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Some remarks on the Permian basement in the vicinity of Szreniawa (Łobzów)

In the Łobzów IG 1 borehole at a depth of 525.2–999.2 m limestones, dolomites, sandstones, chalcedonites as well as sedimentary-tectonic carbonate breccias have been described. Organic material has been noted in limestones, sandstones and in breccias. Re-examination of the palaeontological determinations justifies the Upper Visean age. The deposits were formed under turbidity currents and submarine flows conditions in the pelagic basin with strong joint-action of synsedimentary tectonic movements.

INTRODUCTION

The Szreniawa area is located in the Miechów Basin and belongs to the Słomniki Syncline. The structure is composed of the sequence of the Devonian, Lower and Upper Carboniferous and in the vicinity of Imbramowice, probably also of the Permian deposits (S.Bukowy, 1964*a*). The Łobzów IG 1 borehole drilled in 1962–1963 in Szreniawa 6.5 km E of Wolbrom (Fig. 1) to obtain the profile of the Palaeozoic and Mesozoic deposits and to explain the geophysical anomalies has provided new data on the geology of the region (*Opracowanie...*,1964). The data on the Permian basement deposits have not been published until now. Only some remarks on the localization of the borehole, the sequence of the Lower Carboniferous and Upper Visean deposits, the presence of diastrophic conglomerates and laminated limestones with cherts as well as on the directions of transportation of the coarse-grained material have been published (S.Bukowy, 1964*a*, *b*; J.Kicuła, H.Żakowa, 1966, 1972; H.Żakowa, 1968; H.Jurkiewicz, H.Żakowa, 1972). Some notes were also made on the uppermost Westphalian coal exotics occurring within the Dogger conglomerates (S.Bukowy, A.Jachowicz, 1964).

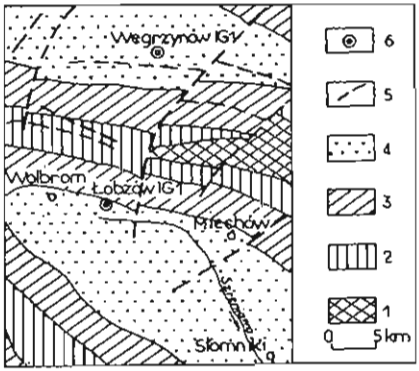


Fig. 1.Geological sketch map of the Permian subcrops in the vicinity of Wolbrom — Miechów (H. Jurkiewicz, H. Żakowa, 1972)

1 — Precambrian, 2 — Ordovician and Silurian, 3 — Devonian, 4 — Carboniferous, 5 — dislocations, 6 — boreholes

Mapa geologiczna utworów podpermskich w okolicy Wolbromia — Miechowa (H. Jurkiewicz, H.Żakowa, 1972)

1 — prekambr, 2 — ordowik i sylur, 3 — dewon, 4 — karbon, 5 — dyslokacje, 6 — otwory wiertnicze

The paper presents the stratigraphy of the Permian basement deposits based upon the results from the Łobzów IG 1 borehole which were already compiled in 1964 as well as on new data and revision studies. New petrographic analyses have been carried out on the rock samples from the collection preserved in the Świętokrzyski Branch of the State Geological Institute (cat. no. 0S–55) and on previously prepared thin sections. In the authors' opinion the presentation of these data is important in the interpretation of the deep geological structure and sedimentary-diastrophic development of the SW part of the Miechów Basin and of the NW margin of the Upper Silesian Coal Basin.

The authors wish to express their grateful thanks to prof. S.Bukowy for the materials and to Mrs. D.Nowak for her help in preparing the illustrations.

PETROGRAPHIC CHARACTERISTICS OF THE ROCKS

The Carboniferous deposits in the Łobzów IG 1 borehole profile occur at a depth of 525.2–999.2 m. The apparent thickness of the deposits is 474.0 m whereas the true thickness is 381.2 m. The sediments are overlain by the Permian conglomerates containing coal fragments. The conglomerates are lying on the erosional Carboniferous surface (*Opracowanie ...*, 1964). Within the Carboniferous deposits 11 lithological complexes (from I to XI, Fig. 2) containing 51 series have been distinguished by S.Bukowy. Forty three of the specified series comprise conglomerates whereas the remaining eight detrital limestones at the base. All the series composed of detrital limestones, sandstones and siltstones contain claystones, shales, sometimes marlaceous sediments at the top. The thickness of each series is varying from 1.0–28.0 m whereas the thickness of conglomerate inserts is ranging from 1.0 to 5.0 m. The Carboniferous deposits of the profile have been divided by S.Bukowy into 2 lithological parts – the lower (588.4–999.2 m) including complexes from I to IX composed of 49 series underlain usually by conglomerate and the upper (525.2–588.4 m) including complexes X and XI characterized by the presence of the carbonate deposits developed as bituminous limestones with lidites, detritic limestones and dolomites. Attention is paid to the presence within the complex VII of numerous sandy and silty inserts and intercalations of alterated tuffites. The tuff intercalations have been also

noted within the deposits of complex IX at a depth of 604.6 m. Complex III is characterized by the predominance of claystones over remaining types.

All major lithotypes mentioned by S.Cebulak (*Opracowanie* ...., 1964) have been the subject of petrographical examination. It has to be pointed out that apart from the description of five major lithotypes the author also distinguished at the depth of 976.4–999.2 m quartzitic sandstones and specific marlaceous sediments classified as "clayey silty sediments" which have not been reported from the overlying Carboniferous deposits and non-carbonate sandy conglomerates varying in psephitic material content (vein quartz, undetermined volcanic rocks, mudstones) at the depth of 800.0–900.0 m.

The classification of carbonate rocks have been based upon the classifications of R. L. Folk (1962), R.J.Dunham (1962) and A.F.Embry, J.E.Klovan (1972), the classification of terrigenous rocks upon modified (K.Jaworowski, 1987) classification of R.L.Dott (1964) and F.J.Pettijohn et al. (1972). Calcite and dolomite in calcareous rocks have been identified using coloring indicators (Z.Migaszewski, M.Narkiewicz, 1983).

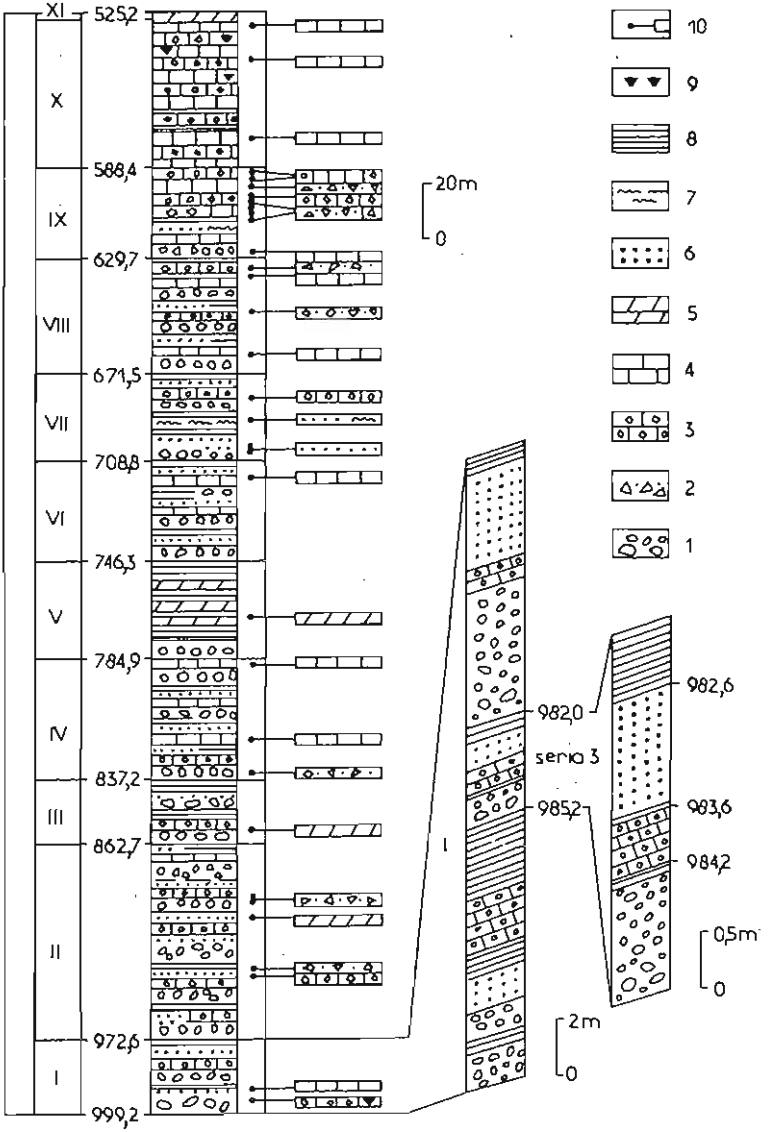
LIMESTONES

Several petrographic varieties of limestones i.e. biomicrites, oncopelsparites, bio(intra)sparites, bio(intra)micrites (biocalcarenites) and intra(bio)micrites (calcirudites) occur within the profile.

B i o m i c r i t e s (wackestones sometimes packstones) have been noted at the following depths: 531.2, 542.1–543.3, 573.3–575.4 , 589.9–590.1, 595.6–596.6, 628.5–629.5, 634.7–635.7, 664.3–665.3, 713.8–715.8, 785.9–786.9, 822.0 and 989.8 m (Fig. 2). They are characterized by lutitic-arenitic texture and unoriented, sporadically oriented (laminae) structure. The matrix is composed of micrite with dispersed "primary" pigment admixtures (clayey-iron-organic substance) with dispersed bioclasts (skeletal detritus 0.1 mm in diameter, maximum diameter up to 1.8 mm). Piroclastic and authigenic quartz and chalcedony (in form of concentrations and impregnations of the bioclasts up to 4.5 mm in diameter revealing pseudograiny-mosaic or fibrous-fan-like microtexture) are the main accessoric components. Other components — hydrated iron oxides and iron hydroxides, pyrite and vitrinified flora remains occur in form of dispersed concentrations (Pl. I, Fig. 1).

O n c o p e l s p a r i t e s (grainstones) have been reported at a depth of 992.8 m (Fig. 2). They are characterized by arenitic texture and unoriented structure. The clastic components are represented by oncoids and peloids about 0.1 mm in diameter, maximally 0.6 mm. The cement is represented by microsparite. In some zones fine- to medium-grained sparitic cement is also noted. Sporadically traces of dispersed admixtures of iron-oxides and hydroxides are also present (Pl. I, Fig. 2).

B i o (i n t r a) s p a r i t e s a n d b i o (i n t r a) m i c r i t e s (biocalcarenites-grainstones, sporadically packstones) have been reported at a depth of 592.2–593.2, 602.6–603.1, 605.6–606.1, 611.0–612.0, 681.1–682.2 and 938.9 m (Fig. 2). They possess predominantly arenitic texture and unoriented structure. Among the clasts — bioclasts of skeletal detritus 0.5 mm in diameter, sometimes reaching 3.9 mm – are


XI
X
IX
VIII
VII
VI
V
IV
III
II
I
525,2
588,4
629,7
671,5
708,8
746,3
784,9
837,2
862,7
972,6
999,2
20m
0
10
9
8
7
6
5
4
3
2
1
982,0
982,6
seria 3
985,2
983,6
984,2
0,5m
0
2m
0

prevailing (Pl. I, Fig. 3–4). They are occasionally accompanied by biomicritic and siliceous crypto/microcrystalline rarely neodolomicrosparitic bioclasts reaching 4 mm in diameter. Sporadically observed peloids are considered to be rounded, biomicritic bioclasts or small intraclasts. Some of the bioclasts contain concentrations of chalcedony and authigenic quartz. Sometimes concentrations of dolomites or phosphates varying from 0.5 up to 2.5 mm in diameter are also observed. Among the secondary components quartz and potassium feldspar (grains up to 2.4 mm in diameter) are predominant. Other components — mainly iron oxides and hydroxides occur in form of dispersed accumulations. Micro- or fine-crystalline sparite, sporadically micrite is the typical cement of these petrographic varieties.

Intra(bio)micrites (calcirudites-floatstones) noted at a depth of 599.5–600, 600.5, 610.0–611.0 and 612.0–613.0 m (Fig. 2) have a arenitic-ruditic texture and a non-directional structure. Micrite with admixtures of dispersed "primary" pigment is a typical cement for these limestones. Within the cement intraclasts of biomicrite (wackestone), micrite (mudstone), crypto/microcrystalline siliceous rocks, micro/fine-crystalline neosparite and arenite-quartz with siliceous matrix as well as bioclasts represented by skeletal detritus, sporadically impregnated by chalcedony and authigenic quartz (Pl. II, Fig. 2) have been distinguished. Sometimes clasts of oncoides are also noted. The intraclasts and bioclasts are poorly rounded. They are reaching 2 cm in diameter (intraclasts) and 0.3 mm (bioclasts). Among the accessory minerals piroclastic quartz grains up to 0.6 mm in diameter are predominant.

DOLOMITES

Dolomites have been noted at a depth of 770.1–770.4, 858.1 and 909.5 m (Fig. 2). Among the examined samples 2 petrographic varieties of dolomites — the crypto- and medium-crystalline have been distinguished.

Crypto-crystalline dolomites (laminated dolomicrites). The groundmass is represented by an–or more rarely, subhedral dolomite crystals (diameter 0.00X mm) with admixtures of dispersed "primary" pigment. Among the

Fig. 2. Generalized lithological profile of the Carboniferous from borehole Łobzów IG 1 after S. Bukowy (*Opracowanie...*, 1964) with localization and lithology (enlarged) of samples investigated by the authors

1 — conglomerate, 2 — carbonate breccia (sedimentary-tectonic breccia), calcirudite, 3 — detrital limestone (biocalcarenite, oncopelsparite), 4 — biomicritic limestone, 5 — dolomite, 6 — sandstone (arenite, quartz wacke), 7 — siltstone, 8 — claystone, shale, 9 — flint and chert, 10 — samples described for the purpose of this report; I — XI lithological complexes

Zgeneralizowany profil litologiczny karbonu z otworu wiertniczego Łobzów IG 1 wedug S. Bukowego (*Opracowanie...*, 1964) z lokalizacją i litologią (przewiększona) próbek badanych przez autorów

1 — zlepieniec, 2 — brekcja wglanowa (sedymentacyjno-tektoniczna), kalcyrudyt, 3 — wapień detrytyczny (biokalkarenit, onkopelsparyt), 4 — wapień biomikrytowy, 5 — dolomit, 6 — piaskowiec (arenit, waka kwarcowa), 7 — mułowiec, 8 — iłowiec, łupek, 9 — krzemień i czert, 10 — próbki opisane w pracy; I —XI kompleksy litologiczne

accessoric minerals occurring in amount of 1% of the rock volume, pyroclastic quartz and flakes of muscovite are dominant (Pl. II, Fig. 3).

Medium-crystalline dolomites (neodolosparites). The groundmass is composed of mosaic of an–or rarely subhedral crystals, about 0.08 mm in diameter (maximum 0.2 mm). Locally the cement contains small admixtures of dispersed "primary" pigment. Authigenic quartz, hydrated iron oxides and hydroxides as well as barite (probably) are the dominant accessoric minerals.

SEDIMENTARY-TECTONIC CARBONATE BRECCIAS

These rocks have been noted at a depth of 633.7–634.7, 652.0–653.0, 834.6, 894.0, 895.5 and 938.2 m (Fig. 2). The petrographic composition of the breccias differs from the composition of the calcirudites. They are composed of poorly rounded and sorted out clasts up to 3 cm in diameter cemented by micrite and/or dolomicrite sporadically with some admixtures of pyrite and hydrated iron oxides and hydroxides (Pl. II, Fig. 4). The grains are composed of fine- and medium-crystalline, sporadically crypto/micro-crystalline dolomites, sometimes revealing dedolomitization (Pl. III, Fig. 2; Pl. IV, Fig. 1), of micrites (mudstones), biomicrites (wackestones — Pl. III, Fig. 1, 3), fine-crystalline neosparites and probably of biolithites (boundstones). The limestone fragments contain sporadically fibrous — fan-like chalcedony concentrations up to 2.6 mm in diameter. The smaller amount of fragments and grains of quartzitic sandstones, claystones (Pl. III, Fig. 4), quartzitic mudstones, terrigenous and pyroclastic quartz, muscovite, chalcedony and authigenic quartz are also noted. Some of the above described fragments are reaching 7 mm in diameter.

SANDSTONES

Quartzitic sandstones revealing mainly siliceous-clayey cement (quartzitic wackestones and quartzitic arenites) have been recorded at a depth of 692.2–693.4, 702.3–703.4 and 704.1–705.5 m (Fig. 2). The sandstones display arenitic-psamitic or psamitic-aleuritic texture and non-oriented structure (Pl. IV, Fig. 2). Among the accessory minerals terrigenous quartz is dominating. It is accompanied by potassium feldspar and plagioclases (albite grains up to 0.2 mm in diameter), dolomite (concentrations up to 0.08 mm in diameter) and semi-rounded grains of zircon and tourmaline up to 0.08 mm in diameter. The cement of groundmass type in some places iron-clayey of contact-type, partially regenerated. The muscovite is usually a component of the matrix, rarely reaching 0.2 mm. The sandstones are cut by veinlets of dolomites with pyrite. The presence of gaseous-fluid inclusions observed within the vein dolomite crystals indicate its hydrothermal origin.

CHALCEDONITES

The carbonate chalcedonites have been noted at a depth of 902.8 m. The matrix of the chalcedonites is composed of chalcedony (authigenic quartz forming fibrous-fan-

-like microtexture), calcite bioclasts and neosparite. In accessoric amount eu- and subhedral dolomite crystals about 0.6 mm in diameter and terrigenous quartz grains up to 0.2 mm are occurring. Small concentrations of hydrated iron oxides and hydroxides reaching up to 0.2 mm in diameter are noted.

ORGANIC MATERIAL AND STRATIGRAPHY OF THE SEDIMENTS

Ten of samples collected from the described profile have been macerated. Four of them contain organic components. After H.Jurkiewicz and J.Malec within the matrix of carbonate breccia noted at a depth of 599.5–600.5 and 610.0–611.0 m arenaceous foraminifers of the genus *Tolypammina*, fragments of tetracorallas, ostracods, crinoid fragments, echinoid spines, unidentified algae remains, Chlorophyta of the genus *Moravammina* as well as sporadic conodonts — *Gnathodus* sp. have been found. Description of the ostracods probably of the genus *Sansabella* from the micrites intercalations at a depth of 664.3–665.3 m as well as of arenaceous foraminifers of the genus *Hyperammina*, radiolarians and crinoid fragments from the claystones from the depth of 685.5–686.0 m have been also given.

The micro- (thin sections) and macroscopic analyses have provided new additional information on the organic material and stratigraphy of the sediments. The results will be given for each lithological complex after S.Bukowy (Fig. 2).

Complex I. Micrite intercalations from a depth of 989.8 m contain foraminifers *Endothyra* cf. *bradyi* (Mikhailov), several fragments of unidentified Rugosa and badly preserved fauna. Oncopelsparites from the depth of 992.8 m contain *Calcispaera* sp. and "radiosphaerid calcisphaeres" (Pl. I, Fig. 2). The systematic position of these remains has not been identified – probably they are belonging to algae.

Complex II. In the carbonate breccia clasts (depth of 909.0, 946.8 and 967.2 m) the presence of numerous specimens of the genus *Amphipora*, unidentified fragments of tabulates, accumulations of the brachiopod shells of the genus *Ilmenia* (Pl. VI, Fig. 3, 4), unidentified brachiopod fragments and several valves of *Adolfia?* sp., *Desquamatia?* sp. and *Tenticospirifer* sp. (Pl. V, Fig. 5, 6) as well as crinoid fragments have been described. The carbonate breccias from the depth of 894.0–895.5, 928.3 and 938.2 m contain fossil remains of poorly preserved corals, brachiopods — *Phlogoiderhynchus* sp., dispersed crinoid fragments and Rhodophyta — *Parachaetetes johnsoni* Maslov (Pl. V, Fig. 1b). Foraminifers — *Endothyra bradyi* (Mikhailov) and *Archaediscus*? sp., unidentified ostracods, Cyanophyta — *Girvanella problematica* (Nicholson et Etheridge) and "radiosphaerid calcisphaeres" have in turn been found in biocalcarenite intercalation at a depth of 938.9 m.

Complex IV. In the biomicrite from the profile depth of 785.9–786.9, 822.0, 824.3, 826.9–828.0 and 834.6 m foraminifers of the genus *Climacammina*, fragments of *Spiriferida* and of unidentified brachiopods, fragments of ostracods, numerous dispersed and recrystalized crinoid fragments, *Calcisphaera* sp. and "radiospaerid calcisphaeres" have been described.

Complex VI. The biomicrite intercalations reported from the depth interval of 713.5–715.8 m contain numerous remains of unidentified valves of brachiopods, single specimens of *Composita* cf. *ambigua* (Sowerby), unidentified ostracods, *Girvanella problematica* (Nicholson et Etheridge), *Calcisphaera*? sp. and "radiosphaerid calcisphaeres".

Complex VII. Carbonified plant remains have been encountered in the sandstones at a depth of 702.3–703.4 and 704.1–705.5 m. Dispersed crinoid fragments have been found in biomicrite intercalation at a depth of 685.0–686.0 m as well as in calcarenites at a depth of 681.1–682.2 m. Besides within the calcarenites also single, badly preserved foraminifers of the family *Archaediscidae*, sections of *Brachiopoda*, *Ostracoda* valves, *Calcisphaera*? sp. and traces of Rhodophyta probably of the genus *Stacheoides* have been recorded.

Complex VIII. In the biomicrite clast of the carbonate breccia intercalation from the depth of 664.3–665.3 m a rich assemblage of shell and valve fragments of unidentified fauna and brachiopods, pelecypods — *Buchiola* cf. *retrostriata* (v. Buch) (Pl. V, Fig. 4), damaged shells of *Nautiloidea* and *Clymenia*, sections of ostracods and *Calcisphaera*? sp. are present. In the higher lying biomicrite intercalations (634.7–635.7, 637.8–638.7 and 641.7–642.7 m) brachiopods — *Rugosochonetes*? sp. and *Composita* sp. (Pl. V, Fig. 3), unidentified ostracods, crinoid detritus and rarely "radiosphaerid calcisphaeres" are noted.

Complex IX. The intercalations of biomicrites reported at a depth of 589.9–590.1, 593.3–594.5, 595.6–596.6, 597.5–598.5, 614.0–615.0 and 628.5–629.5 m contain: foraminifers *Tournayellidae* ind., *Endothyra*? sp., *E. bradyi* (Mikhailov) — Pl. VI, Fig. 1a, b — *Endothyranopsis crassus* (Brady), *Loeblichia*? sp. and *Archaediscus* sp. Apart from fragments of tetracorallas and a large amount of shells and valves of unidentified fauna and brachiopods, specimens of *Chonetipustula*? sp. (Pl. VI, Fig. 5), *Eomarginifera*? sp. (Pl. VI, Fig. 6), *Martinia* sp. are occurring. In addition, numerous crinoid fragments varying in size, sections of ostracods, *Girvanella problematica* (Nicholson et Etheridge) — Pl. IV, Fig. 4, *Parachaetetes johnsoni* Maslov (Pl. V, Fig. 1a), fragments of Chlorophyta — *Kamaena*? sp., problematic algae of the genus *Saccaminopsis* and algae of non-precised systematic position described as *Wetheredella* cf. *silurica* Wood (Pl. IV, Fig. 3) have been ascertained.

In the biocalcarenite intercalations occurring at a depth of 592.0–593.2, 602.6–603.1, 605.6–606.1 and 611.0–612.0 m observations confirmed the presence of numerous foraminifers: *Erlandia* sp. (Pl. V, Fig. 2), *Tournayellidae* ind., *Tetrataxidae* ind., *Endothyra* sp., *E.bradyi* (Mikhailov), *Endothyranopsis crassus* (Brady) — Pl. V, Fig. 2, *Archaediscus* sp., *A.karreri* Brady, *A.karreri crassa* Brady, *Paraarchaediscus*? sp. ex gr. *P.stilus* (Grozdilova et Lebedeva) and *Priscella* sp. ex gr. *P.prisca* (Rauzer-Chernousova et Reitlinger) — Pl. VI, Fig. 2. Besides, fragments of tetracorallas, brachiopods (Pl. I, Fig. 3), sections of ostracods, crinoid detritus and algae of the same species are reported from the biomicrites.

In intercalations of carbonate breccias at a depth of 599.5–600.5, 612.0–613.0, 618.0–620.0 and 623.1–624.2 m the great amount of strongly recrystalized, varying in size, crinoid fragments is accompanied by not numerous *Endothyra*? sp., fragments of tetracorallas (Pl. II, Fig. 2), *Girvanella*? sp., *G.problematica* (Nicholson et Etheridge),

Parachaetetes sp., *P.johnsoni* Maslov, *Stacheoides*? sp. and *Kamaena*? sp. In the carbonate breccia cement at a depth of 610.0–611.0 m *Archaediscus karreri crassa* Brady has been noted. In all rock types of the complex IX *Calcisphaera* sp. and "radiosphaerid calcisphaeres" of various size are occurring.

Complex X. The biomicrite intercalations at a depth of 531.2, 542.1–543.3 and 573.3–575.4 m comprise foraminifers *Archaediscus karreri crassa* Brady, unidentified valves of ostracods, a large amount of crinoid detritus, *Girvanella problematica* (Nicholson et Etheridge), *Kamaena* sp. ex gr. *K. awirsi* Mamet et Roux (Pl. I, Fig. 1) and *Saccaminopsis*? sp. These intercalations are also abundant in recrystalized fragments of shells and valves of unidentified fauna as well as the brachiopods and sporadically flora remains.

Organic remains of the family *Tournayellidae* and of some genera: *Stacheoides*, *Kamaena*, *Girvanella*, *Calcisphaera* commonly encountered in the Devonian and Carboniferous deposits are of small stratigraphic importance. The latter as well as the form described as "radiosphaerid calcisphaeres" (P.L.Brenckle et al., 1982) are commonly widespread in the lagoonal and shallow marine-bay deposits, very often within biocalcarenites. Vertical range of *Wetheredella silurica* Wood is very large. The form is known from the Lower Cambrian through the Visean deposits (B.Mamet, A.Roux, 1983). Also the stratigraphic extent of *Girvanella problematica* (Nicholson et Etheridge) is very large. The taxon is known from the Lower Carboniferous deposits in Australia and Europe, in Poland it is known from the Carboniferous of the Lublin Coal Basin, Holy Cross Mts and from the Upper Silurian deposits of the Ural Mts (B.Mamet, A.Roux, 1983; R.Conil, M.Lys, 1964; R.Dressen et al., 1985; H.Żakowa, 1968; S.Skompski, 1986; *Izwiestkowyje...*, 1988).

The Devonian brachiopods, occurring in the whole Devonian profile or only in Middle /Upper Devonian profile, are represented by the genera: *Adolfia*, *Desquamatia*, *Cyrtospirifer*, *Ilmenia*, *Phlogoiderhynchus* and *Tenticospirifer*. The genera occurring in Carboniferous are represented by *Chonetipustula*, *Eomarginifera*, *Composita*, *Rugosochonetes* and *Martinia*. The first two mentioned do not occur within sediments older than the Visean (*Treatise...*, 1965), while the species *Composita ambigua* (Sowerby) is characteristic of the Carboniferous deposits (T.A.Grunt, 1980; C.H.C.Brunton, 1980). The pelecypod of the species *Buchiola retrostriata* (v. Buch) — A.M.Sadykow, 1962 — as well as the Rhodophyta — *Parachaetetes johnsoni* Maslov — are the taxons typical of the Upper Devonian (B.Mamet, A.Roux, 1983).The algae mentioned above have been also ascertained lately in the Upper Tournaisian.

The foraminifers of the *Tetrataxidae* and *Archaediscidae* families are characteristic of the Carboniferous, the latter family is known to have occurred since the Visean and the genus of *Archaediscus* sensu P.L.Brenckle et al. (1987) and *Archaediscus karreri* Brady in the Upper- (and Middle?) Visean. The species *Archaediscus karreri crassa* Brady is especially characteristic of the Upper Visean. In Poland it is known from the Upper Visean of the Lublin Coal Basin, Upper Silesian Coal Basin, Sudety Mts, Nida Basin, Holy Cross Mts (H.Jurkiewicz, H.Żakowa, 1978). The *Endothyridae* family and the genera *Endothyra* and *Priscella* are common in the Carboniferous and Famennian deposits, the genus *Loeblichia* had occur since Visean and the *Climacammina* probably since Upper Visean. *Endothyra bradyi* Mikhailov is known from the

whole profile of the Lower Carboniferous, Namurian and Westphalian deposits. The species *Endothyranopsis crassus* (Brady) is characteristic of the Upper Visean but sporadically it has been also described from the Middle Visean deposits (R.Conil, M.Lys, 1964). In Poland it is known from the Upper Visean deposits of the Lublin Coal Basin, Upper Silesian Coal Basin and Holy Cross Mts (H.Jurkiewicz, H.Żakowa, 1978; S.Skompski, J.Soboń-Podgórska, 1980).

Stratigraphic analysis of the fossil remains (stromatoporoides, brachiopods, pelecypods and clymenias) gives support to the presence of the Middle and Upper Devonian clasts in the carbonate breccia intercalations of the complexes II and VIII. The taxons indicating Upper Devonian age of the sediments — brachiopods and Rhodophyta of the genus *Parachaetetes*, known also from the lowermost Lower Carboniferous deposits, are present within the carbonate breccias of the complexes II and IX. Admixtures of these algae accompanied by organic indices known only from the Carboniferous deposits is a very characteristic feature of the detritic limestones (biocalcarenites and calcirudites) and of the biomicrites of the complex IX. In all remaining numerous biomicrite inserts of the complexes I through X apart from specimens of no stratigraphic value, brachiopod and foraminifera taxons characteristic of the Carboniferous especially of the Lower Carboniferous are occurring. This indicates that the pre-Permian deposits from the Łobzów IG 1 borehole are not older than the Carboniferous.

In connection with the presence of brachiopod genera *Chonetipustula* and *Eomarginifera* as well as of foraminifera taxons of the family *Archaediscidae*, the genera *Loeblichia* and *Climacammina* in the detrital limestones of complexes II, VII and IX and in biomicrites of the complexes IV, IX and X the age of the pre-Permian basement may be determined as not older than the Visean. Further determination of the age of these sediments was possible due to the presence of foraminifera taxons considered to be typical of the Upper Visean of E and W Europe — among others *Archaediscus karreri crassa* Brady, *Endothyranopsis crassus* Brady and even *Archaediscus* sensu P.L.Brenckle et al. (1987). The above mentioned taxons have been recognized in the detrital limestones of the complexes II and IX, in the cement of carbonate breccias of the complex IX and in the biomicrites of the complex IX and X i.e. in the redeposited sediments as well as in sediments deposited during the period of stabilization of the environment of sedimentation.

All the data presented above indicate that the discussed profile of the pre-Permian basement deposits of Łobzów IG 1 borehole profile might be assigned to the Upper Visean.

CONCLUSIONS

The analysis of archival rock samples although based on uncompleted documentation have provided new data and led to conclusions on the sedimentation conditions in the Upper Visean basin.

Claystones and biomicrites (wackestones and packstones) were deposited in the calm sedimentary conditions in the deeper parts of the basin corresponding to the

pelagic zone. The oncopelsparites and bio(intra)sparites were deposited in high energy off-shore environment. The bio(intra)micrites as well as the silty-sandy deposits containing poorly-rounded and simultaneously well sorted grains were formed as a result of the suspension current activity.

The carbonate sedimentary-tectonic breccias, composed of poorly-rounded and sorted as well as often inwedged fragments of strongly diversified lithological composition, were formed by the gravitational mass flows of rock material from the uplifted to the deeper parts of the basin. Dense clast compaction and fractional stratification are characteristic feature of the sediment. The petrographic examination of the samples collected from various parts of the profile did not indicate the presence of the conglomerates typically observed in the off-shore zone, therefore it may reasonably be supposed, that the conglomerates distinguished by S.Bukowy are genetically related to the sedimentary-tectonic breccias.

Calcirudites (floatstones) composed of micritic matrix and dispersed intraclasts similar to the breccia fragments as well as of bioclasts varying in taxonomic content are probably the sediments of gravitational flows, of submarine mud flow-type, which redeposited structural components from the shallower, high-energy environment and/or older deposits. Material transportation was not so violent as in the case of sedimentary-tectonic breccias of gravitational type. Further studies are required to explain the genesis of the Upper Visean dolomites from the Łobzów IG 1 borehole, where the "primary" (dolomicrites) and secondary (neodolomicrites) have been noted.

Based upon this, the performed petrographic examination indicate the presence of relatively steady bathimetric conditions within the Upper Visean basin corresponding to the pelagic facies. The calm deposition rhythm has been disturbed by various kinds of debris flows and turbidity currents. The above described processes were the result of synsedimentary tectonic movements. They have initiated the recurrence of diastrophic impulses as well as erosional processes of the diagenezed Middle and Upper Devonian and even Lower Carboniferous deposits. The lithologic, petrographic and stratigraphical investigations indicate the gradual stabilization of sedimentation conditions in the uppermost Lower Carboniferous, characterized by the predominance of micrites (complex X and XI). It should be pointed out that the synsedimentary tectonic movements have not been accompanied by hydrothermal activity. At the present phase of the investigation it is hard to evidence the scale of hydrothermal fluid impact on the formation of the dolomites.

Further and more detailed complex regional investigations are required to localize the alimentary area (areas). According to J.Kicuła and H.Żakowa (1966, 1972) the alimentary area seems to have been situated to the south-east of Łobzów, in the Skalbmierz – Kazimierza Wielka zone, where the Eifel–Lower Visean deposits have been noted. After S.Bukowy the main source of the coarse-grained material might have been located to the north-east of the vicinity of Szreniawa (Łobzów), which is

considered to have been one of the inferred alimentary areas also for the diastrophic deposits (conglomerates) encountered in the Węgrzynów IG 1 borehole (H.Jurkiewicz, H.Żakowa, 1972, 1973).

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Zdzisław MIGASZEWSKI, Halina ŻAKOWA

UWAGI DO PODŁOŻA PERMU W OKOLICY SZRENIAWY (ŁOBZOWA)

Streszczenie

Obszar Szreniawy, położony w niecce miechowskiej, należy do synkliny Słomnik zbudowanej z utworów dewonu, karbonu i permu. Osady karbonu uchwycono pod permem w otworze wiertniczym Łobzów IG 1 na głęb. 525,2–999,2 m (fig. 1) wykonanym w latach 1962–1963. S.Bukowy wydzielił w profilu 11 kompleksów skalnych (I–XI, fig. 2), a w ich obrębie 51 serii o grubości 1,0–28,0 m, z reguły zaczynających się zlepieńcami (przeciętne wkładki grubości 1,0—5,0 m), a w stropie zawierających osady marglisto-ilaste. Badania petrograficzne i stratygraficzne oparto na wybranych próbkach skał i nowych pracach rewizyjnych. Niektóre okazy mikro- i makrofauny oraz płytki cienkie zilustrowano na tabl. I–VI.

Opisano 5 typów skał reprezentujących ważniejsze litotypy już wstępnie sygnalizowane przez S.Cebulaka. Wyróżniono kilka odmian petrograficznych wapieni – biomikrytowe, onkopelsparytowe, bio(intra)sparytowe, bio(intra)mikrytowe (biokalkarenity) oraz intra(bio)mikrytowe (kalcyrudyty). Ponadto opisano dolomity krypto- i średniokrystaliczne, brekcje sedymentacyjno-tektoniczne, piaskowce i chalcedonity. Nie potwierdzono obecności klasycznych zlepieńców związanych ze strefą linii brzegowej lub z gwałtownym obniżeniem się podstawy falowania. Można więc przypuszczać, że zlepieńce wydzielone przez S.Bukowego odpowiadają genetycznie wspomnianym brekcjom.

Materiał organiczny występuje w kompleksach I–IX w podanych wyżej typach skał z wyjątkiem dolomitów i chalcedonitów. Reprezentowany jest przez otwornice, radiolarie, stromatoporoidy, małże, klymenie, ramienionogi, małżoraczki, liliowce, sinice, glony, *Calcisphaera* sp.,"radiosferyczne kalcysfery" i mikroflorę. Fauna i krasnorosty dokumentują obecność okruchów dewonu środkowego i górnego w brekcjach kompleksów II i VIII. Wkładki wapieni biomikrytowych z kompleksów I–X zawierają w zasadzie tylko wskaźniki karbonu, w tym taksony otwornic z rodzaju *Archaediscus* i *Endothyranopsis*, charakterystyczne dla wizenu górnego. W związku z tym omawiany profil osadów podpermskich zaliczono bez większych zastrzeżeń do wizenu górnego.

Badania petrograficzne świadczą o stosunkowo stałych warunkach batymetrycznych w zbiorniku górnowizeńskim, odpowiadających facji pelagicznej. Spokojny rytm sedymentacji ulega zakłóceniu przez różnego typu spływy podmorskie (*debris flows*), o czym świadczy obecność brekcji węglanowych sedymentacyjno-tektonicznych pochodzenia grawitacyjnego i częściowo kalcyrudytów (flotstonów) oraz przez prądy zawiesinowe (*turbidity currents*). Z ostatnimi wiąże się z kolei obecność dobrze wysortowanych osadów piaskowcowo-mułowcowych oraz biokalkarenitów o spoiwie mikrytowym lub sparytowo-mikrytowym. Procesy te zachodziły pod wpływem synsedymentacyjnych ruchów tektonicznych powodujących wielokrotność impulsów ożywienia diastroficznego z erozją już zdiagenezowanych skał dewonu (środkowego i górnego), a nawet osadów wczesnego karbonu. Analiza litologiczno-petrograficzna i stratygraficzna świadczą o stopniowym stabilizowaniu się warunków sedymentacji w górnej części profilu wizenu górnego, gdzie zaznacza się dominacja wapieni pelitycznych — biomikrytów (kompleksy X i XI). Synsedymentacyjnym ruchom tektonicznym nie towarzyszy prawdopodobnie znacząca działalność hydrotermalna. Na obecnym etapie trudno jest ustalić zakres wpływu roztworów hydrotermalnych na proces tworzenia się dolomitów.

Dalszych, kompleksowych badań regionalnych wymaga kwestia lokalizacji obszaru lub obszarów alimentacyjnych. J.Kicuła i H.Żakowa (1966, 1972) zakładają istnienie takiego obszaru na SE od Łobzowa, w strefie Skalbmierza — Kazimierzy Wielkiej. Według S.Bukowego źródem materiału grubookruchowego mógł być obszar położony na NE od okolic Szreniawy (Łobzowa), który przypuszczalnie odegrał rolę w powstaniu osadów diastroficznych (zlepieńców) wizenu znanych z otworu wiertniczego Węgrzynów IG 1 (H.Jurkiewicz, H.Żakowa, 1972, 1973).

PLATE I

Fig. 1. Biomicrite (wackestone). Bioclasts accompanied by grains of pyroclastic quartz (arrow), note *Calcisphaera* sp. and *Kamaena* sp. ex gr. *K. awirsi* Mamet et Roux; 531.2 m, complex X

Wapień biomikrytowy (wakston). Bioklastom towarzyszą ziarna kwarcu piroklastycznego (strzałka); widoczne *Calcisphaera* sp. i *Kamaena* sp. ex gr. *K. awirsi* Mamet et Roux; 531,2 m, kompleks X

Fig. 2. Oncopelsparite (grainstone). Note "radiosphaerid calcisphaeres"; 992.8 m, complex I

Wapień onkopelsparytowy (greinston). Widoczne "radiosferyczne kalcysfery"; 992,8 m, kompleks I

Fig. 3. Bio(intra)sparite (grainstone). Fragment of brachiopod valve (arrow) associated with subrounded biomicritic intraclast; 592.2–593.2 m, complex IX

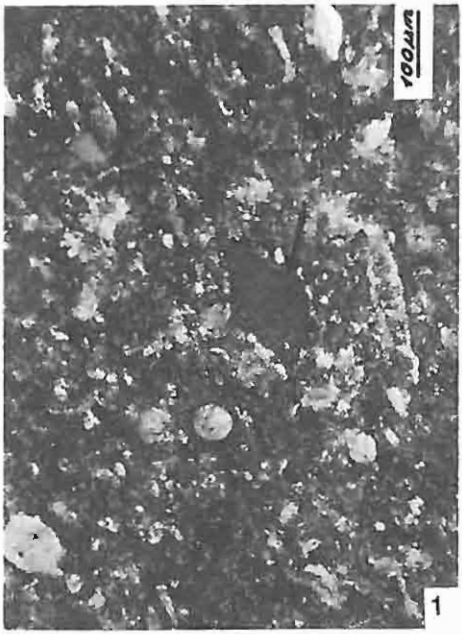
Wapień bio(intra)sparytowy (greinston). Fragment skorupki ramienionoga (strzałka), obok półobtoczony intraklast biomikrytowy; 592,2–593,2 m, kompleks IX

Fig. 4. Biosparite (grainstone). Bioclasts accompanied by grains of quartz primarily pyroclastic; 681.1–682.2 m, complex VII

Wapień biosparytowy (greinston). Bioklastom towarzyszą ziarna kwarcu przeważnie piroklastycznego; 681,1–682,2 m, kompleks VII

Thin sections (microphotographs taken at crossed nicols) and specimens depicted in Plates I through VI are assigned to the Upper Visean deposits from borehole Łobzów IG 1

Płytki cienkie (fotografowane przy nikolach skrzyżowanych) i okazy ilustrowane na tabl. I–VI pochodzą z utworów wizenu górnego otworu wiertniczego Łobzów IG 1



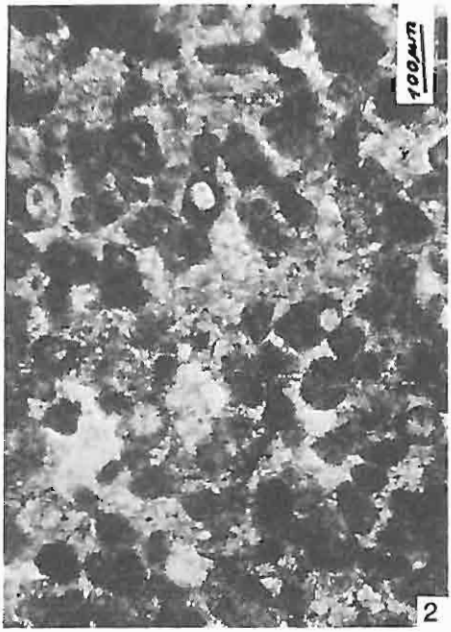


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PLATE II

Fig. 1. Intramicrite (floatstone). Fragment of quartz sandstone with crypto/micro-crystalline siliceous cement; 610.0–611.0 m, complex IX

Wapień intramikrytowy (flotston). Okruch piaskowca kwarcowego o spoiwie krzemionkowym krypto/mikrokrystalicznym; 610,0–611,0 m, kompleks IX

Fig. 2. Bio(intra)micrite (floatstone) with coral fragment impregnated by chalcedony/authigenic quartz; 612.0–613.0 m, complex IX

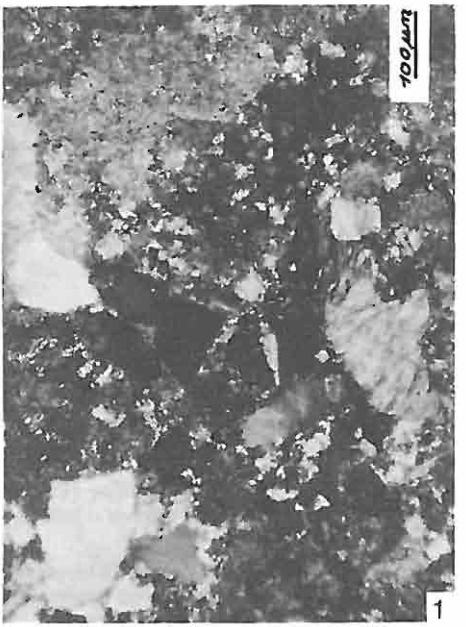
Wapień bio(intra)mikrytowy (flotston) z fragmentem koralowca impregnowanego chalcedonem/kwarcem autigenicznym; 612,0–613,0 m, kompleks IX

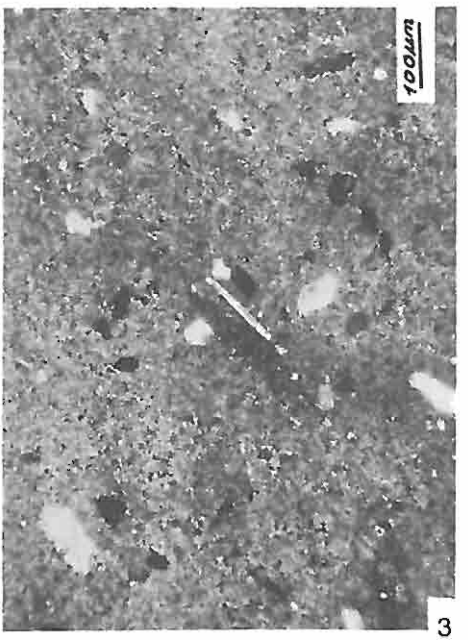
Fig. 3. Crypto-crystalline dolomite (dolomicrite). Matrix contains scattered quartz grains (white), opaque components – primarily pyrite (black) and single mica flakes; 770.1–770.4, complex V

Dolomit kryptokrystaliczny (dolomikryt). W matriks występują ziarna kwarcu (białe), skupienia składników nieprzeroczystych — głównie pirytu (czarne) oraz pojedyncze blaszki łyszczyków; 770,0–770,4 m, kompleks V

Fig. 4. Tectono-sedimentary "gravitational" carbonate breccia composed mainly of particles of dolomites and limestones cemented by irony-micritic substance; 633.7–634.7 m, complex VIII

Brekcja węglanowa sedymentacyjno-tektoniczna "grawitacyjna" złożona z okruchów głównie dolomitów i wapieni scementowanych substancją żelazisto-mikrytową; 633,7–634,7 m, kompleks VIII





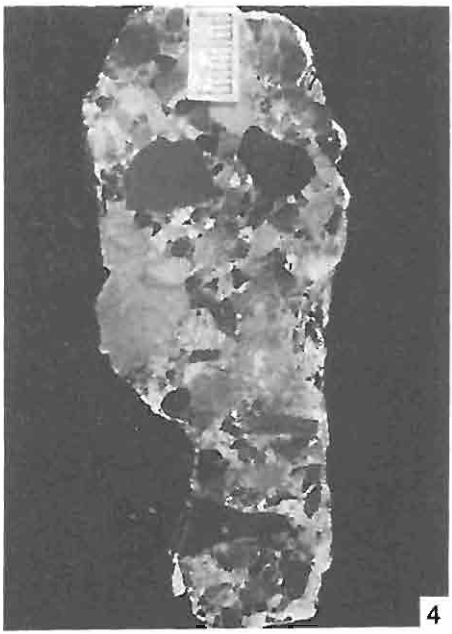


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PLATE III

Fig. 1. Tectono-sedimentary "gravitational" carbonate breccia. Particles of crypto-crystalline (Dk) and medium-crystalline (Ds) dolomite and micrite (Wm) wedged in-between; intergranular space is infilled by micrite with quartz admixture; 633.7–634.7 m

Brekcja węglanowa sedymentacyjno-tektoniczna "grawitacyjna". Wklinowane okruchy dolomitu kryptokrystalicznego (Dk) i średniokrystalicznego (Ds) oraz wapienia mikrytowego (Wm); przestrzeń między okruchami wypełnia mikryt z domieszką kwarcu; 633,7–634,7 m

Fig. 2. Tectono-sedimentary "gravitational" carbonate breccia. Partiele of fine-crystalline dolomite (mid-part of photo) wedged between two particles of medium-crystalline dolomite; 652.0–653.0 m

Brekcja węglanowa sedymentacyjno-tektoniczna "grawitacyjna". Okruch dolomitu drobnokrystalicznego (środkowa partia zdjęcia) wklinowany między dwa okruchy dolomitu średniokrystalicznego; 652,0–653,0 m

Fig. 3. Tectono-sedimentary "gravitational" carbonate breccia. Euhedral crystals of dolomite, grains of quartz and a particle of fine-crystalline dolomite are scattered in and enclosed by micritic matrix; 652.0–653.0 m

Brekcja węglanowa sedymentacyjno-tektoniczna "grawitacyjna". W obrębie mikrytowej matriks występują euhedrony dolomitu, ziarna kwarcu oraz okruch dolomitu drobnokrystalicznego; 652,0–653,0 m

Fig. 4. Tectono-sedimentary "gravitational" carbonate breccia. Two inwedged particles composed of micro/fine-crystalline dolomite (D) and claystone (I), intergranular space infilled by micrite with an admixture of dolomite; 652.0–653.0 m

Brekcja węglanowa sedymentacyjno-tektoniczna "grawitacyjna". Wklinowane dwa okruchy: dolomitu mikro/drobnokrystalicznego (D) oraz iłowca (I); przestrzeń między okruchami wypełnia mikryt z domieszką dolomitu; 652,0–653,0 m.

All the thin sections derived from complex VIII

Wszystkie płytki cienkie pochodzą z kompleksu VIII

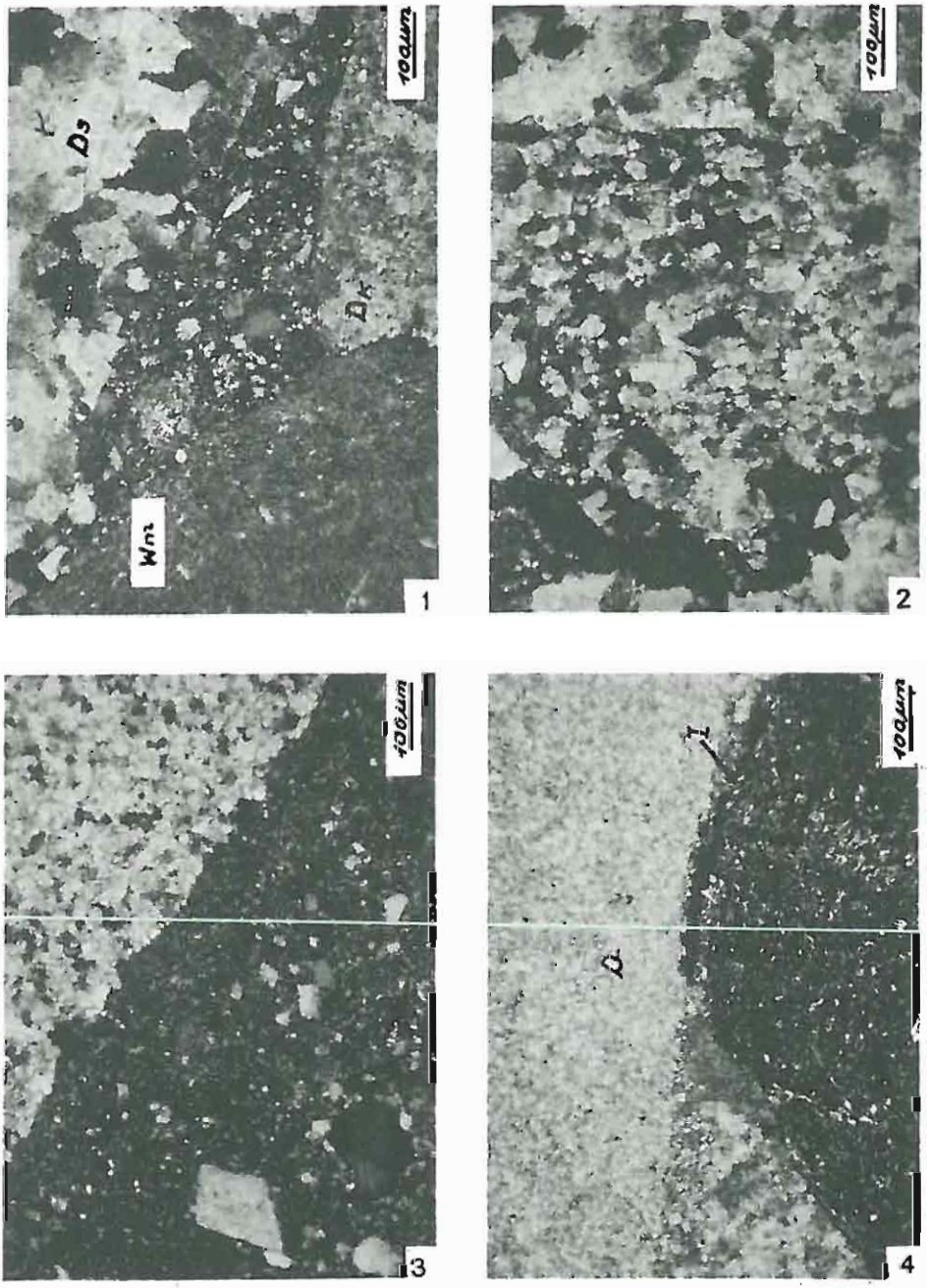

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PLATE IV

Fig. 1. Tectono-sedimentary carbonate breccia. Particles of medium- and fine-crystalline dolomite floating within dolomicritic matrix; 895.5 m, complex II

Brekcja węglanowa sedymentacyjno-tektoniczna. Okruchy dolomitu średnio- i drobnokrystalicznego "flotują" w obrębie dolomikrytowej matriks; 895,5 m, kompleks II

Fig. 2. Quartzitic wacke; 702.3–703.4 m, complex VII

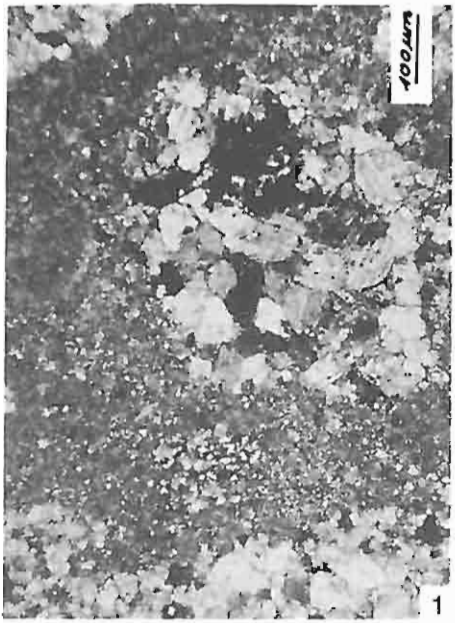
Waka kwarcowa; 702,3–703,4 m, kompleks VII

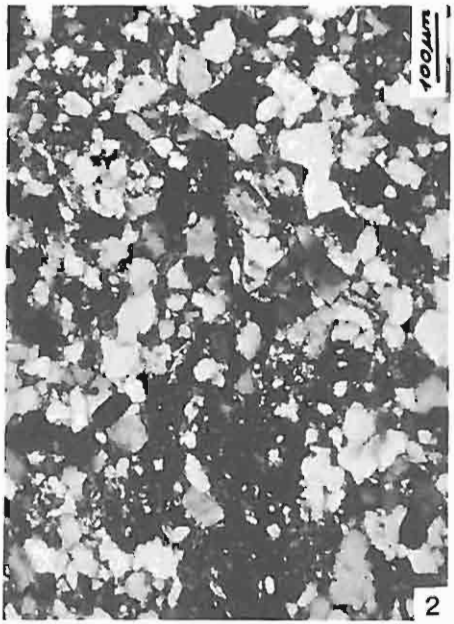
Fig. 3. *Wetheredella* cf. *silurica* Wood

NRS 317; 589.9–590.1 m, complex (kompleks) IX; x 60

Fig. 4. *Girvanella problematica* (Nicholson et Etheridge)

NRS 318; 595.8–596.6 m, complex (kompleks) IX; x 100





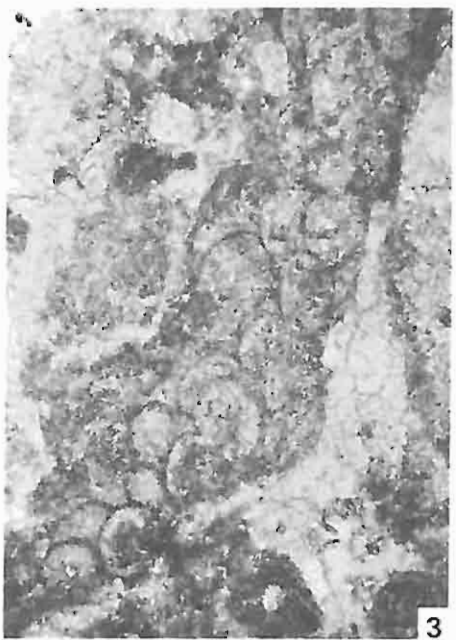


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PLATE V

Fig. 1. *Parachaetetes johnsoni* Maslov

a — NRS 317; 589.9–590.1 m, complex (kompleks) IX; b — NRS 339, 938.2 m, complex (kompleks) II; . 60

Fig. 2. *Endothyranopsis crassus* (Brady), *Erlandia* sp.

602.6–603.1 m, complex (kompleks) IX; x 60

Fig. 3. *Composita* sp.

Pedicle valve; 641.7–642.7 m, complex VIII; natural size

Skorupka nóżkowa 641,7–642,7 m, kompleks VIII; wielkość naturalna

Fig. 4. *Buchiola* cf. *retrostriata* (v.Buch)

Damaged right valve; 664.3–665.3 m, complex VIII (from pebble); x ca 6

Uszkodzona skorupka prawa; 664,3–665,3 m, kompleks VIII (z otoczaka); x ok. 6

Fig. 5. *Desquamatia*? sp.

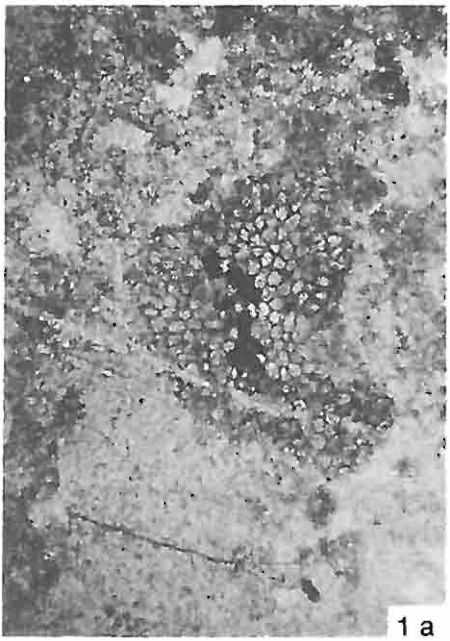
Pedicle valve; 946.8 m, complex II (from pebble); x ca 1.5

Skorupka nóżkowa; 946,8 m, kompleks II (z otoczaka); x ok. 1,5

Fig. 6. *Tenticospirifer* sp.

Damaged pediele valve; 946.8 m, complex II (from pebble); natural size

Uszkodzona skorupka nóżkowa;946,8 m, kompleks II (z otoczaka); wielkość naturalna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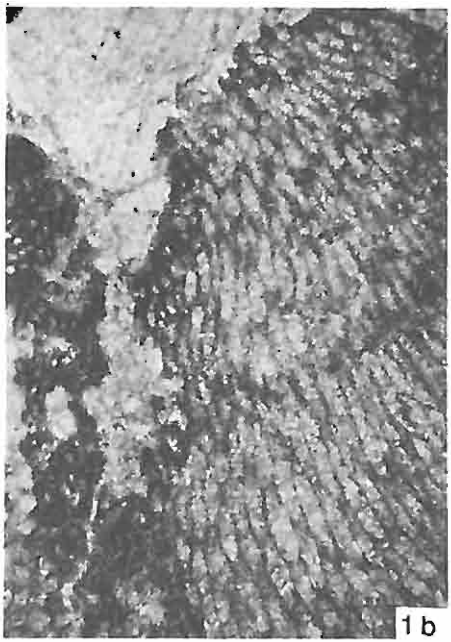
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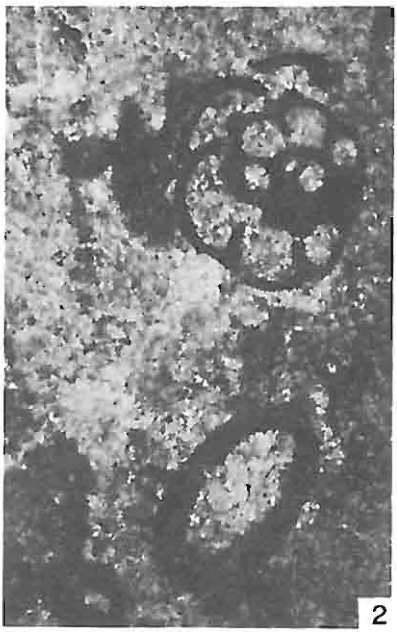
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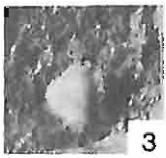
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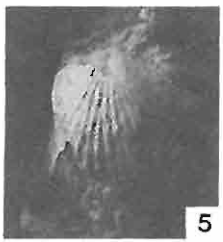
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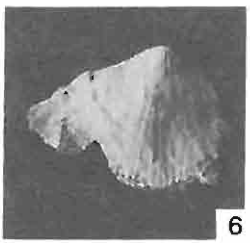
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PLATE VI

Fig. 1. *Endothyra bradyi* (Mikhailov)

a — NRS 318; 595.6–596.6 m; b — NRS 322; 628.5–629.5 m; complex (kompleks) IX; x ca 80

Fig. 2. *Priscella* sp.? ex gr. *P.prisca* (Rauzer-Chernousova et Reitlinger)

NRS 321; 611.0–612.0 m, complex (kompleks) IX; ca x60

Fig. 3. *Ilmenia* sp.

Shell in 5 positions: a — pedicle valve, b — brachial valve, c — posterior, d — anterior, e — side; 946.8 m, complex II (from pebble); x ca 2

Muszla w 5 położeniach: a — skorupka nóżkowa, b — skorupka ramieniowa, c — tył, d — przód, e — bok; 946,8 m, kompleks II (z otoczaka); x ok. 2

Fig. 4. *Ilmenia* sp. (accumulations), *Adolfia*? sp.

Shells and damaged valves; 946.8 m, complex II (from pebble); x ca 2

Muszle i uszkodzone skorupki; 946,8 m, kompleks II (z otoczaka); x ok. 2

Fig. 5. *Eomarginifera*? sp.

Fragment of posterior part of a valve; 595.6–596.6 m, complex IX; x ca 5

Fragment tylnej części skorupki 595,6–596,6 m, kompleks IX; x ok. 5

Fig. 6. *Chonetipustula*? sp.

Posterior part of a damaged valve; 614.0–615.0 m, complex IX; natural size

Tylna część uszkodzonej skorupki;614,0–615,0 m, kompleks IX; wielkość naturalna


1 a

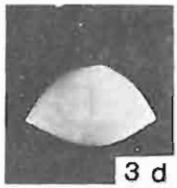

1 b


2


3 a


3 b

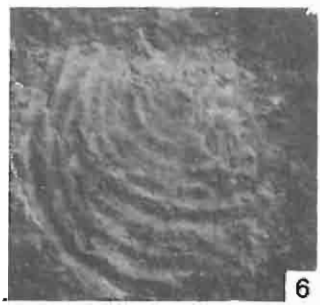

3 c


3 d


3 e


4


5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