

## PALINOFACIES IN THE TURÓW OPEN-PIT (SW POLAND)

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**ABSTRACT:** During Early Miocene thick lignite deposit was formed in the Zittau Basin. The Lignite Deposit was formed in some different environments (swamp, mire, lake). Character of those environments involved immediate influence on palynological spectra and composition of plant detritus. Every environment has variable quality of those elements and this allows to mark out characteristic palynofacies.

**KEY WORDS:** Tertiary, palynofacies, lignite

### INTRODUCTION

The Turów lignite deposit originated during Early Miocene within an intramontane basin (Zittau Basin). Sedimentary fill of the Zittau Basin was controlled by processes of cyclic sedimentation and 6 sedimentary megacycles may be subdivided within Miocene lithological column there (Kasiński & Klimek 1985). The beginning of every cycle was related to rapid tectonic subsidence of the basin bottom; sedimentary basin was a large area during these stages.

Coarse-grained clastic sediments have been deposited in nearshore lake zones and fine-grained sediments – in the central part of the basin. During continuous mineral infilling the lake formed as more and more shallow and peat-forming plant communities gradually overgrew its area. This process brought plant matter accumulation in form of thick peat seams, which changed to lignite during process of coalification.

### RESULTS

Palynological data on the Turów coals allowed to try to characterize a few palynofacies defined in these deposits. The term “palynofacies” may be here defined as an assemblage of small (microscopical) phytogenic remains, related to individual character of sedimentary subenvironment and position within the basin. Phytogenic remains are dominated by elements of pollen/spore spectrum.

The palynofacies has been established on a base on features as follows:

1. Composition of the pollen/spore spectrum:

1a. Autochthonic sporomorphs bringing an information on taxonomy of coal forming assemblages.

1b. Allochthonic sporomorphs bringing an information on vegetation at the frames of the sedimentary basin.

2. Preservation and frequency of sporomorphs: these features are depended on character of a sedimentary environment.

3. Macroscopic features of the sediment:

3a. Main components: clay, plant detritus, xylite.

3b. Additions: clasts of xylite and fusinite, resine grains.

3c. Sedimentary features: lamination.

3d. Diagenetic features: gelification, fusinization.

The feature presented above were a base to define of deposition areas and palynofacies corresponding to them.

#### A. OPEN LACUSTRINE AREA

White kaoline clays and also gray and gray/brownish clays have been deposited in this zone. These deposits include also addition of xylitic clasts and resine grains.

There are no pollen of water plants in the pollen/spore spectra of this zone. Mesophilous and dry forest pollen grains are most frequent, sporomorphs of swamp communities are more scarce (Fig. 1).

#### B. AREA OF WATER PLANT VEGETATION

This area covers nearshore shallow part of the lake; gray/brownish clays, coaly middlings and pyropisitic lignite originated there. Large xylitic clasts, frequent fusinite remains and resine grains occur in the sediments of this zone. Macroscopic fragments of leaves are also observed.

Pollen grains of the water plants: *Sparganium* and *Po-*

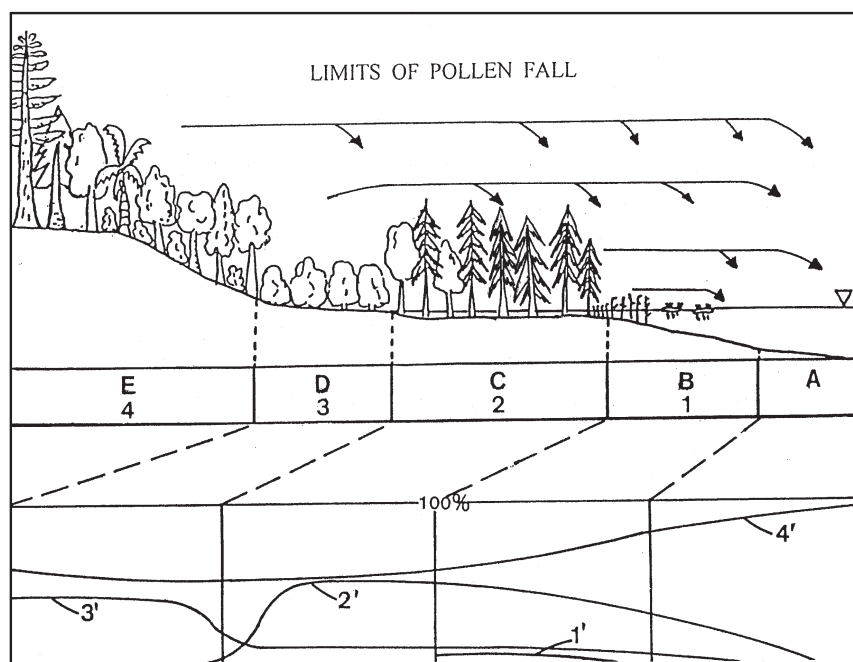


Fig. 1. Model of plant communities distribution, accumulation of phytogenic deposits and pollen-fall distribution areas (after: Traverse 1988, modified). A–D: zones of deposits accumulation. 1–4: plant vegetation zones: 1 – water plant community, 2 – mixed swamp forest community, 3 – swamp-bush peatland community, 4 – mixed mesophilous forest community. 1'–4': diagram of pollen percentage in deposits of the defined vegetation zones (1–4)

*tamogeton* occur in the pollen/spore spectrum of this zone. Also fresh-water plankton – *Sigmopollis* – occurs there. Allochthonic sporomorphs predominating in the pollen/spore spectra, however they are not so frequent as in the spectra of open lake A-zone), represent plants of a mesophilous mixed forest. Autochthonic sporomorphs are represented by pollen of the mixed swamp forest and shrubby peat-swamp.

#### C. AREA OF SWAMP-FOREST VEGETATION

Xylite-detrital and xylitic coal originated in this zone.

– xylite-detrital coal composing the lower coal seam – originated from swamp forest plants with predominance of *Alnus* and Polypodiaceae and small addition of swamp coniferous trees;

– xylitic coal composing the upper coal seam – originated from swamp forest coniferous trees, mostly of species of the *Glyptostrobus* and *Taxodium* with addition of *Nyssa* and *Osmunda*.

Both of them have a substantial addition of xylitic clasts and resine grains. They are often gelified and fusinited.

Allochthonic pollen of the mixed mesophilous plants is frequent in the coals of this zone and its quantity reaches up to 54%. Pollen grains of swamp forest representatives are most frequent from among peat-forming plants. Pollen of shrubby peat-swamp plants are more rare (extremely up to 9% of a spectrum). Pollen of water plants does not occur in this zone.

#### D. AREA OF SHRUBBY PEAT-SWAMP VEGETATION

Detrital and, locally, pyropissitic lignite originated in this zone. Detrital lignite consist mostly of amorphous humic detritus. Low quantity of fine xylites occur in addition.

Allochthonic sporomorphs are very frequent in a pollen/spore spectra of this zone. Pollen representing swamp-bush peatland vegetation are most frequent from among allochthonic elements.

Pollen/spore composition displays, than plants of the Clethraceae-Cyrillaceae, Myricaceae and Osmundaceae families were major components of a dense bush. Plants of the Ericaceae family dominated more uncovered areas. Pollen of swamp-forest plants is rare and somewhere its content may reach up to 4.5%.

Pyropissitic light coal, gray/yellowish, contains dispersed plant detritus and small clasts of xylite and fusinite. It originated on a swamp-bush peatland area within small intra-peat ponds. Pollen of water plants occurs in the coal.

#### E. AREA OF MIXED MESOPHILOUS FOREST VEGETATION

This area covers hills and hill foreland around the sedimentary basin. Mesophilous-forest community consist of trees with high climatic requirements, mostly evergreens: *Aralia*, *Castanea*, *Engelhardtia*, *Palmae*, *Platycarya*, some species of *Quercus*, and conifers: *Sequoia*,

*Pinus*, *Tsuga*, *Sciadopitys*. Phytogenic deposits consisting of tree fragments with preserved *in situ* groups of standing tree trunks (mostly of the *Sequoia*), described as "forest horizons" (Czeczott 1959) might belong to this zone.

Material of palynological studies has been collected in the central part of the basin; standing tree trunks *in situ* has been observed there only in areas of the C-zone. Probably they were trunks of swamp conifers: *Taxodium* and *Glyptostrobus*.

After the result of this examination, coal originated in the mixed swamp forest (C-zone) are most thicker and most frequent in the column of Miocene coals; sediments of other zones are secondary.

Lake overgrown floral succession was related to settlement of the basin by the associations continuously less and less hydrophilous.

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