specimen IG 46468/88/F in side (*a*) and edge-apertural (*b*) views, × 30, Lubartów IG 2 borehole, depth 312.9 m, lower Maastrichtian.

9, 10. *Spiroplectammina baudouiniana* (d'ORBIGNY); 9 — specimen IG 46469/88/F in side view, × 72; 10 — specimen IG 46470/88/F in edge apertural view, × 30, Telatyn borehole IG 1, depth 10 m, upper Maastrichtian.

11. *Tritaxia eggeri* (CUSHMAN); specimen IG 46858/88/F, × 48, Telatyn IG 1 borehole, depth 268 m, upper Campanian.

Figs. 3, 4, 8, 10 light microscope photographs
Figs. 1, 2, 5—7, 9, 11 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 3

1, 2. *Gaudryina laevigata* FRANKE; 1 — specimen IG 46471/88/F in side view, × 101; 2 — specimen 46472/88/F in edge view, × 125, Telatyn IG 1 borehole, depth 262 m, lower Maastrichtian.

3—5. *Heterostomella carinata* (FRANKE); 3 — specimen IG 46473/88/F in side view, × 78; 4 — specimen IG 46474/88/F in side view, opposit to (3), × 94; 5 — specimen IG 46475/88/F in edge-apertural view, × 95, Dorohucza IG 5 borehole, depth 47 m, upper Maastrichtian.

6, 7. *Heterostomella rugosa* (d'ORBIGNY); 6 — specimen IG 46476/88/F, general view, × 60; 7 — specimen IG 464477/88/F in edge-apertural view, × 48, Piaski IG 1 borehole, depth 402.1 m, lower Maastrichtian.

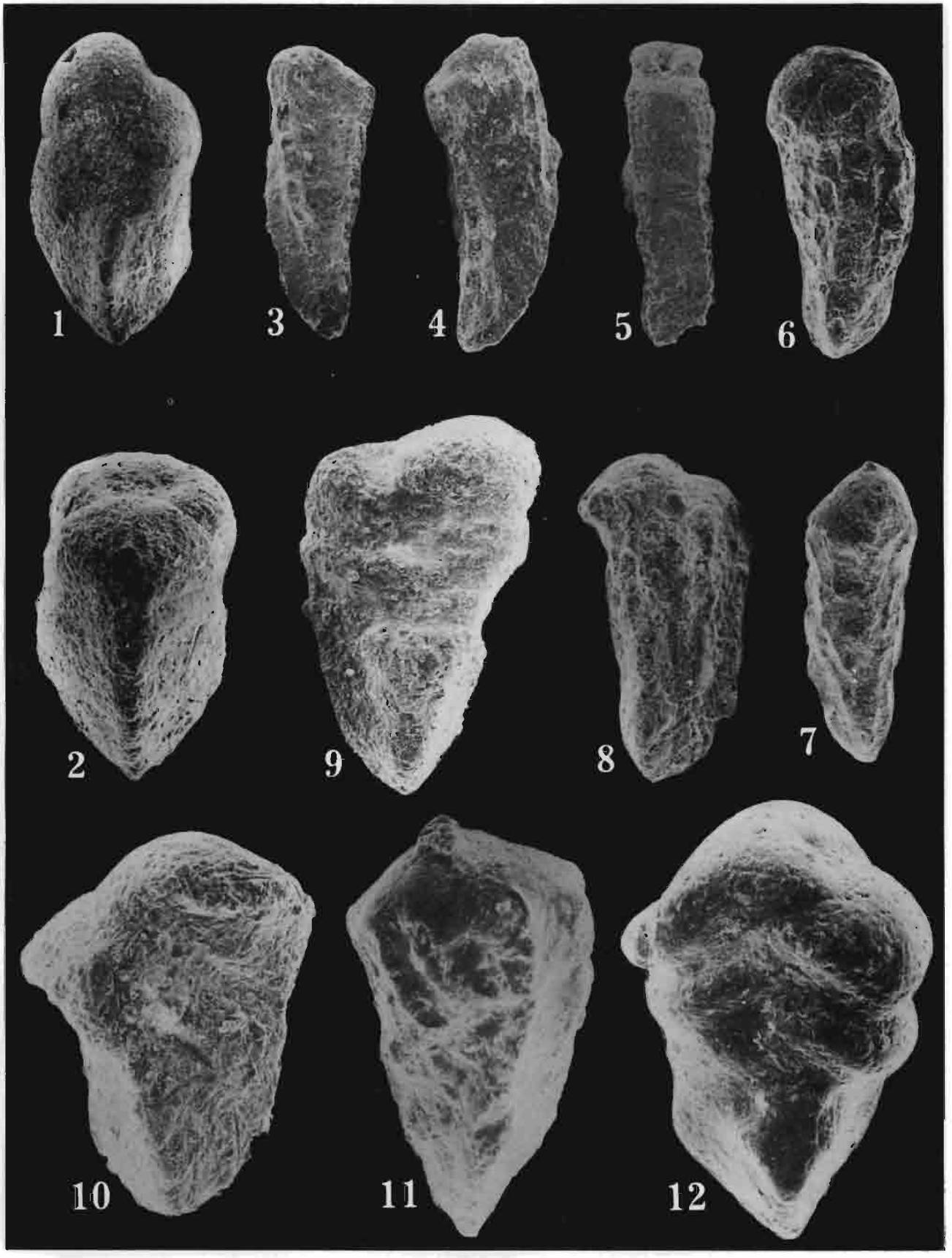
8. *Heterostomella leopolitana* OLSZEWSKI; specimen IG 46478/88/F, × 78, Telatyn IG 1 borehole, depth 25 m, upper Maastrichtian.

9. *Gaudryina rugosa* d'ORBIGNY; IG 46479/88/F, × 48, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

10. *Gaudryina pyramidata* (CUSHMAN); IG 464480/88/F, × 66, Lublin IG 2 borehole, depth 449 m, lower Maastrichtian.

11. *Heterostomella foveolata* (MARSSON); IG 46481/88/F, × 86, Telatyn IG 1 borehole, depth 271.5 m, Campanian.

12. *Gaudryina frankei* BROTZEN; IG 46482/88/F, × 60, Lubartów IG 2 borehole, depth 312.9 m, Maastrichtian.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E. GAWOR-BIEDOWA: UPPER CRETACEOUS FORAMINIFERA FROM E POLAND

PLATE 4

1. *Heterostomella leopolitana* OLSZEWSKI; specimen IG 46483/88/F, × 66, Telatyn IG 1 borehole, depth 25.0 m, upper Maastrichtian.
2—4. *Heterostomella laevigata* MARIE; 2 — specimen IG 46484/88/F, side view, × 150; 3 — specimen IG 46485/88/F, opposite side view, × 120; 4 — specimen IG 46486/88/F, edge view, × 130, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.
5*a*, *b*. *Orbignyna ruegensis* (FRANKE); specimen IG 46487/88/F, (*a*) side and (*b*) edge views, × 54, × 60, Piaski IG 1 borehole, depth 402 m, lower Maastrichtian.
6*a*, *b*; 7. *Ataxophragmium lvovense* WOLOSCHYNA; 6 — specimen IG 46488/88/F, (*a*) side and (*b*) apertural views, × 40, × 45; 7 — specimen IG 46489/88/F, side view, × 54, Tyszowce IG 1 borehole, depth 60 m, upper Maastrichtian.
8. *Ataxophragmium beisseli* (CUSHMAN); specimen IG 46490/88/F, apertural view, × 78, Lubartów IG 2 borehole, depth 105 m, upper Maastrichtian.
9, 10. *Ataxophragmium fartile* WOLOSCHYNA; 9 — specimen IG 46491/88/F, ventral side, × 110; 10 — specimen IG 46492/88/F, dorsal side, × 100, Tyszowce IG 1 borehole, depth 105 m, upper Maastrichtian.
11, 12. *Ataxophragmium depressum* (PERNER); 11 — specimen IG 46493/88/F, ventral side, × 100; 12 — specimen IG 46494/88/F, dorsal side, × 94, Telatyn IG 1 borehole, depth 183.5 m, lower Maastrichtian.

Figs. 5*a*, *b*; 6*a*, *b* light microscope photographs
Figs. 1—4 and 7—12 SEM micrographs

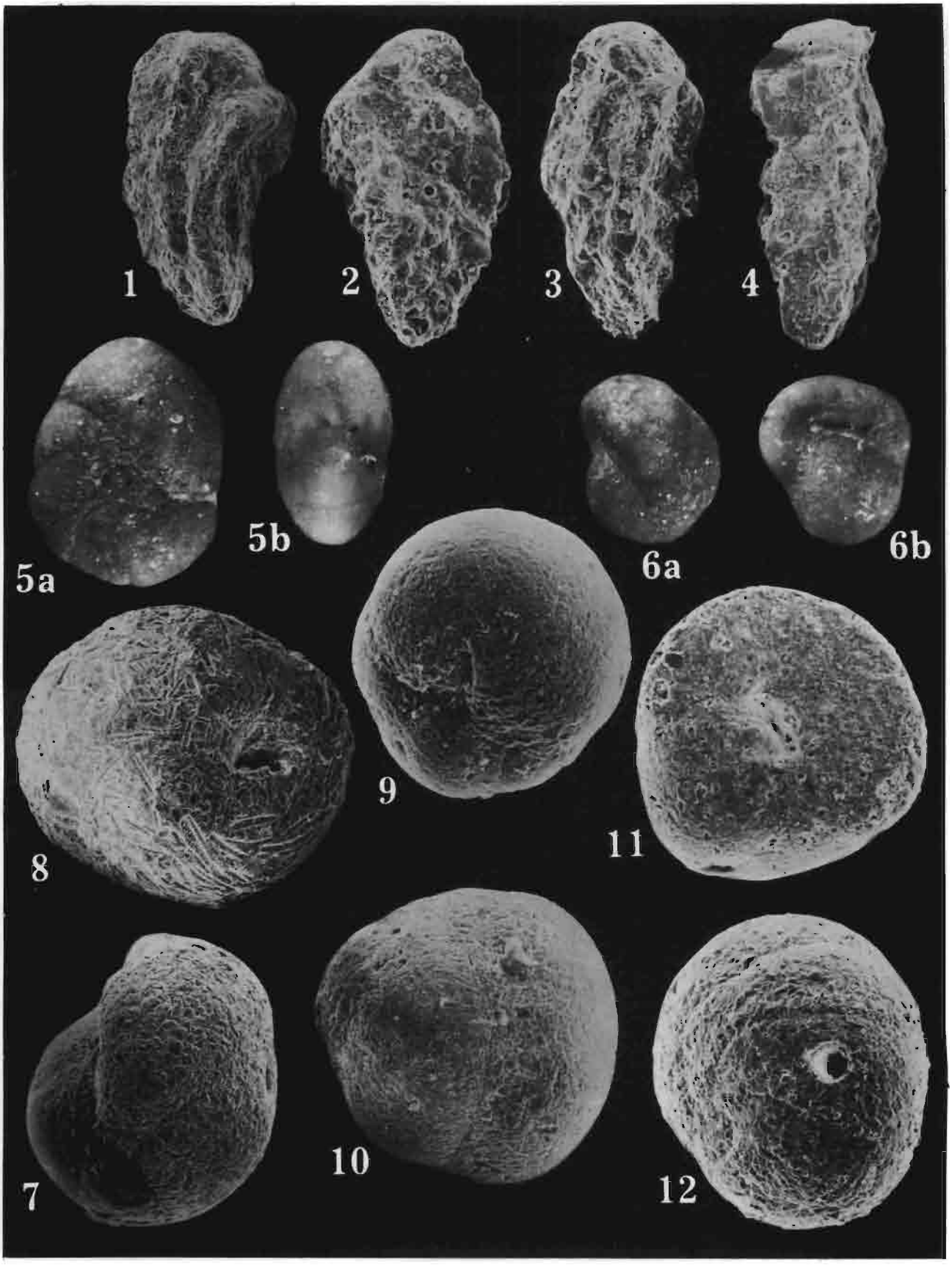
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PLATE 5

1, 2. *Arenobulimina elevata* (d'ORBIGNY); 1 — specimen IG 46495/88/F, dorsal side, × 60; 2 — specimen IG 46496/88/F, side view, × 50, Piaski IG 1 borehole, depth 404 m, lower Maastrichtian.

3. *Orbignyna simplex* (REUSS); specimen IG 464497/88/F, last chamber partly damaged, × 30, Telatyn IG 1 borehole, depth 227 m, lower Maastrichtian.

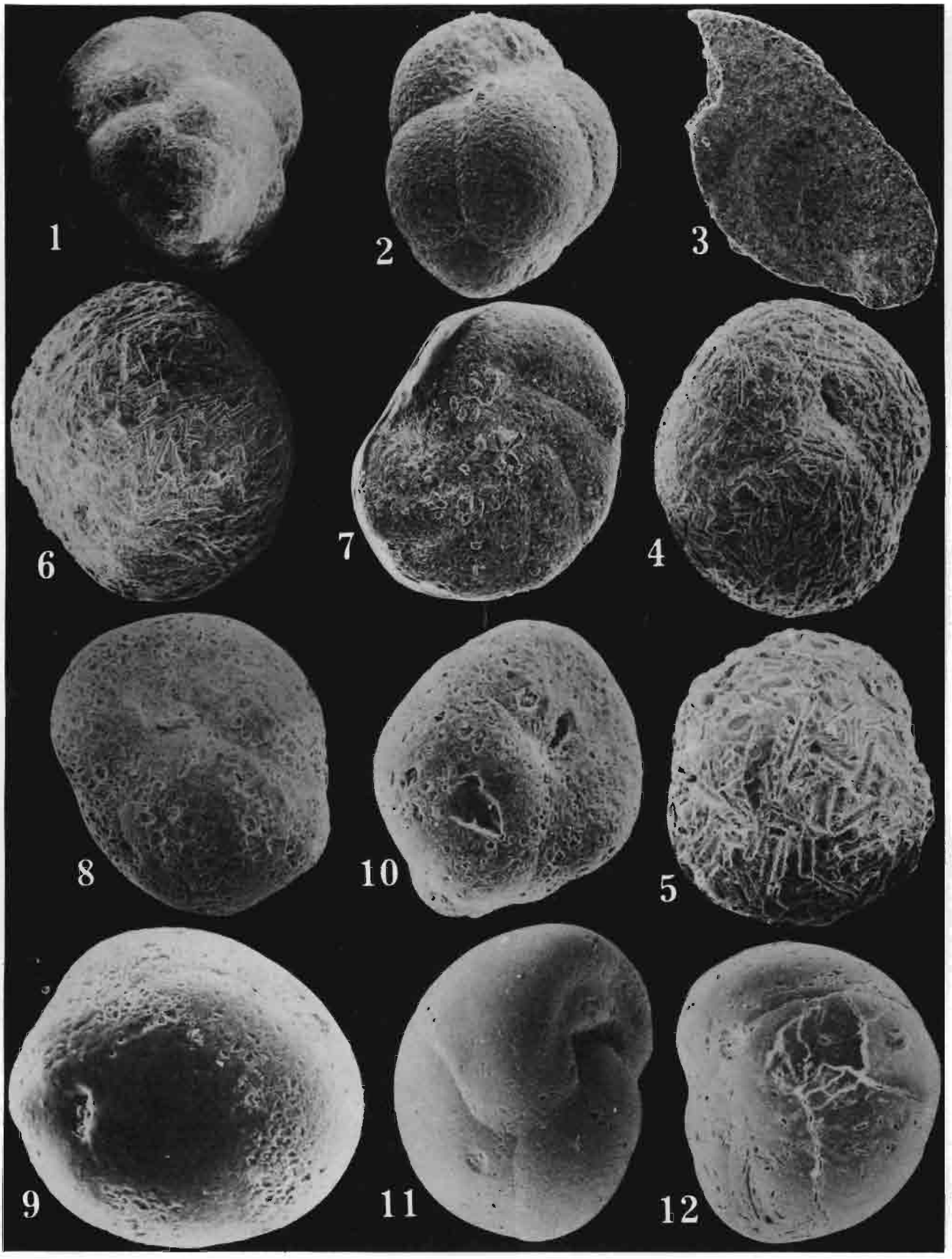
4, 5. *Ataxophragmium rimosum* (MARSSON); 4 — specimen IG 46500/88/F, side-apertural view, × 65; 5 — specimen IG 46501/88/F, dorsal side, × 70, Tyszowce IG 1 borehole, depth 60 m, upper Maastrichtian.

6. *Ataxophragmium beisseli* (CUSHMAN); specimen IG 46498/88/F, dorsal side, × 60, Lubartów IG 2 borehole, depth 105 m, upper Maastrichtian.

7. *Orbignyna sacheri* (REUSS); specimen IG 46499/88/F, × 35, Telatyn IG 1 borehole, depth 242 m, lower Maastrichtian.

8—10. *Arenobulimina sphaerica* MARIE; 8 — specimen IG 46502/88/F, ventral side, megalospheric form; 9 — specimen IG 46503/88/F, dorsal side, megalospheric form, × 120; 10 — specimen IG 46504/88/F, ventral side, microspheric form, × 150, Lubartów IG 2 borehole, depth 206 m, upper Maastrichtian.

11, 12. *Ataxophragmium crassum* (d'ORBIGNY); 11 — specimen IG 46505/88/F, side-apertural view, × 70; 12 — specimen IG 465506/88/F, dorsal side, × 66, Telatyn IG 1 borehole, depth 231 m, lower Maastrichtian.

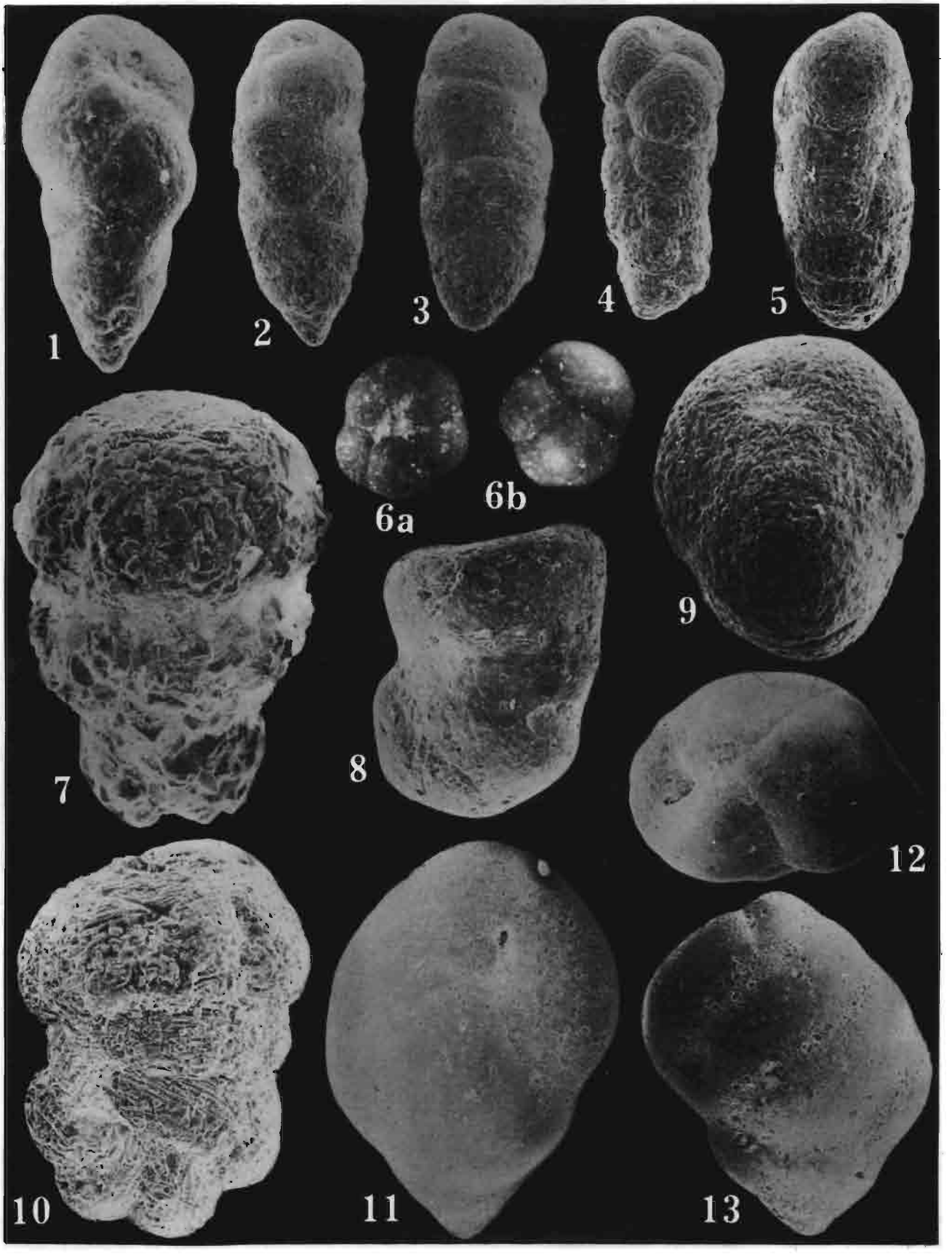


E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 6

1. *Arenobulimina minutissima* sp. n.; specimen IG 45806/88/F, holotype, side-apertural view, × 220, Piaski IG 1 borehole, depth 402.1 m, lower Maastrichtian.
2, 3. *Arenobulimina cuneata* WOLOSCHYNA; 2 — specimen IG 46506/88/F, side-apertural view, × 44; 3 — specimen IG 46507/88/F, opposite side view, × 48, Piaski IG 1 borehole, depth 502.6 m, Campanian.
4, 5. *Arenobulimina puschi* (REUSS); 4 — specimen IG 46508/88/F, side-apertural view, × 54; 5 — specimen IG 46509/88/F, opposite side view, × 72, Telatyn IG 1 borehole, depth 47 m, upper Maastrichtian.
6*a*, *b*. *Arenobulimina obesa* (REUSS); specimen IG 46510/88/F, *a* — ventral and *b* — dorsal sides, × 50, Dorohucza IG 5, depth 7.2 m, upper Maastrichtian.
7. *Voloshinovella conica* (BEISSEL); specimen IG 46511/88/F, × 78, Telatyn IG 1 borehole, depth 227 m, lower Maastrichtian.
8. *Orbignyna variabilis* (d'ORBIGNY); specimen IG 46512/88/F, × 70, Telatyn IG 1 borehole, depth 271.5 m, upper Campanian.
9. *Orbignyna ovata* HAGENOW; specimen IG 46513/88/F, ventral side, × 120, Piaski IG 1 borehole, depth 404 m, lower Maastrichtian.
10. *Orbignyna inflata* (REUSS); specimen IG 46514/88/F, × 44, Lubartów IG 2 borehole, depth 106.1 m, upper Maastrichtian.
11. *Arenobulimina preslii* (REUSS); specimen IG 46515/88/F, ventral side, × 100, Lubartów IG 2 borehole, depth 203.2 m, upper Maastrichtian.
12, 13. *Arenobulimina conica* MARIE; 12 — specimen IG 46516/88/F, ventral side, × 72; 13 — specimen IG 46517/88/F, dorsal side, × 78, Dorohucza IG 5 borehole, depth 85 m, upper Maastrichtian.

Figs. 6*a*, *b* light microscope photographs
Figs. 1—5 and 7—13 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 7

1, 2. *Varsoviella pazdroae* GAWOR-BIEDOWA; 1 — specimen IG 46518/88/F, general view, × 44; 2 — specimen IG 46519/88/F, apertural view, × 40, Lublin IG 2 borehole, depth 440 m, lower Maastrichtian.

3, 4. *Dorothia irregularis* (MARSSON); 3 — specimen IG 46520/88/F, side-apertural view; 4 — specimen IG 46521/88/F, opposite side view, × 44, Telatyn IG 1 borehole, depth 227 m, lower Maastrichtian.

5. *Plectina lenis* (GRZYBOWSKI); specimen IG 46534/88/F, × 120, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

6, 7. *Eggerellina brevis* (d'ORBIGNY); 6 — specimen IG 46522/88/F, ventral side, × 80; 7 — specimen IG 46523/88/F, ventral side, × 72, Lubartów IG 2 borehole, depth 413.5 m, Campanian.

8. *Goesella rugosa* HANZLIKOVÁ; specimen IG 46524/88/F, × 110, Piaski IG 1 borehole, depth 502.6 m, Campanian.

9, 10. *Arenobulimina vialovi* WOLOSCHYNA; 9 — specimen IG 46525/88/F, side view, × 65; 10 — specimen IG 46526/88/F, side-apertural view, × 60, Telatyn IG 1 borehole, depth 153 m, upper Maastrichtian.

11. *Dorothia pupa* (REUSS); specimen IG 465527/88/F, × 60, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

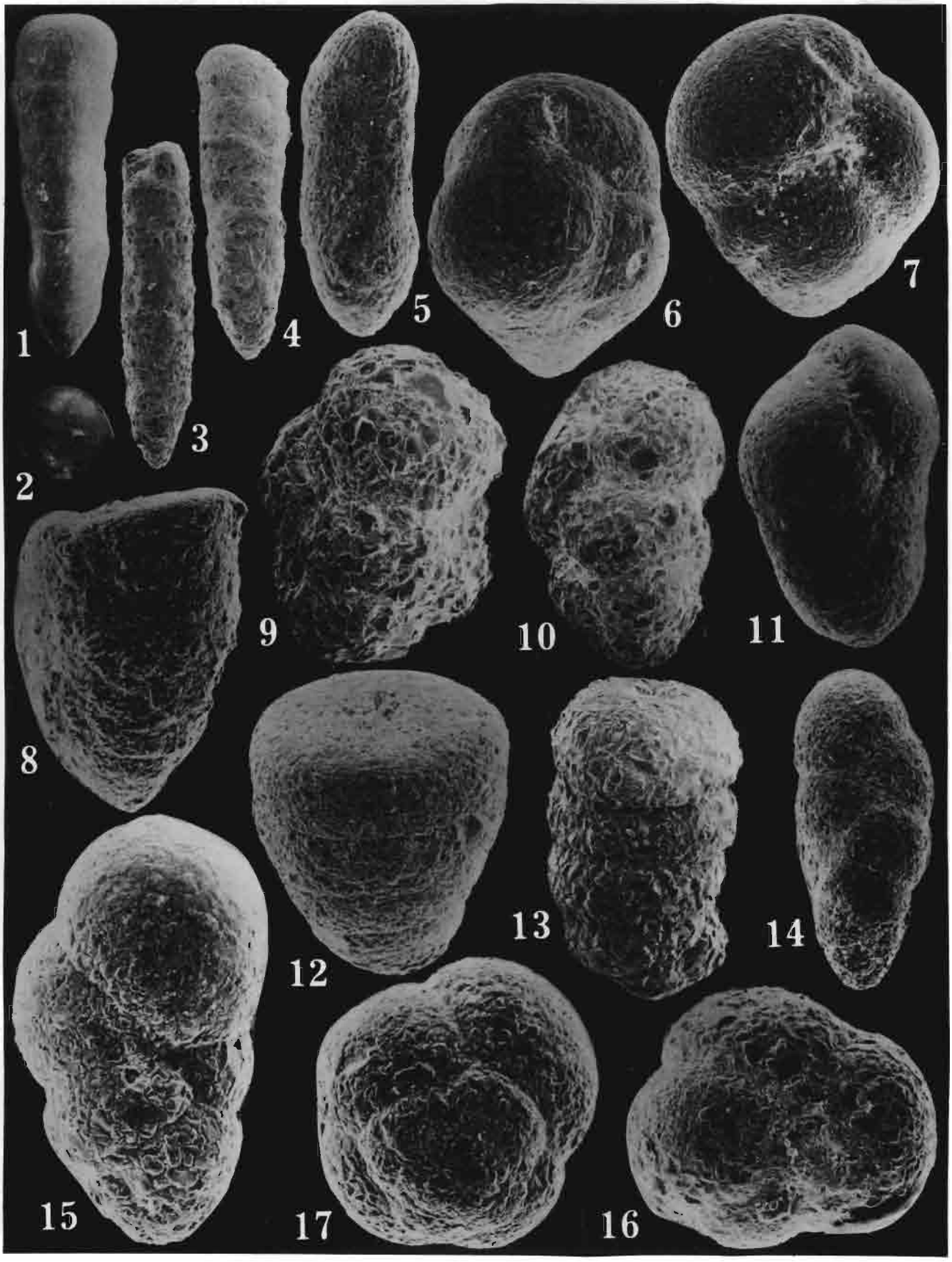
12. *Voloshinovella laffittei* (MARIE); specimen IG 46528/88/F, × 50, Lubartów IG 2 borehole, depth 411 m, Campanian.

13. *Voloshinovella aquisgranensis* (BEISSEL); specimen IG 46529/88/F, × 40, Telatyn IG 1 borehole, depth 195 m, lower Maastrichtian.

14. *Plectina ruthenica* (REUSS); specimen IG 46530/88/F, × 40, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

15. *Plectina convergens* (KELLER); specimen IG 46531/88/F, × 72, Piaski IG 1 borehole, depth 63 m, upper Maastrichtian.

16, 17. *Trochammina globigeriniformis* CUSHMAN; 16 — specimen IG 46532/88/F, ventral side, × 66; 17 — specimen IG 46533/88/F, side, × 90, Telatyn IG 1 borehole, depth 181 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 8

1, 2. *Frondicularia biformis* MARSSON; 1 — specimen IG 46535/88/F, ?megalospheric form, × 70, 2 — specimen IG 46536/88/F, ?microspheric form, × 90, Lublin IG 2 borehole, depth 317 m, upper Maastrichtian.

3. *Cribrebella lacrima* (GAWOR-BIEDOWA); specimen IG 45654/85/F, holotype, × 188, Telatyn IG 1 borehole, depth 242 m, lower Maastrichtian.

4. *Cribrebella ovata* GAWOR-BIEDOWA; specimen IG 45660/85/F, holotype, × 260, Telatyn IG 1 borehole, depth 231 m, lower Maastrichtian.

5. *Cribrebella fusiformis* GAWOR-BIEDOWA; specimen IG 45657/85/F, holotype, × 168, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

6. *Heterohelix carinata* (CUSHMAN); specimen IG 46537/88/F, × 120, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

7. *Guttulina trigonula* (REUSS); specimen IG 46538/88/F, × 110, Lublin IG 2 borehole, depth 317 m, upper Maastrichtian.

8. *Globulina prisca* (REUSS); specimen IG 46539/88/F, × 204, Telatyn IG 1 borehole, depth 127.5 m, upper Maastrichtian.

9, 10. *Globulina lacrima* (REUSS); 9 — specimen IG 46540/88/F, general view, × 100; 10 — specimen IG 46541/88/F, aperture and surface of the test, × 1000, Telatyn IG 1 borehole, depth 178 m, lower Maastrichtian.

11. *Neoflabellina reticulata* (REUSS); specimen IG 46542/88/F, × 86, Telatyn IG 1 borehole, depth 227 m, lower Maastrichtian.

12—14. *Ceratocancris caspia* VASSILENKO; 12 — specimen IG 46543/88/F, ventral side, × 156; 13 — specimen IG 46544/88/F, dorsal side, × 130; 14 — specimen IG 46545/88/F, edge view, × 156, Telatyn IG 1 borehole, depth 282.1 m, upper Campanian.

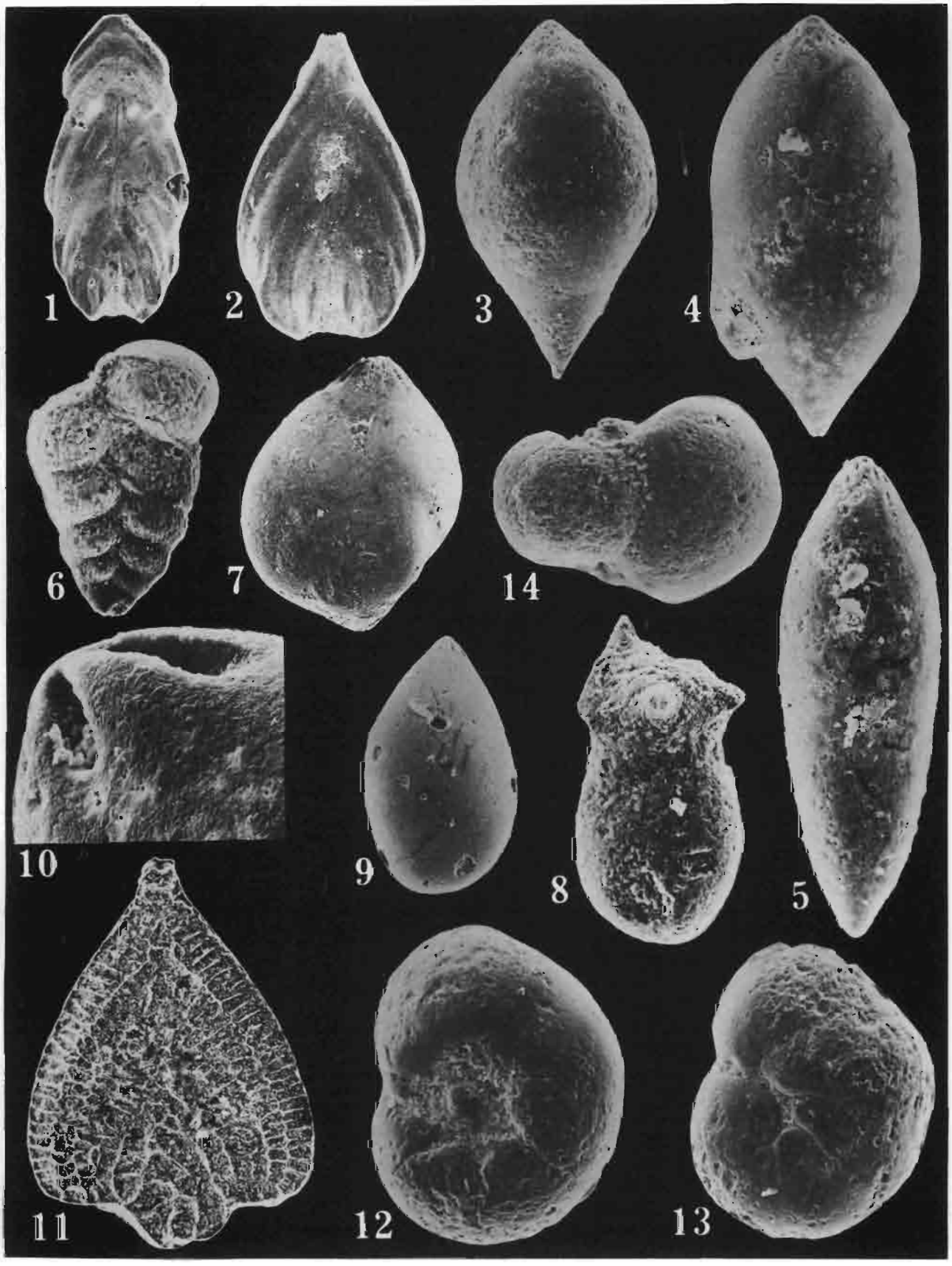


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PLATE 9

1*a*, *b*—4. *Guembelitria ornata* sp. n.; 1 — specimen IG 46428/88/F, holotype, *a* — side-apertural view, × 400, *b* — surface of the test, ribs and foramina, × 1000; 2 — specimen IG 46429/88/F, paratype, side-apertural view, × 360; 3 — specimen IG 46430/88/F, paratype, opposite side view, × 440; 4 — specimen IG 46431/88/F, paratype, side apertural view, last chamber damaged, × 440, Gorzków IG 1 borehole, depth 10.8 m, upper Maastrichtian.

5*a*, *b*; 6. *Heterohelix robusta* STENESTAD; 5 — specimen IG 46546/88/F, *a* — side view, last chamber partly damaged, *b* — surface of the test, × 150, × 780; 6 — specimen IG 46547/88/F, edge view, × 130, Telatyn IG 1 borehole, depth 245.5 m, lower Maastrichtian.

7—12. *Heterohelix globocarinata* (CUSHMAN); 7 — specimen IG 46548/88/F, surface of the last chamber partly damaged, × 180; 12 — specimen IG 46553/88/F, edge view, × 200, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

8. *Heterohelix carinata* (CUSHMAN); specimen IG 46549/88/F, × 260, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

9, 10. *Heterohelix pulchra* (BROTZEN); 9 — specimen IG 46550/88/F, side view, × 300; 10 — specimen IG 46451/88/F, edge view, × 360, Tyszowce IG 1 borehole, depth 315 m, Campanian.

11*a*, *b*. *Heterohelix punctulata* (CUSHMAN); specimen IG 46552/88/F, *a* — side view, last chamber damaged, *b* — surface of the test, × 15, × 1000, Telatyn IG 1 borehole, depth 254.5 m, lower Maastrichtian.

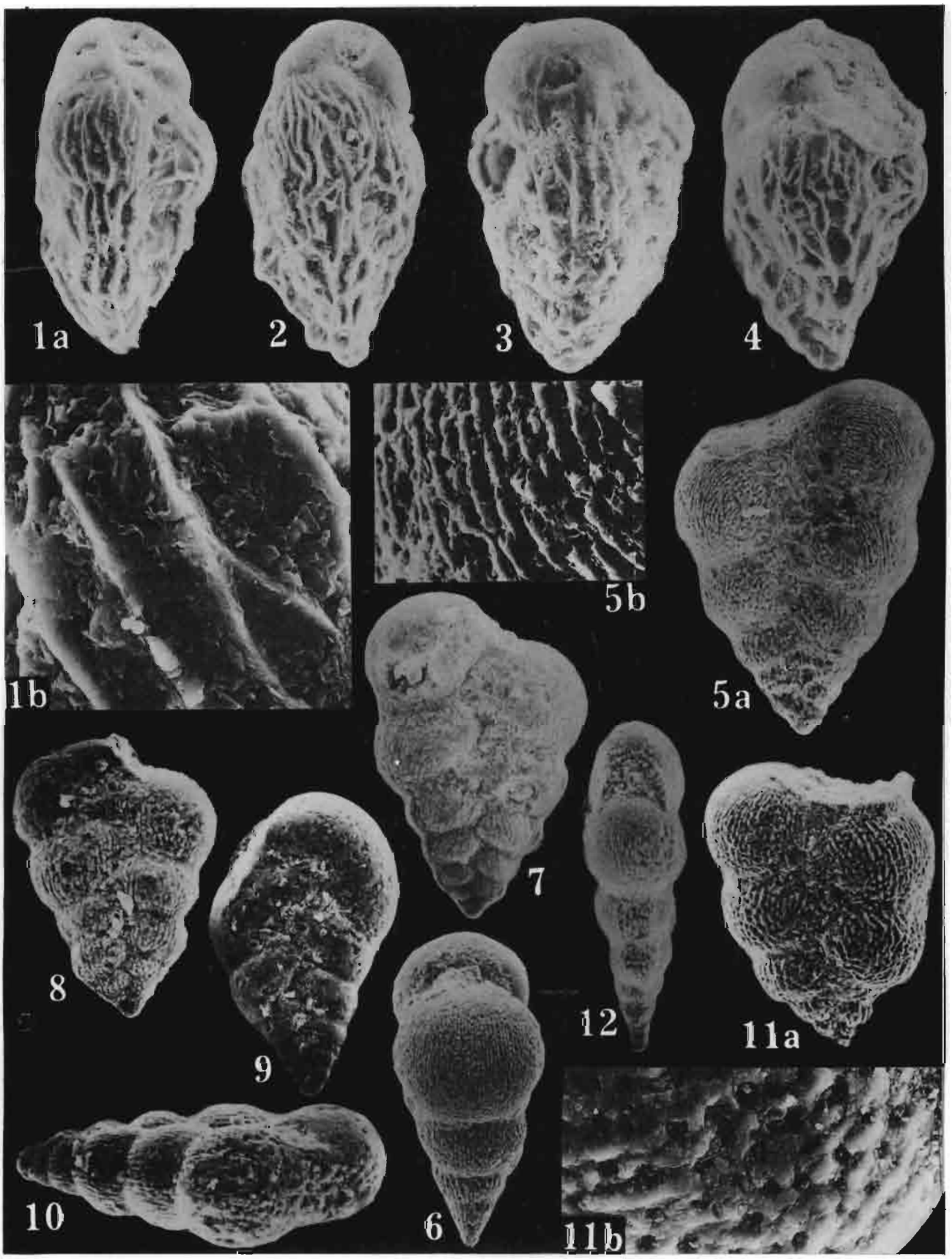
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PLATE 10

1—3. *Heterohelix planata* (CUSHMAN); 1, 2 — specimens IG 46554/88/F, IG 46555/88/F, side views, × 160, × 130; 3 — specimen IG 46556/88/F, edge view, × 160, Tyszowce IG 1 borehole, depth 266 m, lower Maastrichtian.

4, 5. *Heterohelix pseudotessera* (CUSHMAN); 4 — specimen IG 46557/88/F, side view; 5 — specimen IG 46558/88/F, edge view, × 200, Tyszowce IG 1 borehole, depth 315 m, Campanian.

6. *Heterohelix moremani* (CUSHMAN); specimen IG 46559/88/F, × 140, Dorohucza IG 5 borehole, depth 7.26 m, upper Maastrichtian.

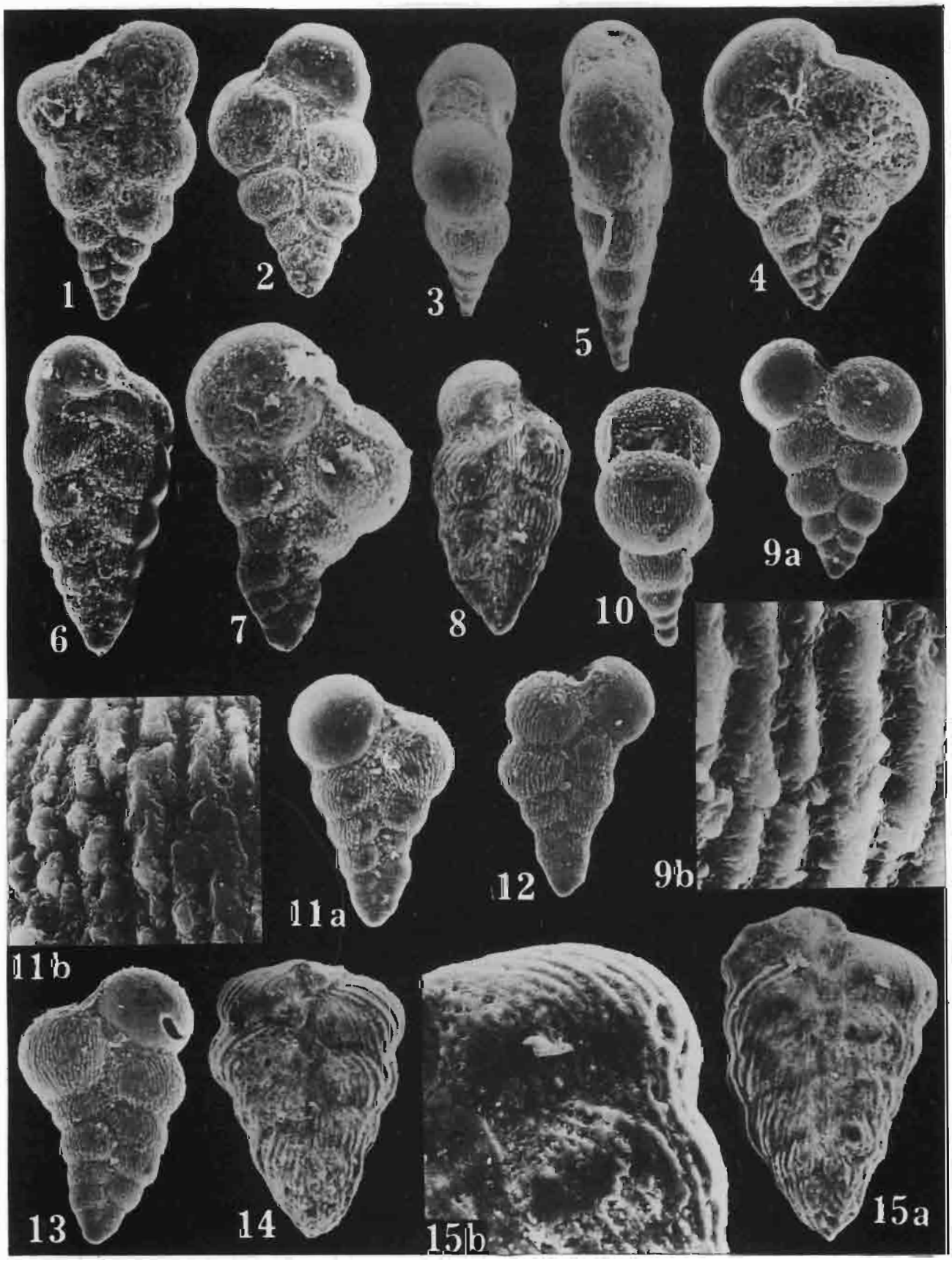
7. *Heterohelix navarroensis* LOEBLICH; specimen IG 46560/88/F, × 150, Tyszowce IG 1 borehole, depth 153 m, upper Maastrichtian.

8. *Heterohelix pseudoglobulosa* FRERICHS; specimen IG 46561/88/F, × 200, Tyszowce IG 1 borehole, depth 315 m, Campanian.

9*a*, *b*; 10. *Heterohelix striata* (EHRENBERG); 9 — specimen IG 46562/88/F, *a* — side view, *b* — surface of the test, × 125, × 4400; 10 — specimen IG 46563/88/F, edge view, × 136, Dorohucza IG 5 borehole, depth 21 m, upper Maastrichtian.

11*a*, *b*—13. *Heterohelix varsoviensis* sp. n.; 11 — specimen IG 45946/88/F, holotype, *a* — dorsal view, *b* — surface of the test, × 210, × 2200; 12, 13 — specimens IG 45947/88/F, 45948/88/F, paratypes, side views, × 200, Jeleniewo 1/V borehole, depth 276.1 m, upper Maastrichtian.

14, 15*a*, *b*. *Heterohelix semicostata* (CUSHMAN); 14, 15*a*, *b* — specimens IG 46564/88/F, IG 46565/88/F, side views, × 200, × 240, × 600, Tyszowce IG 1 borehole, depth 280—282.1 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 11

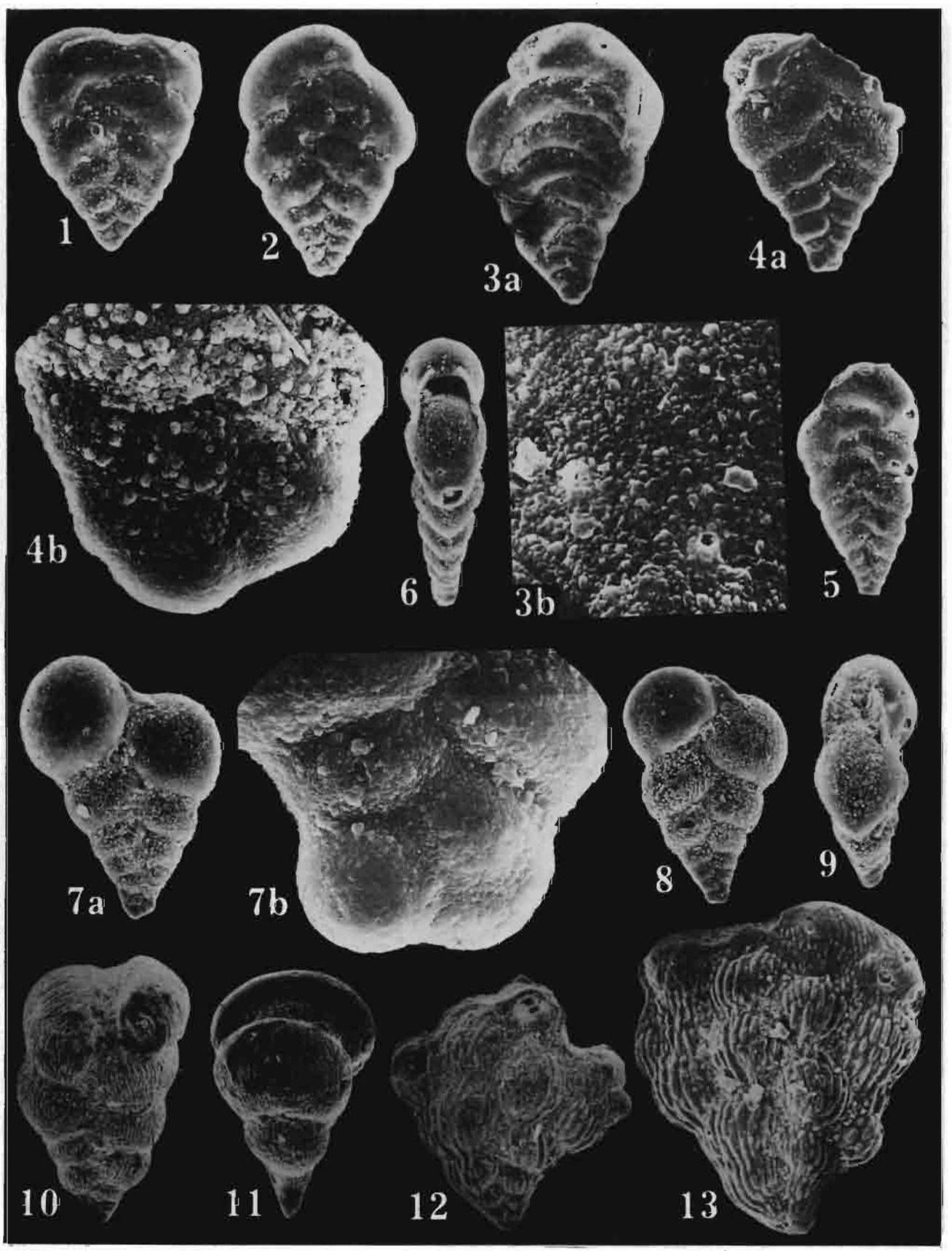
1—6. *Heterohelix suwalkensis* sp. n.; 1 — specimen IG 45944/88/F, holotype, microspheric form, × 213; 2, 4, 5, 6 — specimens IG 45945/88/F, IG 45945A/88/F, IG 45945B/88/F, IG 45595C/88/F, paratypes, megalospheric forms, 2, 4*a*, 5 — side views, 4*b* — initial part of the test, 6 — edge view, × 213, × 267, × 2200, × 124, × 200; 3 — specimen IG 45595D/88/F, paratype, microspheric form, side view (*a*) and surface of the test (*b*), × 240, × 2200, Jeleniewo 1/V borehole, depth 276.1 m, Maastrichtian.

7*a*, *b*—9. *Heterohelix glabrans* (CUSHMAN); 7, 8 — specimens IG 46566/88/F, IG 46567/88/F, side views, side view (*a*) and initial part of the test (*b*), × 187, × 1800, × 166; 9 — specimen IG 46568/88/F, edge view, × 200, Tyszowce IG 1 borehole, depth 65 m, upper Maastrichtian.

10, 11. *Pseudotextularia elegans* (RZEHAK); 10 — specimen IG 46569/88/F, side view, × 94; 11 — specimen IG 46570/88/F, apertural view, × 100, Tyszowce IG 1 borehole, depth 330 m, Campanian.

12. *Planoglobulina brazoensis* MARTIN; specimen IG 46571/88/F, × 100, Tyszowce IG 1 borehole, depth 135 m, upper Maastrichtian.

13. *Planoglobulina acervulinoides* (EGGER); specimen IG 46572/88/F, × 150, Tyszowce IG 1 borehole, depth 128 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 12

1*a*, *b*; 2. *Globigerinelloides multispinus* (LALICKER); 1 — specimen IG 46573/88/F, side view (*a*) and surface of the test (*b*), × 175, × 2400; 2 — specimen IG 46574/88/F, edge view, × 203, Dorohucza IG 5 borehole, depth 85 m, upper Maastrichtian.

5*a*, *b*; 6. *Globigerinelloides abberantus* (NECKAJA); 5 — specimen IG 46575/88/F, side view (*a*) and surface of the test (*b*), × 175, × 2000; 6 — specimen IG 46576/88/F, edge view, × 175, Dorohucza IG 5 borehole, depth 65.4 m, upper Maastrichtian.

3*a*, *b*; 4. *Globigerinelloides ehrenbergi* (BARR); 3 — specimen IG 46577/88/F, side view (*a*) and surface of the test (*b*), × 200, × 2400; 4 — specimen IG 46578/88/F, edge view, × 200, Telatyn IG 1 borehole, depth 178 m, lower Maastrichtian.

7*a*, *b*; 8. *Globigerinelloides asperus* (EHRENBERG); 7 — specimen IG 46579/88/F, side view (*a*) and apertural lip of the test specimen and surface of the youngest chamber (*b*), × 200, × 1300; 8 — specimen IG 46580/88/F, edge view, × 200, Dorohucza IG 5 borehole, depth 65.4 m, upper Maastrichtian.

9. *Gublerina* cf. *reniformis* (MARIE); specimen IG 46581/88/F, side view, × 200, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.

10*a*, *b*; 11. *Pseudoguembelina costulata* (CUSHMAN); 10 — specimen IG 46582/88/F, side view (*a*) and surface of the test (*b*), × 300, × 720; 11 — specimen IG 46583/88/F, edge view, × 300, Telatyn IG 1 borehole, depth 242 m, lower Maastrichtian.

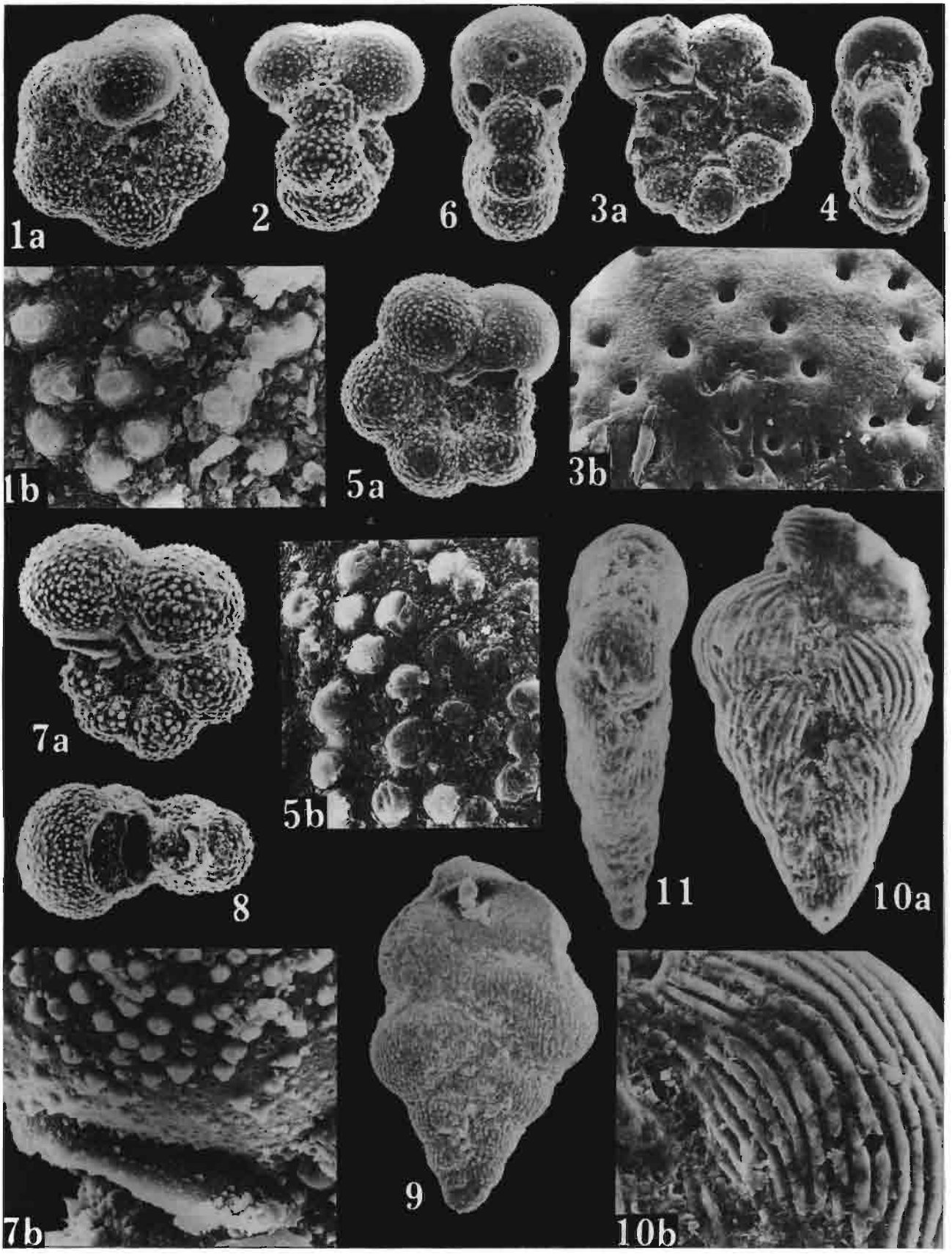

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PLATE 13

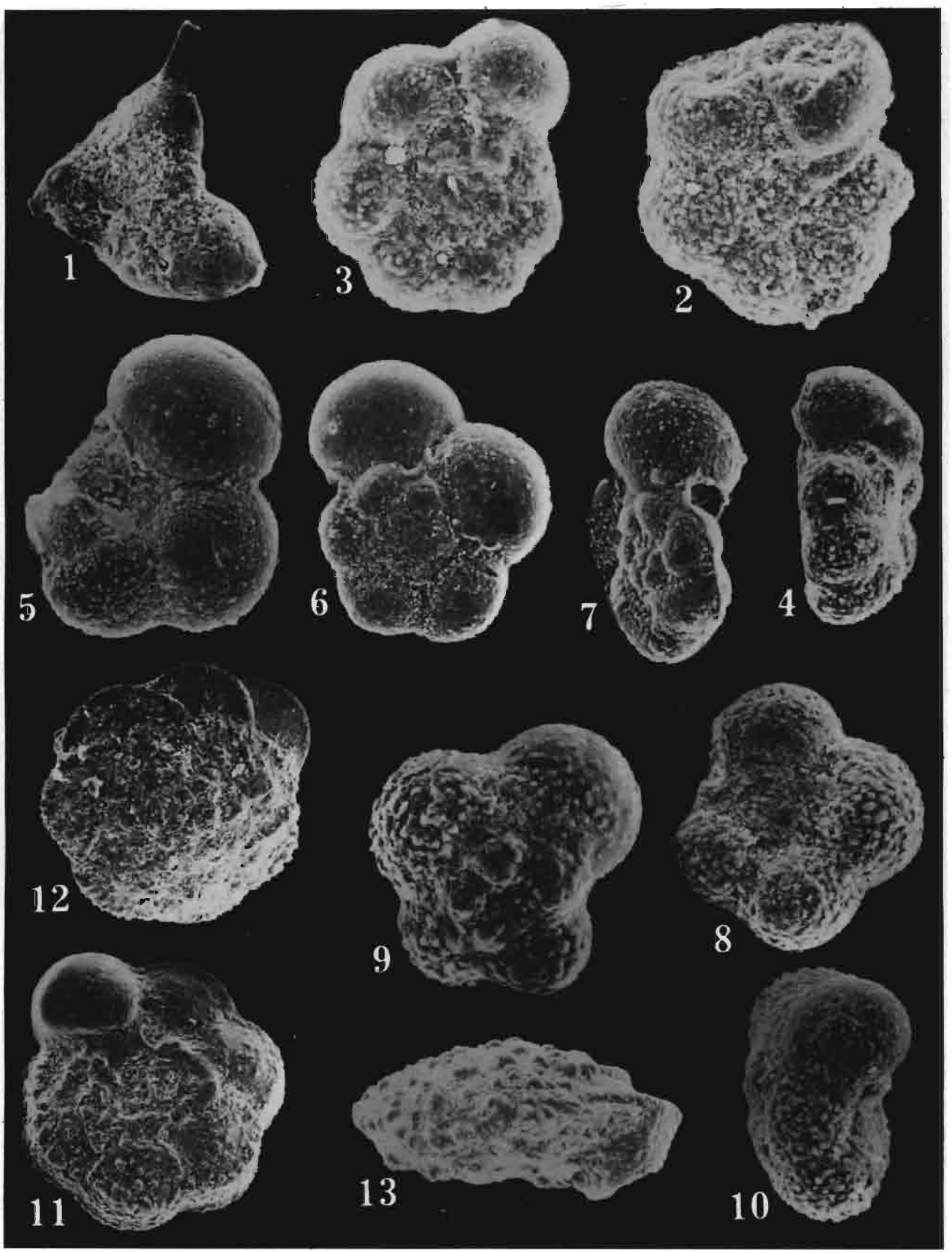
1. *Schackoina tappanae* MONTANARO-GALLITELLI; specimen IG 45584/88/F, × 240, Telatyn IG 1 borehole, depth 254.5 m, lower Maastrichtian.

2—4. *Hedbergella telatynensis* sp. n.; 2 — specimen IG 45982/88/F, paratype, ventral side, × 300; 3 — specimen IG 45981/88/F, holotype, dorsal side, × 400; 4 — specimen IG 45983/88/F, paratype, edge view, × 200, Telatyn IG 1 borehole, depth 282.1 m, Campanian.

5—7. *Hedbergella holmdelensis* OLSSON; 5 — specimen IG 46584/88/F, ventral side, oldest chamber in the whorl is destroyed, × 300; 6 — specimen IG 46585/88/F, dorsal side, × 206; 7 — specimen IG 46586/88/F, edge view, × 300, Lublin IG 2 borehole, depth 316.2 m, upper Maastrichtian.

8—10. *Whiteinella baltica* DOUGLAS et RANKIN; 8 — specimen IG 46586/88/F, ventral side, × 200; 9 — specimen IG 46587/88/F, dorsal side, × 200; 10 — specimen IG 46588/88/F, edge view, × 300, Tyszowce IG 1 borehole, depth 280—282.1 m, lower Maastrichtian.

11—13. *Globotruncana arca* (CUSHMAN); 11 — specimen IG 46589/88/F, ventral side; 12 — specimen IG 46590/88/F, dorsal side, × 100; 13 — specimen IG 46591/88/F, edge view, × 120, Tyszowce IG 1 borehole, depth 235 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 14

1—3. *Globotruncana falsostuarti* SIGAL; 1 — specimen IG 46592/88/F, ventral side, × 130; 2 — specimen IG 46593/88/F, dorsal side, × 120; 3 — specimen IG 46594/88/F, edge view, × 150, Tyszowce IG 1 borehole, depth 266 m, lower Maastrichtian.

4—6. *Rosita fornicata* (PLUMMER); 4 — specimen IG 465/88/F, ventral side, × 160; 5 — specimen IG 46596/88/F, dorsal side, × 110; 6 — specimen IG 46597/88/F, edge view, × 130, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

7—9. *Rosita contusa* (CUSHMAN); 7 — specimen IG 465598/88/F, ventral side; 8 — specimen IG 46599/88/F, dorsal side; 9 — specimen IG 46600/88/F, × 150, Tyszowce IG 1 borehole, depth 330 m, upper Campanian.

10. *Globotruncana obliqua* HERM; specimen IG 46601/88/F, dorsal side, × 120, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.

11. *Globotruncanella havanensis* (VOORWIJK); specimen IG 46602/88/F, edge view, × 210, Tyszowce IG 1 borehole, depth 190 m, lower Maastrichtian.

12. *Globotruncanella pschadae* (KELLER); specimen IG 46611/88/F, edge view, × 200, Tyszowce IG 1 borehole, depth 190 m, lower Maastrichtian.

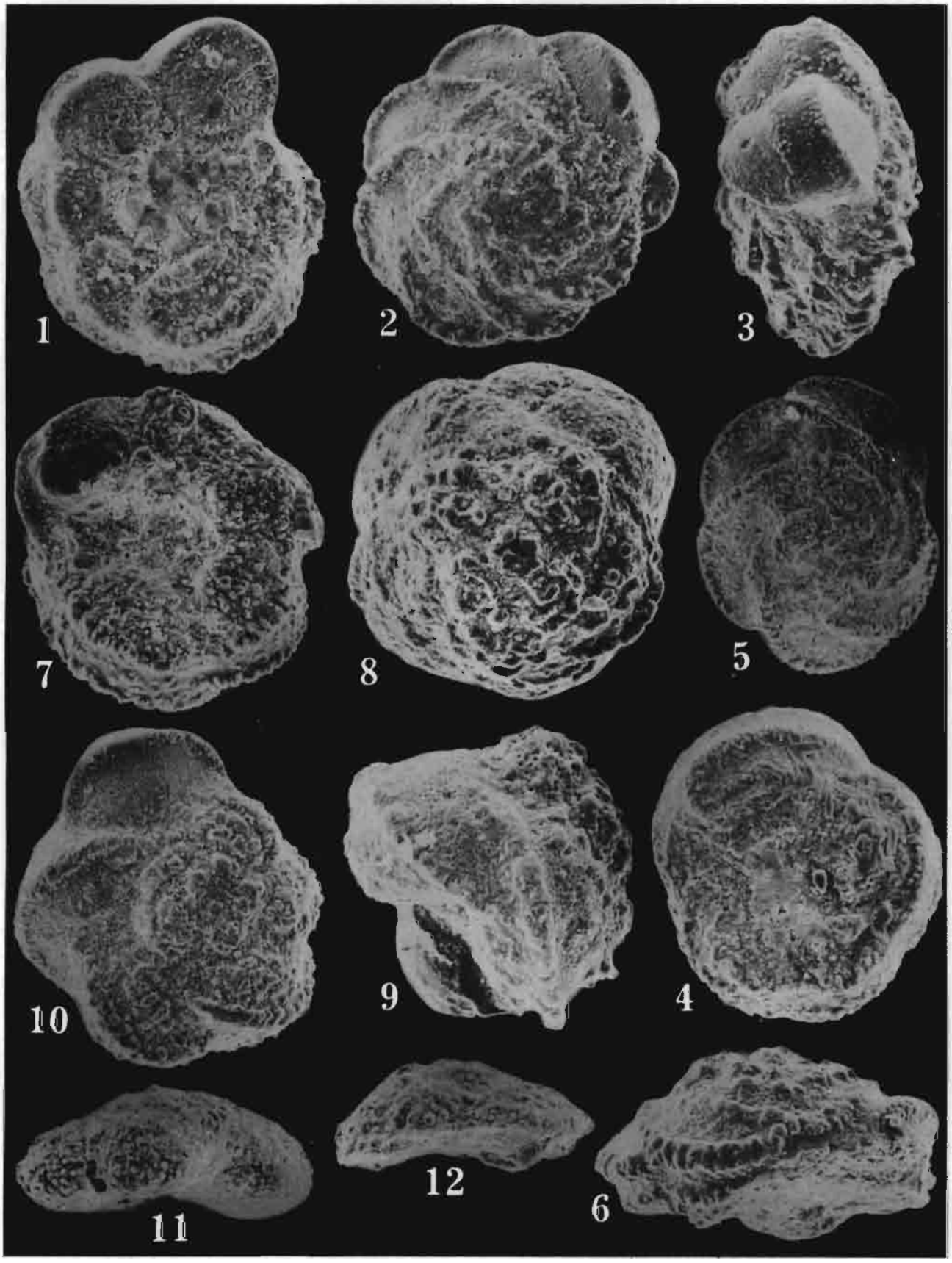

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PLATE 15

1—3. *Globotruncana obliqua* HERM; 1 — specimen IG 46603/88/F, ventral side, × 100; 2 — specimen IG 46604/88/F dorsal side, × 80; 3 — specimen IG 46605/88/F, edge view, × 100, Tyszowce IG 1 borehole, depth 244 m, lower Maastrichtian.

4, 5*a*, *b*. *Globotruncana rugosa* (MARIE); 4 — specimen IG 46606/88/F, ventral side, × 120; 5 — specimen IG 46607/88/F, dorsal side (*a*) and surface of the test (*b*), × 100, × 480, Tyszowce IG 1 borehole, depth 266 m, lower Maastrichtian.

6—8. *Rosita plummerae* (GANDOLFI); 6 — specimen IG 46608/88/F, ventral side; 7 — specimen IG 46609/88/F, dorsal side; 8 — specimen IG 46610/88/F, edge view, × 150, Tyszowce IG 1 borehole, depth 290 m, lower Maastrichtian.

9, 10. *Globotruncanella pschadae* (KELLER); 9 — specimen IG 46612/88/F, ventral side, × 130; 10 — specimen IG 46613/88/F, dorsal side, × 150, Tyszowce IG 1 borehole, depth 190 m lower Maastrichtian.

11, 12. *Globotruncanella havanensis* (VOORWIJK); 11 — specimen IG 46614/88/F, ventral side; 12 — specimen IG 46515/88/F, dorsal side, × 200, Tyszowce IG 1 borehole, depth 190 m, lower Maastrichtian.

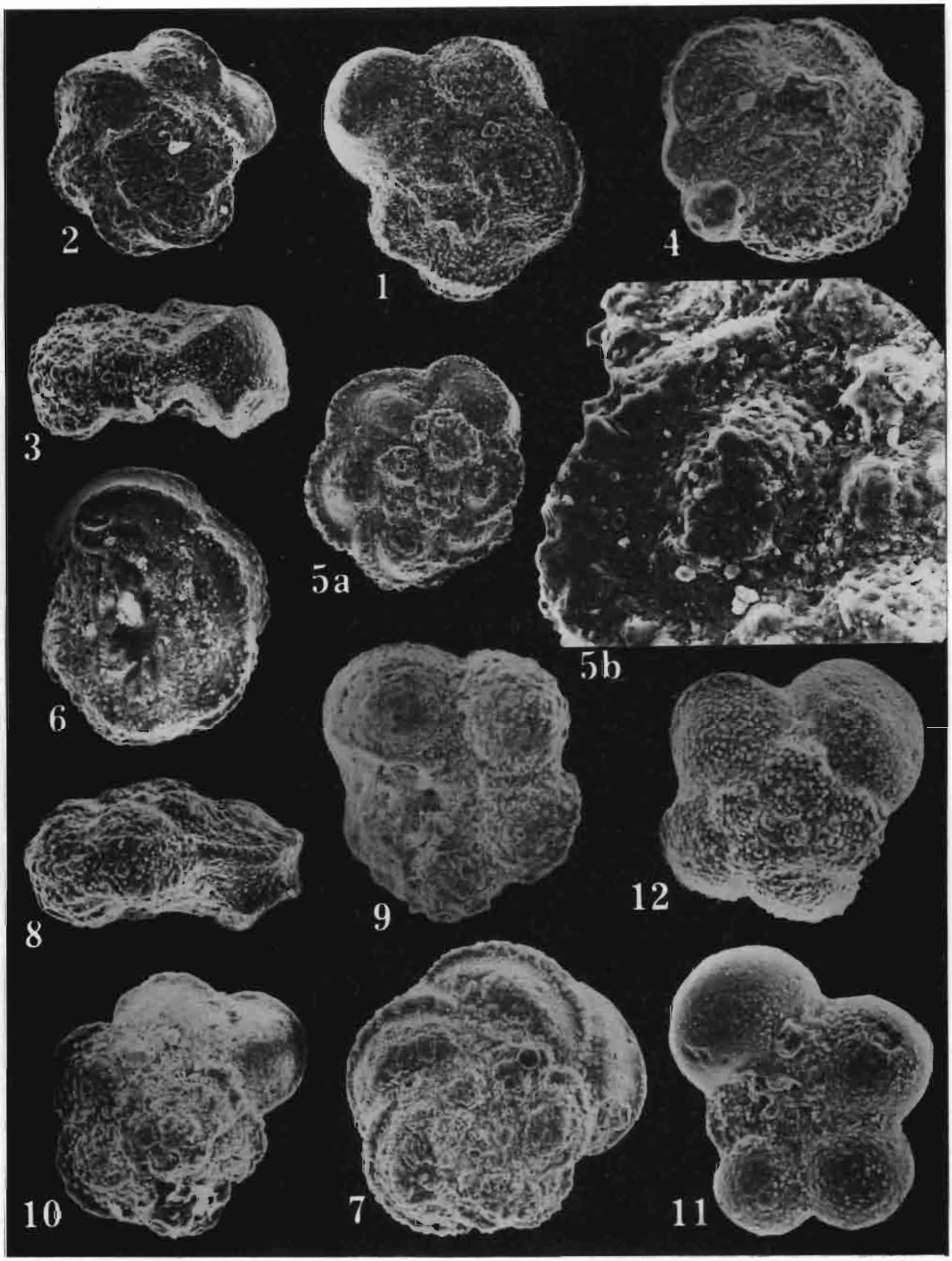
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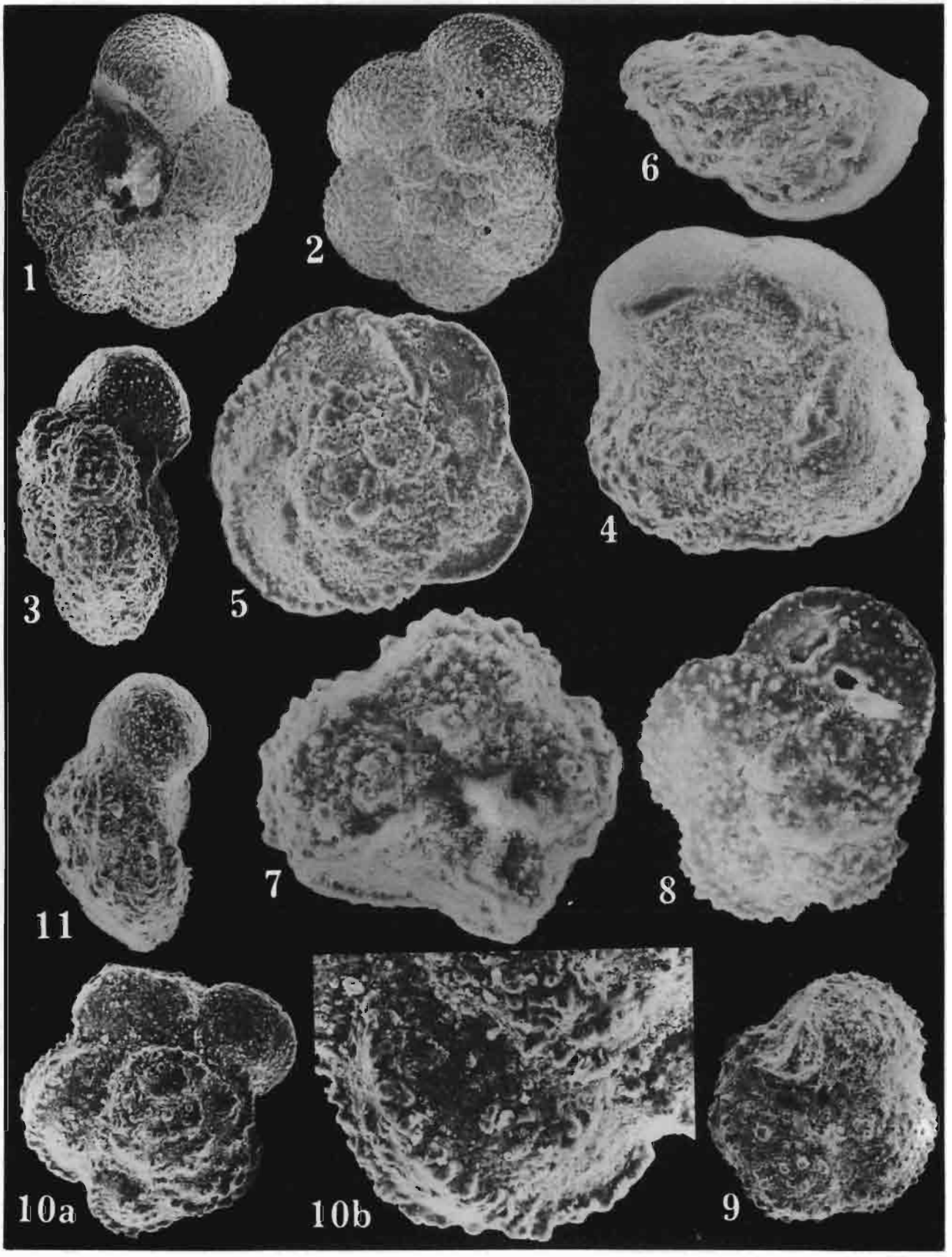
PLATE 16

1—3. *Archaeoglobigerina cretacea* (d'ORBIGNY); 1 — specimen IG 46616/88/F, ventral side, × 109; 2 — specimen IG 46617/88/F, dorsal side; 3 — specimen IG 46618/88/F, edge view, × 140, Telatyn IG 1 borehole, depth 295.8 m, Campanian.

4—6. *Gansserina gansseri* (BOLLI); 4 — specimen IG 46619/88/F, ventral side; 5 — specimen IG 46620/88/F, dorsal side, × 150; 6 — specimen IG 46621/88/F, edge view, × 130, Tyszowce IG 1 borehole, depth 120 m, upper Maastrichtian.

7, 8. *Globotruncanella minuta* CARON et GONZALEZ; 7 — specimen IG 46622/88/F, ventral side, last chamber damaged; 8 — specimen IG 46623/88/F, dorsal side, × 300, Lublin IG 2 borehole, depth 453 m, lower Maastrichtian.

9—11. *Abathomphalus intermedius* (BOLLI); 9 — specimen IG 46624/88/F, ventral side, × 110; 10*a*, *b* — specimen 46625/88/F, dorsal side (*a*) and (*b*) edge of the test from dorsal side, × 120, × 300; 11 — specimen IG 46626/88/F, edge view, × 130, Telatyn IG 1 borehole, depth 259 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 17

1*a*, *b*. *Bolivina crassa* VASSILENKO et MJATLIUK; specimen IG 46627/88/F, general view (*a*) and (*b*) surface of the test × 48, × 2000, Gorzków IG 1 borehole, depth 10.8 m, upper Maastrichtian.

2. *Bolivinoides laevigatus* MARIE; specimen IG 46628/88/F, × 122, Telatyn IG 1 borehole, depth 295.80 m, Campanian.

3, 4. *Bolivina decurrens* (EHRENBERG); 3 — specimen IG 46629/88/F, megalospheric form, × 94; 4 — specimen IG 46630/88/F, microspheric form, × 120, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

5. *Tappanina selmensis* (CUSHMAN); specimen IG 46631/88/F, edge-apertural view, × 207, Lubartów IG 2 borehole, depth 206 m, upper Maastrichtian.

6. *Bolivina praecrenulata* sp. n.; specimen IG 46426/88/F, holotype, general view, × 260, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

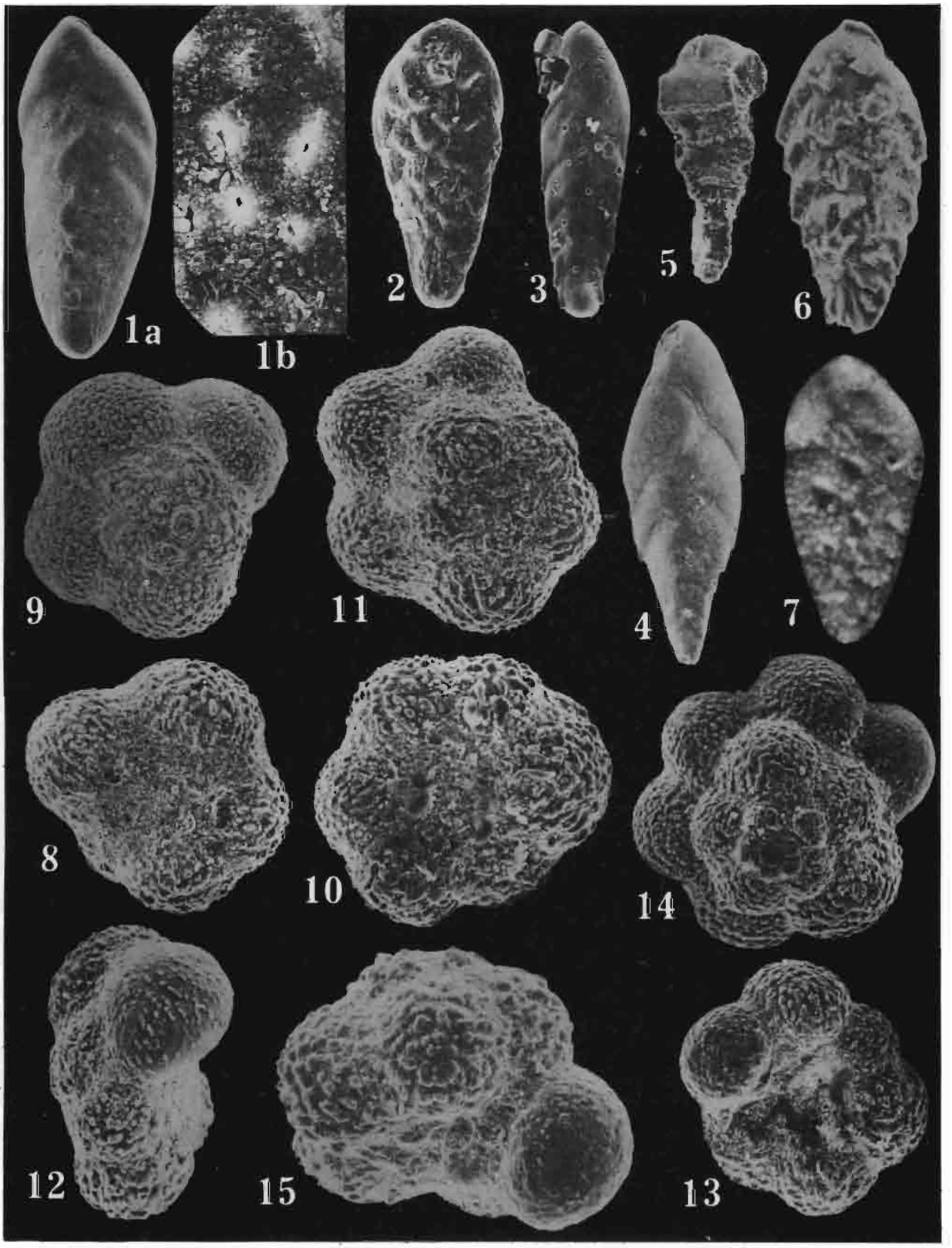
7. *Bolivina crenulata* CUSHMAN; specimen IG

8, 9. *Rugoglobigerina rugosa* (PLUMMER); 8 — specimen IG 46632/88/F, ventral side, × 150; 9 — specimen IG 46633/88/F, dorsal side, × 130, Telatyn IG 1 borehole, depth 236 m, lower Maastrichtian.

10—12. *Rugoglobigerina hexacamarata* BRÖNNIMANN; 10 — specimen IG 46634/88/F, ventral side, × 200; 11 — specimen IG 46635/88/F, dorsal side, × 150; 12 — specimen IG 46636/88/F, edge view, × 160, Tyszowce IG 1 borehole, depth 158 m, upper Maastrichtian.

13—15. *Rugoglobigerina milamensis* SMITH et PESSAGNO; 13 — specimen IG 46634/88/F, ventral side, × 110; 14 — specimen IG 46638/88/F, dorsal side, × 130; 15 — specimen IG 46639/88/F, side view, × 160, Tyszowce IG 1 borehole, depth 235 m, lower Maastrichtian.

Fig. 7 light microscope photograph
Figs. 1—6 and 8—15 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 18

1*a*, *b*, *c* — 4*a*, *b*. *Bolivina aleksandrae* sp. n.; 1 — specimen IG 46421/88/F, paratype, general view (*a*), initial part of the test (*b*) and surface of the test (*c*), × 240, × 720, × 3200; 2 — specimen IG 46422/88/F, paratype, general view, × 300; 3 — specimen IG 46423/88/F, paratype, general view, × 200; 4 — specimen IG 46420/88/F, holotype, side view (*a*) and edge view (*b*), × 170, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

5—7*a*, *b*. *Bolivina witwickae* sp. n.; 5 — specimen IG 46418/88/F, paratype, side view; 6 — specimen IG 46419/88/F, paratype, apertural — edge view, × 480; 7 — specimen IG 46417/88/F, holotype, side view (*a*) and surface of the test (*b*), × 360, × 1200, Orzechów IG 6 borehole, depth 216 m, Campanian.

8, 9. *Bolivinoides dentatus* sp. n.; 8 — specimen IG 46052/88/F, holotype, × 150; 9 — specimen IG 46053/88/F, paratype, youngest part of the test damaged, × 240, Telatyn IG 1 borehole, depth 195 m, lower Maastrichtian.

Fig. 4*a*, *b* light microscope photographs
Figs. 1—3 and 5—8 SEM micrographs

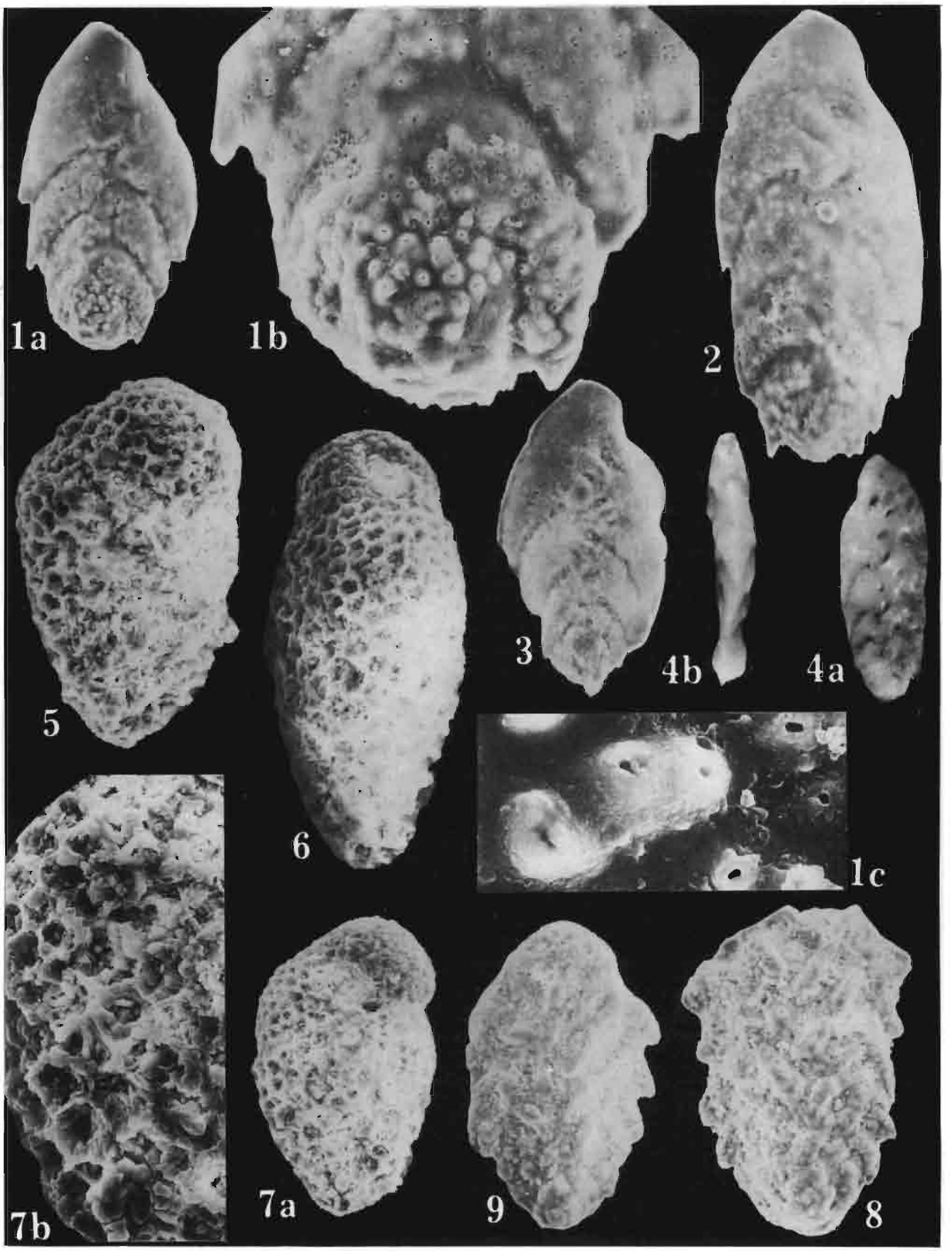

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PLATE 19

1*a*, *b* — 3*a*, *b*. *Bolivina incrassata* REUSS; 1 — specimen IG 46640/88/F, microspheric form, general view (*a*) and surface of the test (*b*), × 40, × 1300; 2 — specimen IG 46641/88/F, megalospheric form A_1, general view (*a*) and surface of the test (*b*), × 61, × 6000; 3 — specimen IG 46642/88/F, megalospheric form A_2, general view (*a*) and surface of the test (*b*), × 80, × 7800, Telatyn IG 1 borehole, depth 295.80 m, Campanian.

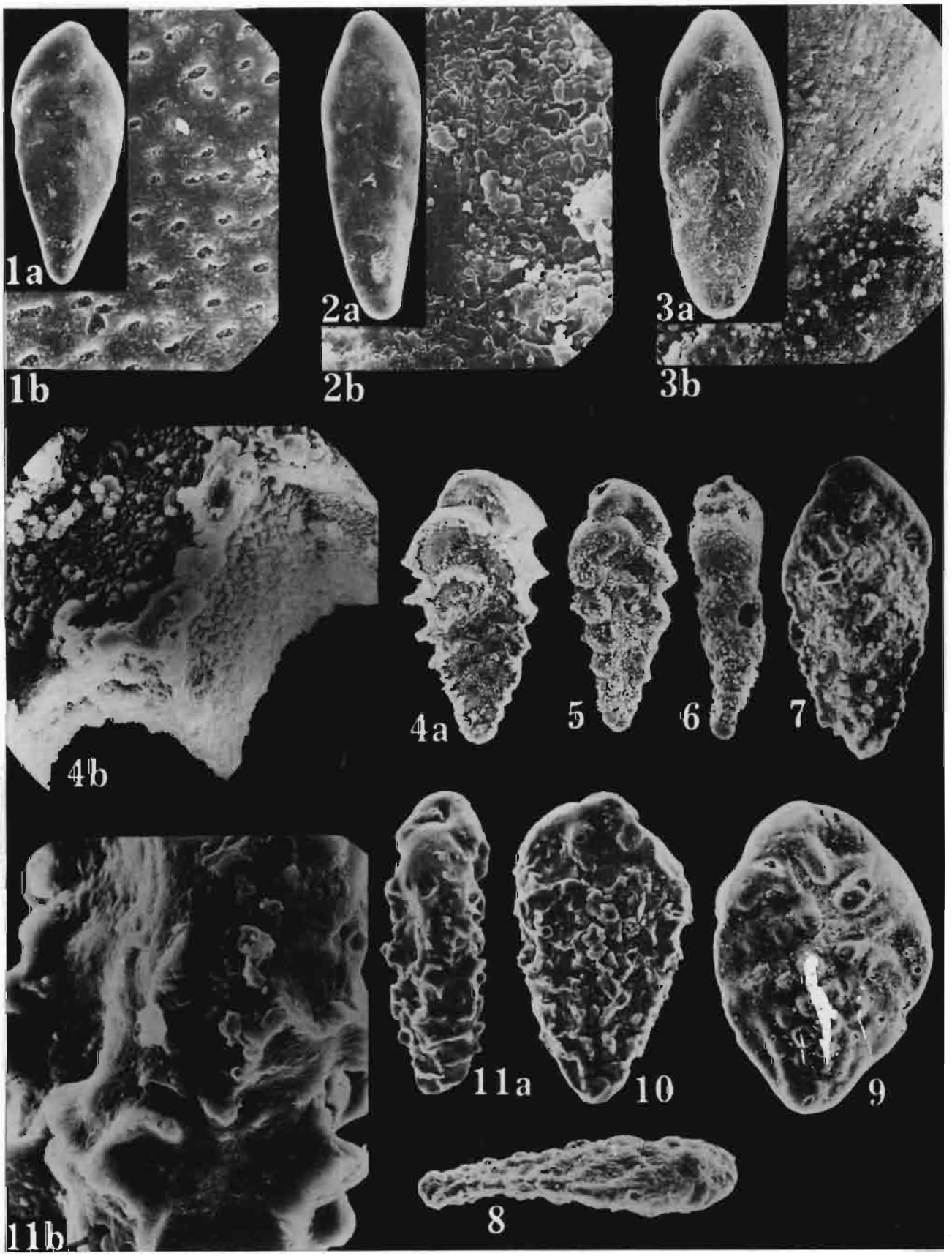
4*a*, *b*. *Tappanina selmensis* (CUSHMAN); specimen IG 46643/88/F, side view (*a*) and edge of the test (*b*), × 230, × 1600, Lubartów IG 1 borehole, depth 206 m, upper Maastrichtian.

5, 6. *Tappanina tuberosa* SLITER; 5 — specimen IG 46644/88/F, side view, × 190; 6 — specimen IG 46645/88/F, edge view, × 209, Telatyn IG 1 borehole, depth 200 m, lower Maastrichtian.

7, 8. *Bolivinoides pustulatus* REISS; 7 — specimen IG 46646/88/F, side view, × 200; 8 — specimen IG 46647/88/F, edge view, × 240, Telatyn IG 1 borehole, depth 282 m, upper Campanian.

9. *Bolivinoides peterssoni* BROTZEN; specimen IG 46648/88/F, × 160, Tyszowce IG 1 borehole, depth 128 m, upper Maastrichtian.

10, 11*a*, *b*. *Bolivinoides clavatus* PLOTNIKOVA; 10 — specimen IG 46649/88/F, side view, × 240; 11 — specimen IG 46650/88/F, edge view (*a*) and (*b*), × 260, × 1300, Telatyn IG 1 borehole, depth 282.10 m, upper Campanian.



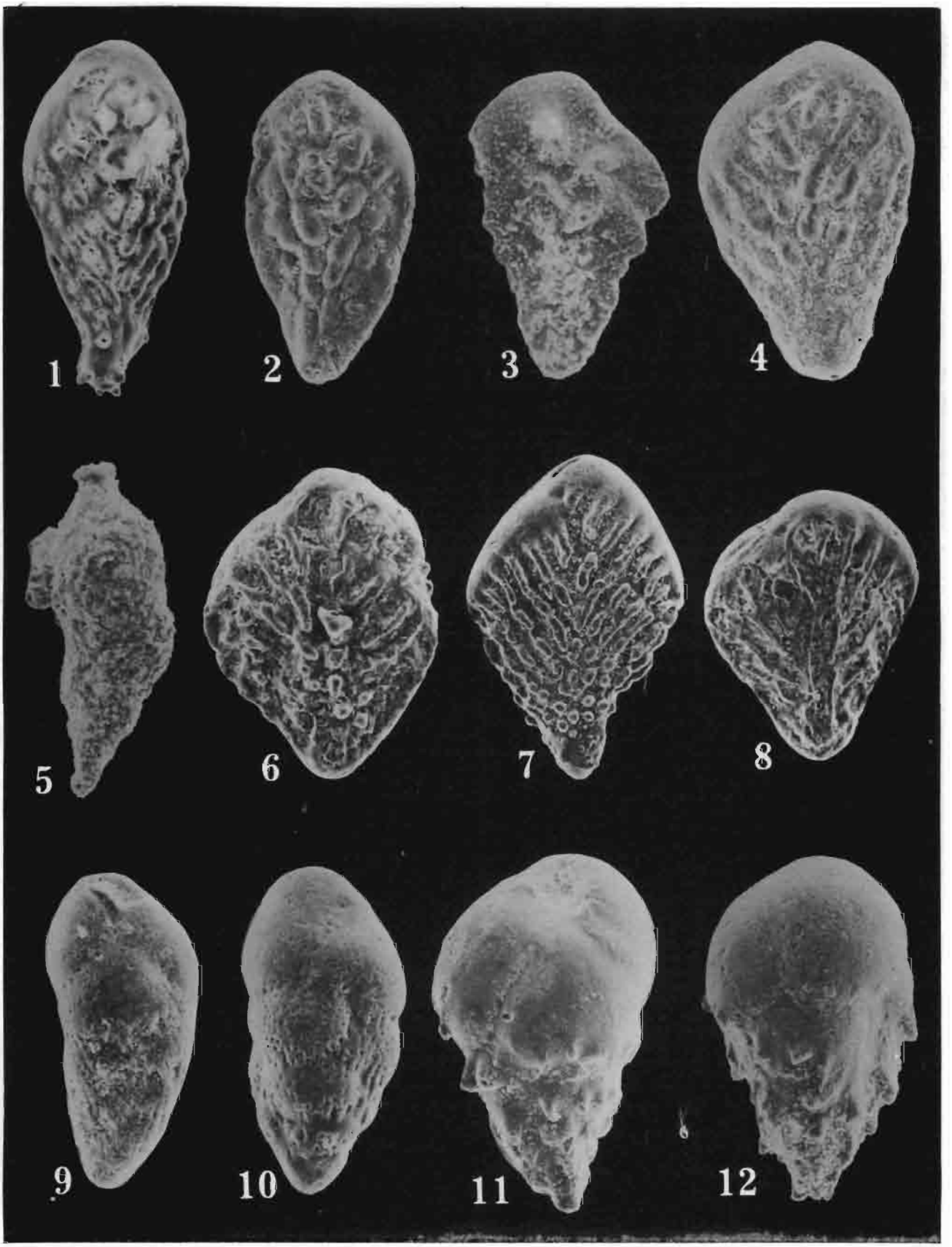
E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 20

1. *Bolivinoides sidestrandensis* BARR; specimen IG 46651/88/F, × 130, Telatyn IG 1 borehole, depth 181 m, lower Maastrichtian.
2. *Bolivinoides mielnicensis* BIEDA; specimen IG 46652/88/F, × 130, Tyszowce IG 1 borehole, depth 360 m, Campanian.
3. *Bolivinoides paleocenicus* (BROTZEN); specimen IG 46653/88/F, × 200, Gorzków borehole, depth 251 m, upper Maastrichtian.
4. *Bolivinoides decoratus* (JONES); specimen IG 46654/88/F, × 130, Telatyn IG 1 borehole, depth 257.50 m, lower Maastrichtian.
5. *Eouvigerina gracilis* (EGGER); specimen IG 46655/88/F, × 200, Telatyn IG 1 borehole, depth 282,10 m, upper Campanian.
6. *Bolivinoides miliaris* HILTERMANN et KOCH; specimen IG 46655/88/F, × 160, Lublin IG 2 borehole, depth 432.80 m, lower Maastrichtian.
7. *Bolivinoides giganteus* HILTERMANN et KOCH; specimen IG 46657/88/F, × 90, Telatyn IG 1 borehole, depth 10 m. upper Maastrichtian.
8. *Bolivinoides draco* (MARSSON); specimen IG 46658/88/F, × 130, Lublin IG 1 borehole, depth 428.80 m, lower Maastrichtian.

9, 10. *Praebulimina asperoaculeata* (BROTZEN); 9 — specimen IG 46659/88/F, ventral side, × 160; 10 — specimen IG 46660/88/F, doral side, × 150, Tyszowce IG 1 borehole, depth 60 m, upper Maastrichtian.

11, 12. *Praebulimina arcadelphiana* (CUSHMAN et PARKER); 11 — specimen IG 46661/88/F, ventral side, × 130; 12 — specimen IG 46662/88/F, dorsal side, × 150, microspheric forms (B), Tyszowce IG 1 borehole, depth 65.0 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 21

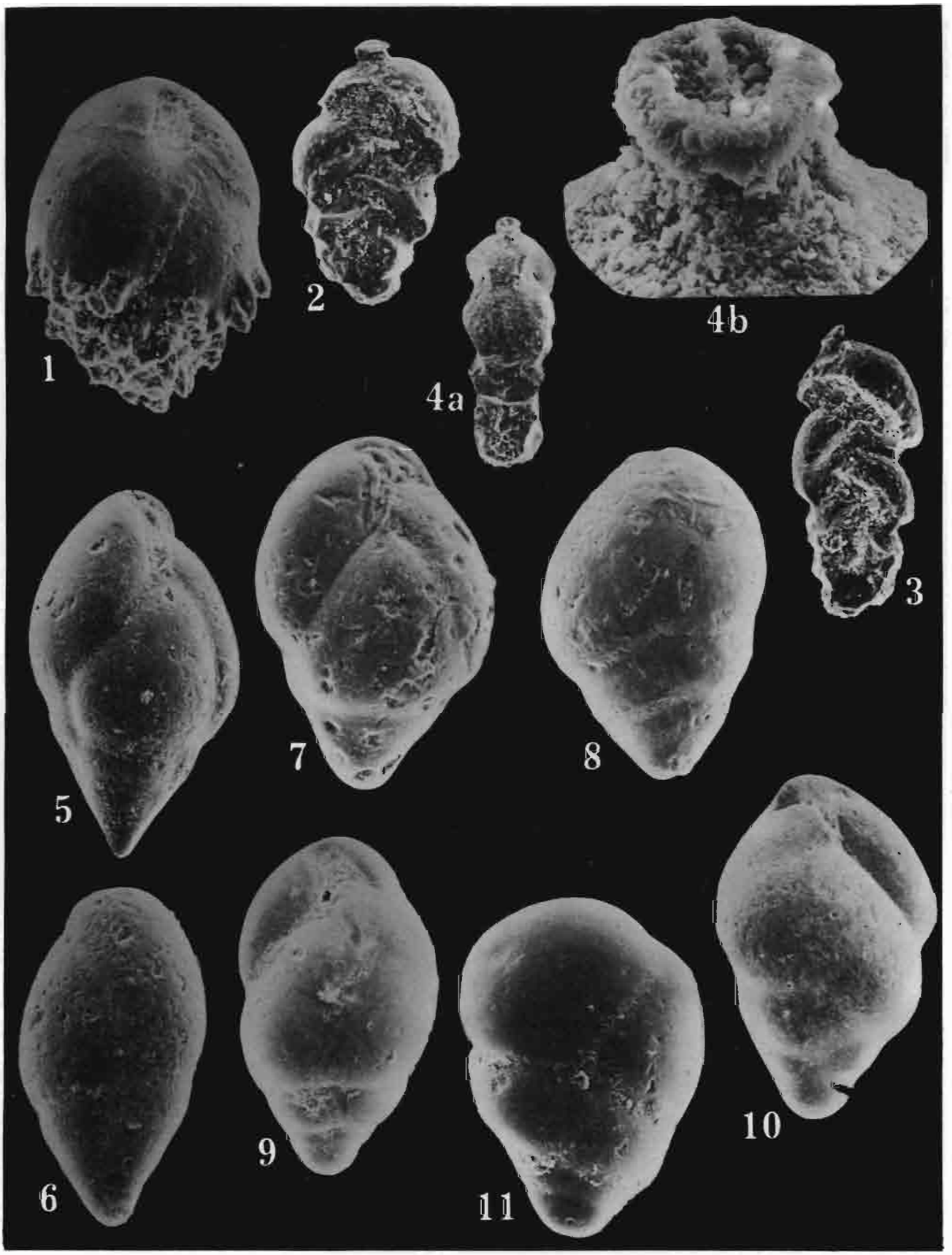
1. *Praebulimina arcadelphiana* (CUSHMAN et PARKER); specimen IG 46663/88/F, megalospheric form, ventral side, × 240, Tyszowce IG 1 borehole, depth 65.0 m, upper Maastrichtian.

2—4*a*, *b*. *Eouvigerine serrata* (CHAPMAN); 2 — specimen 46664/88/F, × 230; 3 — specimen IG 46665/88/F, × 150, side views; 4 — specimen IG 46666/88/F, edge view (*a*) and neck of the test (*b*), × 170, × 1800, Lublin IG 2 borehole, depth 315.70 m, upper Maastrichtian.

5, 6. *Praebulimina reussi* (MORROW); 5 — specimen IG 46667/88/F, ventral side; 6 — specimen IG 46668/88/F, dorsal side, × 200, Gorzków IG 1 borehole, depth 519 m, lower Maastrichtian.

7, 8. *Praebulimina reussi* (MORROW); 7 — specimen IG 46669/88/F, dorsal side, × 160, Brzezno, Czechosłowacja, Coniacian.

9—11. *Praebulimina carseyae* (PLUMMER); 9 — specimen IG 46671/88/F, dorsal side, × 130, Piaski IG 1 borehole, depth 63 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 22

1. *Praebulimina laevis* (BEISSEL); specimen IG 46674/88/F, ventral side, × 54, Tyszowce IG 1 borehole, depth 280—282 m, lower Maastrichtian.

2—4. *Praebulimina dorohuczensis* sp. n.; 2 — specimen IG 46095/88/F, holotype, ventral side, × 130; 3 — specimen IG 46094/88/F, paratype, ventral side, × 130; 4 — specimen IG 46096/88/F, paratype, dorsal side, × 150, Dorohucza IG 5 borehole, depth 65.40 m, upper Maastrichtian.

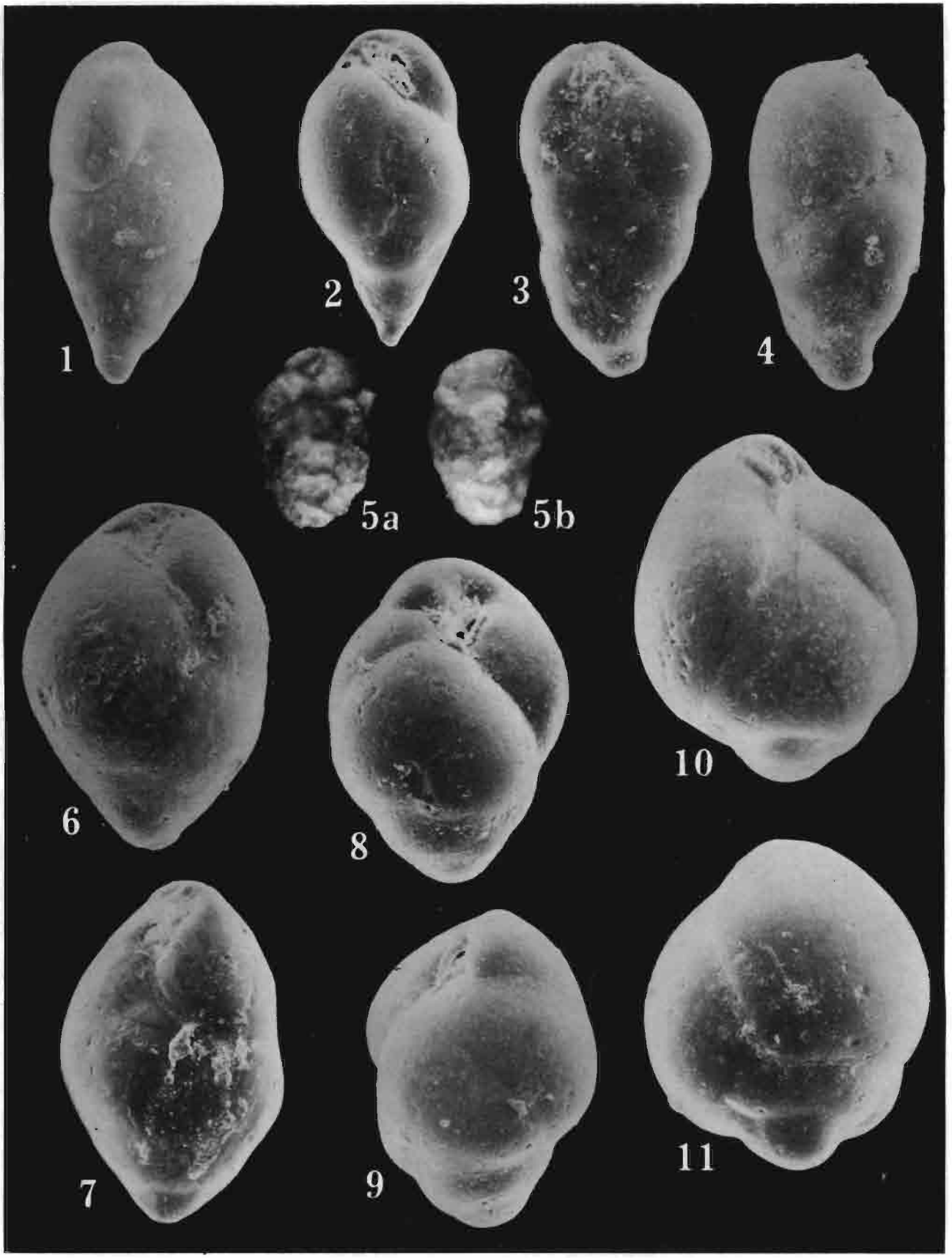
5*a*, *b*. *Praebulimina taylorensis* (CUSHMAN et PARKER); specimen IG 46675/88/F, *a* — ventral side and *b* — dorsal side, × 127, Telatyn IG 1 borehole, depth 254.5 m, lower Maastrichtian.

6, 7. *Praebulimina obtusa* (d'ORBIGNY); 6 — specimen IG 46676/88/F, ventral side, × 110; 7 — specimen IG 46677/88/F, side-apertural view, × 86, Piaski IG 1 borehole, depth 402.10 m, lower Maastrichtian.

8, 9. *Praebulimina parvula* (BROTZEN); 8 — specimen IG 46678/88/F, ventral side, × 240; 9 — specimen IG 46679/88/F, side-apertural view, × 220, Lublin IG 2 borehole, depth 317 m, upper Maastrichtian.

10, 11. *Praebulimina ventricosa* (BROTZEN); 10 — specimen IG 46680/88/F, ventral side, × 180; 11 specimen IG 46681/88/F, dorsal side, × 130, Telatyn IG 1 borehole, depth 253.10 m, lower Maastrichtian.

Fig. 5*a*, *b* light microscope photographs
Figs. 1—4 and 6—11 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 23

1, 2. *Pyramidina cimbrica* (BROTZEN); 1 — specimen IG 46682/88/F, ventral side; 2 — specimen IG 46683/88/F, dorsal side, × 260, Gorzków IG 1 borehole, depth 57.60 m, upper Maastrichtian.

3—5. *Pyramidina prolixa* (CUSHMAN et PARKER); 3 — specimen IG 46684/88/F, ventral side, × 270; 4 — specimen IG 46685/88/F, *a* — dorsal side, *b* — surface of the test, × 222, × 2400; 5 — specimen IG 46686/88/F, dorsal side, × 260, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

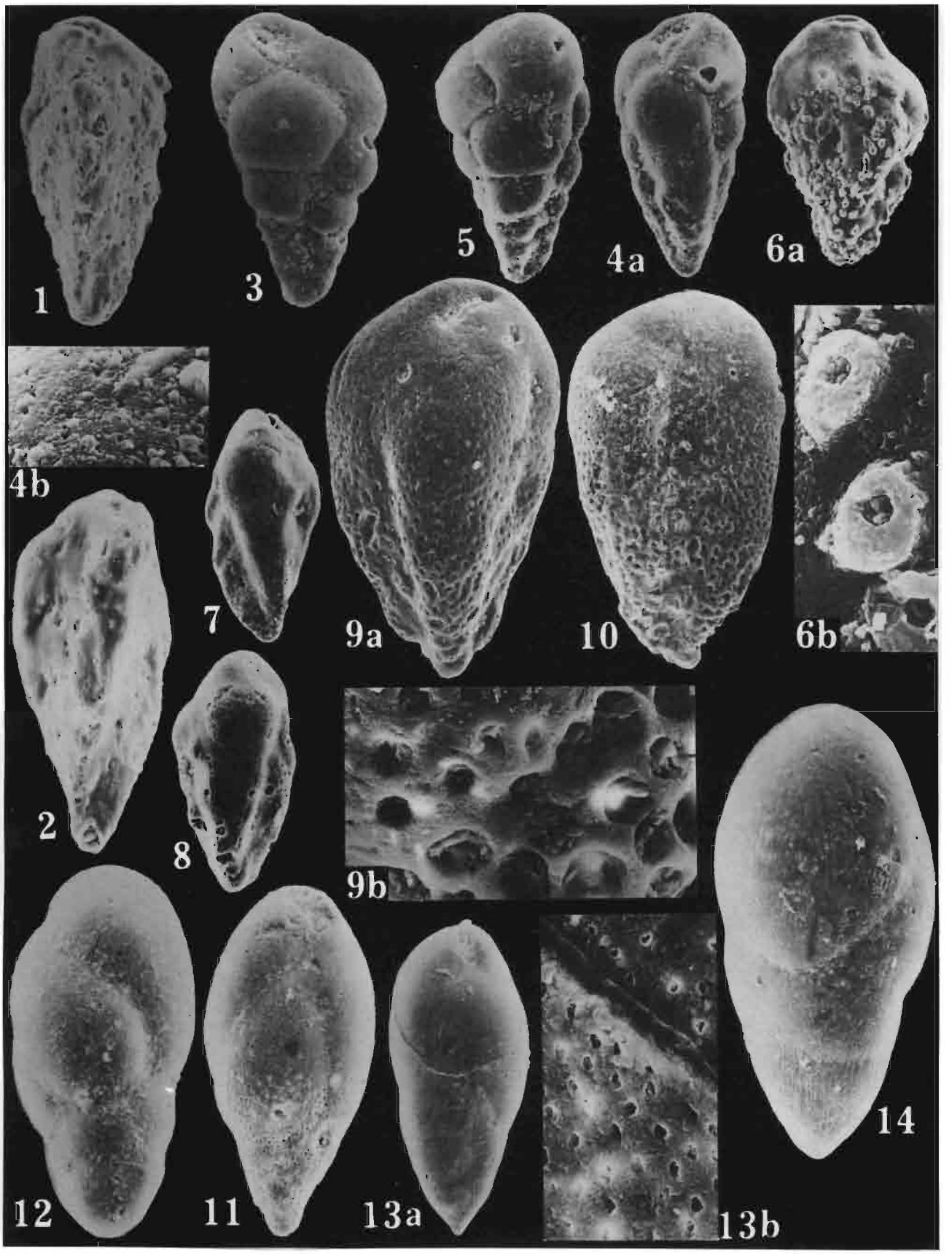
6*a*, *b*. *Pyramidina rudita* (CUSHMAN et PARKER); specimen IG 46687/88/F, *a* — general view and *b* — surface of the test, × 213, × 3600, Tyszowce IG 1 borehole, depth 85 m, upper Maastrichtian.

7, 8. *Pyramidina minuta* (MARSSON); 7 — specimen IG 46688/88/F, ventral side, × 153; 8 — specimen IG 46689/88/F, dorsal side, × 166, Telatyn IG 1 borehole, depth 35 m, upper Maastrichtian.

9*a*, *b*; 10. *Pyramidina triangularis* (CUSHMAN et PARKER); 9 — specimen IG 46690/88/F, *a* — dorsal side and *b* — surface of the test, × 240, × 1500; 10 — specimen IG 46691/88/F, dorsal side, × 220, Telatyn IG 1 borehole, depth 289.10 m, upper Campanian.

11, 12. *Praebulimina pusilla* (BROTZEN); 11 — specimen IG 46692/88/F, ventral side, microspheric form, × 220; 12 — specimen IG 46693/88/F, dorsal side, megalospheric form, × 260, Piaski IG 1 borehole, depth 66 m, upper Maastrichtian.

13*a*, *b*; 14. *Praeglobobulimina imbricata* (REUSS); 13 — specimen IG 46694/88/F, *a* — ventral side and *b* — surface of the test, × 100, × 1600; 14 — specimen IG 46695/88/F, dorsal side, × 150, microspheric forms, Piaski IG 1 borehole, depth 63 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 24

1, 2. *Pseudouvigerina telatynensis* sp. n.; 1 — specimen IG 46149/88/F, holotype, general view, × 200; 2 — specimen IG 46150/88/F, paratype, neck and aperture, × 700, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.

3, 4*a*, *b*. *Biedafranciszkina beaumonti* (CUSHMAN et PARKER); 3 — specimen IG 46696/88/F, ventral side, × 300; 4 — specimen IG 46697/88/F, *a* — dorsal side and *b* — surface of the test, × 300, × 1000, Lublin IG 2 borehole, depth 463 m, lower Maastrichtian.

5. *Pyramidina pseudospinulosa* (BROTZEN); specimen IG 46698/88/F, × 111, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

6, 7. *Pseudouvigerina cristata* (MARSSON); 6 — specimen IG 46699/88/F, general view, × 160; 7 — specimen IG 46700/88/F, apertural view, × 186, Lublin IG 2 borehole, depth 476 m, lower Maastrichtian.

8—10. *Pyramidina szajnochae* (GRZYBOWSKI); 8 — specimen IG 46701/88/F, ventral side, microspheric form, × 94; 9 — specimen IG 46702/88/F, dorsal side, megalospheric form, × 66; 10 — specimen IG 46703/88/F, apertural view, × 120, Telatyn IG 1 borehole, depth 268 m, upper Campanian.

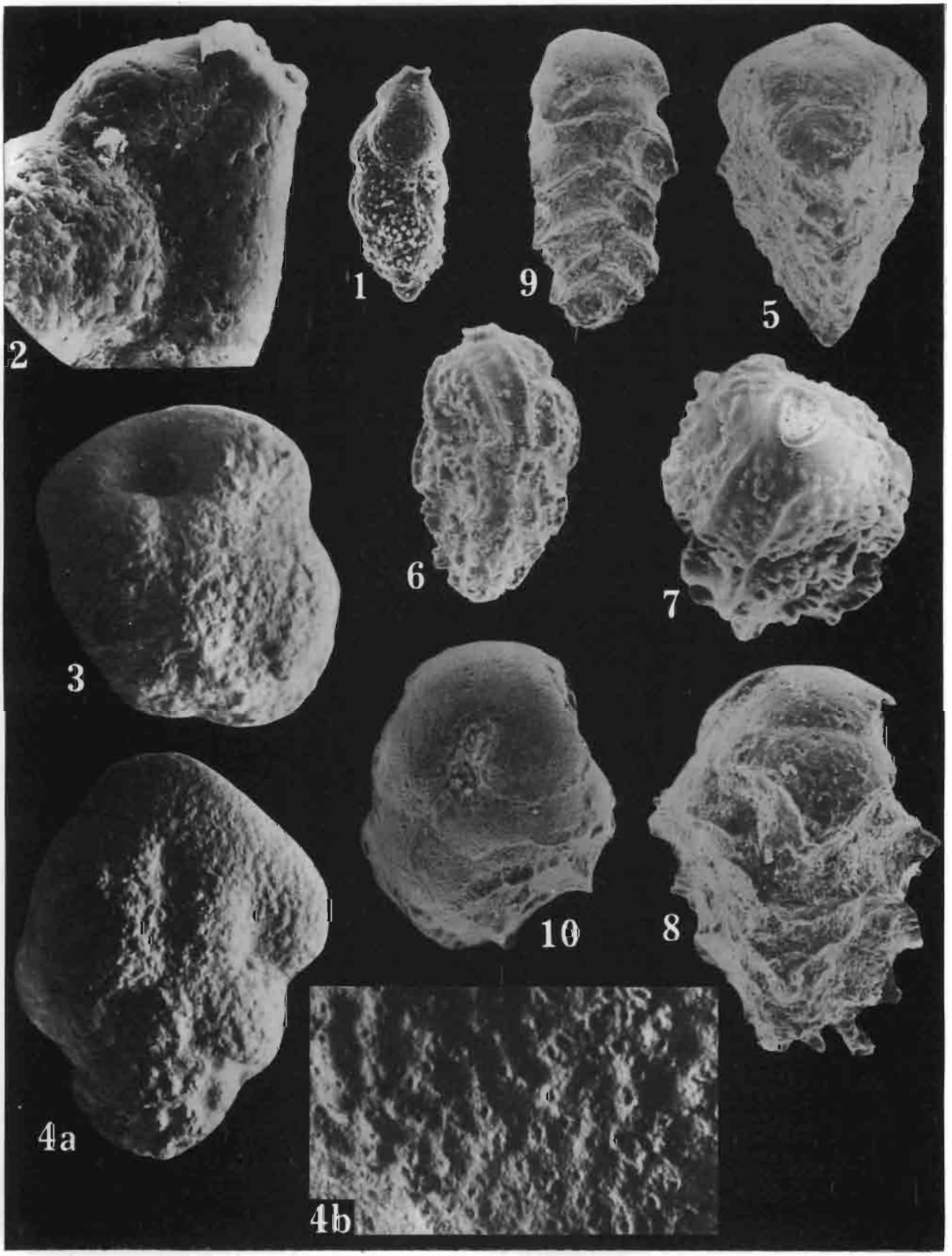

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PLATE 25

1—4. *Coryphostomella lublinensis* GAWOR-BIEDOWA; 1 — specimen IG 46704/88/F, side view; 2 — specimen IG 46705/88/F, side view, upper part of the test damaged, × 160, Gorzków IG 1 borehole, depth 57.60 m, upper Maastrichtian; 3 — specimen IG 46706/88/F, side view, × 250; 4 — specimen IG 46707/88/F, edge view, × 274, paratypes, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

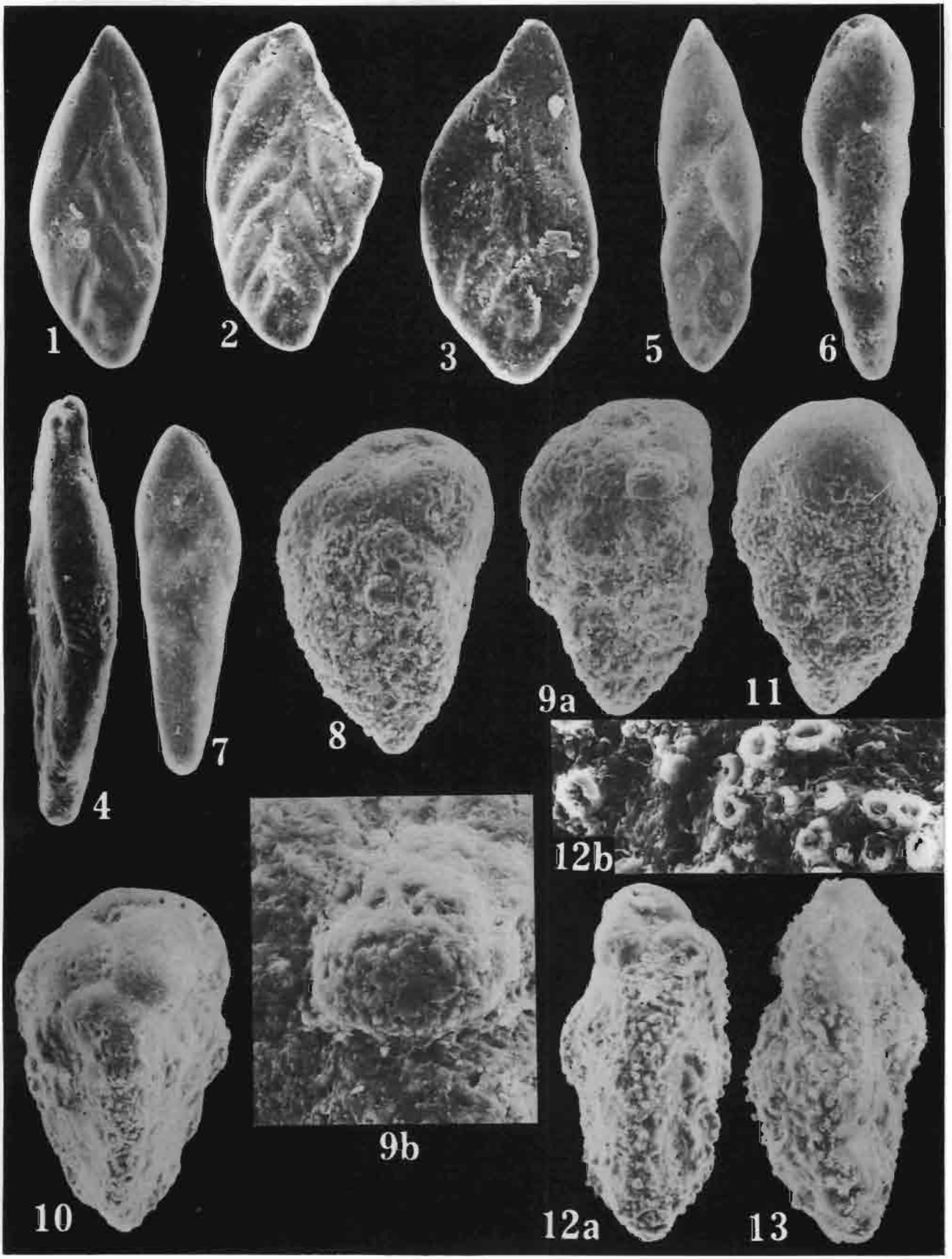
5. *Coryphostomella telatynensis* GAWOR-BIEDOWA; specimen IG 46708/88/F, paratype, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

6. *Fursenkoina polonica* GAWOR-BIEDOWA; specimen IG 46709/88/F, paratype, × 220, Telatyn IG 1 borehole, depth 242 m, lower Maastrichtian.

7. *Coryphostoma plaita* (CARSEY); specimen IG 46710/88/F, × 130, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

8—11. *Biedafranciszkina polonica* sp. n.; 8 — specimen IG 46411/88/F, holotype, ventral side, × 200; 9 — specimen IG 46412/88/F, paratype, *a* — ventral side and *b* — convexity on the surface of a chamber, × 200, × 780; 10 — specimen IG 46413/88/F, paratype, ventral side, × 220; 11 — specimen IG 46414/88/F, paratype, dorsal side, × 160, Lublin IG 1 borehole, depth 432.80 m, lower Maastrichtian.

12*a*, *b*; 13. *Pseudowigerina rugosa* BROTZEN; 12 — specimen IG 46711/88/F, *a* — general view, *b* — surface of the test, × 200, × 1300; 13 — specimen IG 46712/88/F, opposite side view, × 260, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 26

1, 2. *Loxostomum eleyi* (CUSHMAN); 1 — specimen IG 46713/88/F, side view; 2 — specimen IG 46714/88/F, edge view, × 112, Lublin IG 1 borehole, depth 486 m, upper Campanian.

3. *Ellipsodimorphina cretacea* GAWOR-BIEDOWA; specimen IG 46715/88/F, paratype, × 94, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

4. *Nodosarella suturicostata* GAWOR-BIEDOWA; specimen IG 46716/88/F, paratype, × 78, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.

5. *Nodosarella subnodosa* (GUPPY); specimen IG 46617/88/F, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

6, 7. *Pleurostomella pseudocurta* NEAGU; 6 — specimen IG 46717/88/F, side-apertural view, × 160; 7 — specimen IG 46718/88/F, ventral side, × 120, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

8. *Ellipsoidella inflatocamerata* GAWOR-BIEDOWA; specimen IG 46719/88/F, paratype, × 160, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

9, 10. *Nodosarella hedbergi* CUSHMAN and RENZ; 9 — specimen IG 46720/88/F, ventral side, × 66; 10 — specimen IG 46721/88/F, dorsal side, × 78, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

11. *Ellipsodimorphina rara* GAWOR-BIEDOWA; specimen IG 46722/88/F, paratype, × 200, Telatyn IG 1 borehole, depth 239 m, lower Maastrichtian.

12, 13. *Ellipsodimorphina hrubieszowiensis* GAWOR-BIEDOWA; 12 — specimen IG 46723/88/F, general view, immature specimen, × 220; 13 — specimen IG 46724/88/F, youngest part of the test damaged, × 130, paratypes, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

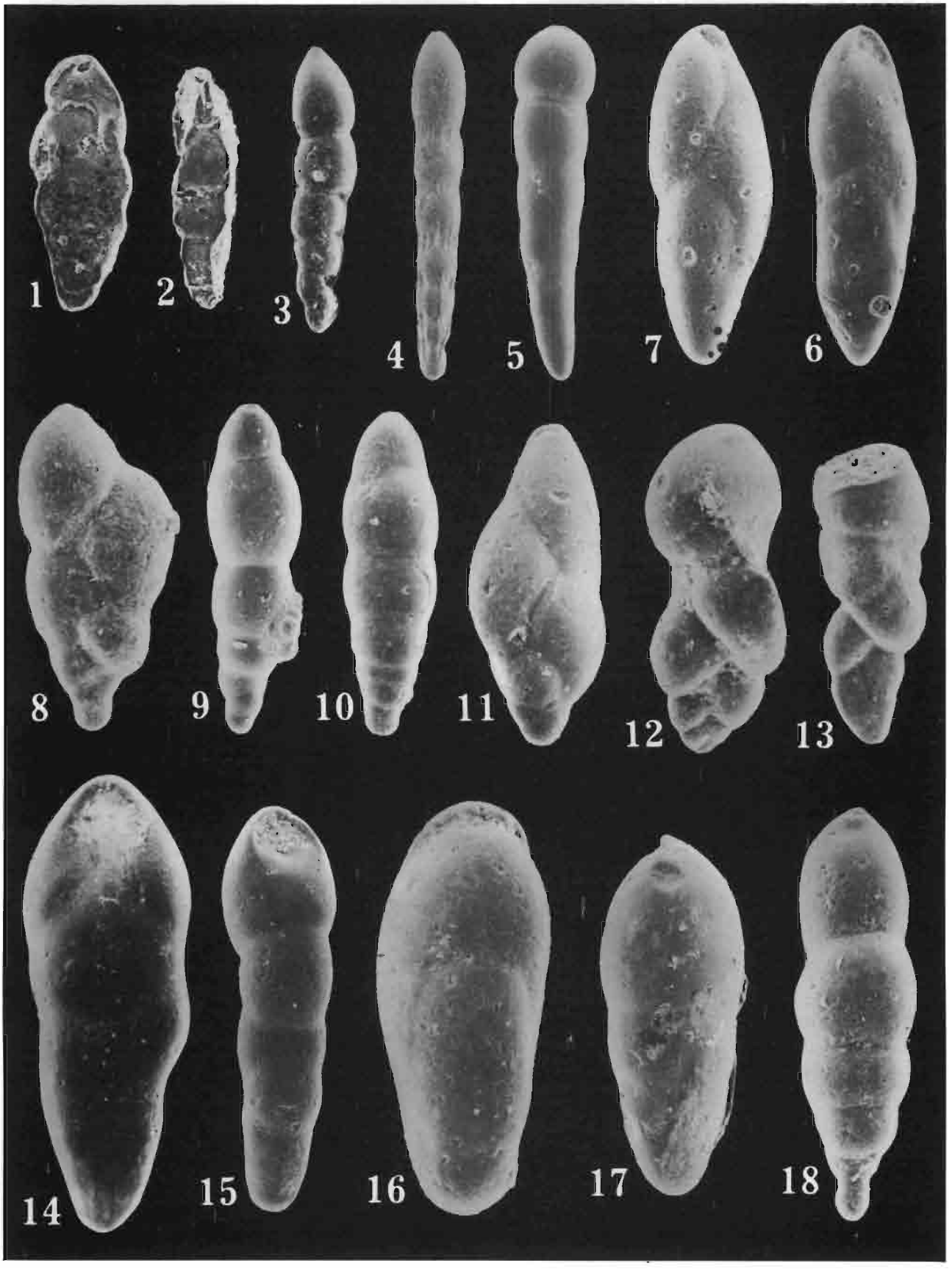
14. *Pleurostomella wadowicensis* GRZYBOWSKI; specimen IG 46725/88/F, × 86, Lublin IG 2 borehole, depth 432.80 m, lower Maastrichtian.

15. *Pleurostomella subnodosa* REUSS; specimen IG 46726/88/F, × 86, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

16. *Ellipsoidella ovata* GAWOR-BIEDOWA; specimen IG 46727/88/F, paratype, × 260, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

17. *Ellipsoglandulina varsoviensis* GAWOR-BIEDOWA; specimen IG 46728/88/F, paratype, × 44, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

18. *Ellipsodimorphina pozaryskae* sp. n.; specimen IG 46191/88/F, paratype, ventral side, × 180, Gorzków 1 borehole, depth 519 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 27

1, 2. *Elipsoidella divergens* (STORM); 1 — specimen IG 46729/88/F, ventral side, × 54; 2 — specimen IG 467/88/F, dorsal side, × 72, Piaski IG 1 borehole, depth 502.60 m, Campanian.

3. *Ellipsodimorphinae pożaryskae* sp. n.; specimen IG 46190/88/F, holotype, × 120, Gorzków IG 1 borehole, depth 519 m, lower Maastrichtian.

4, 5*a*, *b*. *Ellipsoidella gracillima* (CUSHMAN); 4 — specimen IG 46730/88/F, dorsal side, × 120; 5 — specimen IG 467318/8/F, *a* — ventral side, *b* — side view, × 150, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

6, 7*a*, *b*. *Ellipsodimorphina variabilis* GAWOR-BIEDOWA; 6 — specimen IG 46732/88/F, side view, × 110; 7 — specimen IG 46733/88/F, *a* — side view, *b* — edge view, × 150, paratypes, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

8*a*, *b*; 9. *Ellipsoglandulina manifesta* FRANKE; 8 — specimen IG 46734/88/F, *a* — ventral side, *b* — side view, × 130; 9 — specimen IG 46735/88/F, ventral side, × 160, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

10. *Ellipsoidella ovata* GAWOR-BIEDOWA; specimen IG 46736/88/F, ventral side, paratype, × 86, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

11*a*, *b*. *Triaperturina polonica* GAWOR-BIEDOWA; specimen IG 46737/88/F, paratype, *a* — general view and *b* — apertural view, × 60, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

12*a*, *b*. *Quadriaperturina varsoviensis* GAWOR-BIEDOWA; specimen IG 45637B/88/F, *a* — general view, *b* — apertural view, × 37, Mielnik, quarry near by market place, lower Maastrichtian.

13. *Ellipsoidella polonica* GAWOR-BIEDOWA; specimen IG 46738/88/F, Gorzków IG 1 borehole, depth 302 m, lower Maastrichtian.

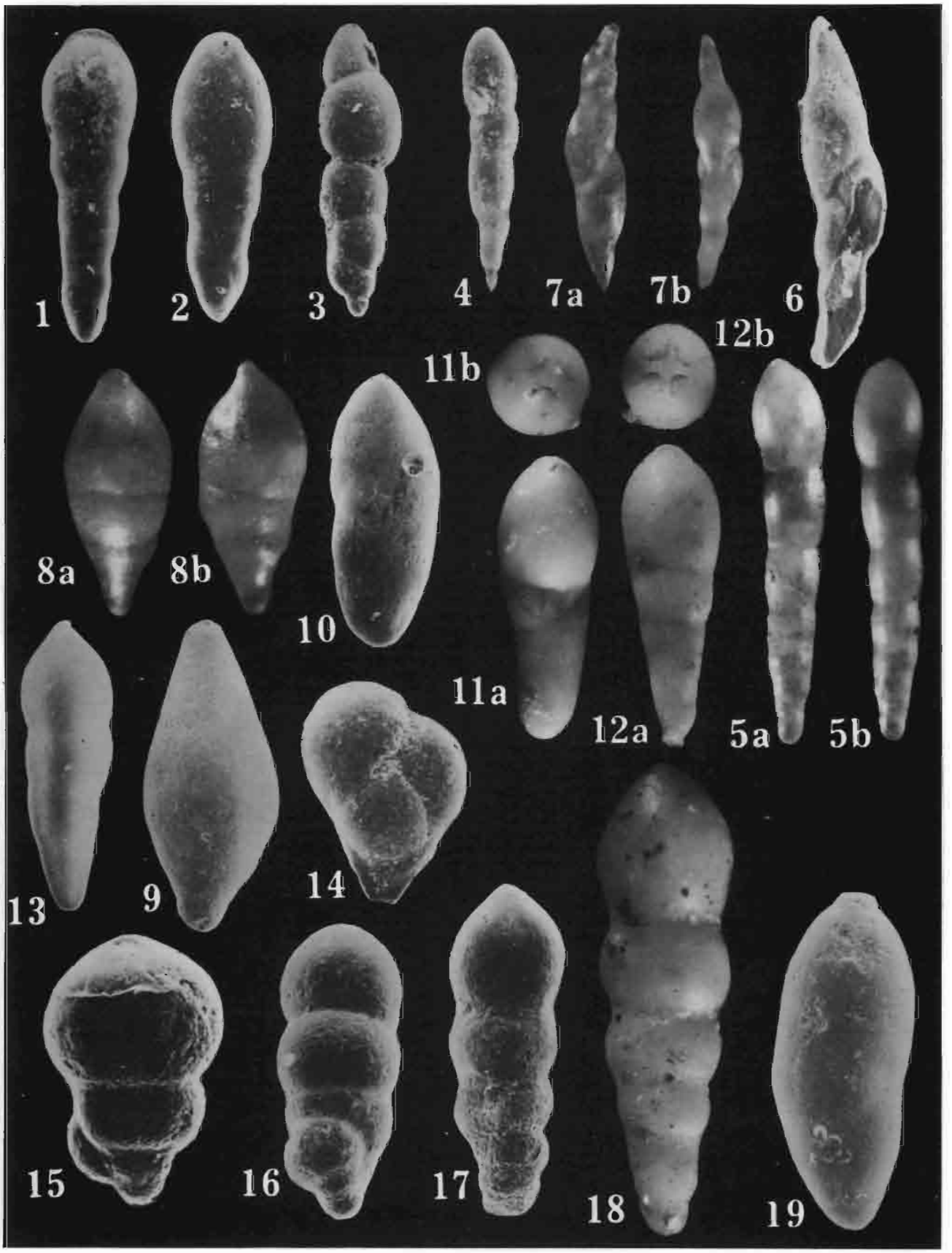
14. *Allomorphina trochoides* (REUSS); specimen IG 46739/88/F, apertural view, × 130, Lublin IG 2 borehole, depth 316.20 m, upper Maastrichtian.

15—17. *Ellipsoidella kugleri* (CUSHMAN and RENZ); 15 — specimen IG 46740/88/F, microspheric generation, × 160; 16 — specimen IG 46741/88/F; 17 — specimen IG 46742/88/F, megalospheric generation (A), × 110, × 86, Telatyn IG 1 borehole, depth 236 m, lower Maastrichtian.

18. *Ellipsoglandulina varsoviensis* GAWOR-BIEDOWA; specimen IG 46743/88/F, paratype, × 42, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

19, 20. *Pazdroella olgae* GAWOR-BIEDOWA; 19 — specimen IG 46744/88/F, general view, paratype, × 86, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

Figs. 5, 7, 8, 11, 12, 18 light microscope photographs
Figs. 1—4, 6, 9, 10, 13—17, 19, SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 28

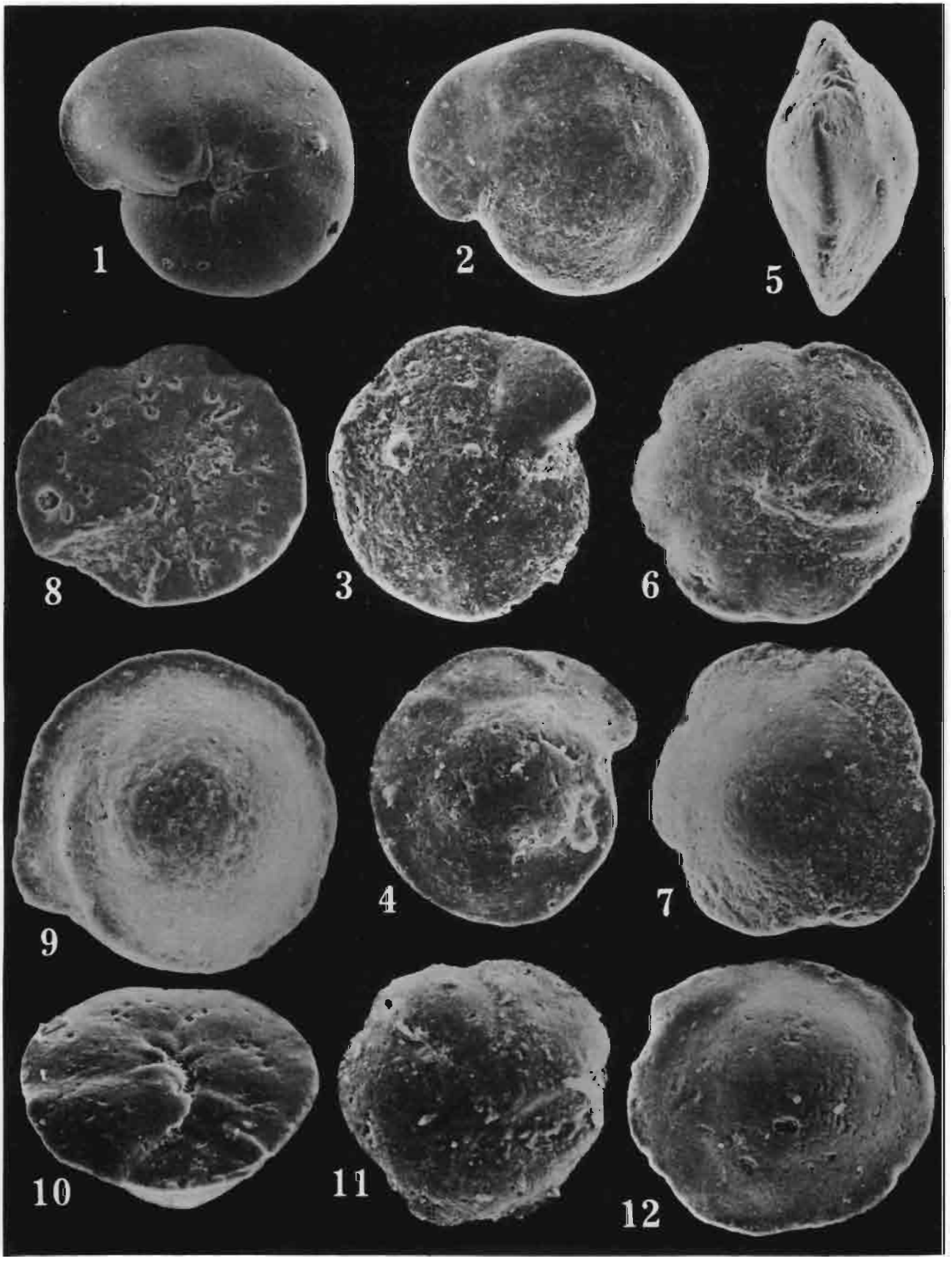
1, 2. *Valvulineria laevis* BROTZEN; 1 — specimen IG 46746/88/F, ventral side, × 153; 2 — specimen IG 46747/88/F, dorsal side, × 110, Lublin IG 2 borehole, depth 315.70 m, upper Maastrichtian.

3—5. *Eponides biconvexus* MARIE; 3 — specimen IG 46748/88/F, ventral side, × 220; 4 — specimen IG 46749/88/F, dorsal side, × 240; 5 — specimen IG 46750/88/F, edge view, × 260, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

6, 7. *Eponides concinna* BROTZEN; 6 — specimen IG 46741/88/F, ventral side; 7 — specimen IG 46752/88/F, dorsal side, × 240, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

8—10. *Eponides dorsoconvexus* GAWOR-BIEDOWA; 8 — specimen IG 46753/88/F, ventral side, youngest chamber of the test damaged, × 260; 9 — specimen IG 46754/88/G, dorsal side, × 300, paratypes; 10 — specimen IG 45692/90/F, edge view, × 220, Lublin IG 2 borehole, depth 463 m, lower Maastrichtian.

11, 12. *Eponides karsteni* (REUSS); 11 — specimen IG 46755/88/F, ventral side, × 320; 12 — specimen IG 46756/88/F, dorsal side, × 260, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.



E. GAWOR-BIEDOWA: UPPER CRETACEOUS FORAMINIFERA FROM E POLAND

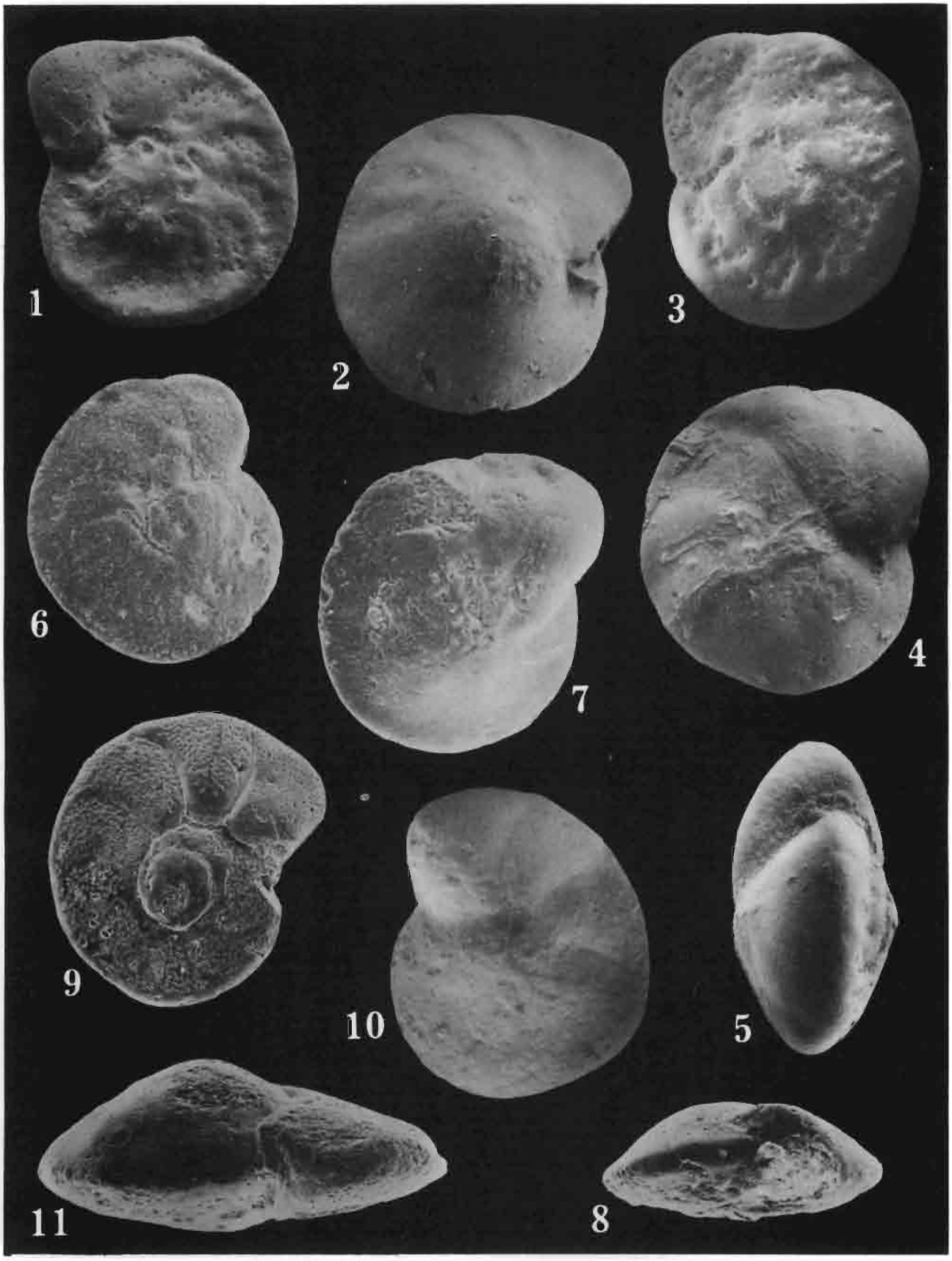
PLATE 29

1, 2. *Cibicidoides bembix* (MARSSON); 1 — specimen IG 45199/88/F, spiral side, × 201; 2 — specimen IG 45200/75/F, umbilical side, × 175, Kozienice IG 1 borehole, Maastrichtian.

3—5. *Cibicidoides involutus* (REUSS); 3 — specimen IG 45202/88/F, spiral side, × 152; 4 — specimen IG 45203/88/F, umbilical side, × 150, 5 — specimen IG 45204/88/F, × 152, edge view, Dorohucza IG 1 borehole, depth 56.3 m, Maastrichtian.

6—8. *Cibicidoides eriksdalensis* (BROTZEN); 6 — specimen IG 46757/88/F, spiral side, × 180; 7 — specimen IG 46758/88/F, umbilical side, × 160; 8 — specimen IG 46759/88/F, edge view, × 180, Telatyn IG 1 borehole, depth 254.50 m, lower Maastrichtian.

9—11. *Cibicidoides voltzianus* (d'ORBIGNY); 9 — specimen IG 46760/88/F, spiral side; 10 — specimen IG 46761/88/F, umbilical side, × 68, 11 — specimen IG 46762/88/F, edge view, × 94, Telatyn IG 1 borehole, depth 25 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 30

1, 2. *Pullenia cretacea* CUSHMAN; 1 — specimen IG 46763/88/F, side view, × 130; 2 — specimen IG 46764/88/F, apertural view, × 160, Lublin IG 2 borehole, depth 317 m, upper Maastrichtian.

3, 4. *Pullenia jarvisi* CUSHMAN; 3 — specimen IG 46765/88/F, side view, youngest chamber of the test damaged, × 172; 4 — specimen IG 46767/88/F, apertural view, youngest chamber of the test damaged, × 170, Lublin IG 2 borehole, depth 430.80 m, lower Maastrichtian.

5, 6. *Quadrimorphina varsoviensis* sp. n.; 5 — specimen IG 46272/88/F, holotype, ventral side, × 360; 6 — specimen IG 46273/88/F, paratype, dorsal side, × 360, Telatyn IG 1 borehole, depth 282.10 m, Campanian.

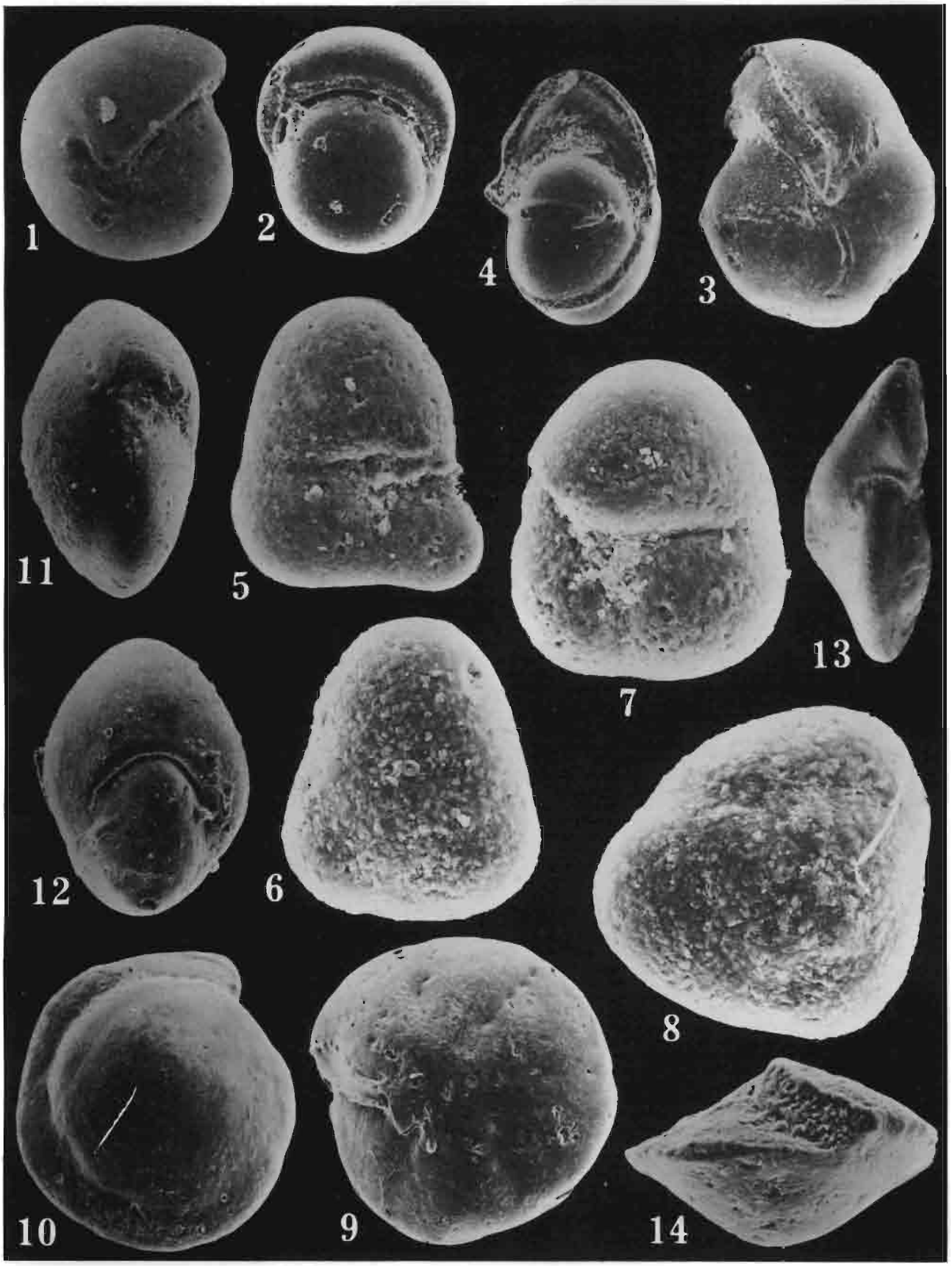
7, 8. *Quadrimorphina minuta* (CUSHMAN); 7 — specimen IG 46768/88/F, ventral side, × 360; 8 — specimen IG 46769/88/F, dorsal side, × 440, Telatyn IG 1 borehole, depth 282.10 m, Campanian.

9—11. *Eponides frankei* BROTZEN; 9 — specimen IG 46770/88/F, ventral side; 10 — specimen IG 46771/88/F, dorsal side, 11 — specimen IG 46772/88/F, edge view, × 78, × 86, Telatyn IG 1 borehole, depth 200 m, lower Maastrichtian.

12. *Allomorphinella contraria* (REUSS); specimen IG 46773/88/F, edge view, × 120, Tyszowce IG 1 borehole, depth 160 m, upper Maastrichtian.

13. *Cibicidoides bembix* (MARSSON); specimen IG 45201/75/F, edge view, × 175, Kozienice IG 1 borehole, depth 205 m, Maastrichtian.

14. *Eponides karsteni* (REUSS); specimen IG 46774/88/F, edge view, youngest chamber of the test damaged, × 320, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 31

1—4. *Allomorphinella lublinensis* sp. n.; 1 — specimen IG 46286/88/F, holotype, ventral side, × 138; 2 — specimen IG 46287/88/F; 3 — specimen IG 46288/88/F, paratypes, dorsal side, × 200, × 130; 4 — specimen IG 46289/88/F, paratype, edge view, × 240, Lublin IG 2 borehole, depth 463 m, lower Maastrichtian.

5*a*, *b*—7. *Allomorphina polonica* sp. n.; 5 — specimen IG 46277/88/F, holotype, *a* — apertural view, *b* — surface of the test, × 110, × 780; 6 — specimen IG 46278/88/F; 7 — specimen IG 46279/88/F, paratypes, opposite side view, × 150, × 110, Telatyn IG 1 borehole, depth 236 m lower Maastrichtian.

8—10. *Cibicidoides commatus* (VASSILENKO); 8 — specimen IG 46775/88/F, umbilical side, × 150; 9 — specimen IG 46776/88/F, spiral side, × 100; 10 — specimen IG 46777/88/F, edge view, × 150, Gorzków IG 1 borehole, depth 8 m, upper Maastrichtian.

11. *Allomorphinella contraria* (REUSS); specimen IG 46778/88/F, side view, × 300, Tyszowce IG 1 borehole, depth 160 m, upper Maastrichtian.

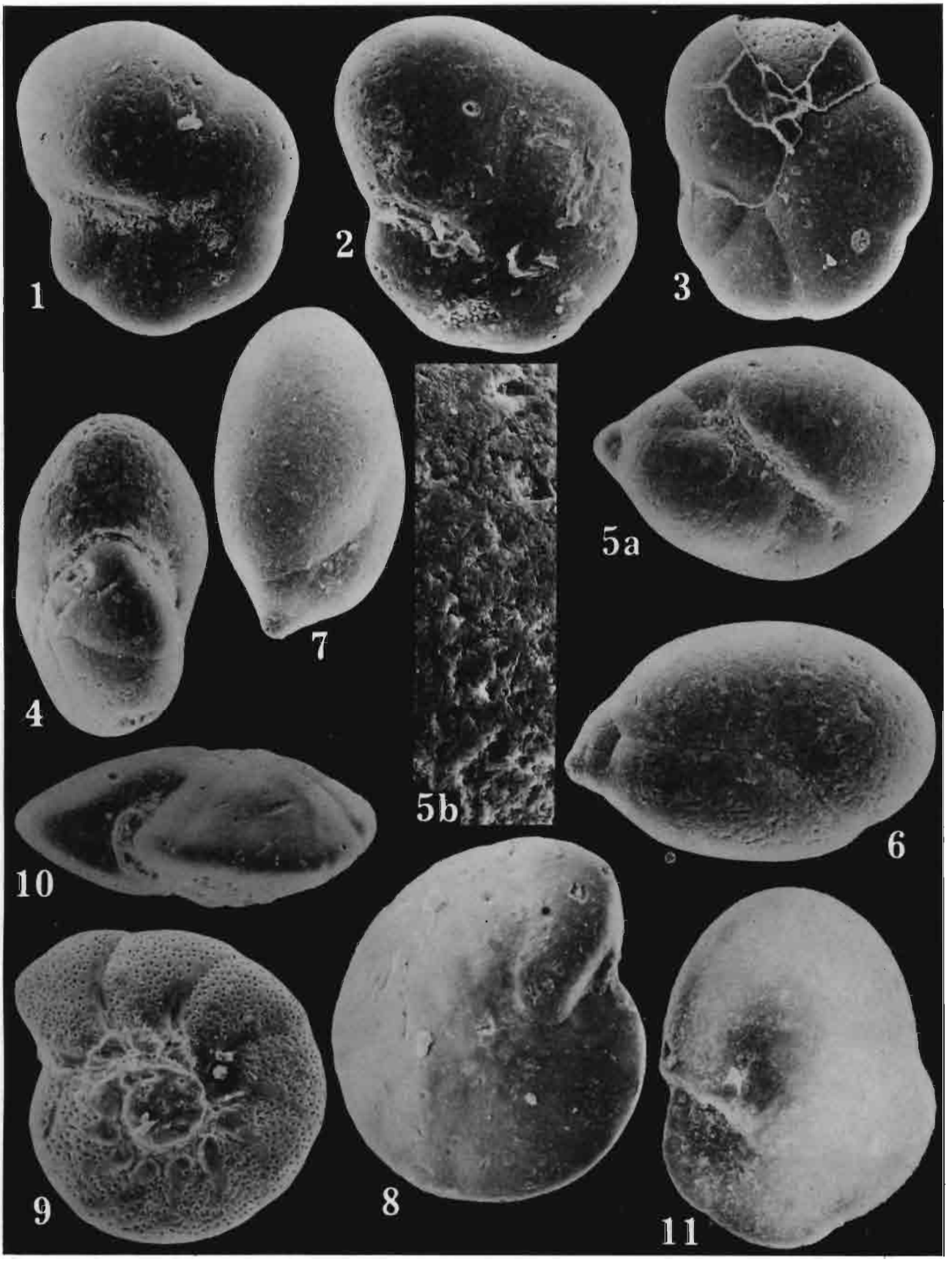

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PLATE 32

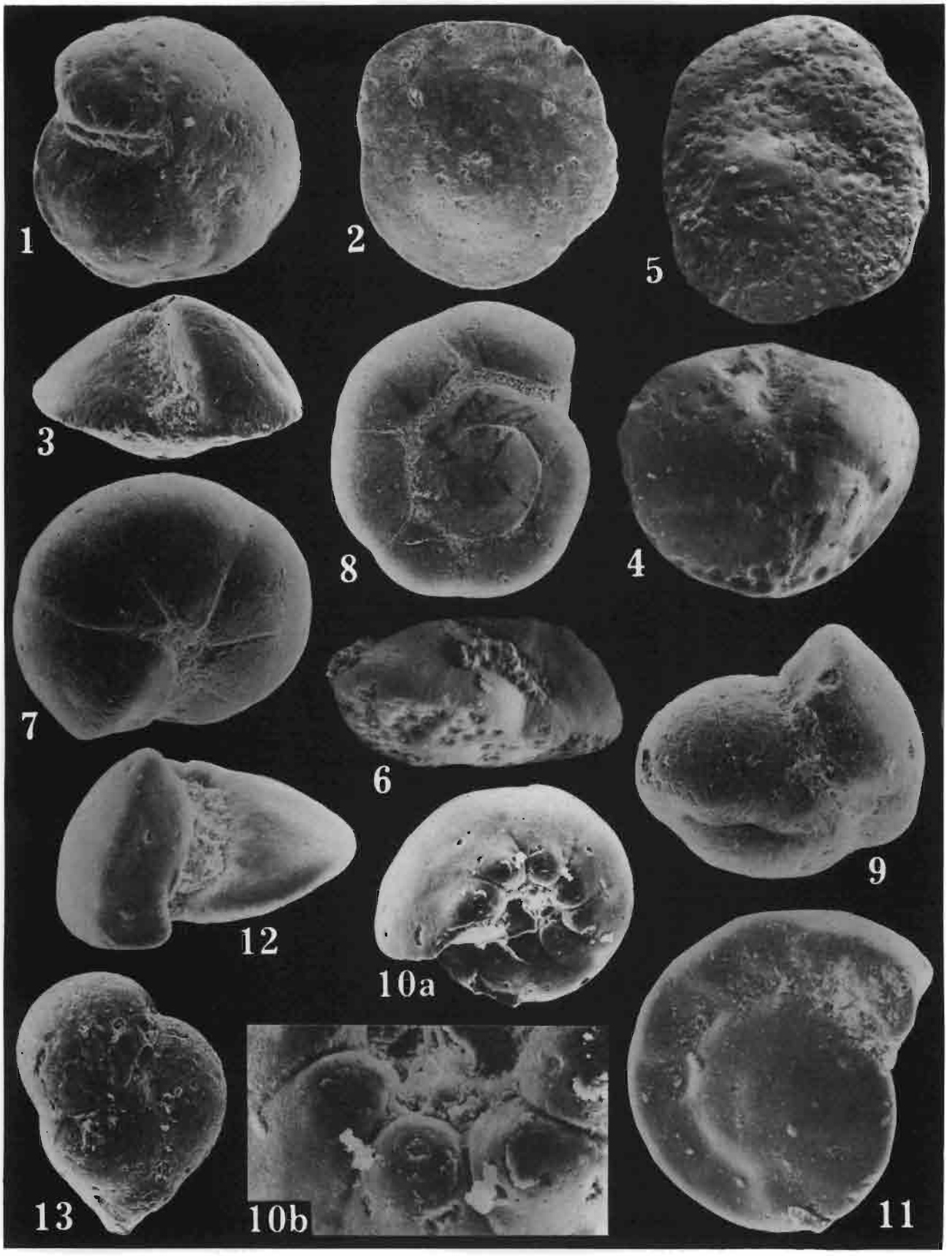
1—3. *Globorotalites emdyensis* VASSILENKO; 1 — specimen IG 46779/88/F, ventral side; 2 — specimen IG 46780/88/F, dorsal side, × 100; 3 — specimen IG 4781/88/F, edge view, × 120, Telatyn IG 1 borehole, depth 222.50 m, lower Maastrichtian.

4—6. *Paralabamina toulmini* (BROTZEN); 4 — specimen IG 46782/88/F, ventral side, × 218; 5 — specimen IG 46783/88/F, dorsal side, × 197; 6 — specimen IG 46784/88/F, × 245, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

7—9. *Gyroidinoides globosus* (HAGENOW); 7 — specimen IG 46785/88/F, ventral side, × 86; 8 — specimen IG 46786/88/F, dorsal side, × 72; 9 — specimen IG 46787/88/F, edge view, × 86, Telatyn IG 1 borehole, depth 25 m, upper Maastrichtian.

10*a*, *b*—12. *Gyroidinoides girardanus* (REUSS); 10 — specimen IG 46788/88/F, *a* — ventral side, *b* — periumbilical part of chambers, × 180, × 540; 11 — specimen IG 46789/88/F, dorsal side, × 240; 12 — specimen IG 46790/88/F, edge view, × 260, Piaski IG 1 borehole, depth 63.80 m, upper Maastrichtian.

13. *Allomorphina trochoides* (REUSS); 1 — specimen IG 46791/88/F, side view, × 80, Lublin IG 2 borehole, depth 316.20 m, upper Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 33

1—3. *Osangularia navarroana* (CUSHMAN); 1 — specimen IG 46792/88/F, ventral side, × 180; 2 — specimen IG 46793/88/F, dorsal side, × 158; 3 — specimen IG 46794/88/F, edge view, × 127, Telatyn IG 1 borehole, depth 153 m, upper Maastrichtian.

4—6. *Osangularia peracuta* (LIPNIK); 4 — specimen IG 46795/88/F, ventral side, × 240; 5 — specimen IG 46796/88/F, dorsal side, × 260; 6 — specimen IG 46797/88/F, edge view, × 360, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

7, 8. *Osangularia cordieriana* (d'ORBIGNY); 7 — specimen 46798/88/F, ventral side, × 134; 8 — specimen IG 46799/88/F, dorsal side, × 140, Lublin IG 2 borehole, depth 597 m, upper Campanian.

9—13. *Sliteria varsoviensis* sp. n.; 9 — specimen IG 46306/88/F, ventral side, paratype, × 270; 10 — specimen IG 46307/88/F, dorsal side, paratype, × 240; 11 — specimen IG 46305/88/F, ventral side, holotype, × 300; 12 — specimen IG 46308/88/F, edge view, paratype, × 300; 13 — specimen 46309/88/F, axial section; *a* — wall of the test, *b* — septa, *c* — ornamentation on the surface of sutures on dorsal side of the test, paratype, × 320, Tyszowce IG 1 borehole, depth 110 m, Maastrichtian.

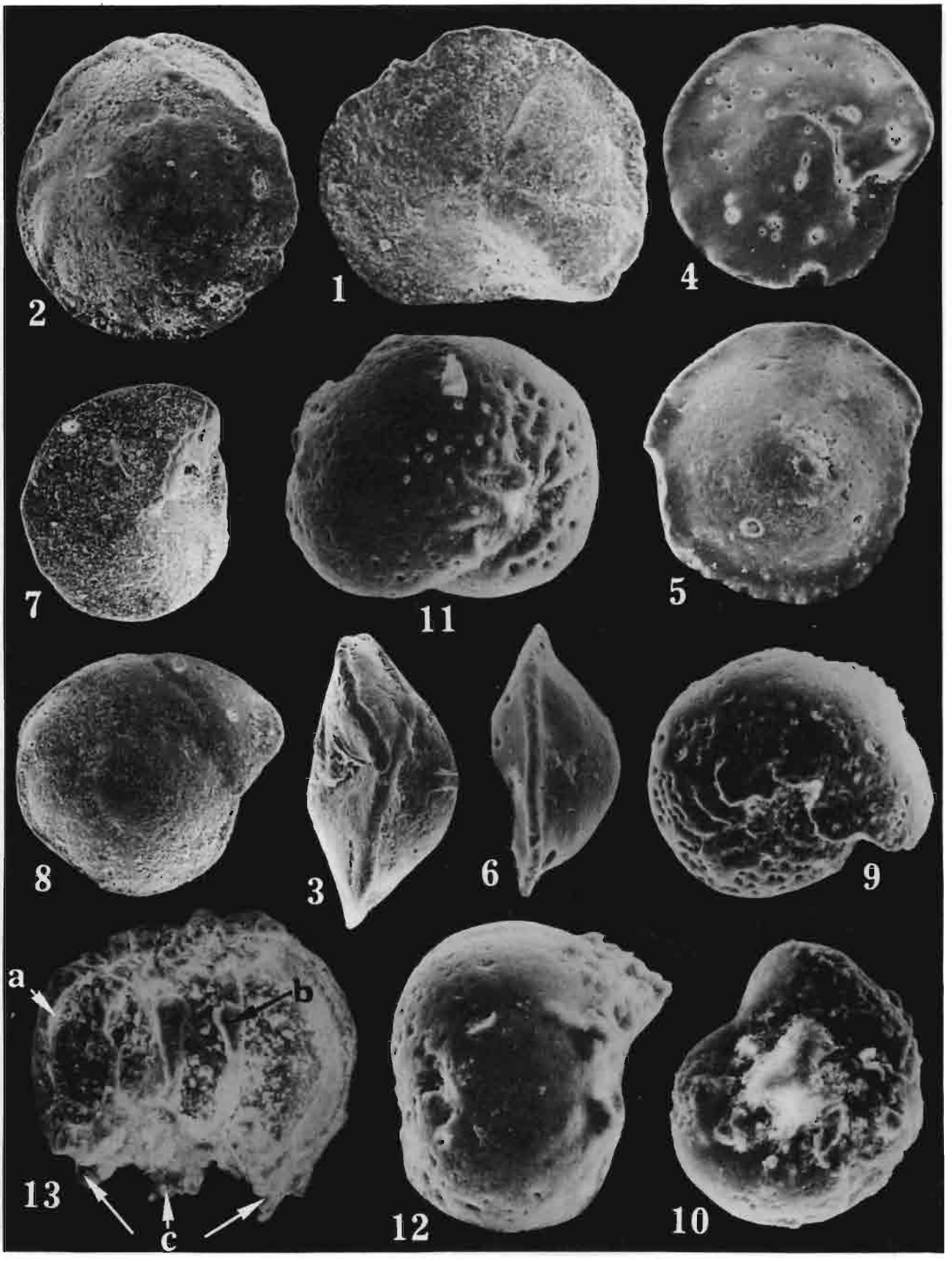


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PLATE 34

1—3. *Angulogavellinella gracilis* (MARSSON); 1 — specimen IG 46800/88/F, ventral side, × 130; 2 — specimen IG 46801/88/F, dorsal side; 3 — specimen IG 46802/88/F, Lublin IG 1 borehole, depth 466 m, lower Maastrichtian.

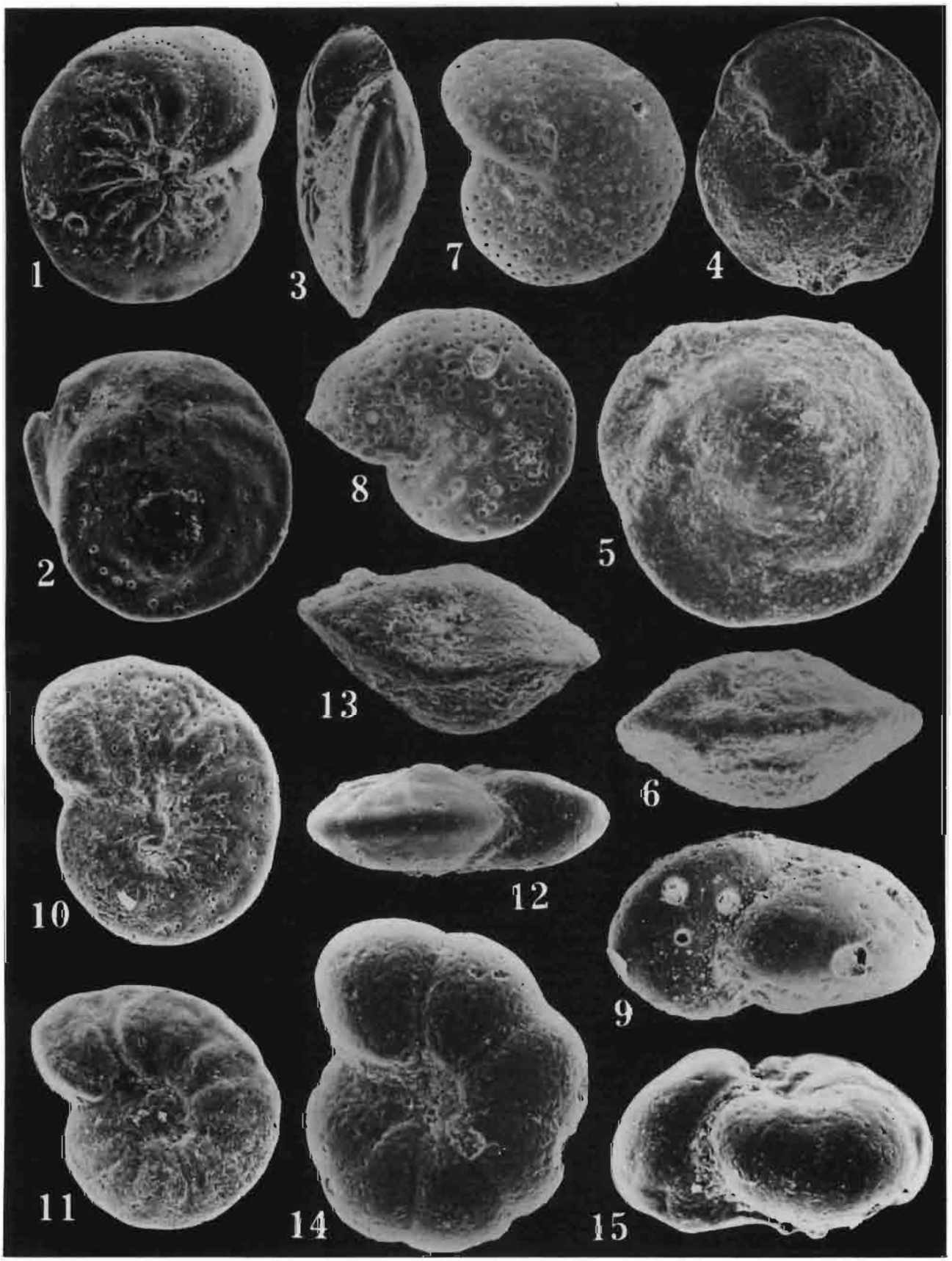
4—6. *Angulogavellinella grodnoensis* (AKIMEZ); 4 — specimen IG 46803/88/F, ventral side, × 130; 5 — specimen IG 46804/88/F, dorsal side, × 160; 6 — specimen IG 46805/88/F, edge view, × 150, Olsztyn IG 1 borehole, depth 484.50 m, Campanian.

7—9. *Anomalinoides pinguis* (JENNINGS); 7 — specimen IG 46806/88/F, ventral side, × 200; 8 — specimen IG 46807/88/F, dorsal side, × 160; 9 — specimen IG 46808/88/F, edge view, × 300, Telatyn IG 1 borehole, depth 10 m, upper Maastrichtian.

10—12. *Gavelinella acuta* (PLUMMER); 10 — specimen IG 46809/88/F, ventral side, × 120; 11 — specimen IG 46810/88/F, dorsal side, × 120; 12 — specimen IG 46811/88/F, edge view, × 180, Telatyn IG 1 borehole, depth 47 m, upper Maastrichtian.

13. *Osangularia cordieriana* (d'ORBIGNY); specimen IG 46812/88/F, × 200, Lublin IG 2 borehole, depth 597 m, Campanian.

14, 15. *Anomalina incognita* sp. n.; 14 — specimen IG 46321/88/F, side view, holotype, × 240, 15 — specimen IG 46322/88/F, edge view, paratype, × 240, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 35

1—3. *Gavelinella complanata* (REUSS); 1 — specimen IG 46813/88/F, ventral side, × 109; 2 — specimen IG 46814/88/F, dorsal side, × 104; 3 — specimen IG 46815/88/F, edge view, × 144, Lublin IG 2 borehole, depth 432.80 m, lower Maastrichtian.

4—6. *Gavelinella costulata* (MARIE); 4 — specimen IG 46816/88/F, ventral side, × 130; 5 — specimen IG 46817/88/F, dorsal side, × 110; 6 — specimen IG 46818/88/F, edge view, × 130, Telatyn IG 1 borehole, depth 279 m, upper Campanian.

7—10. *Gavelinella mariae* (JONES); 7 — specimen IG 46819/88/F, ventral side; 8 — specimen IG 46820/88/F, dorsal side, × 200; 9 — specimen IG 46821/88/F, edge view, × 186; 10 — specimen IG 46822/88/F, surface of the chamber above apertural lip, × 1500, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

11—13. *Gavelinella danica* (BROTZEN); 11 — specimen IG 46823/88/F, ventral side × 71; 12 — specimen IG 46824/88/F, dorsal side, × 80; 13 — specimen IG 46825/88/F, edge view, × 127, Telatyn IG 1 borehole, depth 25 m, upper Maastrichtian.

14—16. *Gavelinella gankinoensis* (NECKAJA); 14 — specimen IG 46826/88/F, ventral side; 15 — specimen IG 46827/88/F, dorsal side; 16 — specimen IG 46828/88/F, edge view, × 160, × 160, Telatyn IG 1 borehole, depth 25 m, upper Maastrichtian.

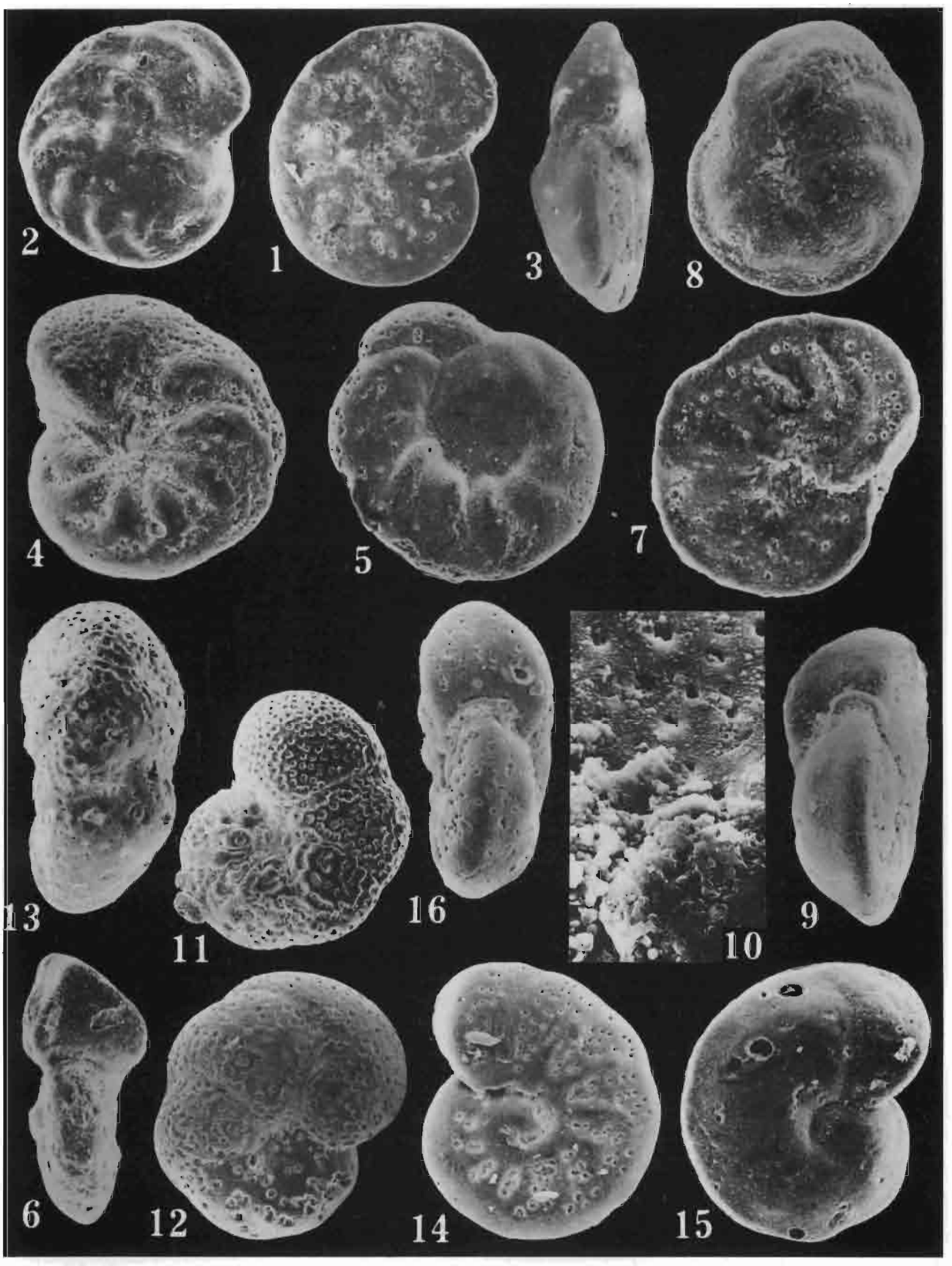


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PLATE 36

1, 2. *Gavelinella monterelensis* (MARIE); 1 — specimen IG 46829/88/F, ventral side, × 66; 2 — specimen IG 46830/88/F, dorsal side, × 86, Lublin IG 2 borehole, depth 490 m, upper Campanian.

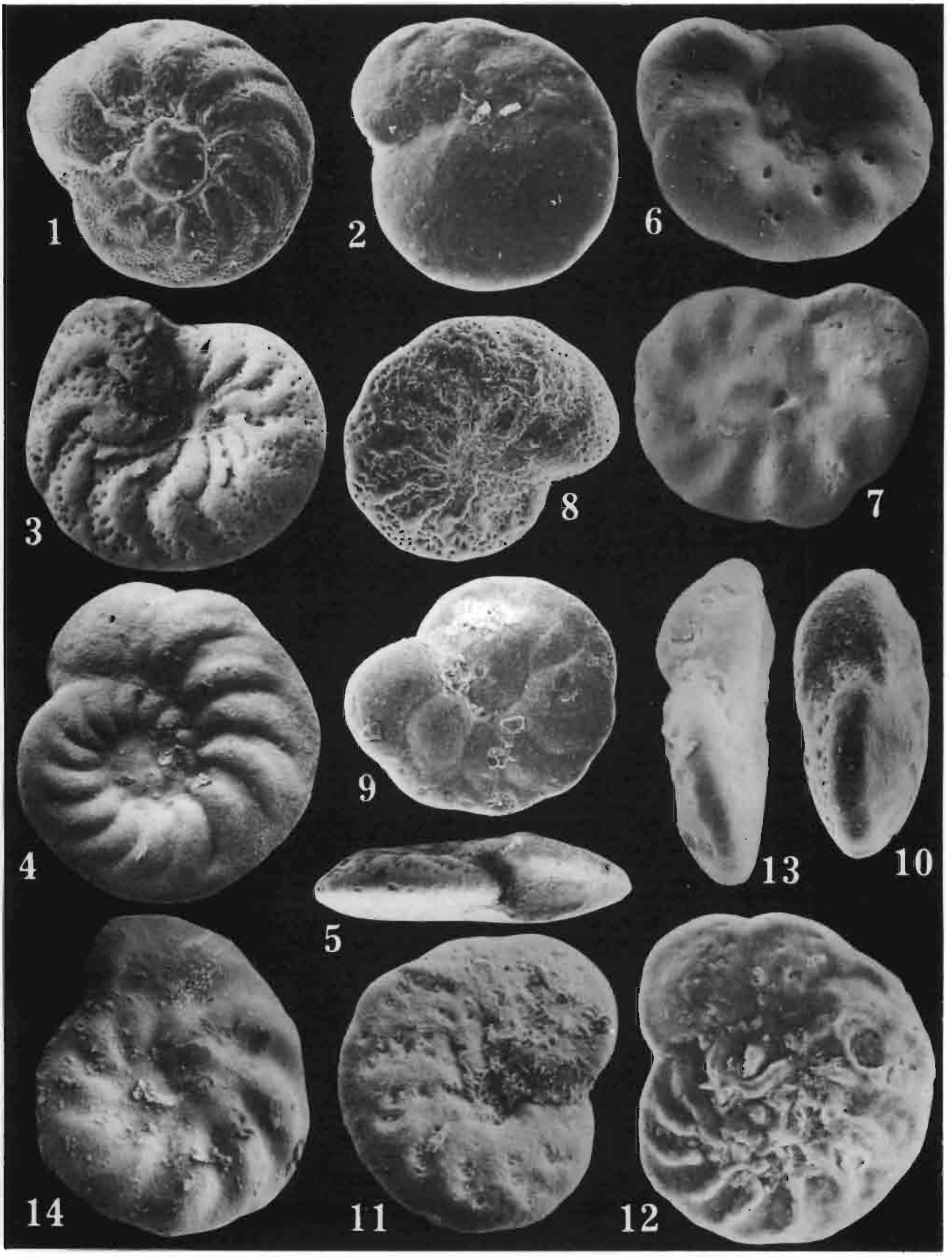
3—5. *Gavelinella stelligera* (MARIE); 3 — specimen IG 45311/75/F, ventral side, × 86; 4 — specimen IG 45312/75/F, dorsal side, × 82; 5 — specimen IG 46813/88/F, edge view, × 84, Wisznice IG 1 borehole, depth 120 m, Campanian.

6, 7. *Gavelinella pertusa* (MARSSON); 6 — specimen IG 45294/75/F, ventral side, × 143; 7 — specimen IG 45295/75/F, dorsal side, × 129, Strabla IG 1 borehole, depth 152.40 m, Maastrichtian.

8—10. *Gavelinella vombiensis* (BROTZEN); 8 — specimen IG 46831/88/F, ventral side, × 100; 9 — specimen IG 46832/88/F, dorsal side, × 90; 10 — specimen IG 46833/88/F, edge view, × 120, Lublin IG 2 borehole, depth 597 m, upper Campanian.

11—13. *Gavelinella sahlstroemi* (BROTZEN); 11 — specimen IG 46834/88/F, ventral side, 254; 12 — specimen IG 46835/88/F, dorsal side, × 320; 13 — specimen IG 46836/88/F, edge view, × 320, Gorzków IG 1 borehole, depth 10.80 m, upper Maastrichtian.

14. *Gavelinella umbilicata* (VASSILENKO et MJATLIUK); specimen IG 46837/88/F, dorsal side, × 123, Łęczna IG 2 borehole, depth 322 m, Campanian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 37

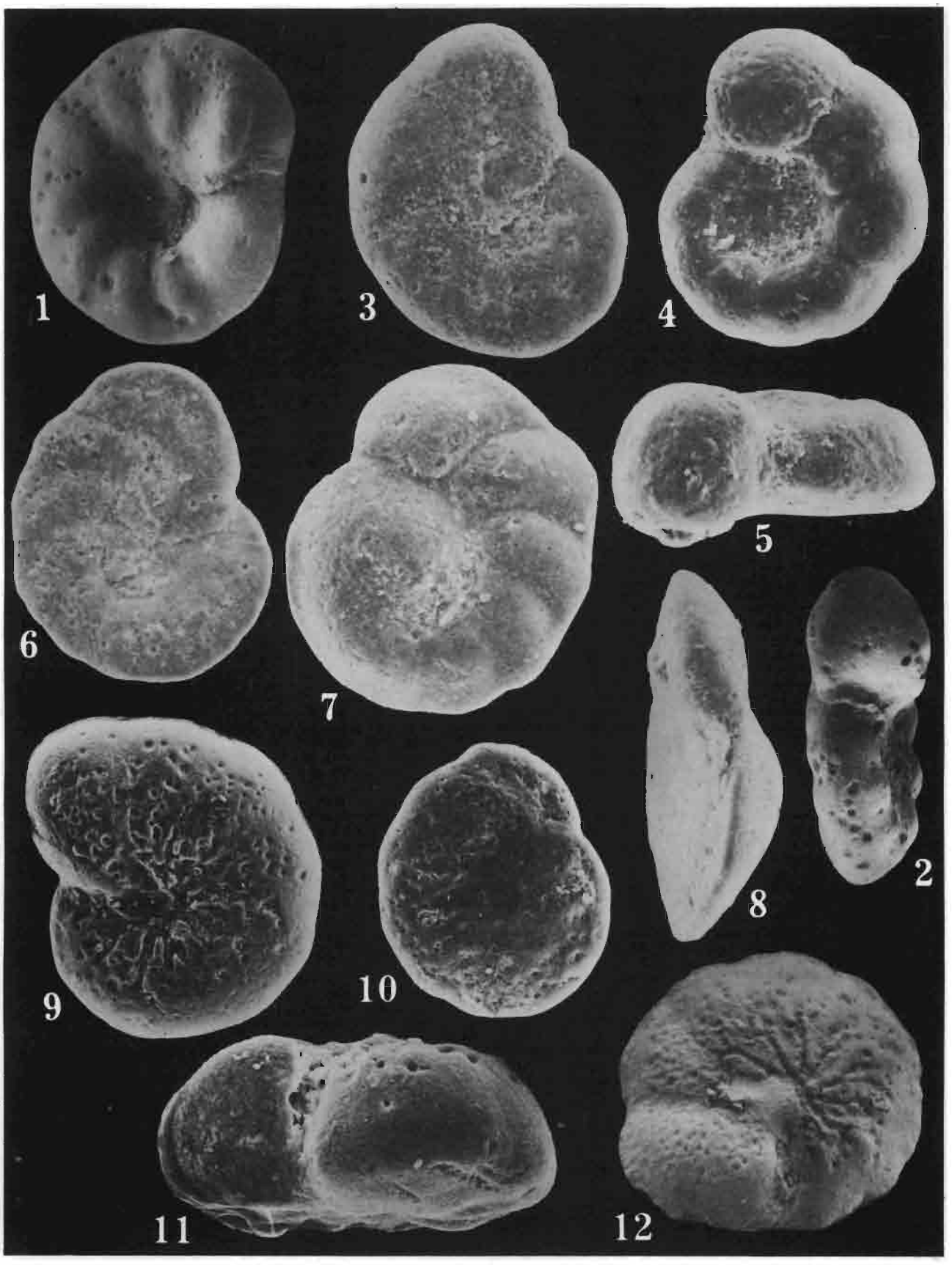
1, 2. *Gavelinella umbilicatula* (VASSILENKO et MJATLIUK); 1 — specimen IG 46838/88/F, ventral side, × 126; 2 — specimen IG 46839/88/F, edge view, × 115, Łęczna IG 2 borehole, depth 322 m, Campanian.

3—5. *Gavelinella postthalmanni* sp. n.; 3 — specimen IG 46361/88/F, ventral side, paratype, × 220; 4 — specimen IG 46360/88/F, dorsal side, holotype, × 240; 5 — specimen IG 46362/88/F, edge view, paratype, × 220, Tyszowce IG 1 borehole, depth 330 m, Campanian.

6—8. *Gavelinella tenuissima* GAWOR-BIEDOWA; 6 — specimen IG 46840/88/F, ventral side, × 260; 7 — specimen IG 46841/88/F, dorsal side, × 240; 8 — specimen IG 46842/88/F, edge view, × 260, paratypes, Telatyn IG 1 borehole, depth 282.10 m, Campanian.

9—11. *Stensioeina beccariiformis* (WHITE); 9 — specimen IG 46843/88/F, ventral side, × 200; 10 — specimen IG 46844/88/F, dorsal side, × 160; 11 — specimen IG 46845/88/F, × 470, Telatyn IG 1 borehole, depth 200 m, lower Maastrichtian.

12. *Stensioeina gracilis* BROTZEN; specimen IG 45337/75/F, ventral side, × 127, Wisznice IG 1 borehole, depth 120 m, Campanian.



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

PLATE 38

1, 2. *Stensioeina pulchra* sp. n.; 1 — specimen IG 46398/88/F, ventral side, holotype, × 180; 2 — specimen IG 46399/88/F, dorsal side, paratype, × 160, Telatyn IG 1 borehole, depth 282.10 m, upper Campanian.

3, 4. *Stensioeina* cf. *diction* POKORNÝ; 3 — specimen IG 46846/88/F, ventral side, × 130; 4 — specimen IG 46847/88/F, dorsal side, × 200, Telatyn IG 1 borehole, depth 265 m, upper Campanian.

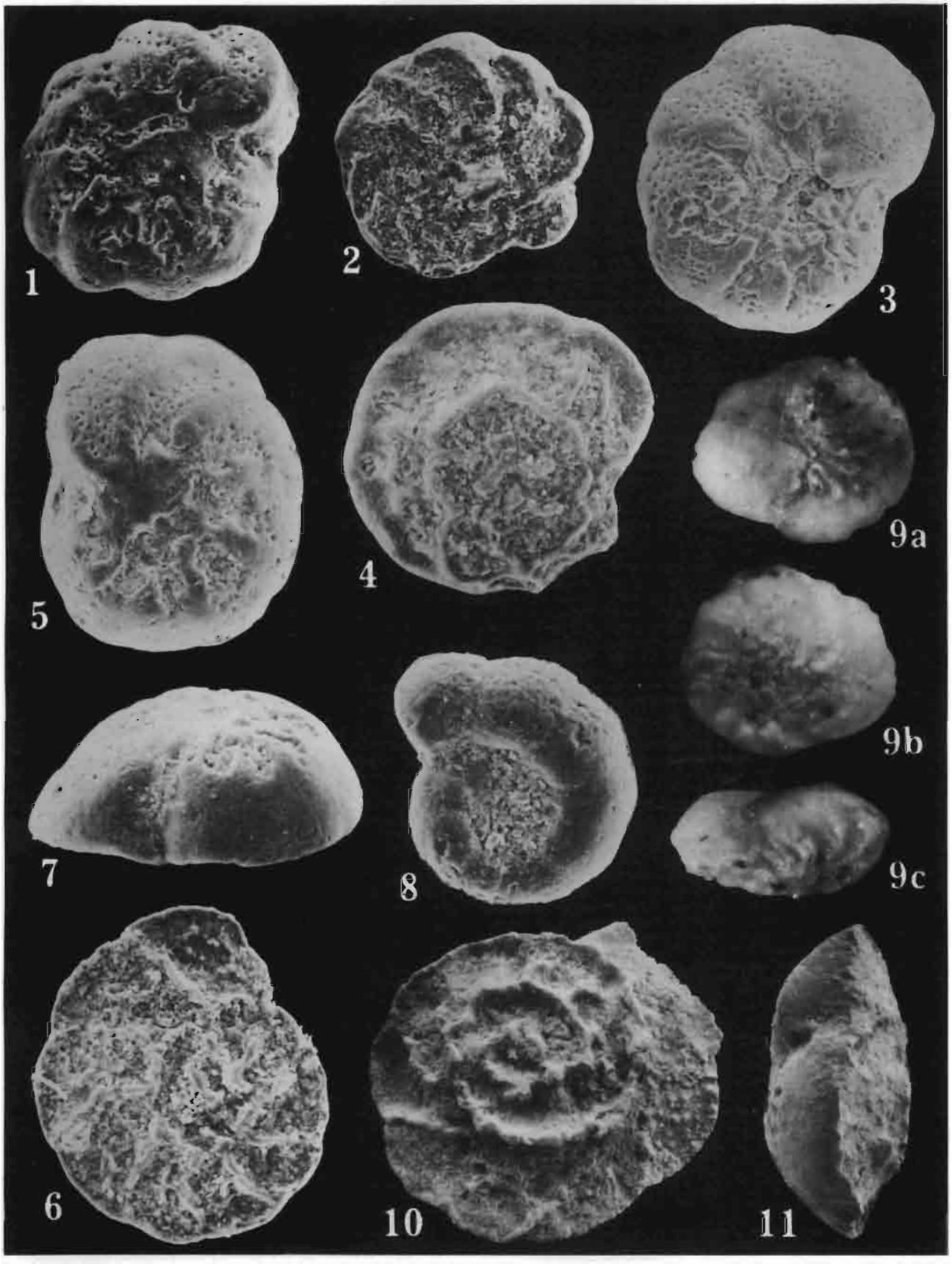
5—7. *Stensioeina exsculpta* (REUSS); 5 — specimen IG 46848/88/F, ventral side, × 150; 6 — specimen IG 46849/88/F, dorsal side, × 200; 7 — specimen 46850/88/F, edge view, × 180, Telatyn IG 1, borehole, depth 271.50 m, upper Campanian.

8. *Gavelinella postthalmanni* sp. n.; specimen IG 46363/88/F, dorsal side, × 150, Telatyn IG 1 borehole, depth 246 m, lower Maastrichtian.

9*a*, *b*, *c*. *Stensioeina bella* sp. n.; specimen IG 46400/88/F, *a* — ventral side, *b* — dorsal side, *c* — edge view, holotype, × 146, Tyszowce IG 1 borehole, depth 200 m, lower Maastrichtian.

10, 11. *Stensioeina gracilis* BROTZEN; 10 — specimen IG 46851/88/F, dorsal side, × 169; 11 — specimen IG 45339/88/F, edge view, × 146, Wisznice IG 1 borehole, depth 120 m, Campanian.

Figs. 9*a*, *b*, *c* light microscope photographs
Figs. 1—8 and 10, 11 SEM micrographs



E. Gawor-Biedowa: Upper Cretaceous Foraminifera from E Poland

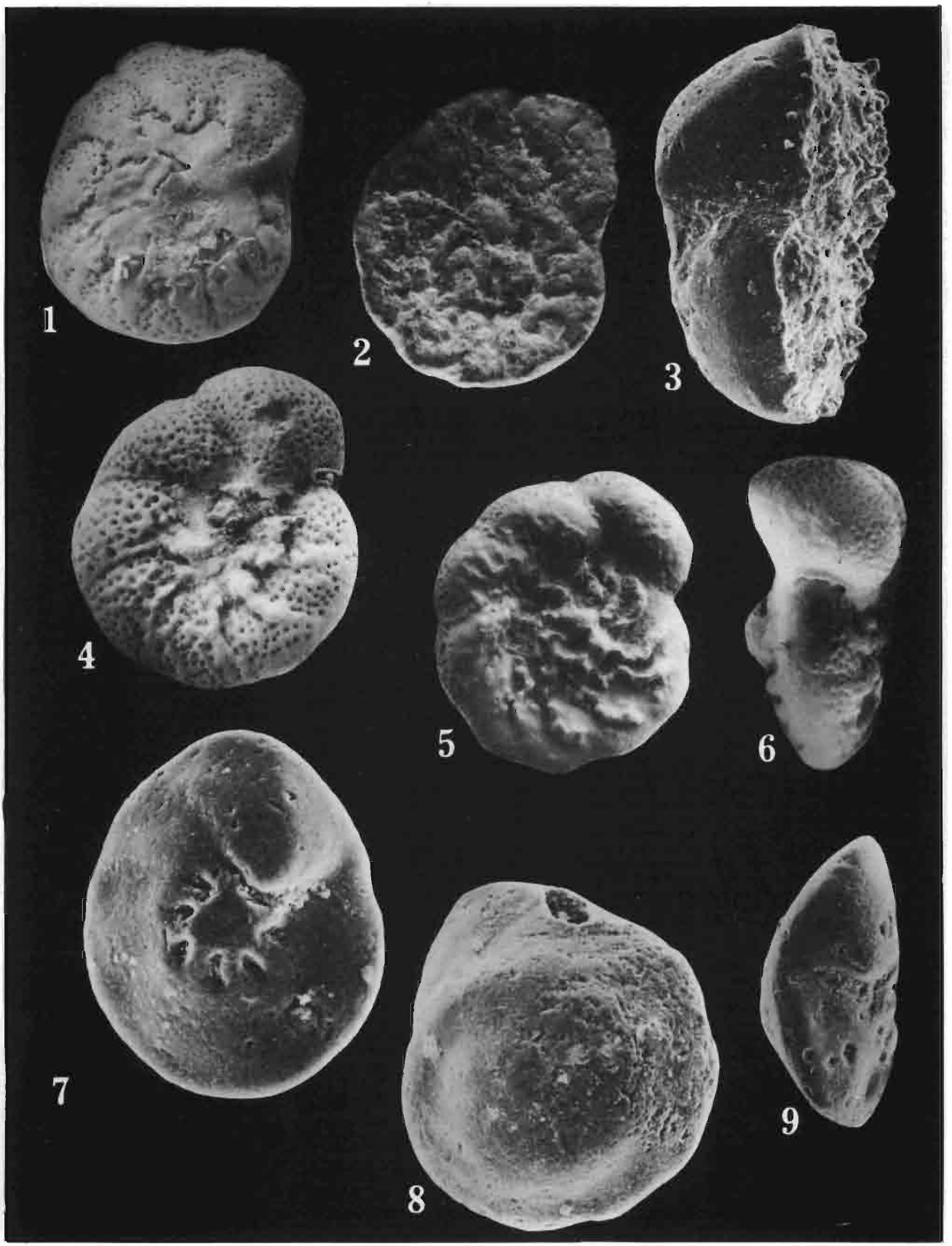
E. GAWOR-BIEDOWA: UPPER CRETACEOUS FORAMINIFERA FROM E POLAND

PLATE 39

1—3. *Stensioeina pommerana* BROTZEN; 1 — specimen IG 46852/88/F, ventral side, × 144; 2 — specimen IG 46853/88/F, dorsal side, × 117; 3 — specimen IG 46854/88/F, edge view, × 240, Telatyn IG 1 borehole, depth 178 m, lower Maastrichtian.

4—6. *Stensioeina clementiana* (d'ORBIGNY); 4 — specimen IG 45329/75/F, ventral side, × 58; 5 — specimen IG 45328/75/F, dorsal side, × 62; 6 — specimen IG 45330/75/F, edge view, × 73, Wisznice IG 1 borehole, depth 120 m, Campanian.

7—9. *Lublina lublinensis* (GAWOR-BIEDOWA); 7 — specimen IG 46855/88/F, ventral side, × 300; 8 — specimen IG 46856/88/F, dorsal side, × 180; 9 — specimen IG 46857/88/F, edge view, × 130, paratypes, Lublin IG 2 borehole, depth 436.90m, lower Maastrichtian.



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ISBN 83-01-09860-0
ISSN 0078-8562