Muscovite is present in two generations. The young generation was formed under hydrothermal conditions in the course of Alpine deformation mostly from K-feldspar and also from biotite and albite. The newly formed muscovite is concentrated in the fine-grained (80-160 μm) fraction and resulted ages from 91.6 to 81.1 Ma. The older generation of muscovite was formed in the Hercynian time, it is preserved in the coarser (315-630 μm) grains and gave ages from 160 to 109.1 Ma. This implies that radiogenic Ar was not completely liberated from the old muscovite when the new generation was formed. Since older grains may be present in the finer grains too, the 81.1 Ma age could be the older limit for the formation of the new generation.

Six biotite samples were dated from the Sopron Gneiss Formation, the K/Ar ages range from 102.8 to 78.5 Ma. The ages do not correlate with the grain size, nor with the atmospheric Ar content. Therefore, the scatter of ages is explained by the retention of some radiogenic Ar and not by the incorporation of excess Ar when the new generation of muscovite was formed.

K-feldspar and albite were probably formed during the hydrothermal process too. The slightly older ages from 103.8 to 84.6 Ma are explained by the incorporation of some radiogenic Ar from the hydrothermal fluids.

The accordance of the youngest muscovite and feldspar ages indicate about 80 Ma for the hydrothermal/deformation process and, on the basis of some preserved radiogenic Ar in the biotite and coarse-grained muscovite, suggest ~300 °C for the temperature of this process. The small difference of muscovite, biotite and feldspar ages indicate a fast uplift during or soon after the hydrothermal/deformation process.

In contrast to the gneiss, biotites from the andalusite-sillimanite-biotite schist resulted Hercynian ages of 272 and 281 Ma, suggesting that the crystalline schists were in a more elevated position than the orthogneiss when the Austro-Alpine Nappe System was formed.

PRE-ALPINE CRUST IN THE CENTRAL WESTERN CARPATHIANS (SLOVAKIA)

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Density modelling and results of other geophysical methods (seismic, MTS, magnetic) indicate a complicated structure of the crust in the Western Carpathian realm which is a result of repeated continental collisions during:

- Tertiary (collision of the European and the Carpatho-Pannonian plate);
- Mesozoic (shortening within the frame of the Central Western Carpathians plate with the rise of two main paleoalpine tectonic units - the Tatricum and the Veporicum);
- Paleozoic (the crystalline basement of the last mentioned Alpine tectonic units comprise relicts of three main Hercynian lithotectonic units, being mutually overthrusted during continental collision in the mesohercynian stage).

The pre-Alpine crust of the Central Western Carpathians originated as a result of the Hercynian continental collision. Reconstruction of the pre-collisional situation is difficult because reliable structural and geochronological data for the early Hercynian stages and fragments of the Cadomian consolidated crust either are lacking. The stage of continental (microcontinental) Hercynian collision was preceded by subduction since in certain segments of the Western Carpathians crystalline relicts presumably of an oceanic crust and higher pressure metamorphic rocks are present. Consolidated continental crust was formed in the collisional stage (after early Paleozoic subduction) as an amalgamated cluster of the Precambrian fragments, the early Paleozoic metamorphic rocks and granitic intrusions. This crust was later affected by extension in the late Hercynian stage.

CRUSTAL STRUCTURE STUDY OF THE EUROPEAN PLATE PASSIVE MARGIN BENEATH THE WESTERN CARPATHIANS BASED ON GRAVITY DATA

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The Carpathians are included in the northern branch of the European system of the Alpides. Together with the Eastern Alps and the Dinarides they are the result of a Mesozoic and Cenozoic continental collision between Europe and several continental fragments to the south, including Africa.

Gravity models show changes in the degree of continental convergence in the Eastern Alpine and Western Carpathian region. Analysis of the continental collision zone incoporates a kinematic model of ocean basin closure, whereby gravity anomalies and topography are viewed as part of a continuum of continental crustal shortening, erosion and isostatic rebound. Thick crust and high topography in the Eastern Alps along with a broad Bouguer anomaly of -140 mGal amplitude, are consistent with about 175 km of crustal shortening, followed by 10 km of isostatic rebound. Eastward, crustal thicknesses and gravity anomaly widths and amplitudes