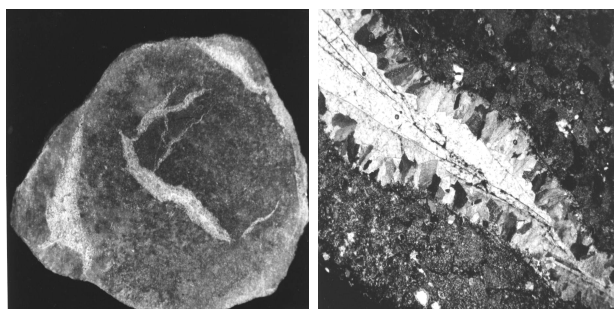


Genesis of carbonate concretions in the Western Carpathian Keuper shale

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Mineralogical and chemical investigations of carbonate concretions of the Upper Triassic Carpathian Keuper shale, Slovakia were investigated to verify their genesis. These concretions are commonly distributed as red, violet calcite concretions in red hosted shale or as nodular yellowish brown dolomite concretions in red and green hosted shale. Generally, they are of spherical to ovate shapes and range of 2-15 cm in size. Septarian calcite veins (0.1-0.5 cm wide) are found in some of these concretions (see Figure, left). The veins die out towards the margin of concretion; some concretions are enclosed by concentric shell along the margin.



Microscopic description of these concretions revealed that calcite is the main mineral and forming the micritic groundmass. Micrite recrystallization into microspar and pseudospar is also common. Sometimes scattered dolomite rhombs is also present. Other materials of the concretions include, fine quartz grains, feldspars mainly is sericitized, clayey materials, and some rubbish fragments of shale. Iron oxides and hydroxides are abundant and commonly they form rounded limonitic pebbles or finely disseminated grains. The surrounding rim are varied in thickness, the thicker part is of calcite enclosed cryptocrystalline silica (see Figure, right). XRD analysis of the bulk samples of some concretions show the presence of calcite and/or dolomite, quartz, chlorite illite and/or mica and kaolinite.

The ratio of calcite and dolomite and the amount of insoluble residues (see Table) revealed the dominance of calcite in the concretions of the Keuper shale from the Klippen belt, whereas, dolomite is the main mineralogical components for those concretions from the High and Low Tatra Keuper.

Sample location/No.	CaCO ₃ %	CaMg(CO ₃) ₂ %	Insoluble residues
Klippen belt / 4	39.9	13.5	46.6
Klippen belt / 8	62.3	11.8	25.9
High Tatra / 39	1.4	66.1	32.5
Low Tatra / 5	0.9	69.3	29.8

The studied concretions were most probably formed before the compaction of the hosted shale, that is, early diagenetic or penecontemporaneous in origin.