

**Siliciclastic-carbonate deposits in the flysch of the Outer Carpathians:  
a case study from the Istebna Beds in Melsztyn  
(Silesian Nappe, ?Palaeocene)**

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In the Outer Carpathians coralline algae occur in Palaeogene deposits usually as algal debris within siliciclastic and carbonate successions. This study regards to rhodolith beds within the Palaeocene deposits of the Silesian Nappe. On the eastern slope of the castle hill in Melsztyn (20 km SW Tarnow, Poland) a stratigraphic profile of flysch deposits about 20 m thick is exposed. It consists of two composed conglomerate-sandstone beds with calcareous components. These deposits were considered up to now as belonging to the Lower Istebna Sandstone (Campanian-Maastrichtian). The upper part of the outcrop (Upper Istebna Sandstone formation, ?Palaeocene) is characterised by the presence of numerous, irregularly distributed rhodoliths made up mainly of coralline red algae. Rare ostracods mixed in sandy-siliciclastic material are also present. Occasional clasts of marls and mudstones occur. This part of the outcrop containing the largest volume of calcareous detritus is characterised by lens different in size. Sparitic cement occurs in the neighbourhood of calcareous grains. Rhodoliths are mainly ellipsoidal in shape and range in size from 1.5 to 4 cm (max 8 cm) in diameter. Both encrusting corallines and rhodoliths show laminar growth-forms. The coralline laminar thalli, consisting of singular or multiple coralline plants, envelope encrusting foraminifera, serpulids, bryozoans, molluscs, and sporadically corals; siliciclastic matrix with few, small bioclasts are also present. The coralline taxonomic assemblage is dominated by *Sporolithon*. The nucleus of the rhodoliths consists of siliciclastic material. Rhodoliths are frequently and commonly bored. Badly preserved aragonite bioclasts occurring within the rhodoliths suggest that the original bioclasts possibly dissolved, providing source for calcareous cement in the study beds.

The studied sediments originated from high-condensed mass gravity flows from the SW-located source area. Relationships between rhodoliths and siliciclastic material suggest that they formed on the basement composed of such material within a moderately hydrodynamic energy setting. The presence of numerous microborings testify periods without sedimentation.