



Научни съобщения

Palynostratigraphy and correlation between Dobrudzha Basin and South Wales coal sediments

Tatyana Dimitrova

Geological Institute, Bulgarian Academy of Sciences, Acad. G. Bonchev str., bl. 24, 1113 Sofia;
E-mail: tania_d@geology.bas.bg

Т. Димитрова. 2005. Палиностратиграфия и корелация на Добруджанския басейн с въглищните седименти от Южен Уелс. — Спис. Бълг. геол. д-во, 66, 1–3, 177–179.

Резюме. Добруджанският въглищен басейн и въглищните басейни на Южен Уелс са част от тропическите гори през късния карбон. Независимо от безспорните различия на образците за анализ, в тях се забелязва изобилие на маратиевите спори *Thymospora* и *Punctatosporites*. Изобилието на ликофитовите растения (lycopsida) е от значение за формирането на въглищните пластовете от двете находища и тяхната последователност. Условието на обитаване за тази група растения се променя рязко в най-младите седименти от двете находища (р3 — р7 от Добруджа — Гурковска свита и Llantwit 1 в Южен Уелс) поради настъпилото засушаване. Това дава началото на експанзията на кордаитовите растения (Monosaccate, Bisaccate pollen), съвпадащо със стратиграфската граница вестфал/стефан.

Колективът, работил по този проблем (проекти НЗ—1303 и IGCP 469) предлага на вниманието на Комисията по стратиграфия на карбона нова зонална схема за границата между сериите вестфал и стефан.

Key words: Palynostratigraphic correlation, Westphalian, Dobrudzha Basin, South Wales.

Introduction

Using the dispersed palynology of the Late Carboniferous (Pennsylvanian) tropical coal forests for vegetational analysis has traditionally been difficult because we did not know which plants produced many types of pollen and spore. However, this situation has changed through recent studies on *in situ* spores and pollen, and we can now start reinterpreting the dispersed palynological data (Monolete, Trilete group spore and Monosaccate, Bisaccate pollen grains). Evidence from South Wales (U. K.) and the Dobrudzha Coalfield (Bulgaria) suggests a progressive expansion of the lycophyte-dominated wetlands during the late Westphalian D, resulting in a distinct *Lycospora*—spike at the Westphalian—Stephanian series boundary. Traditionally, work on the dispersed palynology of these deposits has been mainly on the coals, but our evidence suggests that the palynology of the clastic deposits give the best evidence for the overall composition of the forests.

Dobrudzha Basin palynology

This study contains the stratigraphical analysis of microspores from the Late Westphalian sediments of the Dobrudzha Coal Basin, NE Bulgaria (Fig. 1). The palynological data obtained from samples of the boreholes near Gurkovo is discussed for the aim of the correlative programme of the Project IGCP 469. The litho- and biostratigraphical data for this region have been previously described in a number of publications. The absence of precise data from the most upper level of Gurkovo Formation is subject of further discussions about the boundary between Westphalian D and Cambrian stages in regional aspect. The levels of the boreholes studied for the purpose of this article, contain following species: *Spinisporites spinosus*, *Thymospora pseudothiessenii*, *Angulisporites splendidus*, *Cadiospora magna* and *Candidispora candida*; genus *Latensina*.

The analysis of the pollen assemblages of part of the Westphalian in the above-mentioned regions permits the palynostratigraphic subdivision of this

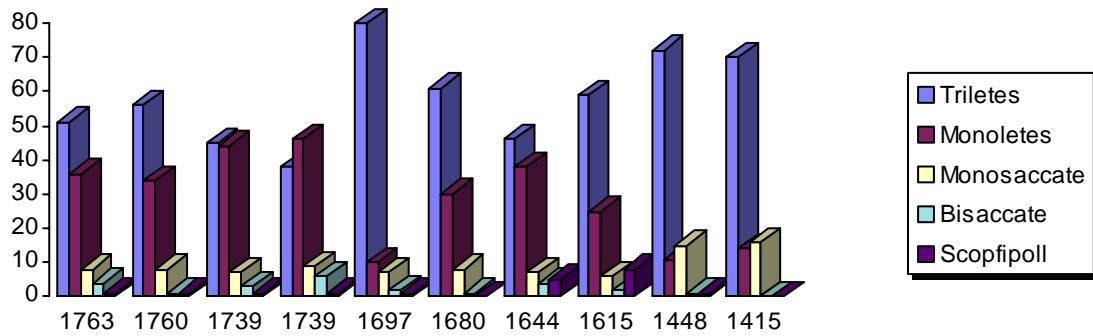


Fig. 1. The percentage occurrences of the morphological groups miospore of the P-191, Dobrudzha Basin, Bulgaria

Фиг. 1 Процентно съдържание на групи миоспори от Добруджанския басейн

regional type as well as some boreholes of the Kabalshki member (Nikolov et al., 1989) in the Gurkovo Formation, in data on macro- and microflora. The results of palynological studies concerning stratigraphic succession of Gurkovo Formation and new zonation of the palynostratigraphy were published in the earliest (Dimitrova, 2004).

Welsh palynology

New information on the palynostratigraphy of South Wales has been presented in the study (Fig. 2). Woodland et al. (1957) regarded the Pennant Measures as being synonymous with the Upper Coal Measures in South Wales.

Entirely new data on the palynology were obtained from 8 samples from upper Silesian Pennant Measures of South Wales, coal seams Darren Ddu and Llantwit. The palynologically studied samples come from Collection of David Davies in National Museum, Cardiff. The data about the age on of the macroflora published by Cleal (1978) confirmedly the palynological studies (Dimitrova et al., 2005) carried out per the purpose of this paper.

Preservation of palynomorphs Darren Ddu seam is very poor, and to some extent Westphalian D, with miospore like as *Thymospora*. The microfloral change between two maceration samples Dd1 and Dd2 is marked by the quantative analysis of several taxa

including *Triquitrites* spp., *Endosporites globiformis*, *Florinites* spp., genera *Punctatosporites* and *Laevigatosporites*. In the associatins the pollen forms *Potonieisporites* and *Florinites* are very common in Llantwit 3 seam, and spore genera *Cadiospora* and *Columinisporites* - in Llantwit 2 seam. The taxa as *Candidispora* sp., *Angulisporites splendidus*, *Protohaploxipinus*, *Vesicaspora*, *Illinites*, and *Latensina* spp., are already present of the studied section in coal seam Llantwit 1.

Biostratigraphy and correlations

The coals from Dobrudzha Basin and South Wales are economically the most important. The coal seams are markers for the more swamped and drier areas during the coal sedimentation of the microfloral assemblages. The two very important palynological correlation markers in the Westphalian D are the change of the palynoflora, established the *Thymospora* Zone in Dimitrova (2004).

According to the study, the oldest part of the sequence of Gurkovo Formation is probably no middle Westphalian D in age (Dimitrova, Cleal, 2004). The palynology indicates new age. The base of the Gurkovo Formation is middle/late Westphalian D. This is indicated also by two of three index macrofloral species for the upper *Lobopteris vestita* Zone (Cleal et al., 2003) and by abundant appearance

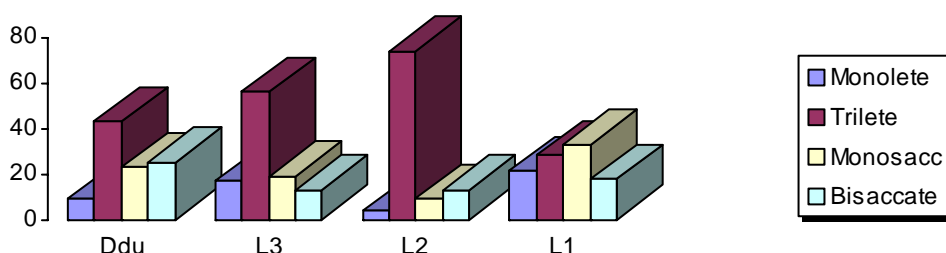


Fig. 2. The percentage occurrences of the morphological groups miospore of South Wales coal, UK

Фиг. 2. Процентно съдържание на групи миоспори от южноуелските въглища (Великобритания)

of the spore species *Thymospora pseudothiessenii*, *Angulisporites splendidus*, *Latensina* sp., *Cadiospora magna* and *Candidispora candida*.

Analysis of the microflora of Llantwit 1, 2 and 3 coal sediments of upper Silesian Pennant Measures assignment to the some palynozones described by Clayton et al.(1977). The stratigraphical boundary, which we discussed, is proposed by Clayton with two Zones: *Thymospora obscura* — *T. thiessenii* (OT); *Angulisporites splendidus* — *Latensina trileta* (ST).

The upper pollen and spore assemblages range from maceration L5 and L6 to the top of the profile. Some of the incoming species, such *Angulisporites splendidus* and *Candidispora candida* are stratigraphically

significant of probably Cantabrian to a level near the Baruelian in West European stratigraphic scale.

The full analysis of the microflora present in the Westphalian — Stephanian boundary is still subject to discussion. A collective study presented by the Commission Internationale de Microflore du Paleozoique Working Group on Carboniferous Stratigraphical Palynology offers the most unified zonal scheme formulation to date that is available from the late Carboniferous deposits of Western Europe. The work is part of a multidisciplinary research programmed in the framework of the Sub commission of Carboniferous Stratigraphy.

References

- Dimitrova, T. 2004. Microfloral biostratigraphy and vegetation change of the late Westphalian in the Dobrudzha Basin, NE Bulgaria. — *Geologica Balc.*, 34, 1–2, 32–27.
- Dimitrova, T. 2004. Palynological study of the Gurkovo Formation (Westphalian D/Cantabrian), Dobrudzha Basin, Bulgaria. — *Geologica Balc.*, 34, 3–4, 29–43.
- Dimitrova, T. Kh., C. J. Cleal. 2004. The late Westphalian D — early Cantabrian palynology of Europe and the Canadian Maritimes. — In: *Proc. 11th Intern. Palynological Cong.*, Granada, 2004 (in press).
- Dimitrova, T. Kh., C. J. Cleal, B. A. Thomas. 2005. Palynology of late Westphalian - early Stephanian coal-bearing deposits in the eastern South Wales Coalfield. — *Geol. Mag.* (in press).
- Clayton, G., R. J. Coquel, K. Doubinger, J. Gueinn, S. Loboziak, B. Owens, M. Streel. 1977. Carboniferous miospore of Western Europe: illustrations and zonations. — *Meded. Rijks. Geol. Dienst*, 29, 1–71.
- Cleal, C. J. 1978. Floral biostratigraphy of the upper Silesian Pennant Measures of South Wales. — *Geol. Journ.*, 13, 165–194.
- Cleal, C. J., T. Kh. Dimitrova, E. L. Zodrow. 2003. Macrofloral and palynological criteria for recognising the Westphalian - Stephanian boundary. — *Newsletters in Stratigr.*, 39, 181–208.
- Nikolov, Z., Y. Tenchov, K. Popova, T. Dimitrova, A. Popov. 1989. Subdivision and correlation of Gurkovo Formation from Carboniferous of Dobrudzha Coal Deposit. — *Rev. Bulg. Geol. Soc.*, 50, 1, 1–14.
- Woodland, A. W., W. B. Evans, J. V. Stephens. 1957. Classification of the coal measures of South Wales with special reference to the upper coal measures. — *Bull. Geol. Survey Great Britain*, 13, 39–60.