

The Bartonian organic-rich deposits within the Silesian Basin (Polish Outer Carpathians)

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The Silesian Basin developed in the Western part of the Carpathian Tethys during the Jurassic – Early Miocene times. Its size and bathymetry changed and the sedimentation took place in different environments during these times. The dark deposits rich in organic matter were widely distributed twice, first in the Early Cretaceous during the sedimentation of the Verovice Formation, and again in the latest Eocene – Early Oligocene when the Menilite Formation was deposited. The sedimentary successions of these formations are dominated by shales that originated in anoxic or dysoxic conditions.

Similar deposits are present in the Bartonian and crop out in the Szczyrzyc Depression within the Silesian Nappe. They are represented by shales dominated by dark deposits rich in organic matter and contain several 0,5-3 mm thick layers of creamy bentonites. Brown mudstones prevail, they are laminated with intercalations of grey-green mudstones. The very fine-grained massive or parallel-laminated quartzite sandstones, hard brown siltstones, or sphaerosiderites occur as rare intercalations. The TOC content is usually 1-2%, in the uppermost part of the dark deposits complex TOC reaches 3%, while the surrounding deposits contain only 0.1-0.3 % .

The foraminifera were used for age estimations. Assemblages from the dark deposits are poorly taxonomically diversified and contain agglutinated foraminifera represented by long-range cosmopolitan forms. It is possible to distinguish the lower part of the *Ammodiscus latus* biozone (after zonations by Geroch & Nowak 1984 and Olszewska, 1997 for the Carpathians) of Bartonian age taking into account the foraminiferal data from under- and overlying deposits. Low diversity and numbers of foraminifera is connected with low oxygen conditions in the bottom of the Silesian Basin.

Concentration of organic matter in deep water conditions took place under certain conditions, like a low-energy environment with very low delivery of clastic material. These conditions were favorable for preserving organic matter, which was supplied to the basin floor and secured against wash-out and dilution. These conditions were fulfilled during the sedimentation of the Bartonian organic-rich deposits, which suggests the lithological development predominated by mudstones and siltstones, occurring in particular within thin layers of bentonites.

The Bartonian organic-rich deposits occur within the upper part of the so-called Hieroglyphic Beds and form a relatively thick complex measuring 20m in thickness. They are clearly separated from the Menilite Formation by 40 m thick deposits of grey-green shales with sandstones belonging to the upper Bartonian - Priabonian Hieroglyphic Beds and the light marly shales, marls and marly limestones of the Priabonian *Globigerina* Marls Formation. The anoxic conditions lasted about 4-5 million years.

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