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Late Mississippian–early Pennysylvanian (Serpukhovian–Bashkirian) miospore assemblages of the Bohemian part of the Upper Silesian Basin, Czech Republic

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ABSTRACT

Palynological samples from thirty-four boreholes drilled in the Bohemian part of the Upper Silesian Basin in the Czech Republic during more than last fifty years were examined. Coal samples from the Ostrava (Jaklovec and Poruba members) and Karviná (Saddle, Lower and Upper Suchá members) formations of Serpukhovian to Bashkirian age (Arnsbergian–Langsettian) were palynologically studied. Fifty-six genera with two hundred and forty-seven species were recognised by four palynologists. A brief review of the history of geological, palaeobotanical and palynological research is given. The changes in the dominance of the two principal miospore groups, lycospores and densospores, are the most significant criteria for the determination and characterization of dispersed miospore assemblages. The reconstruction of coal-forming vegetation is suggested. The comparison with some other European, and American coal basins and Western Europe palynozonation is suggested.

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1. Introduction

Upper Silesian Basin is one of the most important coal basins of the Carboniferous age in Europe. Geological research of this area was started in the beginning of the 19th century.

Palynological research started with intensive exploitation of black coal deposits in Czech and Polish parts of the basin during fifties of the last century. Almost nothing was published about Carboniferous spore assemblages from the Czech part of the Upper Silesian Basin that contrasts with number of papers published by several Polish palynologists from the Polish part of the basin (e.g. Kruszewska, 1963, 1968; Kmiecik, 1973; Konior and Turnau, 1974; Kmiecik, 1981, 1987a,b,c; Turnau and Gradziński, 1987; Kmiecik, 1988; Kmiecik and Żoldani, 1990; Turnau, 1991; Żdanowski and Żakowa, 1995; Oliwkiewicz-Miklasińska, 2004). With the exception of Horst (1955) all palynological data from the Czech part are in form of unpublished manuscripts. The main reason of this paper is summarization of today usually unavailable data to international palynological community for the first time, compare previously separated data from Polish and Czech parts of the Upper Silesian Basin and correlate spore assemblages of the Upper Silesian Basin with Western Europe zonation proposed by Clayton et al. (1977) and Owens et al. (2004).

The stratigraphical range of coal-bearing strata in the Czech part of the Upper Silesian Basin is Serpukhovian to Bashkirian (former late Namurian A-Langsettian). Palynological samples are from the Ostrava (Jaklovec and Poruba members) and Karviná (Saddle, Lower and Upper Suchá members) formations. Samples were obtained from the coal seams and/or coal horizons from boreholes and from mines.

The data in the present study were obtained from more than nine hundred samples from thirty-four boreholes and from several samples from mines. The minority of them was drilled more than fifty years ago, but most were drilled ten to fifteen years ago. The fundamentals of the system of classification of dispersed miospores (used by Dybová from Dybová and Jachowicz, 1957a) from earlier boreholes was sometimes different from that established by Dettmann (1963) and Smith and Butterworth (1967). Consequently it was difficult and sometimes problematic to compare some of the miospore taxa proposed, described and used only by Dybová (Dybová and Jachowicz, 1957a) with those from the current system of classification of dispersed miospores. Comparison can therefore, be focused on certain stratigraphically significant and morphologically distinctive spore taxa usually on the generic level.

The comparison shows that spore assemblages from the Upper Silesian Basin differ from most of those of the same age in Western Europe, especially from UK (Owens et al., 2004). Surprising is, that spore assemblages of similar age from Spain (Moore et al., 1972) is comparable with the Upper Silesian Basin although Spanish samples are from clastic rocks and not from coal seams.

Western Europe palynozonation (Clayton et al., 1977) is functional in several countries of Western Europe but is different from spore assemblages in some countries of Central Europe such as Poland and the Czech Republic where similar general palynoscheme is missing.

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2. Materials and methods

Material, rock samples and slides from boreholes drilled more than fifty years ago and described by Horst, Dybová and Valterová were not found. Slides, photomicrographs and most samples processed by the author are housed in the Laboratory of Palaeobiology and Palaeoecology, Institute of Geology v.v.i., Academy of Sciences, Prague, Czech Republic. All palynological data of Dybová, Valterová and author were derived from forty-three short palynological reports (manuscripts with lists of spore taxa which lack any detailed descriptions of spores and their photomicrographs) which concentrated only on the stratigraphic position of geological units.

Most samples used for this paper are from boreholes drilled during the research projects Dětmarovice–Petrovice, Frenštát–Trojanovice and Frenštát–Západ by Geologický průzkum Ostrava, UNIGEO Ostrava, Czech Republic. The author evaluated eleven boreholes (NP-860, NP-892, NP-893, NP-896, NP-897, NP-898, NP-899, NP-900, NP-901, NP-903 and NP-909), Valterová worked on seventeen boreholes (NP-545, NP-807-811, NP-813–816, NP-819–820, NP-857–858, NP-891, NP-895 and NP-907) and samples from eight boreholes drilled earlier were described by Dybová (NP-382, NP-383, NP-384, NP-388, NP-702, NP-717, NP-729 and NP-731).

Samples from the boreholes drilled about fifty years ago were macerated in the Laboratory of the Uhelný průzkum Ostrava, Czech Republic by two methods. The first maceration method used the Schulze's (1855) solution. The broken samples were mixed with $KClO_3$ (10%) and treated by HNO_3 (40%) for 1 or 2 days and neutralised by KOH or NaOH (5%). The second method was that of Zerndt (1934). The broken samples were treated with the technical bromine for 3–4 h and then by HNO_3 and water.

Samples from more recent boreholes were macerated in the Laboratory of the Geoindustria Praha in Černošice and Prague and in the Laboratory of Palaeobiology and Palaeoecology, the Geological Institute v.v.i., Academy of Science, Prague by the author. These samples were macerated in the Schulze's solution. From each sample 3–5 palynological slides were prepared in glycerine jelly. Samples,

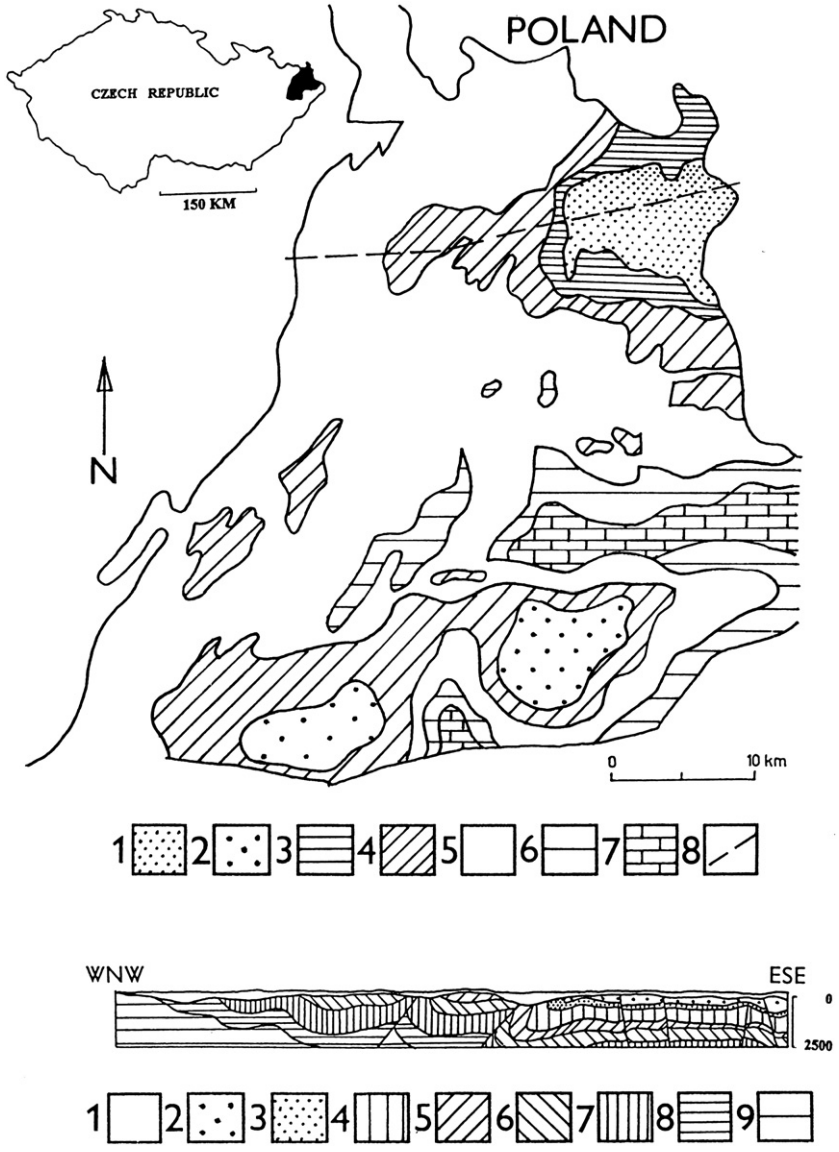

Fig. 1. Uncovered geological map of the Czech part of the Upper Silesian Basin (from Dopita et al., 1987). 1. Doubrava and Suchá members. 2. Suchá and Saddle members including the Prokop seams. 3. Saddle Member and the Prokop seams. 4. Poruba and Jaklovec members. 5. The Hrušov and Petřkovice members. 6. Culmian sandstones. 7. Culmian flysh rocks. 8. Geological section. Geological section (from Dopita et al., 1987). 1. Neogenian sediments. 2. Doubrava and Suchá members. 3. Saddle Member and the Prokop seams. 4. Poruba Member. 5. Jaklovice Member. 6. Hrušov Member. 7. Petřkovice Member. 8. Culmian sandstones. 9. Culmian flysh rocks.

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