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## CRETACEOUS OCEANIC RED BEDS IN THE OUTER FLYSCH CARPATHIANS OF CZECH REPUBLIC

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On the territory of Czech Republic the Upper Cretaceous oceanic red beds (CORB) occur through the Silesian, Fore-Magura, Rača, and Bílé Karpaty units of the Outer Western Carpathians. Predominantly hemipelagic and turbidite facies accumulated in several elongated deep-sea basins in the Western Tethys realm. During the Late Paleogene and Early Miocene Neo-Alpine orogenic movements imbricated the deposits into individual nappes. The red and green non-calcareous shales are dominant lithology. CORB biostratigraphy in the Outer Carpathians is based mainly on agglutinated foraminifera and non-calcareous dinoflagellates.

In the Silesian Unit the CORB deposited under basinal setting and on the slope. Basinal facies provides continuous section through the CORB (Bystry section). The CORB at the Bystra section occupy the Mazák Formation and lower part of the Godula Formation. The Mazák Formation is of Late Cenomanian (?) to Santonian age based on agglutinated foraminifera. The FO of *Uvigerinammia jankoi* and *Caudammia gigantea* represent the most prominent datums. Dinoflagellate assemblages suggested Middle Cenomanian to Coniacian age. Gray and brown-gray claystones of the lower part of the Godula Formation are Upper Santonian or Lower Campanian based on dinoflagellates. A low-diversity *Chondrites* and *Planolites* ichnofossil assemblage characterizes the claystones of the CORB. Rich *Cruziana* ichnofacies in the sandstones demonstrates nutrient influx coming with clastic material. The  $\delta^{13}\text{C}$  isotopic values of claystones show positive excursion around the top Albian, in the middle part of the Mazák Formation (?Lower Turonian), and lower part of the Godula Formation (Santonian). Variegated calcareous shales comprise the CORB in the slope facies of the Silesian Unit. Dinoflagellate cyst assemblages recovered till now (*Odontochitina perforata*, *Trihyrodinium suspectum*) indicate the upper Cenomanian to Lower Turonian. Calcareous nannofossils of UC6b Zone together with planktonic foraminifera *Helvetoglobotruncana praehelvetica*, *Praeglobotruncana* spp. etc. evidence the Early Turonian age. Plentiful siliceous microfossils (mostly sponge spicules) and paucity of calcareous in red and green shales indicate dissolution facies. Interesting are black gray horizons with isolated fish remnants deposited in hypoxic setting.

The CORB in the Fore-Magura Unit consist of variegated calcareous shales. Stratigraphic record is fragmentary and underlying strata are unknown due strong

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tectonic

disturbance.

Tectonic disturbance and poor outcrops in the Rača and Bílé Karpaty units allow only generalized sections based on the biostratigraphic correlation. In the flysch deposits of the Rača Unit the CORB are enclosed within the Kaumberg Formation. Brown red and greenish gray non-calcareous shale are prevailing lithology. Underlying strata, called informally Gault Flysch, are dominated by black-gray shale. The Kaumberg Formation is gradually passing to overlying turbidite sandstone/shale sediments of the Soláň Formation. *Uvigerinamina jankoi* and *Caudamina gigantea* foraminifer zones recognized within the Kaumberg Formation span within the Turonian-Campanian interval. The black and green-gray intercalations contain dinoflagellates from Lower Turonian (*Senoniasphaera rotundata*, *Subtilisphaera points-mariae*) in the lower part and Campanian in the upper part. The upper turbidite member of the formation contained nanofossils documenting Late Campanian and basal Maastrichtian age. Top of the Gault Flysch is dated by calcareous nanofossils and dinoflagellates of Middle and early Late Cenomanian age.

In the Bílé Karpaty Unit, the CORB are most facially diverse indicating different paleoenvironmental settings varying from middle-slope marls, through lower-slope turbidite fan, to abyssal clays. Slope-marl facies known as the Púchov Marls from Hluk, crops out locally in the front of the Bílé Karpaty Nappe in the same position as the same sediments in the Hauptklippenzone of Eastern Alps. Age of the marls is the uppermost Campanian to Upper Maastrichtian based on rich foraminifer fauna and nanofossils. The marls show small-scale cyclicity that may reflect Melankovich cycles. Both underlying and overlying strata are unknown. Abyssal red clays assigned to the Kaumberg Formation occur both in front and back of the nappe. Rich agglutinated foraminifera allow establish *Plectorecurvoides alternans*, *Ammobaculites problematicus*, *Uvigerinamina jankoi* and *Hormosina gigantea* zones that evidence Cenomanian to late Senonian age. Hluk Formation composed of interbedded turbidite marl, limestone, and hemipelagic black gray and green gray clay underlay the Kaumberg Formation. Foraminifera of *Plectorecurvoides alternans* Zone indicate Albian-Cenomanian age for the top of the Hluk Formation. Abyssal red clays are barren of dinoflagellate cysts as well of calcareous nanofossils.

The duration of CORB sedimentation varied in different sub-basins and was terminated by the influx of terrigenous turbidites. In the Silesian Basin the CORB deposition terminated in the Santonian, in the Rača Basin in the Maastrichtian. The CORB of the Silesian Unit in Godula development and Rača Unit were deposited in lower bathyal to abyssal below the CCD.