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ON SOME WARM-WATER FORAMINIFERS FROM THE POLISH
MONTIAN

Abstract. — In this paper the authors give a summary of the Paleocene sedimentation in Poland, its facies, paleoclimatic conditions and add a description of 3 species of warm-water foraminifers, belonging to the genera *Boldia* van Bellen, *Glabratella* Dorreen and *Baggatella* Howe, of which *Glabratella polonica* and *Baggatella aenigmatica* are new. These species were found by the present authors in the Pamiętowo boring (Pomerania, northern Poland), in the tuffeau-type sediments of Montian age. The species described here, especially *Boldia reinholdi* Marie, also occur in the Montian sediments of the western European Province, the so-called Meridional (not Mediterranean) Province, including the Mons Basin, the Paris Basin and the Limbourg Province.

INTRODUCTION

The present note is a supplement to the previously published papers on the Lower Paleocene (Montian) Foraminifera from northern Poland (Brotzen & Pożaryska, 1961; Pożaryska, 1965; Pożaryska & Szczuchura, 1968). It concerns three warm-water species, which indicate the proximity to northern Poland of a warm-water sea, developing from Upper Cretaceous to Montian times and containing a warm-water liking foraminiferal microfauna. The presence in the Montian of northern Poland (Pamiętowo boring) of these warm-water species characteristic of the Montian of the western European Province proves the present authors' previous suggestions (1968) that during Montian times, the influence of the western European Province sea reached Poland. This influence is first seen in the upper part of the Montian sediments just above the Selandian beds.

The collection of specimens figured in this paper is housed in the Palaeozoological Institute of the Polish Academy of Sciences, for which the abbreviation Z. Pal. is used.

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LOWER PALEOCENE IN POLAND

Marine Paleocene sediments in Poland (the Carpathians excluded) occur principally in the Polish Lowlands where, however, they are rather poorly developed. They are preserved mainly in the marginal synclinorium, which was an elongated sea basin at the beginning of the Tertiary on the western periphery of the East European Platform. This synclinorium runs in a North West—South East direction, separating the area of the Platform itself from the Middle Polish anticlinorium.

Within the shallow sea basin, sedimentation occurred during the Cretaceous until Upper Maastrichtian times and continued during Danian and Montian times. These lowermost Tertiary sediments consist of sandy marls, interbedded with calcareous gaizes, in contrast to the siliceous marls, the so-called "opoka", which were deposited in the Upper Cretaceous sea. The Danian and Montian sediments were deposited over large areas and are up to several dozen metres in thickness. In Poland, these sediments were strongly eroded, probably during Upper Paleocene and Lower Eocene times, therefore being not known sediments of these ages in Poland outside the Carpathians. These lowermost Tertiary deposits can be seen only in few outcrops in central Poland along the banks of the River Vistula, as well as in some of the borings within the marginal synclinorium mentioned above. Everywhere they rest on partially eroded Upper Cretaceous rocks which consist of white siliceous marls, generally

terminated by a hardened layer, the typical "hard-ground". They themselves consist of marls and sandy-glaucconitic sediments which include phosphate nodules and derived Upper Cretaceous fossils. Their microfauna indicates a Lower Tertiary (Danian) age. In most cases, the Montian sediments (mostly of Selandian facies) rest on much reduced thicknesses of Danian sediments or even directly on Maastrichtian beds.

In central Poland the Montian sediments are developed as the so-called Selandian facies, analogous to that in Denmark and Sweden (Scania) on the one side, and the Russian Platform — on the other.

The Selandian microfauna of Poland (Brotzen & Pożaryska, 1957; Pożaryska, 1965) is the same as that which is well known from Scandinavian countries and that recorded from different depressions of the Russian Platform, i.e. Lithuania (Grigelis, 1960), the Donets Basin (Vasilenko, 1950) and the southern Ukraine (Kaptarenko-Tshernousova, Goliak *et al.*, 1963). In northern Poland, the Pamiętowo boring penetrated a 70 m thick series of Montian (Montian s.s.), developed as an organo-detrital reef facies, the so-called "tuffeau", which represents a quite different facies to that of the same age hitherto known from central Poland. The Montian s.s. and Selandian are considered by the present writers (1968) to be facies stratigraphical units of almost the same age, associated with different ecological and sedimentological conditions. This differentiation is the result of the differences in these two markedly separate East and West European geographical provinces.

The present authors' studies (1968) proved that in the Lower Paleocene in Europe there existed two zoogeographical provinces developing independently of each other. By Meridional (non Mediterranean) Province, a name suggested by Deroo (1966), is understood the western European region, containing the Paris Basin, the Mons Basin, Limburg and the adjacent part of Western Germany. Within that Province, in the Lower Paleocene, i.e. Montian, there existed marine shallow-water basins in which near-reef, organo-detrital sediments were deposited. In the literature they are spoken of as the "tuffeau" facies and contain a rich warm-water liking foraminiferal microfauna with an admixture of the larger Foraminifera characteristic of tropical seas. It must be pointed out that Marie (1937) was the first to draw attention to the presence of tropical Foraminifera within the Calcaire Pisolithique series in the Paris Basin. On the other hand, Hofker (1957) also used the term "tropical marine Montian" in referring to the Lower Paleocene of Limburg Province.

At the same time, i.e. in the Lower Paleocene, a similar large shallow sea consisting of basins connected by extensive straits, existed in eastern Europe (Pożaryski & Pażaryska, 1960). This sea covered southern Scandinavia, NE and central Poland, and by the seas covering the Russian Platform was connected with the Crimean sea, where deposition of

epicontinental facies with prevailing calcareous-zoogenic rocks commenced in the Cretaceous.

In both the western- and eastern European climatic provinces in Lower Paleocene times, different ecological and sedimentological conditions existed, resulting in different sediments and different faunal assemblages.

Already in the Upper Maastrichtian calcareous sediments with characteristic warm-water Foraminifera occurred in the western European Province. This province reached its maximum extent in the Montian when its influence reached the Paris Basin, Limburg and later extending through Germany impinged on northern Poland. In the latter case the influence of the Lower Paleocene warm-water sea of the Meridional Province in Poland was weak and is expressed mainly in the small proportion (1 : 6) of the warm-water Foraminifera within the whole foraminiferal assemblage which, as a whole, is characteristic of the eastern European Boreal Province and Poland. The Boreal Province sea was certainly not only colder compared with that of the Meridional Province, but it was also deeper. Its predominant foraminiferal microfauna consists of cold-water benthonic and planktonic forms. The latter are almost absent in the western European, Meridional Province.

In the paper by Pożaryska and Szczuchura (1968) the following Montian species common to the western European Meridional Province and northern Poland are described: *Rotalia trochidiformis* (Lam.), *R. saxorum* d'Orb., *R. marginata* d'Orb., *Pararotalia tuberculifera* (Reuss), *Rotorbinella mariei* (van Bellen), *R. montiana* Poż. & Szczuch., *R. papillata* Poż. & Szczuch., *Vacuovalvulina keijzeri* (van Bellen), *Globorotalia globigeriniformis* (van Bellen), *G. praepseudomenardii* Hofker, *Anomalina minor* Poż. & Szczuch., *Cuvillierina pomeraniana* Poż. & Szczuch., *Stomatorbina* sp.

Besides the above species, the present authors recently found another species, here described, in the Montian of the Pamiętowo boring, which again confirm the influence of the warm-water, western European sea in northern Poland in Montian time. The forms described here belong to the three genera, i. e. *Boldia*, *Glabratella* and *Baggatella*. Certain species, attributed to *Boldia*, have already been recorded from the Polish Montian (Brotzen & Pożaryska, 1961). Recently identified in the Montian of Pamiętowo, *Boldia reinholdi* Marie, 1964, is known from the Lower Paleocene of western Europe, occurring in the Paris and Mons Basins and Limburg region. The representatives of the remaining genera, i. e. *Glabratella* and *Baggatella* have not, so far, been described from the Lower Paleocene of western Europe, that latter, however, is found by the present authors in the samples from the Mons Basin. *Baggatella* and *Glabratella* are known in the Paleogene deposits of the Caribbean Region. Moreover,

representatives of *Glabrattella* are still living in Australia and in the Caribbean Sea and seem to be good ecological indicators.

Distribution of the warm-water forms in the Pamiętowo boring suggests that there were two periods when the influence of the Meridional Province sea in northern Poland in Montian time became more marked. These seem to be most pronounced in the samples from depths of about 273 and 207 m.

Some indistinct effects of the western European warm seas in Poland can already be discerned in the Danian, when some warm-water Foraminifera appeared in the Polish Danian deposits (Pozaryski & Pozaryska, 1959). They were, however, not yet characteristic of sediments of Montian age.

The state of development of these warm-water foraminiferal tests in Polish Montian sediments is much poorer than in the type-region, i. e. in the Montian of western European Province (Meridional, not Mediterranean). Their tests are thinner, their size much smaller, and generally their ornamentation is much less developed.

DESCRIPTIONS

Foraminifera

Family *Anomaliniidae*(?) Cushman, 1927

Genus *Boldia* van Bellen (in van den Bold), 1946

Boldia reinholdi (Marie, 1964)

(Pl. II, Figs. 3, 4; Pl. III, Figs. 1-4)

- ?1946. *Terquemia lobata* (Terquem) nov. gen.; R. C. van Bellen, *Foraminifera...*, p. 86, Pl. 13, Figs. 13-15.
1960. *Boldia madruгаensis* Cushman & Bermudez; J. Hofker, *The taxonomic positions...*, p. 47, Text-figs. 1-8 (non *Boldia madruгаensis* Cushman & Bermudez, 1948).
- ?1960. *Boldia carinata* Cushman & Bermudez var. 2; C. W. Drooger, *Microfauna and age...*, p. 454, Pl. 1, Figs. 12, 13.
1962. *Boldia madruгаensis* Cushman & Bermudez; J. Hofker, *Correlation of the Tuff Chalk...*, p. 1083, Text-fig. 27, Fig. B.
1964. *Scarificatina reinholdi* n. g. n. sp.; P. Marie, *Les faciès du Montien...*, Pl. 2, Fig. 3.
1966. *Boldia madruгаensis* Cushman & Bermudez; J. Hofker, *Maestrichtian, Danian...*, p. 260, Pl. 46, Fig. 142; Pl. 55, Figs. 101-103; Pl. 57, Figs. 134-137 (non *Boldia madruгаensis* Cushman & Bermudez, 1948).

Material. — Eight damaged specimens.

Dimensions (in mm.):

Z. Pal.

	F. X/5	F. X/6	F. X/10
Longest diameter	0.295	0.835	0.420
Shortest diameter	0.245	0.735	0.345
Height	0.147	0.515	0.196

Description. — Test planispiral, plano-concave or bi-concave, with broadly truncated periphery. Peripheral outline entire or lobate, peripheral margin rounded or to some extent angular; this latter mainly on the dorsal side; 2-3 whorls may be distinguished on the dorsal side, less on the ventral; 5-7 chambers of the last formed whorl are generally much more inflated and larger than those of the inner whorls. Sutures radiate, generally slightly depressed or flush with surface on ventral side, rarely thickened dorsally. Indistinctly visible aperture multiple at the base of the frontal area. Wall seems to be distinctly perforate; on the dorsal side it is sometimes coarsely pitted. Surface ornamentation very variable, but the most characteristic features are radiate ribs developed on the chambers of the last whorl and the straight, parallel ribs covering the central part of the ventral side.

Variation. — Taking into consideration all the specimens referred to *Boldia reinholdi* examined from Poland and western Europe, there is considerable variation in size, general shape and ornamentation of the test. Among the collected specimens some are fairly flattened on both sides, having a sharply rimmed margin, and others are subglobular in general appearance. Marginal outline lobulate or entire. Radial and spiral sutures incised or thickened and very commonly obscured by the test ornamentation. The test surface on the ventral side is ornamented by admarginal ribs, the arrangement and development of which vary, and the parallel ribs covering the central part of ventral side; these latter are almost absent in specimens from Poland. Dorsal side smooth or to a some extent rough and pitted.

The observed variation in *Boldia reinholdi* seems to reflect the different ontogenetic stages of the studied specimens, as well as their state of preservation and origin. The specimens from Poland are smaller and more poorly ornamented than those from western Europe, where in the Montian the ecological conditions were probably more favourable than those in eastern Europe. On the other hand, specimens from western Europe seem to be somewhat recrystallized or secondarily deprived of ornamentation. The rather great variability of the general appearance of the tests suggests that *Boldia* is a sessile form and that its mode of fixation affects its shape.

It is possible that the specimens studied should be assigned to a separate subspecies, based on ornamentation, but more material is needed before

a decision can be reached. In the samples collected from both Poland and western Europe, representatives of *B. reinholdi* were very rare.

Remarks. — As stated above, the specimens included in *Boldia reinholdi* from Poland differ mainly in size and ornamentation compared with those from western Europe, determined by Hofker (1960, 1962, 1966) as *B. madrugensis* Cushman & Bermudez, and from those described by Marie (MS, and 1964) as *Scarificatina reinholdi*. Both Hofker and Marie described their species from the true Montian of western Europe, i. e. the Paris Basin, the Mons Basin and the Limburg region, which in the present authors' opinion belongs to the Meridional (non Mediterranean) Province (see Pożaryska & Szczechura, 1968). However, specimens included by Hofker in *Boldia madrugensis* differ distinctly from those described by Cushman and Bermudez in 1948 (*vide* Ellis & Messina, Catal. of Foramin.) from the Paleocene (Madruga Formation) of Cuba in having chambers which differ more in size as growth proceeds. Moreover, whereas in specimens of *Boldia madrugensis* from Cuba the surface of the dorsal side is tuberculate, i. e. covered with elongate and radially arranged papillae and the surface of the ventral side is completely smooth, European specimens identified by Hofker as *B. smallerensis* only show distinct ornamentation on the ventral side, where some well developed ribs occur, the dorsal side being quite smooth.

Boldia carinata Cushman & Bermudez var. 2, described from the Paleocene of Guyana by Drooger (1960), is only tentatively included in the synonymy of *Boldia reinholdi* because it is somewhat differently ornamented from the European specimens of the latter species.

A specimen identified by van Bellen (1946) as *Terquemia lobata* (Terquem), from the Paleocene (Montian) of Holland (Limburg region), is also only tentatively included in the synonymy of *Boldia reinholdi*. Compared with the latter, as may be seen in the illustrations, Bellen's specimen is radially grooved over the whole of the ventral side, whereas in *B. reinholdi* only the outer whorl is so ornamented, the central part being covered by parallel ribs. *Boldia lobata* (Terquem, 1882) as figured in Loeblich and Tappan (1964), revised earlier by Le Calvez (1952), is not ornamented at all on ventral side. Test ornamentation seems to be the main feature differentiating *B. lobata* and *B. reinholdi*.

Species belonging to the genus *Boldia* are known from the Paleocene and Eocene of western Europe, the Caribbean region and the West Indies, in the sediments of shallow and probably rather warm seas (see van den Bold, 1946; Hofker, 1966; Drooger, 1963; Marie, 1964), which is why species of *Boldia* may be regarded as warm-water forms, thus being a good ecological indicator proving the tropical or subtropical environmental conditions of the places where they are found.

Occurrence. — In Poland: Montian of the Pamiętowo boring (depth 263.8; 210.7 and 208.5 m). In western Europe: in Montian (Calcaire de

Mons) of the Mons Basin (Puits Coppée, Puits Goffin and Puits Artésien in Mons), Montian of the Limburg region (Bunde, Eysden). According to Marie (1964), *Scarificatina reinholdi* (recte *Boldia reinholdi*) occurs in all the marine horizons of the Calcaire Pisolithique of the Paris Basin, as well as in the Tuffeau de Cibly in the Mons Basin. It is possible that this species is present in the Paleocene beds of Guyana (see *Remarks*).

Family **Glabratellidae** Loeblich & Tappan, 1964

Genus *Glabratella* Dorreen, 1948

Glabratella polonica n. sp.

(Pl. II, Figs. 1, 2; Pl. IV, Figs. 1, 2)

Holotypus: Pl. II, Fig. 2 (Z. Pal. F. X/4).

Paratypus: Pl. II, Fig. 1 (Z. Pal. F. X/3).

Stratum typicum: Paleocene (Montian).

Locus typicus: Pamiętowo boring (depth 263,8 m), northern Poland.

Derivatio nominis: *polonica* — described from Poland.

Diagnosis. — Test trochospiral, dorsal side distinctly conical or only slightly convex, ventral side flat. Chambers globular, increasing markedly in size as added, forming few whorls of which only the last, consisting of 4-5 chambers, is visible on the ventral side. A small aperture, surrounded by weak radial ornamentation, occurs in the centre of the umbilical side. Test surface finely pitted, unornamented.

Material. — Thirty seven rather badly preserved specimens.

Dimensions (in mm):

Z. Pal.

	F. X/3	F. X/4
Longest diameter	0.195	0.220
Shortest diameter	0.145	0.195
Height	0.125	0.195

Description. — Test trochospiral, conical or hemispherical. Outline, in apertural view, somewhat lobulate, peripheral margin rounded or slightly angulate. All the whorls are visible on the dorsal side, whereas only the chambers of the last whorl, i. e. 4-5 chambers are seen on the ventral side. Chambers globular in shape, increasing moderately in size as added. Sutures slightly incised, more so on the dorsal side. Aperture umbilical in position, rather small, round and concave with surrounding radial striae. Test surface finely pitted, especially dorsally, not ornamented. Wall calcareous opaque, perforate, radial in structure (see Pl. IV, Figs. 1, 2).

Variation. — There is considerable variation in the general shape of the tests studied; there are subconical or hemispherical forms. Because of

the bad state of preservation, in most specimens, the boundaries between the chambers are not clearly pronounced and the wall perforation is only weakly visible or quite indistinct.

Remarks. — The species described here seems most similar to *Glabratella crassa*, described by Dorreen (1948) from the Eocene of New Zealand. However, the Polish species is unornamented in contrast to the finely granulated *G. crassa*, and the specimens from Poland are also higher than those from New Zealand. Species of the genus *Glabratella* have been described from the Eocene to Recent, mainly from the littoral sea region (*vide* Dorreen, 1948; Loeblich & Tappan, 1964; Hornibrook, 1961; Reiss, 1961) and, in the present authors' opinion, chiefly from warm seas. They would thus seem to be good ecological indicators.

Occurrence. — In Poland: Montian of the Pamiętowo boring (depth 263.8 and 207-210.7 m). It is possible that this species occurs also in the Puits Goffin, but the bad state of preservation of the specimens does not permit positive identification.

Family **Turrilinidae** Cushman, 1927

Genus *Baggatella* Howe, 1939

Baggatella aenigmatica n. sp.

(Pl. I, Figs. 1, 2)

Holotypus: Pl. I, Fig. 1 (Z. Pal. F. X/1).

Paratypus: Pl. II, Fig. 2 (Z. Pal. F. X/2).

Stratum typicum: Paleocene (Montian).

Locus typicus: Pamiętowo boring (depth 210.7 m), northern Poland.

Derivatio nominis: *aenigmatica* — a reference to the enigmatic nature of this species.

Diagnosis. — Test trochospiral, low-spined, rather subglobular in general appearance, consisting of about 3 whorls. In the last whorl, the only one visible on the central side, are 4-5 chambers which increase markedly in size as added. Aperture — a loop shaped opening at the base of the last formed chamber or in the open umbilicus when it then has a tooth-plate.

Material. — Six fairly well preserved specimens.

Dimensions (in mm):

Z. Pal.

	F. X/1	F X/2
Longest diameter	0.25	0.15
Shortest diameter	0.20	0.13
Height	0.16	0.13

Description. — Test subglobular in general appearance, trochospiral, low-spired. Peripheral margin broadly rounded, peripheral outline very slightly lobulate or entire. About three whorls, of which the inner ones are poorly visible, are distinguishable on the dorsal side. On the ventral side only the outer whorl, containing 4-5 chambers, can be seen. Chambers, moderately inflated and increasing markedly in size as added. Sutures very weakly incised more so in the outer whorl, radially arranged on the ventral side, but sickle-shaped dorsally. Aperture in the centre of the open umbilicus, with tooth-plate, occurs in the larger tests, smaller tests have a somewhat loop-shaped aperture at the base of the last formed chamber; apertural face generally radially grooved. Test surface smooth, glassy and very finely porous.

Variation. — Inconspicuous variation occurs, in the size and shape of the tests, and the aperture development; the aperture can be loop-shaped or within the open umbilicus.

Remarks. — Polish specimens assigned to *Baggatella aenigmatica* n. sp. resemble closely the specimen figured by Loeblich and Tappan (1964) assigned to *Baggatella inconspiqua* Howe, 1939, a species described from the Paleogene of North America and the genotype of *Baggatella*. The size of the Polish specimens is nearly the same as those from America. The latter, however, is higher in comparison with the Polish specimens. The aperture of the two species differs somewhat in being larger and even open in the Polish specimens, whereas it is slit-like, or loop-shaped in the American specimen.

Occurrence. — In Poland: Montian of the Pamiętowo boring (depth — 207-215 m and 263.8 m). It occurs also in the Mons Basin (Puits Artésien de Mons at depths of 148-148.5 m and 141-141.5 m).

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O KILKU CIEPŁOLUBNYCH OTWORNICACH Z MONTU POLSKI

Streszczenie

Morskie osady paleocenu są stosunkowo słabo rozwinięte na Niżu Polski. Zachowały się one głównie w synklinorium brzeżnym, stanowiącym wydłużony z NW na SE basen morski, położony na zachodnich peryferiach płyty rosyjskiej. Reprezentują one osady dolnego paleocenu, tj. danu i montu, o nieznacznych stosunkowo miąższościach. Zachowały się one głównie w centralnych partiach tego basenu, będąc na znacznych obszarach zerodowane, gdyż zalegają na silnie zredukowanych osadach mastrychtu. W Polsce środkowej osady montu wykształcone są w facji terrygeniczej zelandu, analogicznie jak to jest w Danii, Szwecji i w Związku Radzieckim na Platformie Rosyjskiej, albo organogenicznej typu „tuffeau”, znanej z Europy zachodniej.

Badania autorek wykazały, że we wczesnym paleocenie istniały w Europie pozaalpejskiej dwie prowincje zoogeograficzne, rozwijające się niezależnie jedna od drugiej. Nazwą prowincji merydionalnej, nie śródziemnomorskiej, objęty został obszar Europy zachodniej, w skład którego wchodził Basen Paryski, Basen Mons oraz Limburg Belgijsko-Holenderski wraz z przylegającą częścią Niemiec zachodnich. Na obszarze tym istniał w dolnym paleocenie płytki zbiornik morski, w którym osadziły się przyrafowe, organo-detrytyczne sedymenty, tworzące rodzaj rumoszu wapiennego, znanego w literaturze pod nazwą „tuffeau”, zawierające bogatą faunę otwornic ciepłolubnych. W tym samym czasie, w Europie wschodniej panowało płaskie, rozległe morze, ciągnące się od Danu-Skarii poprzez Polskę i Platformę Rosyjską w stronę Krymu, w którym osadziły się margliste piaski glaukonityczne z bogatą fauną otwornic raczej zimnolubnych, zupełnie odmiennych aniżeli te, które dominowały w tym samym czasie w Europie zachodniej. Otóż w górnym moncie nastąpiło nasilenie wpływów ciepłego zbiornika zachodnio-europejskiego (merydionalnego) na prowincję wschodnio-europejską (borealną), powodując wymianę mikrofauny i przenikanie form ciepłolubnych na teren Polski północnej. Stwierdzono je w osadach wiercenia Pamiętowo na Pomorzu. Wykształcenie skorupki tych gatunków ciepłolubnych w osadach montu Polski północnej jest znacznie gorsze, ani-

żeli w ich prowincji macierzystej, czyli w osadach montu zachodnio-europejskiego. Są one znacznie mniejsze, cieńsze i słabiej ornamentowane. O słabym nasileniu wpływów tego ciepłego morza świadczy fakt, że nieznaczny jest udział form ciepłolubnych (1:6) w stosunku do form dominujących. Autorki opisały w pracy z 1968 r. gatunki ciepłolubne, które zostały stwierdzone w moncie polskim, obecnie zaś podają opis trzech gatunków wówczas nie uwzględnionych, należących do rodzajów *Boldia* van Bellen, *Glabratella* Dorreen oraz *Baggatella* Howe, z których dwa są nowe a mianowicie *Glabratella polonica* i *Baggatella aenigmatica*.

КРЫСТЫНА ПОЖАРЫСКА & ЯНИНА ЩЕХУРА

О НЕКОТОРЫХ ТЕПЛОЛЮБИВЫХ ФОРАМИНИФЕРАХ ИЗ МОНТСКОГО
ЯРУСА ПОЛЬШИ

Резюме

На Польской низменности осадки палеоцена развиты относительно слабо. Они сохранились главным образом в краевом прогибе, который отвечает морскому бассейну вытянутому с северо-запада на юго-восток на западном обрамлении Русской платформы. Эти осадки имеют относительно небольшую мощность и отвечают нижнему палеоцену, т.е. датскому и монтскому ярусам. Они сохранились главным образом в центральных частях этого бассейна, будучи уничтожены эрозией на его периферии, где они лежат на сильно эродированной поверхности маастрихта. В центральной Польше осадки монта представлены зеландской терригенной фацией, аналогично Дании, Швеции и Русской платформе, или фацией органогенных известняков типа „tuffeau”, известной из Западной Европы.

Исследования авторов доказали, что в раннем палеоцене в Европе, вне Альп, существовали две независимые зоогеографические провинции. Одна, западная (но не средиземноморская) обнимала Парижский бассейн, бассейн Монс и бельгийско-голландский Лимбург вместе с прилегающей частью Западной Германии. На этой территории существовал неглубокий морской бассейн, в котором отлагались органогенно-обломочные известковые осадки, так называемые „tuffeau”. Осадки эти содержат богатую фауну теплолюбивых фораминифер. В то же время в Восточной Европе простиралось обширное, мелкое море от Дано-Скании через Польшу и Русскую платформу до Крыма, в котором отлагались мергелистые глауконитовые пески с богатой фауной по всей вероятности теплолюбивых фораминифер, совершенно иных чем западно-европейские. В верхнем монте проявилось влияние теплого, западно-европейского бассейна

на восточно-европейскую (бореальную) провинцию, выражающееся в обмене микрофаун и в проникновении теплолюбивых форм на территорию Северной Польши. Они обнаружены в керне скважины Паментово на Поморье. Интересно что раковины этих фораминифер выглядят несколько иначе, чем раковины тех же видов в их родной провинции, т.е. в монтских осадках Западной Европы. Они гораздо мельче и имеют хуже развитую скульптуру. Процент теплолюбивых форм невелик. Они встречаются в отношении 1:6 к остальным видам, что свидетельствует о незначительном влиянии теплого моря. В 1968 г. авторами уже были описаны теплолюбивые виды из монтского яруса Польши. Теперь описаны еще три вида, принадлежащие родам *Boldia* van Bellen, *Glabratella* Doreen и *Baggatella* Howe, из них два новые — *Glabratella polonica* n.sp. и *Baggatella aenigmatica* n.sp.

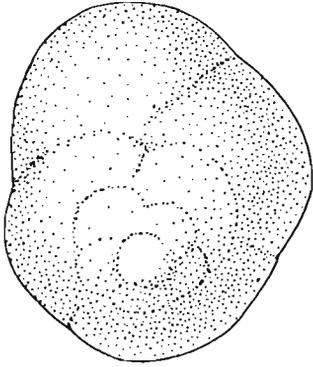
PLATES

Plate I

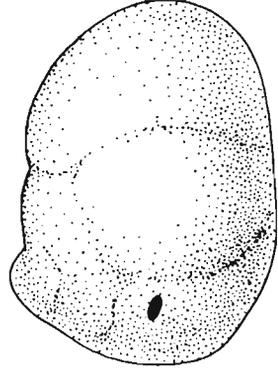
Baggatella aenigmatica n. sp.

Fig. 1. *a* side view, *b* ventral view, *c* dorsal view, holotype (Z. Pal. F. X/1); Pamiętowo, depth 210.7 m, Montian.

Fig. 2. *a* side view, *b* ventral view, *c* dorsal view, paratype (Z. Pal. F. X/2); Pamiętowo, depth 208.5 m, Montian.

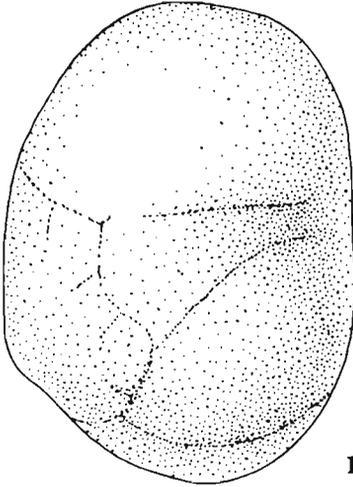


2c

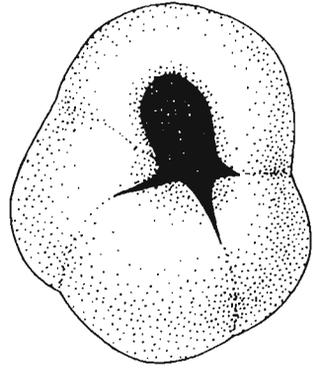


2a

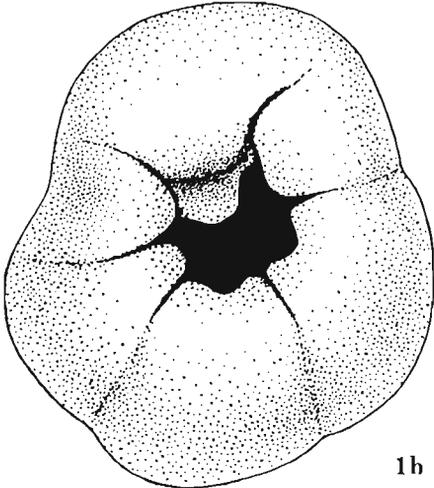
0,1mm



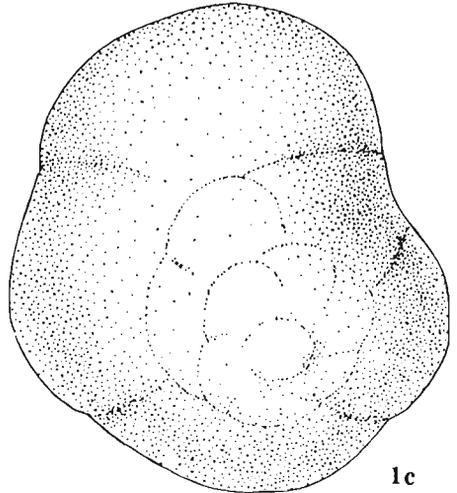
1a



2b



1b



1c

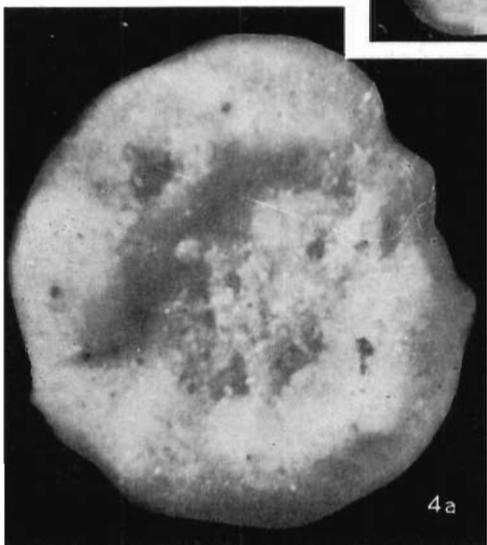
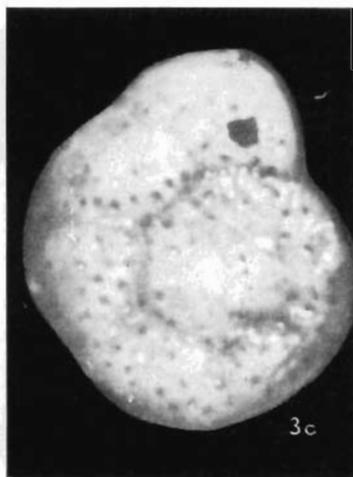
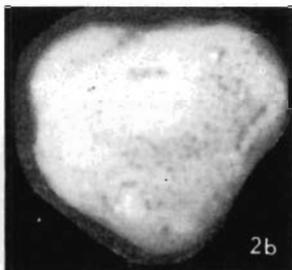
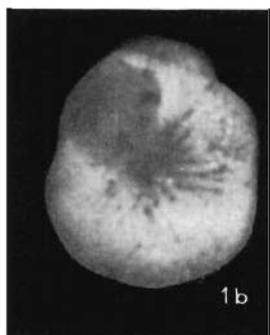
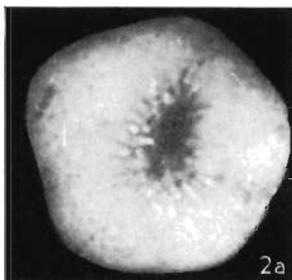
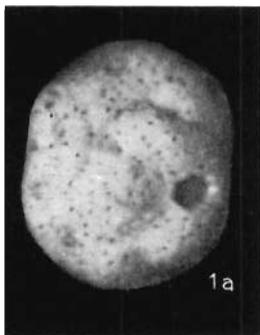


Plate II

Glabratella polonica n. sp.

Fig. 1. *a* dorsal view, *b* ventral view, paratype (Z. Pal. F. X/3), $\times 170$; Pamiętowo, depth 263.8 m, Montian.

Fig. 2. *a* ventral view, *b* side view, holotype (Z. Pal. F. X/4), $\times 170$; Pamiętowo, depth 263.8 m, Montian.

Boldia reinholdi Marie

Fig. 3. *a* ventral view, *b* side view, *c* dorsal view (Z. Pal. F. X/5), $\times 170$; Pamiętowo, depth 263.8 m, Montian.

Fig. 4. *a* dorsal view, *b* ventral view (Z. Pal. F. X/6), $\times 80$; Eysden (Belgium), Montian.

Plate III

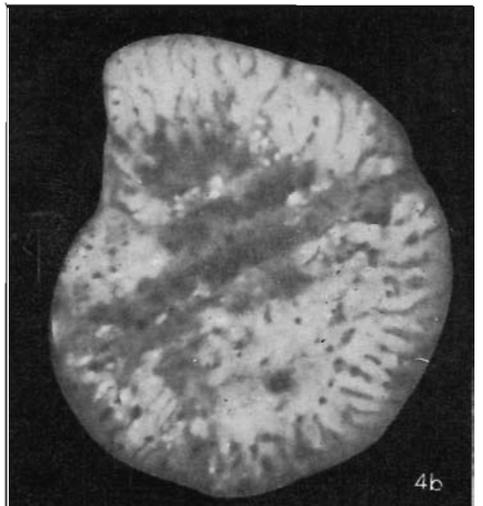
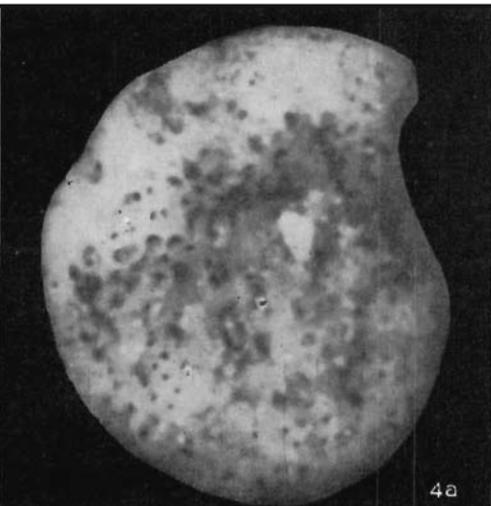
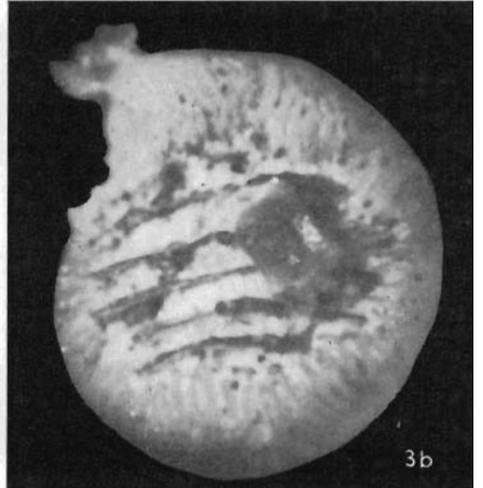
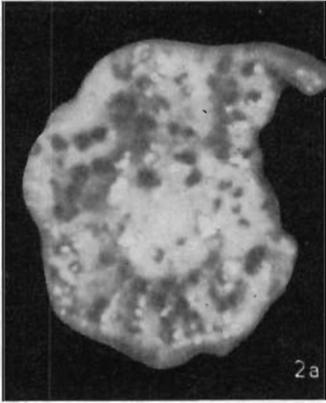
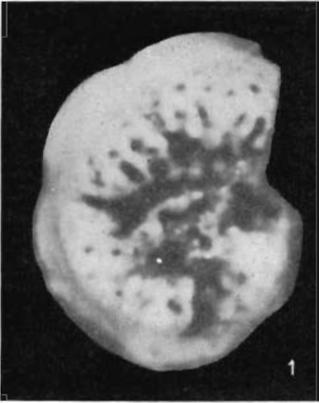
Boldia reinholdi Marie

Fig. 1. Ventral view (Z. Pal. F. X/7), $\times 170$; Pamiętowo, depth 210.7 m, Montian.

Fig. 2. *a* dorsal view, *b* ventral view (Z. Pal. F. X/8), $\times 170$; Pamiętowo, depth 210.7 m, Montian.

Fig. 3. *a* dorsal view, *b* ventral view (Z. Pal. F. X/9), $\times 150$; Bunde (Holland), Montian.

Fig. 4. *a* dorsal view, *b* ventral view (Z. Pal. F. X/10), $\times 150$; Puits Goffin (Belgium), stratotype of Montian.



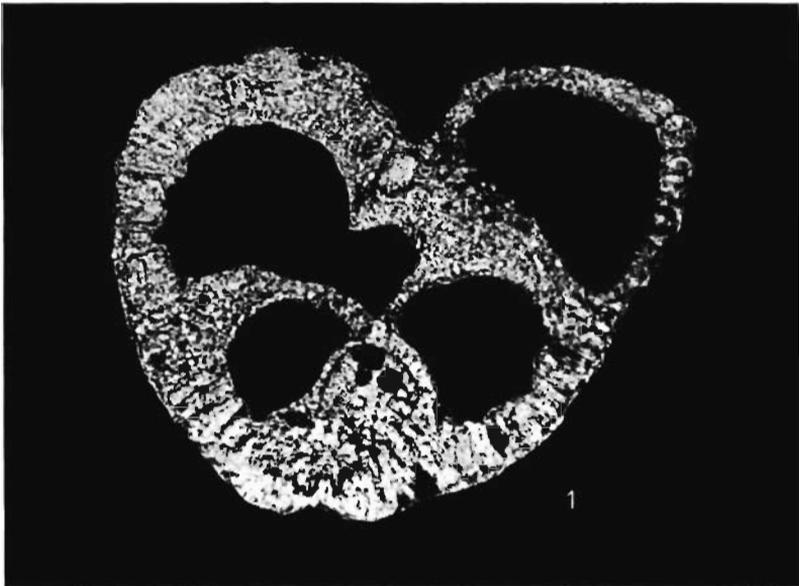


Plate IV

Glabratella polonica n. sp.

Fig. 1. Vertical thin section (Z. Pal. F. X/11), $\times 500$; Pamiętowo, depth 263.8 m, Montian.

Fig. 2. Equatorial thin section (Z. Pal. F. X/12), $\times 500$; Pamiętowo, depth 263.8 m, Montian.