Annales Societatis Geologorum Poloniae (1993), vol. 62: 293 - 308
PL ISSN0208-9068

AGE OF THE NOWA WIEŚ FORMATION (BARDZKIE MTS., MIDDLE SUDETES, SW POLAND)

Arkadiusz Głuszek[1] & Anna Tomaś[2]

[1] *Instytut Nauk Geologicznych PAN, Senacka 1, 31-002 Kraków*

[2] *Państwowy Instytut Geologiczny, Skrzatów 1, 31-560 Kraków*

Głuszek, A. & Tomaś, A., 1993. Age of the Nowa Wieś Formation (Bardzkie Mts., Middle Sudetes, SW Poland). *Ann. Soc. Geol. Polon.*, 62: 293 – 308.

Abstract: The Nowa Wieś Formation in the Bardzkie Mts. includes gneiss-limestone conglomerate, limestone conglomerate and nodular limestone in its uppermost portion. These sediments are exposed in the Dzikowiec - Nowa Wieś - Srebrna Góra zone and they have also been penetrated in the borehole Zdanów IG-1 at the depth interval 1601,9 - 1571,8 m. They contain abundant and diverse fauna, mainly crinoids, foraminifera, algae and bryozoans. The nodular limestone includes also common siliceous sponge spicules, radiolarians and calcispheres.

The fossil-bearing calcareous debris, which includes stratigraphically important foraminifera, was shed from a shallow-water area to the deeper part of the shelf. The fossils are almost contemporaneous with the sediment. During the deposition of nodular limestone this material was transported to the area of pelagic sedimentation.

The foraminiferal fauna is not mixed and it dates the calcareous part of the Nowa Wieś Formation at the Cf3 - Cf4 Zones (Uppermost Tournaisian - Lower Visean). This dating confirms the older dating by Paeckelmann (1930) and partly those by Górecka & Mamet (1970) and Chorowska (1973). It conflicts, however, with the datings by Chorowska & Radlicz (1984) and Haydukiewicz (1986). Therefore, the interpretation of Wajsprych (1986) based on the later datings is brought in question.

Key words: foraminifera, biostratigraphy, microfacies, Nowa Wieś Formation, Lower Carboniferous, Sudetes.

Manuscript received 9 September 1992, accepted 30 March 1993

INTRODUCTION

The Bardzkie Mts. which form a part of the Middle Sudetes have been described by Oberc (1957) as the Bardo structure (Fig. 1). The Bardo structure is composed of the Ordovician to Lower Carboniferous rocks, but it includes a thick sequence of Upper Devonian to Lower Carboniferous sedimentary rocks in its northern and north-western parts. The sequence contains detritic rocks of the Nowa Wieś Formation overlying the pelagic Tournaisian Gołogłowy sequence.

The detritic rocks of the Nowa Wieś Formation are exposed in the Dziko-

Fig. 1 Main structural units of the Middle Sudetes (after Geological Map of the Lower Silesia 1:200 000, simplified) and location of the studied outcrops; *KZSgm* – Kłodzko-Złoty Stok granitoid massif

wiec - Nowa Wieś - Srebrna Góra zone (Fig. 1). They were also penetrated by the borehole Zdanów IG-1, 2km south-east of Srebrna Góra.

The Nowa Wieś Formation originated due to redeposition of material from the eroded Sowie Mts. block which had appeared within a large, stable, deep-sea basin (Wajsprych, 1986). Its dating is crucial to the reconstruction of this stage in the tectonic and sedimentary evolution of the Middle Sudetes.

The age of the Nowa Wieś Formation has been established on the base of the fossils occurring in the upper calcareous part of the formation, formerly known as the Lower Carboniferous Limestone. The dating based upon macrofauna, foraminifera and conodonts, however, gave contradicting results. As a result these deposits were referred to various parts of the Visean or, in part, to uppermost Tournaisian and even to lowermost Namurian (Fig.2). Some auth-

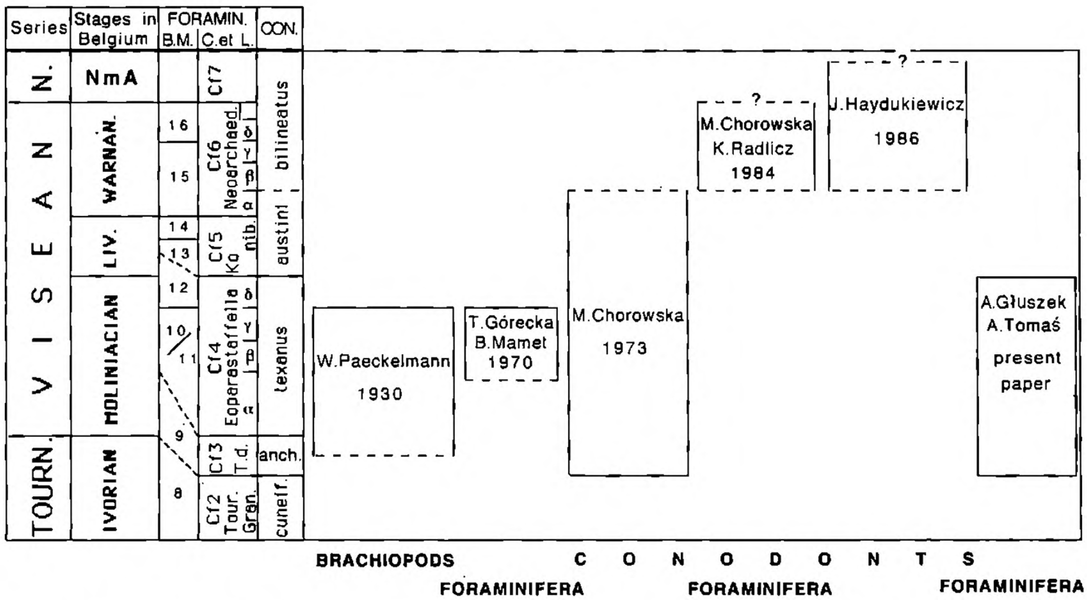


Fig. 2 The review of opinions on the age and stratigraphic relationships of the calcareous part of the Nowa Wieś Formation. Stratigraphic column after Paproth *et al.* (1983); conodont zonation after Bełka (1985); *B.M.* = B. Mamet, *C. et L.* = Conil & Lys

ors who hinted at a younger age of the formation suggested that the fauna occurs in matrix and clasts.

Our study concerned:

(1) The redefinition of the upper boundary of the Nowa Wieś Formation, based on its most representative outcrops, not shown in the earlier literature. We also propose a correlation between calcareous portion of the Nowa Wieś Formation and an interval of the borehole Zdanów IG-1.

(2) The microfacies nature of the fossil-bearing sediment.

(3) The re-examination of the foraminiferal fauna with discussion on the age of the formation. This is based upon the author's material from outcrops and the borehole.

GEOLOGICAL SETTING

The Bardo structure is situated at the northeastern edge of the Bohemian Massif, about 70 km south of Wrocław. It forms nearly central part of the Middle Sudetes between the Sowie Mts. gneiss block, Intra-Sudetic synclinorium, Kłodzko structure and Kłodzko - Złoty Stok granitoid massif. The Sudetic marginal fault separates this unit from the Niemcza zone on the north-east.

The northern and the north-western part of the Bardo structure in the area between Dzikowiec and Srebrna Góra is composed of Upper Devonian to

Lower Carboniferous sedimentary rocks (Oberc, 1957, 1987; Wajsprych, 1978, 1979, 1980, 1986; Żakowa, 1963). The section is shown in Fig. 3. The Srebrna Góra sequence does not possess any biostratigraphical documentation. The northern part of the Bardo structure which is framed by the Sowie Mts. gneiss block is built of autochtonous sequences of the Nowa Wieś Formation and the Srebrna Pass flysch series. Both of them dip about 60° towards the south forming a monoclinal structure named the Ostróg Monocline (Oberc, 1972). Above the Ostróg Monocline there is an allochtonous cover formed by the Ostróg Mt. series and the Brzeźnica unit (Wajsprych, 1986).

The north-western part of the Bardo structure in the Dzikowiec area is composed of the Kłodzko Limestone Formation, Gołogłowy sequence, Nowa Wieś Formation and Srebrna Pass flysch, all dipping about 60° towards NE.

Westwards, a reverse fault cuts off these series from the Laramide compressional Czerwieńczyce Graben which belongs to the Intra-Sudetic Synclinorium and is filled mainly with the Rotliegendes strata. In the northeast, the mentioned rock series are separated from the Ostróg Monocline sequences by the Wolibórz Syncline (all after Oberc, 1972). This syncline is a branch of the Intra-Sudetic Synclinorium and it includes biostratigraphically defined coal-bearing Namurian A deposits overlying the rocks of the Dzikowiec - Srebrna Góra zone (Krawczyńska-Grocholska, 1966, *vide* Oberc, 1987).

NOWA WIEŚ FORMATION

The Nowa Wieś Formation has been defined by Wajsprych (1978). This formation occurs in the Dzikowiec - Nowa Wieś - Srebrna Góra zone (Fig. 1) and it is exposed in the old quarries and at cog-railway cutting escarpments. In the Wolibórz - Nowa Wieś - Srebrna Góra belt the basement of the formation is built probably of the Sowie Mts. gneiss (Pacholska, 1978, 1979). In the Dzikowiec area, the Nowa Wieś Formation overlies uppermost brecciated fragments of the Kłodzko Limestone Formation and black shale of the Gołogłowy sequence.

The Nowa Wieś Formation comprises (from bottom to top; compare Fig. 3):

– gneissic sandstone which forms the lowermost part of this formation in the Dzikowiec area. The sandstone contains fragments of gabbro and black shale in the bottom part as well as very rare, thin intercalations of calcarenite in the top part. Its thickness varies from 70 to 175 m (Pacholska, 1987);

– gneissic breccia which forms the lowermost part of this formation in the remaining area. It contains some dark shale fragments in the Podlesie area (Pacholska, 1978). It occurs between Podlesie (with maximum thickness of 110 m) and Nowa Wieś (Pacholska, 1987);

– gneissic conglomerate which contains up to 10% of limestone, gneissic sandstone and conglomerate fragments as well as bioclasts. Its thickness varies from about 150 m (the Podlesie area) to about 30 m (the Srebrna Góra area) with the maximum of 240 m in the Nowa Wieś area (Pacholska, 1987);

– gneiss-limestone conglomerate with inserts of calciferous sandstone. The total content of both limestone fragments and carbonate cement varies from 10 to 50% of the volume of the conglomerate.

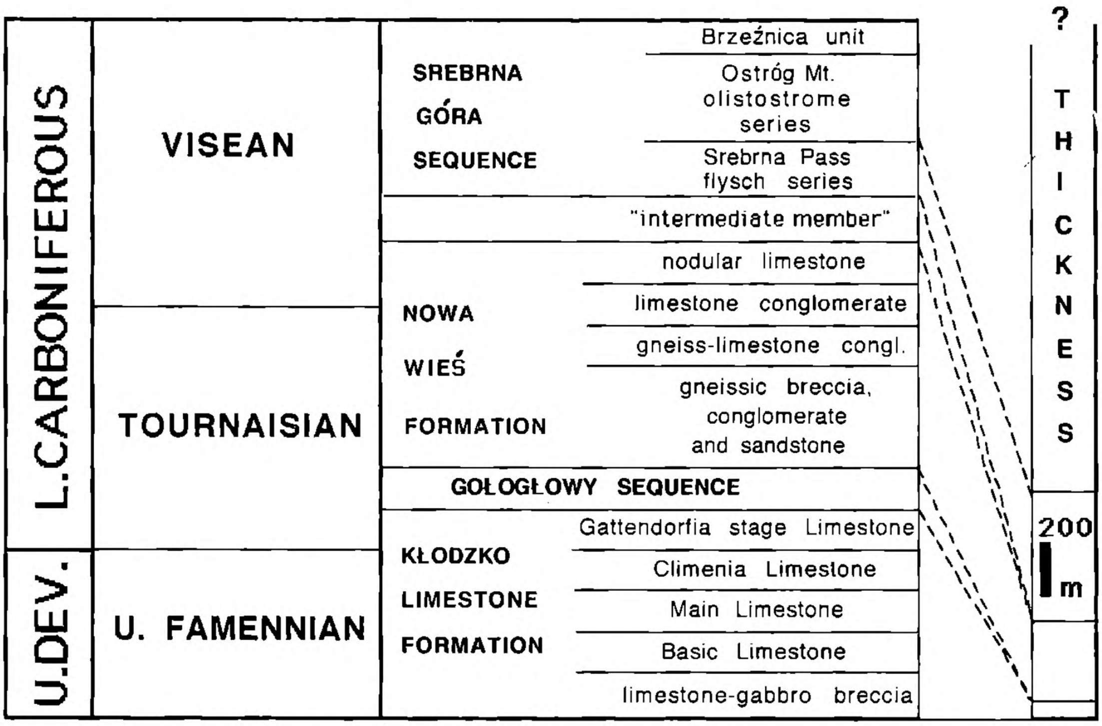


Fig. 3 Generalised succession of sedimentary rocks in the northern and north-western parts of the Bardo structure

The maximum thickness does not exceed 10 m;

– limestone conglomerate passing upwards into biocalcarenite. Its thickness in Dzikowiec exceeds 12 m. A nodular structure is observed in Srebrna Góra (SG-2).

– nodular limestone with intercalations of limestone conglomerate and occasionally biocalcarenite. Diverse plastic deformations are frequent within the limestone. The largest thickness of the limestone (about 9 m) is observed at Nowa Wieś.

A mudstone sequence occurs above the nodular limestone and below the Srebrna Pass flysch. It is exposed in the vicinities of Nowa Wieś and Srebrna Góra. The lower part of the sequence includes thin layers and lenses of biocalcarenite, bioclastic breccia, tuffite and calciferous sandstone, as well as small limestone and marl nodules. Chorowska & Radlicz (1984) reported that at Dzikowiec in an outcrop not shown in this paper, a rhyolitic tuff occurs above the nodular limestone. Wajsprych (1978, 1979, 1980) incorporated the mudstone sequence to the uppermost portion of the Nowa Wieś Formation but he did not define precisely the top of the formation. We propose to exclude the mudstone sequence from the formation because of its differing lithology. We propose to define the top of the Nowa Wieś Formation at the highest surface of the limestone complex. The excluded, several metres thick mudstone sequence could be temporary distinguished as an "intermediate member" because it underlays the Srebrna Pass flysch.

CALCAREOUS PART OF THE NOWA WIEŚ FORMATION IN THE BOREHOLE ZDANÓW IG-1

The borehole penetrated various sedimentary series above the Sowie Mts. gneiss (crystalline basement depth 1908.6 m) (Chorowska *et al.*, 1985). However, their age still raises some problems. Lowermost Tournaisian and Uppermost Visean faunas were reported from the Carboniferous part of the section by Chorowska *et al.* (1985, 1986). The biostratigraphical studies by the present authors do not confirm these results.

The top of the limestone sequence from the depth interval 1861.3 - 1757.5 m contains Uppermost Devonian (Strunian, Df3 Zone) (Pl. V: 1-2) bioclastic grainstone similar to that in the Kłodzko Limestone Formation.

The lithological nature of the sedimentary sequence in the depth interval 1601.9 - 1571.8 m is very similar to that of the calcareous upper part of the Nowa Wieś Formation. Correlation of these deposits (Fig. 4) is supported by our microfacies and biostratigraphical studies presented in the following part of the paper.

MICROFACIES OF THE FOSSIL-BEARING SEDIMENT

Material

We have sampled five representative outcrops of the upper part of the Nowa Wieś Formation (Figs 1, 4). The outcrop numbers are the same as in Chorowska & Radlicz (1984). Samples were also taken from the depth interval 1601.9 - 1571.8 m of the borehole Zdanów IG-1.

Microfacies

Fossils are abundant in thin sections of the limestone conglomerate and nodular limestone. They also appear though are less numerous in some layers within the gneiss-limestone conglomerate. The following microfacies have been distinguished in these fossil-bearing sediments (from bottom to top of the section):

– polymictic calciferous sandstone (Pl. I: 2). Total content of noncalcareous components oscillates between 50 and 70%. The particles include terrigenous quartz, gneiss, schist, feldspar, mica and limestone fragments. The quartz grains are angular or poorly rounded, often cracked, corroded and sometimes with syntaxial over-growth within micritic coats. Limestone particles contain predominantly intraclasts and bioclasts as well as ooids and peloids. Well rounded, micritized intraclasts consist of micrite, biomicrite and microsparite. Bioclasts include skeletal fragments of crinoids, bryozoans, brachiopods, foraminifera, algae (*Girvanella, Koninckopora, Asphaltina*, Solenoporaceae) and echinoid spines. The matrix of the sandstone usually consists of syntaxial rim cement.

– polymictic calcarenite and calcirudite (Pl. I: 1, 3, 4; Pl. II: 1-3; Pl. III; Pl. IV: 2) are mainly composed of bioclasts and intraclasts as well as variable quantity of extraclasts and sparry cement. They also include peloids, coated and aggregate grains as well as dispersed pyrite and iron oxide. The proportions of the main particles and terrigenous quartz are variable. Abundant crinoid plates and common foraminiferal tests and bioclasts of algae (*Girvanella, Ortonella, Koninckopora, Kamaena, Asphaltina*, Stacheiinae, Solenoporaceae), bryozoans as well as less common brachiopods, pelecypods, corals, gastropods, ostracods and calcispheres are not rounded, though large skeletons are often broken. Many bioclasts are micritized and coated by oncoid type laminae. Some organic fragments are recrystallized and they are marked only by micrite envelopes which are relatively resistant to dissolution. Sometimes there are borings within bioclasts. Silicification of bioclasts is common. Intraclasts are represented by micrite, biomicrite, biosparite, algal biolithite, fragments of stromatolite structure, microsparite, sparite, intrabiosparite. Their size varies from fine sand to pebble. Intraclasts are rounded, oval, seldom irregular but sometimes with slightly obliterated outlines. Some of them have micritic coats or they are completely micritized. Extraclasts (vol. 5-25 %) are composed of terrigenous quartz, mica, fragments of gneiss, crystalline schists, metamorphic rocks, feldspars. The extraclasts have sand to pebble grain size and are slightly rounded. Some of the cracked monocristalline and polycristalline quartz grains with traces of dissolution display crystal regeneration within micritic coats. Feldspars are occasionally kaolinitized as described by Łapot (1986). Coated grains are represented by oncoids and both superficial and normal ooids. Their nuclei contain various particles but bioclasts and quartz are the most frequent. Micritization of earlier micritized grains is also observed. Predominant sparry cement is partly neomorphic.

The nodular limestone (Pl. II: 4; Pl. IV: 1) comprises the following microfacies:

– well-sorted biopelmicrite (bioclastic-peloidal wackestone) which forms nodules embedded in marly, wavy-streaky groundmass. The nodules are on the average 1-3 cm in size. Grading and cross-lamination are common in the nodules. The structure of the groundmass is emphasized by the orientation of mica flakes and bioclasts, likewise by the distribution of marl-tuffite streaks. Sharp outlines of nodules are rare. Most often they pass gradually upwards into the marly groundmass in their top parts.

The particles include bioclasts, peloids and rare lithoclasts. The bioclasts include remains of echinoderms, foraminifera, bryozoans, ostracods, brachiopods, algae (*Girvanella*, *Kamaena*, Solenoporaceae) as well as siliceous sponge spicules and radiolarians. The skeletons are broken and abraded. The extraclasts (up to 5% vol.) consist of monocrystalline terrigenous quartz and rare mica. Well rounded intraclasts are composed of micrite and biomicrite. Both bioclasts and intraclasts are partly micritized. Crinoid plates are coated by syntaxial rims.

– poorly sorted biosparenite (bioclastic grainstone) with random structure and intercalation of wavy and discontinuous laminae of very fine biomicrite.

Particles include bioclasts as well as intraclasts, coated grains, peloids and extraclasts. The bioclasts include crinoids, foraminifera, calcispheres, algae (*Girvanella*, *Kamaena*, Solenoporaceae), bryozoans, ostracods, echinoid spines, brachiopods, corals, radiolarians. The skeletons are commonly broken and rounded. The intraclasts contain well rounded fragments of micrites, biolithites and microsparites. Both, bioclasts and intraclasts are partly micritized. Among the coated grains, superficial ooids are more common than the normal ones. The micrite envelopes are developed on various particles but most frequently on bioclasts and quartz grains. The extraclasts (up to 5% vol.) are composed of monocristallic and polycristallic quartz, feldspar and mica. The matrix is built of micritic, mosaic and syntaxial rim cement.

Taking into consideration the presence of shallow-water benthic communities and the concurrence of particles from various shallow-water depositional environments as well as the symptoms of periodically repeated reworking of the sediment, it seems that the debris was shed from a shallow-water area to the deeper part of the shelf. In the zones of biogenic production, the primary biogenic accumulation was interrupted periodically by the destructive processes which excluded the possibility of *in situ* preservation of a primary deposit which was also suggested by Wajsprych (1986). As far as the fossils are concerned, they may be considered as almost contemporaneous with the redeposited sediment.

The nodular limestone contains, beside shallow-water fauna, radiolarians and siliceous sponge spicules which are typical of the deeper slope and basin (Wood & Armstrong, 1975; Wilson, 1975). This suggests that during the deposition of the nodular limestone, bioclasts were transported to the area of pelagic sedimentation.

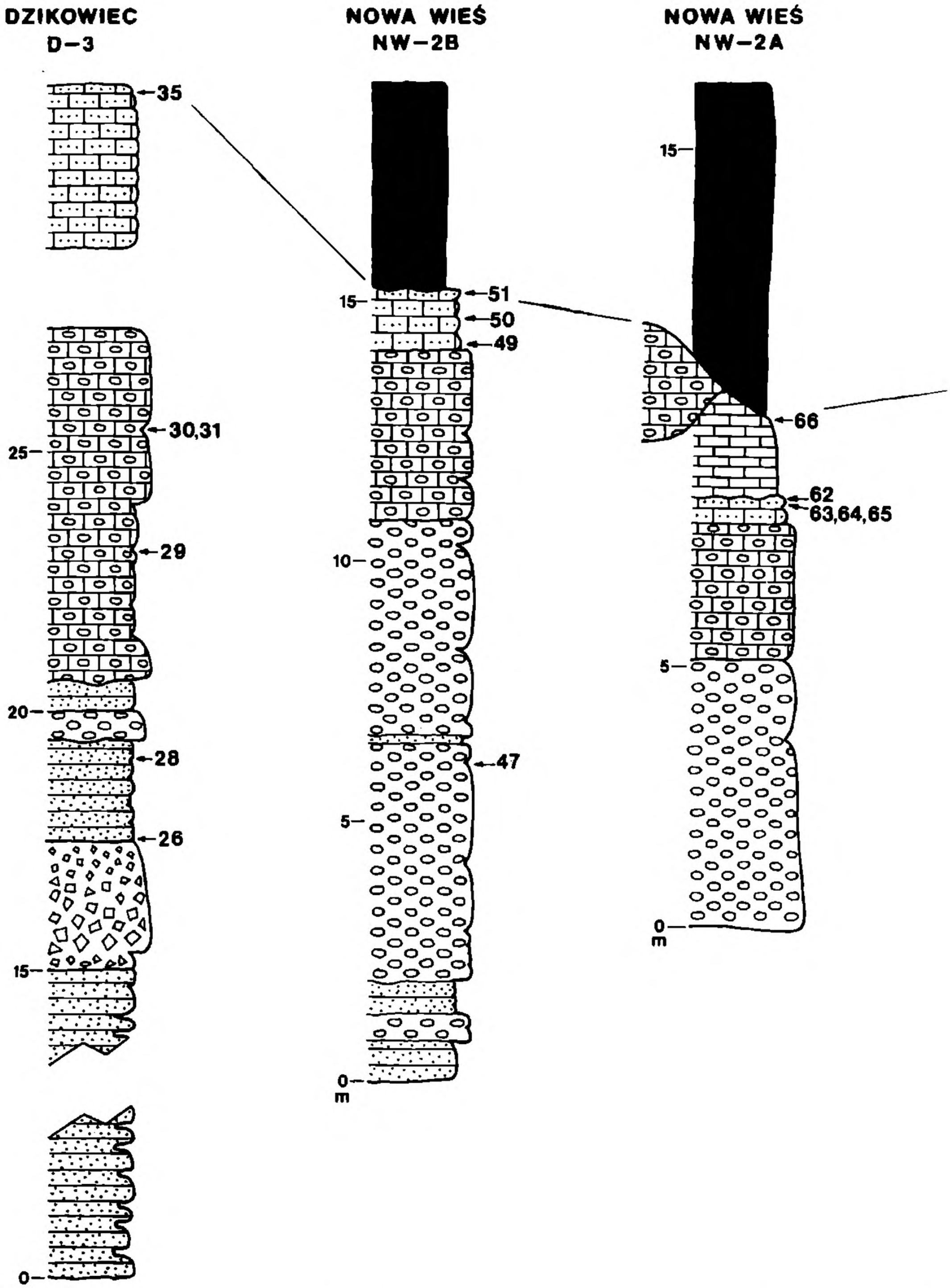
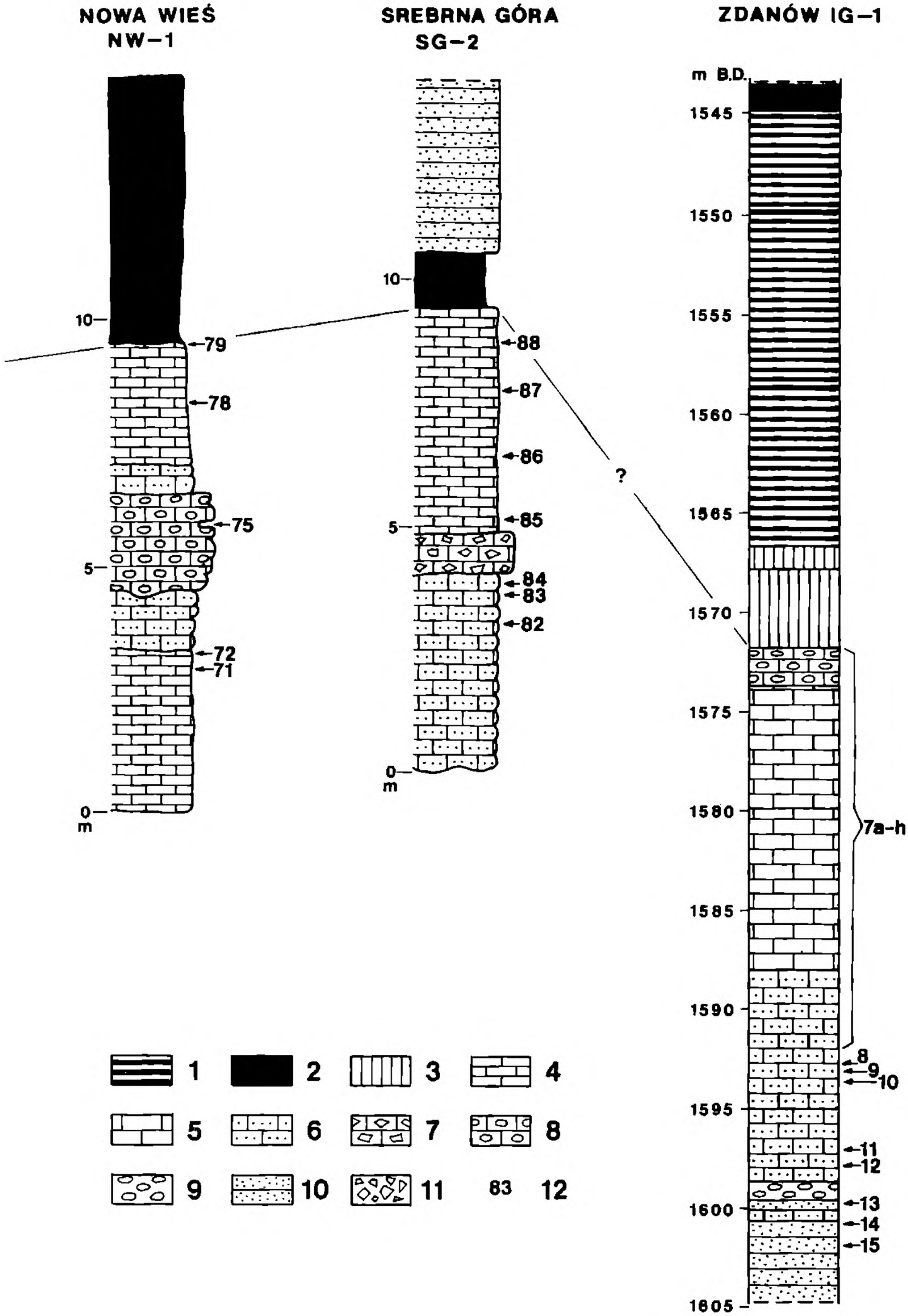


Fig. 4 Lithological sections of the investigated outcrops and corresponding fragment of the borehole (Zdanów IG-1 section after Chorowska *et al.*, 1985; simplified and modified in parts where core material was preserved) with correlation of the top of the Nowa Wieś Formation. The Nowa Wieś and Srebrna Góra sections represent the upper portion of the formation; *1* – laminated calcareous-siliceous deposits; *2* – mudstone sequence; *3* – tuff; *4* – nodular limestone; *5* – limestone (?nodular l.); *6* – biocalcarenite; *7* – limestone breccia; *8* – limestone conglomerate; *9* – gneiss-limestone conglomerate; *10* – gneissic sandstone (*SG-2* – greywacke of the Srebrna Pass flysch); *11* – gneissic breccia; *12* – numbers and location of samples with foraminifera


NOWA WIEŚ
NW-1
SREBRNA GÓRA
SG-2
ZDANÓW IG-1
m B.D.
1545
1550
1555
1560
1565
1570
1575
1580
1585
1590
1595
1600
1605
10
5
0
m
79
78
75
72
71
88
87
86
85
84
83
82
?
7a-h
8
9
10
11
12
13
14
15
1 2 3 4
5 6 7 8
9 10 11 83 12

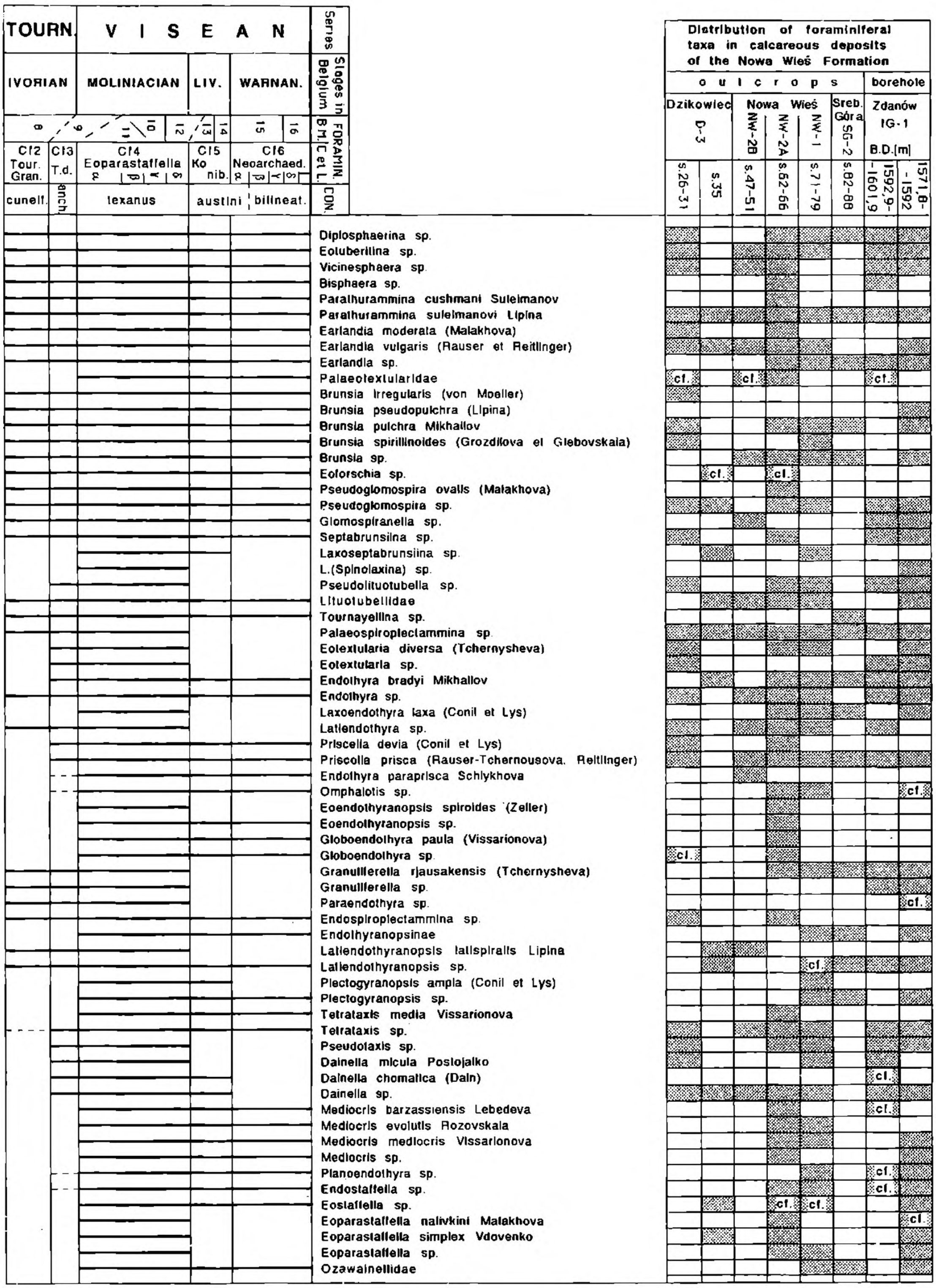


Fig. 5. Distribution of foraminiferal taxa in the Nowa Wieś Formation and their stratigraphic ranges in Belgium and in investigated outcrops. Stratigraphical scheme after Paproth *et al.* (1983) with conodont zonation after Belka (1985).

BIOSTRATIGRAPHY

The rich and high diversified foraminiferal fauna from the studied formation is listed in Figure 5 and illustrated in Plates V - VIII (excepting Pl. V: 1-2).

Beside long-lived foraminiferal taxa, the deposits of the calcareous part of the Nowa Wieś Formation (*e.g.* lower section of Dzikowiec D-3, Nowa Wieś NW-2B, depth interval 1592.9 - 1601.9 m of the borehole Zdanów) contain taxa which appear in the Uppermost Tournaisian and range into the Visean. These deposits do not contain the exclusively Tournaisian taxa and their age is determined by the distinctive concurrence of primitive *Eotextularia*, Tetrataxidae, *Dainella*. Such assemblage suggests the Cf3 Zone (Fig. 6) *i.e.* the Uppermost Tournaisian (Conil *et al.*, 1976, 1979, 1989; Kalvoda, 1990).

The deposits in Dzikowiec D-3 (upper section), Nowa Wieś NW-2A, NW-1, Srebrna Góra SG-2 and in depth interval 1571.8 - 1592 m of the borehole Zdanów, contain long-lived taxa occurring from the Tournaisian but also Lower Visean (Cf4 Zone) index taxa (Conil & Lys, 1964; Conil *et al.*, 1976, 1979, 1989; Armstrong & Mamet, 1977; Kalvoda, 1990).

None of the samples contains Archaediscidae which first appear at the base of the Cf4β Subzone (Conil & Lys, 1964; Conil *et al.*, 1976, 1979, 1989; Armstrong & Mamet, 1977; Kalvoda, 1990). Based on the absence of Archaediscidae, the deposits of the Nowa Wieś Formation may be considered older than the Cf4β Subzone (Kalvoda, 1990). Otherwise, the absence of this taxon could be due to unfavourable environmental conditions (Conil *et al.*, 1979). It might be also caused by abrasion and other processes (*e.g.* micritization) obscuring the diagnostic features on innumerable tests of Archaediscidae.

All investigated foraminifera were found in matrix. Contrary to the previous authors (Chorowska & Radlicz, 1984, p. 266 and 271), we suggest that the foraminiferal assemblages do not contain any admixed specimens.

DISCUSSION

The age of the Nowa Wieś Formation has been established on the base of the fossils occurring in its calcareous top part (Fig. 2). Paeckelmann (1930) assigned these deposits to the *Pericyclus* IIβ and IIγ Stufe, basing mostly on brachiopod fauna. Górecka & Mamet (1970) described microfacies of the sediments from the Nowa Wieś and Dzikowiec areas. The coexistence of *Dainella*, *Propermodiscus* and primitive *Stacheoides* suggests, in their opinion, the late Early Visean age (Zone 11) of these deposits. However, only *Propermodiscus* first appearing in the late early Visean is the Visean index taxon (Conil & Lys, 1964). Unfortunately, these authors did not include photographs of this stratigraphically important "common" form. Chorowska

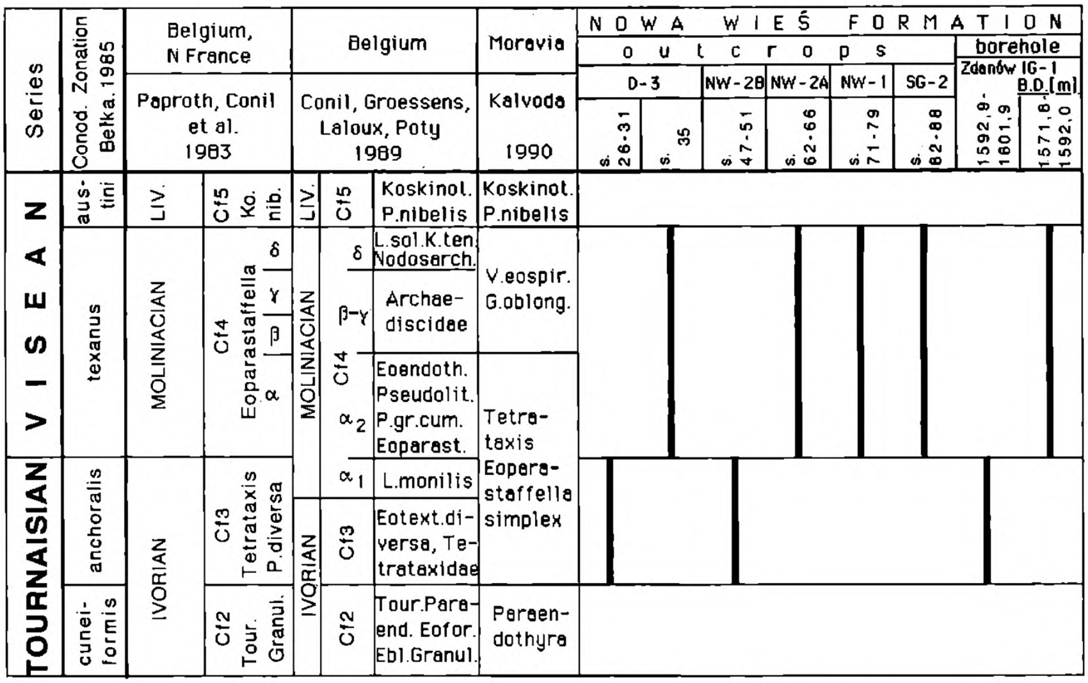


Fig. 6 Stratigraphic position of the upper part of the Nowa Wieś Formation.

(1973) reported the conodont *anchoralis* Zone in Dzikowiec. She also dated the higher part of the "Lower Carboniferous Limestone" from Dzikowiec, Nowa Wieś and Srebrna Góra at the Cu IIδ Zone not excluding the possibility that it might be referred to the Cu IIIα Zone. More recently a late Visean (Chorowska & Radlicz, 1984) or late Visean-early Namurian (Haydukiewicz, 1986) age of these deposits was suggested basing on foraminiferal and conodont studies. In the above autors opinion the microfauna contains taxa derived from different stratigraphical levels. These stratigraphic conclusions were chiefly based on the presence of conodonts of the genus *Gnathodus*. This genus, however, was recently revised. Considering this revision Chorowska (pers. commun., 1992) now agrees with our opinion discussed in the previous section of this paper.

The results of our study show that the investigated foraminifera occur in matrix and their assemblages do not contain any admixed species. The microfacies nature of the fossil-bearing calcareous debris which includes the foraminifera reveales that the debris was shed from a shallow-water area to the deeper part of shelf. It seems that the primary biogenic accumulation was interrupted periodically which resulted in the formation of sediment almost contemporaneous with the included fossils.

We thus conclude that the foraminiferal fauna is not mixed and it dates the calcareous part of the Nowa Wieś Formation at the Cf3 - Cf4 Zones (Fig. 6) *i.e.* Uppermost Tournaisian - Lower Visean.

Wajsprych's (1986) latest interpretation of the tectonic and sedimentary evolution of the Middle Sudetes, based on the conodont dating by Haydukiewicz (1986), was that the background sedimentation persisted throughout the Visean and the allodapic limestone is intercalated in the Upper Visean part of the nodular limestone. The presented results require modification of this model.

Acknowledgements

The authors offer their sincere thanks to Dr. M. Paszkowski, Polish Academy of Sciences (Kraków) for his encouragement and fruitful discussions, and Dr. M. Chorowska, Geological Survey (Wrocław) for discussion on the latest conodont biostratigraphy. We are also indebted to Prof. G. Haczewski, Polish Academy of Sciences (Kraków), Dr. S. Skompski, University of Warsaw and Prof. E. Turnau, Polish Academy of Sciences (Kraków) for helpful criticism of the manuscript.

REFERENCES

Armstrong, A .K. & Mamet, B. L., 1977. Carboniferous microfacies, microfossils and corals, Lisburne Group, Arctic Alaska. *U.S. Geol. Survey, Prof. Paper*, 849: 1 – 144.

Belka, Z., 1985. Lower Carboniferous conodont biostratigraphy in the northeastern part of the Moravia-Silesia Basin. *Acta Geol. Polon.*, 35(1-2): 33 – 60.

Chorowska, M., 1973. Stratygrafia wapienia węglowego Gór Bardzkich na podstawie konodontów. (In Polish only). *Sprawozdania z posiedzeń naukowych I.G. Kwart. Geol.*, 17(4): 917 – 918.

Chorowska, M., Maciejewski, S., Milewicz, J., Radlicz, K. & Siemiątkowski, J., 1985. Badania wgłębnej budowy geologicznej Sudetów – struktura bardzka. Dokumentacja wynikowa otworu Zdanów IG-1. (In Polish only, unpublished). *Arch. Mat. Geol. I.G.*, Warszawa.

Chorowska, M., Milewicz, J. & Radlicz, K., 1986. Wstępne wyniki otworu wiertniczego Zdanów IG-1. (In Polish only). *Przegl. Geol.*, 10: 596 – 597.

Chorowska, M. & Radlicz, K., 1984. Carboniferous limestones and conglomerates in western part of the Bardo structure. (In Polish, English Summary). *Kwart. Geol.*, 28(2): 251 – 290.

Conil, R., Groessens, E., Laloux, M. & Poty, E., 1989. La limite Tournaisien / Viseen dans la region-type. *Ann. Soc. Geol. Belg.*, 112(1): 177 – 189.

Conil, R., Groessens, E. & Pirlet, H., 1976. Nouvelle charte stratigraphique du Dinantien type de la Belgique. *Ann. Soc. Geol. Nord*, 96(4): 363 – 371.

Conil, R., Longerstaey, P. J. & Ramsbottom, W. H. C., 1979. Materiaux pour l'etude micropaleontologique du Dinantien de Grande Bretagne. *Mem. Inst. Geol. Univ. Louvain*, 30: 1 – 187.

Conil, R. & Lys, M., 1964. Materiaux pour l'etude micropaleontologique du Dinantien de la Belgique et de la France (Avesnois). *Mem. Inst. Geol. Univ. Louvain*, 23: 1 – 372.

Górecka, T. & Mamet, B., 1970. Sur quelques microfacies carbonates paleozoiques des Sudetes polonaises (Monts de Bardo). *Rev. Micropaleont.*, 13(3): 155 – 164.

Haydukiewicz, J., 1986. Stratigraphy of the Carboniferous deposits in northern part of the Góry Bardzkie, Sudetes. *Geol. Sudetica*, 21(2): 143 – 148.

Kalvoda, J., 1990. Foraminiferal zonation of the Upper Devonian and Lower Carboniferous in Moravia (Czechoslovakia). *Acta Musei Moraviae, Scientiae Naturales*, 75(1/2): 71 – 93.

Łapot, W., 1986. Some aspects of the diagenesis of the so-called Lower Carboniferous Limestone of the Bardzkie Mts. (In Polish, English Summary). *Geol. Sudetica*, 21(2): 129 – 142.

Oberc, J., 1957. Region Gór Bardzkich (Sudety). Przewodnik dla geologów. (In Polish only). Wyd. Geol.; Warszawa, 284 pp.

Oberc, J., 1972. Sudety i obszary przyległe. *Budowa geologiczna Polski*, vol. IV: *Tektonika*, cz. II., Wyd. Geol.; Warszawa, 306 pp.

Oberc, J., 1987. Struktura bardzka jako reper rozwoju waryscydów wschodniej części Sudetów Zachodnich i ich przedpola. *Przewodnik LVIII Zjazdu Pol. Tow. Geol., Wałbrzych, 17-19 września 1987*, Wyd. AGH; Kraków, pp. 165 – 180.

Pacholska, A., 1978. On the tectonic breccia at southern edge of the Sowie Mts. gneiss block. (In Polish, English Summary). *Geol. Sudetica*, 13: 41 – 63.

Pacholska, A., 1979. *Brekcje tektoniczne południowego brzegu bloku sowiogórskiego i ich stosunek do dolnokarbońskich brekcji osadowych Gór Bardzkich.* (In Polish only). Unpublished Ph. D. thesis. Arch. Inst. Nauk Geol. PAN, Warszawa.

Pacholska, A., 1987. Piaskowce gnejsowe na wschodniej ścianie kamieniołomu w Dzikowcu. (In Polish only). *Przewodnik LVIII Zjazdu Pol. Tow. Geol., Wałbrzych, 17-19 września 1987*, Wyd. AGH, Kraków, pp. 190 - 191 and 193 – 194.

Paeckelmann, W., 1930. Die Brachiopoden des deutschen Unterkarbons. *Abh. Preuss. Geol. Landesanst, N. F.*, 122: 147 – 303.

Paproth, E., Conil, R., Bless, M.J.M., Boonen, P., Bouckaert, J., Carpentier, N., Coen, M., Delcambre, B., Deprijck, Ch., Deuzon, S., Dreesen, R., Groessens, E., Hance, L., Hennebert, M., Hibo, D., Hahn, G.& R., Hislaire, O., Kasig, W., Laloux, M., Lauwers, A., Lees, A., Lys, M., Op de Beek, K., Overlau, P., Pirlet, H., Poty, E., Ramsbottom, W., Streel, M., Swennen, R., Thorez, J., Vanguestaine, M., Van Steenwinkel, M., Vieslet, J.L., 1983. Bio- and lithostratigraphic subdivisions of the Dinantian in Belgium. A Review. *Ann. Soc. Geol. Belg.*, 106(2): 185 – 239.

Wajsprych, B., 1978. Allochtonous Palaeozoic rocks in the Visean of the Bardzkie Mts. (Sudetes). (In Polish, English Summary). *Ann. Soc. Geol. Pol.*, 48: 99 – 127.

Wajsprych, B., 1979. *Sedymentacja osadów dolnego karbonu północnej części Gór Bardzkich i jej tektoniczna interpretacja.* (In Polish only). Unpublished Ph. D. thesis. Arch. Inst. Nauk Geol. PAN, Warszawa.

Wajsprych, B., 1980. Sedimentation of Lower Carboniferous deposits in northern part of the Góry Bardzkie versus allochtonism problem. (In Polish, English Summary). *Materiały Konferencji Terenowej. Srebrna Góra, 20-21 września 1980*, Wrocław, pp. 76 – 85.

Wajsprych, B., 1986. Sedimentary record of tectonic activity on a Devonian-Carboniferous continental margin, Sudetes. In: Teisseyre, A.K. (ed.), *IAS 7th European Regional Meeting, Excursion Guidebook, Kraków - Poland*, Ossolineum, Wrocław, pp. 141 – 164.

Wilson, J.L., 1975. *Carbonate facies in geologic history.* Springer; Berlin - Heidelberg - New York, pp. 1 – 471.

Wood, G.V. & Armstrong, A.K., 1975. Diagenesis and stratigraphy of the Lisburne Group Limestones of the Sadlerochit Mountains and Adjacent Areas, Northeastern Alaska. *U.S. Geol. Survey, Prof. Paper*, 875: 1 – 47.

Żakowa, H., 1963. Stratigraphy and facial extends of the Lower Carboniferous in Sudetes. (In Polish, English Summary). *Kwart. Geol.*, 7(1): 73 – 94.

Streszczenie

WIEK FORMACJI NOWEJ WSI (GÓRY BARDZKIE, SUDETY ŚRODKOWE).

A. Głuszek & A. Tomaś

Górna część formacji Nowej Wsi zbudowana jest ze zlepieńców gnejsowo-wapiennych, zlepieńców wapiennych i wapieni gruzłowych (Fig. 3, 4). Utwory te odsłaniają się w strefie Dzikowiec - Nowa Wieś - Srebrna Góra oraz występują w otworze Zdanów IG-1 (Fig. 1) na głębokości 1571,8 - 1601,9 m. Strop formacji ustalono na górnej powierzchni zwartego kompleksu utworów wapiennych.

Utwory te zawierają bogatą i zróżnicowaną faunę, która zdominowana jest przez liliowce, otwornice, glony, mszywioły a w wapieniach gruzłowych liczne są dodatkowo krzemionkowe spikule gąbek, radiolarie oraz kalcisfery (Pl. I-IV).

Wszystkie stwierdzone otwornice (Pl. V-VIII) występują w matriks i są formami płytkowodnymi. Zamieszkiwały one obszar o cechach szelfu węglanowego. Wraz z biogenicznym rumoszem wapiennym znoszone były sukcesywnie do głębszych rejonów szelfu. Można więc przyjąć ich równowiekowość z osadem. W wapieniu gruzłowym występują one razem z krzemionkowymi spikulami gąbek i radiolariami co świadczy o tym, że znalazły się w obcym dla nich środowisku basenowym w efekcie transportu grawitacyjnego.

Zespół otwornic nie wykazuje cech wymieszania stratygraficznego. Na ich podstawie ustalono, że górna część formacji Nowej Wsi odpowiada przedziałowi czasowemu – najmłodszy późny turnej (zona Cf 3) - wczesny wizen (zona Cf 4) (Fig. 5, 6).

Tak ustalony wiek formacji Nowej Wsi potwierdza datowania Paeckelmanna (1930) oraz częściowo Góreckiej i Mamet'a (1970) i Chorowskiej (1973) (Fig. 2). Stoją z nim natomiast w sprzeczności datowania Chorowskiej i Radlicza (1984) oraz Haydukiewicz (1986) co prowadzi do częściowego zakwestionowania interpretacji Wajsprycha (1986), który się na nich oparł.

EXPLANATION OF PLATES

Plate I

1 — Calcarenite (laminated biomicrite-biosparite). Sample 62c. Thin section, x 3
2 — Calciferous sandstone. Sample 14. Thin section, x 3
3 — Calcirudite (sandy biointramicrudite). Sample 49. Thin section, x 3
4 — Calcarenite (sandy biosparenite with blue-green algal "mat" clasts). Sample 10. Thin section, x 3

Plate II

1 — Calcarenite (sandy biosparenite). Sample 26. Thin section, x 3
2 — Calcarenite (sandy biosparenite). Sample 35. Thin section, x 3
3 — Calcarenite (sandy biomicarenite). Sample 83. Thin section, x 3
4 — Nodular limestone; nodule fragment (biosparenite). Sample 71. Thin section, x 3

Plate III

1 — Calcirudite (intrabiosparudite with bored blue-green algal "mat" fragments). Sample 63.

Thin section, x 3
2 — Calcarenite (biomicarenite). Sample 62a.Thin section,x3

Plate IV

1 — Nodular limestone (biopelmicrite). Sample 66. Thin section, x 3
2 — Calcarenite with nodular structure (sandy biomicarenite). Sample 82. Thin section, x 3

Plate V

1 — *Quasiendothyra communis* (Rauser); borehole Zdanów (depth 1757,5 m); Strunian, x 100
2 — *Latiendothyra paracosvensis* (Lipina); borehole Zdanów (depth 1757,5 m); Strunian, x 100
3 — *Brunsia spirillinoides* (Grozdilova et Glebovskaia); NW-1/71, x 100
4 — *Eotextularia diversa* (Tchernysheva); D-3/31, x 100
5 — *Eotextularia diversa* (Tchernysheva); NW-2A/62b, x 100
6 — *Granuliferella rjausakensis* (Tchernysheva); borehole Zdanów /10, x 100
7 — *Laxoseptabrunsiina* sp.; NW-1/71, x 100
8 — *Palaeospiroplectammina* sp.; D-3/35, x 100
9 — *Pseudolituotubella* sp.; borehole Zdanów /8, x 100
10 — *Pseudolituotubella* sp.; D-3/26, x 100

Plate VI

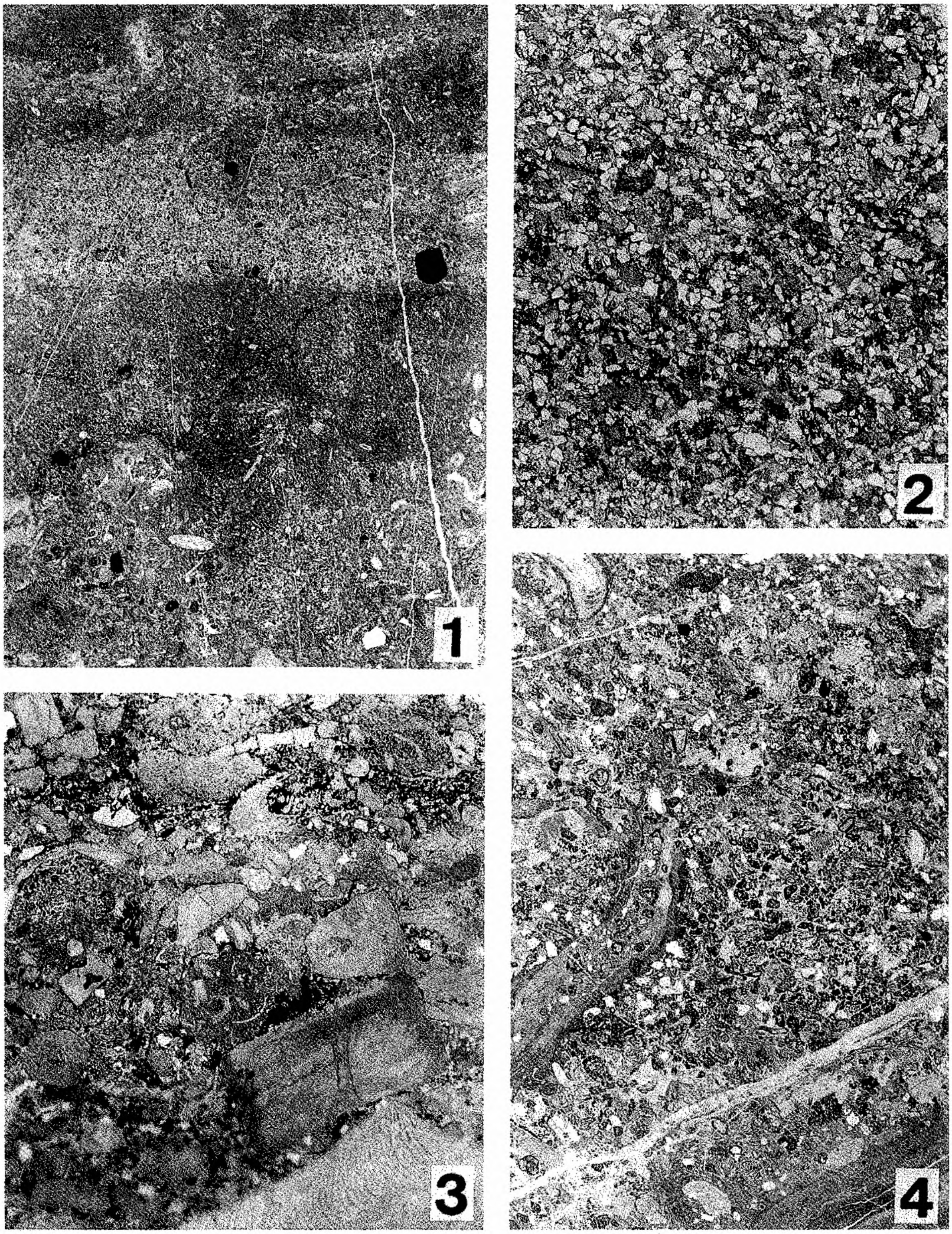
1 — *Laxoseptabrunsiina (Spinolaxina)* sp.; borehole Zdanów /7c, x 100
2 — *Endothyra* sp.; D-3/28, x 100
3 — *Endothyra bradyi* Mikhailov; NW-1/78, x 100
4 — *Endothyra bradyi* Mikhailov; borehole Zdanów /10, x 100
5 — *Endothyra bradyi* Mikhailov; borehole Zdanów /10, x 100
6 — *Priscella prisca* (Rauser-Tchernousova, Reitlinger); NW-1/78, x 100
7 — *Tetrataxis media* Vissarionova; NW-2A/63, x 100
8 — *Laxoendothyra laxa* (Conil et Lys); NW-2A/64, x 100
9 — *Globoendothyra paula* (Vissarionova); NW-2A/65, x 100

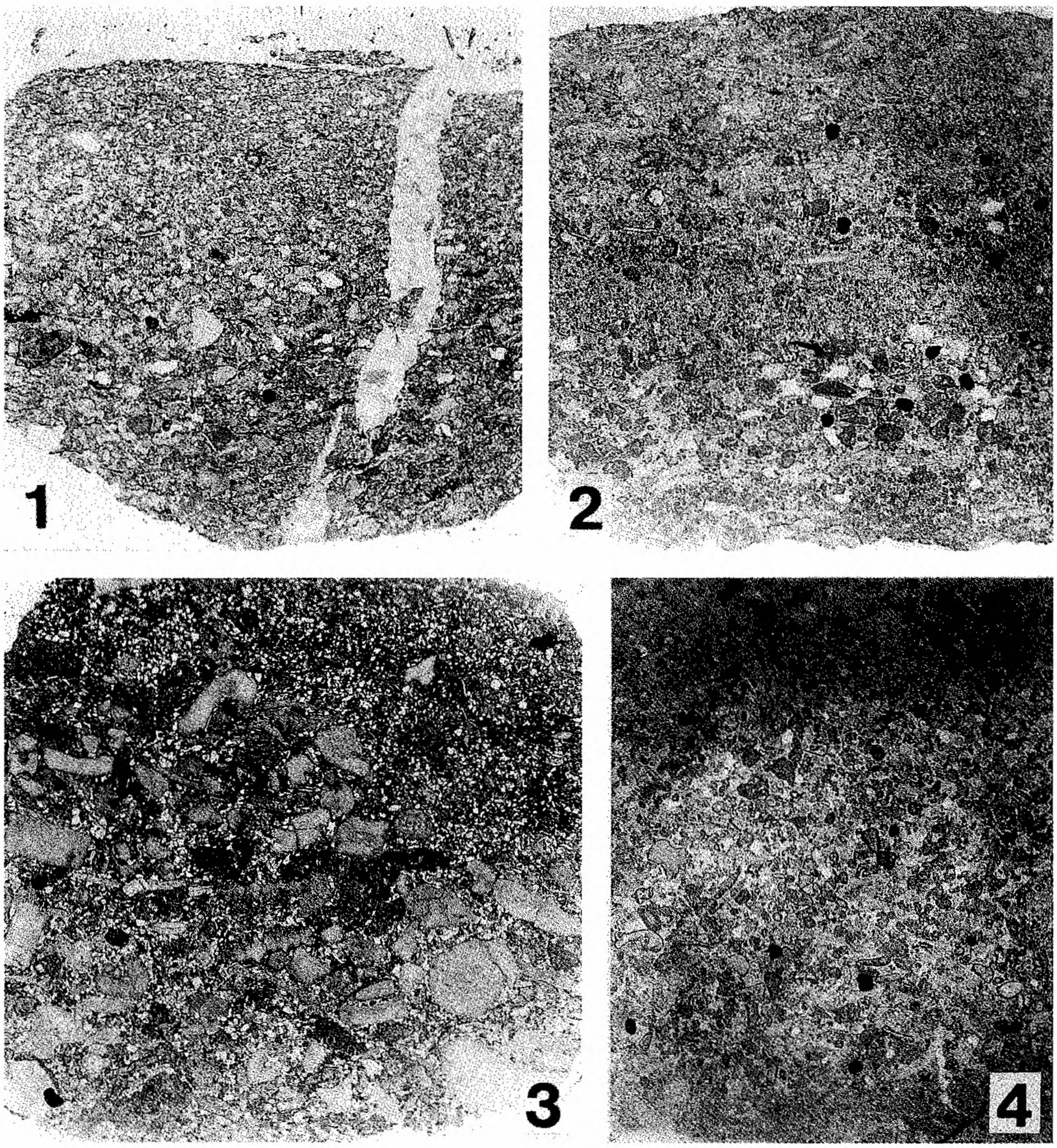
Plate VII

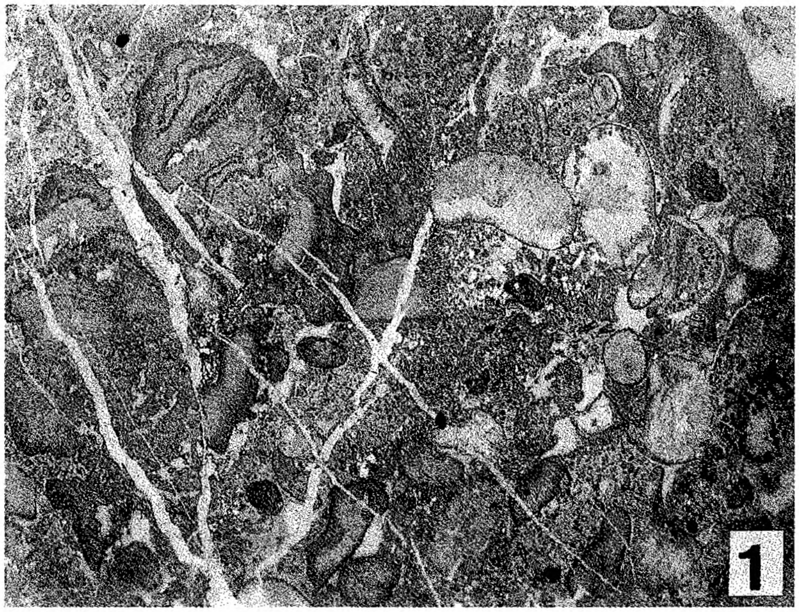
1 — *Latiendothyranopsis* sp.; SG-2/83, x 100
2 — *Latiendothyranopsis* ? sp.; NW-1/71, x 100
3 — *Latiendothyranopsis* ? sp.; NW-1/71, x 100
4 — *Eoendothyranopsis spiroides* (Zeller); NW-2A/62a, x 100
5 — *Eoendothyranopsis* sp.; NW-2A/65, x 100
6 — *Latiendothyra* sp.; NW-1/71, x 100
7 — *Plectogyranopsis* sp.; SG-2/87, x 100

Plate VIII

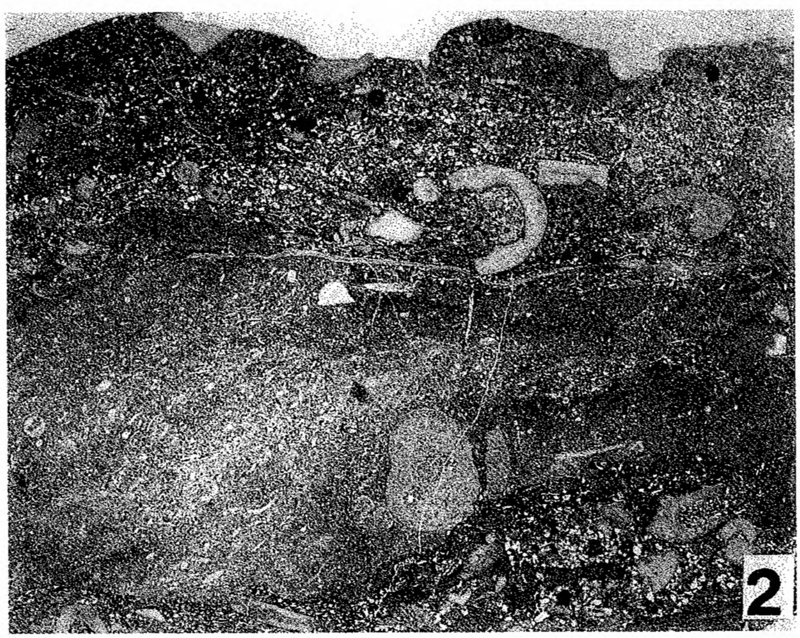
1 — *Latiendothyranopsis latispiralis* Lipina; NW-2B/48, x 100
2 — *Latiendothyranopsis latispiralis* Lipina; D-3/35, x 100
3 — *Dainella micula* Postojalko; D-3/26, x 100
4 — *Dainella micula* Postojalko; borehole Zdanów /9, x 100
5 — *Dainella micula* Postojalko; NW-1/71, x 100
6 — *Dainella* sp.; NW-1/72, x 100
7 — *Dainella* sp.; borehole Zdanów /11, x 100
8 — *Eoparastaffella simplex* Vdovenko; NW-2A/62c, x 100

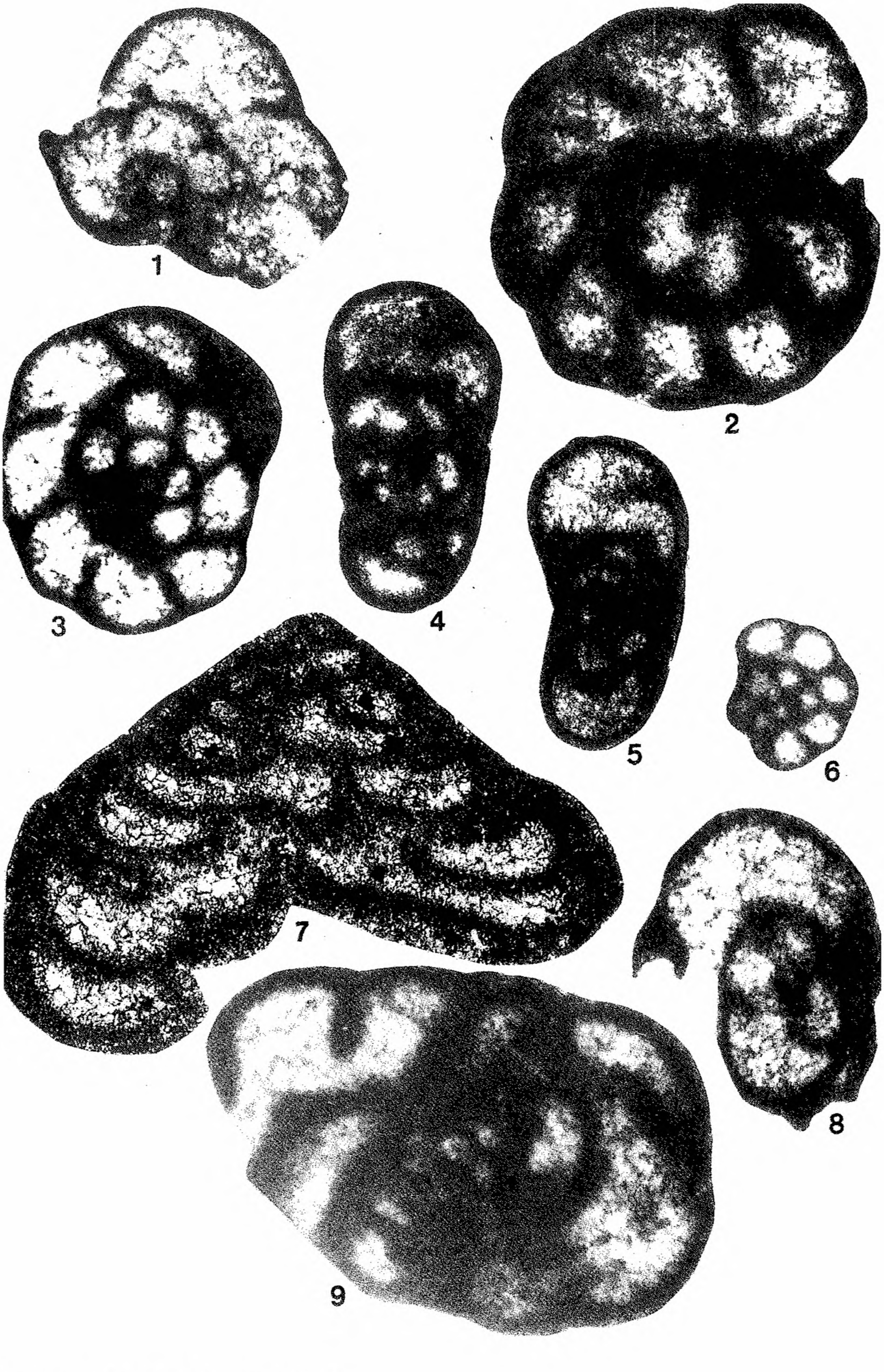

1
2
3
4

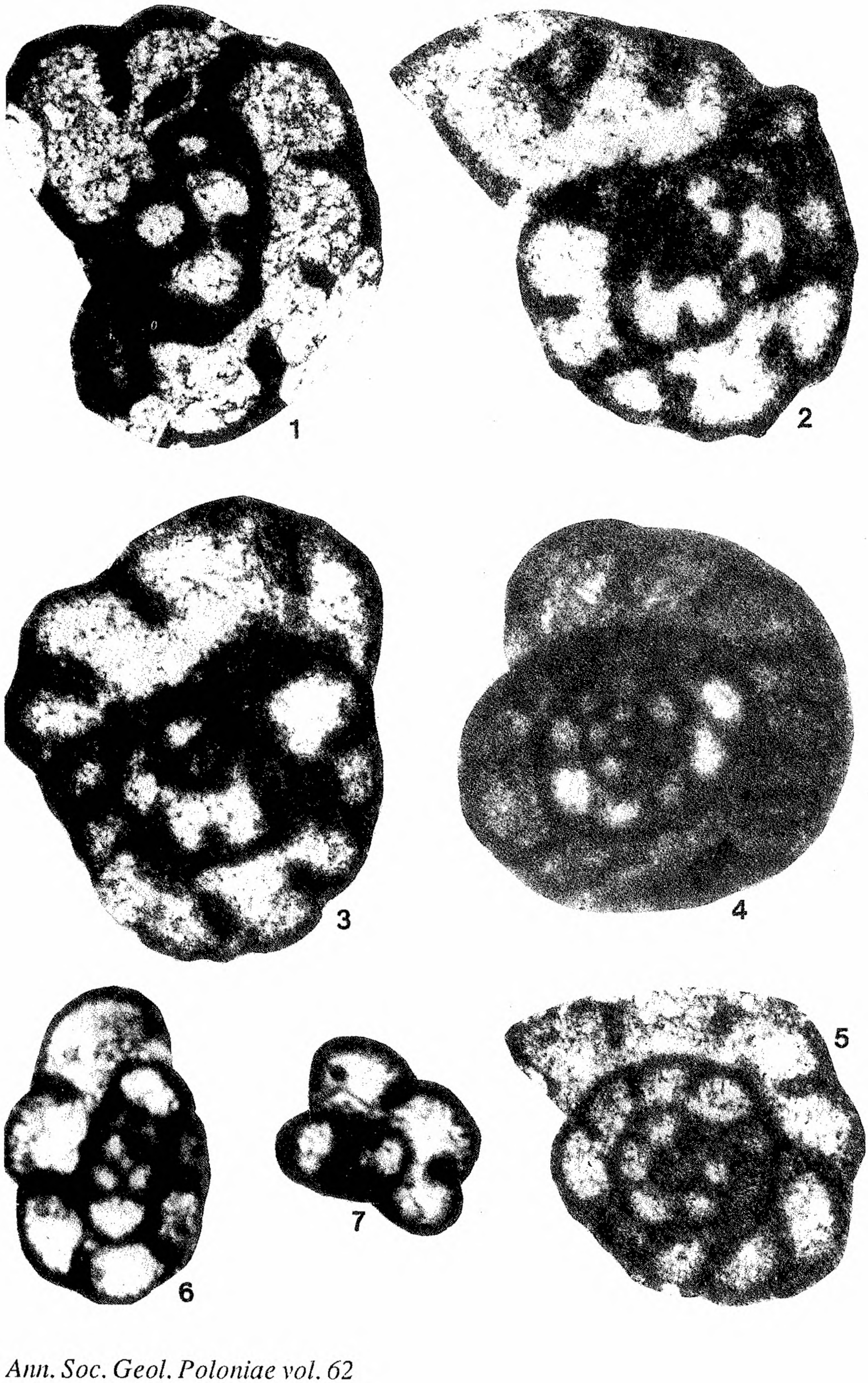

1
2
3
4


1


2






1
2
3
4
5
6
7


1
2
3
4
5
6
7
8