Contrasting mineral assemblages in polymetamorphic rocks from South Transdanubia (Hungary)

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Abstract: In the northern part of the Tisza Superunit (Hungary), the Vajta-3 borehole crosscuts basement rocks. The Al-rich metapelites contain contrasting mineral assemblages: an older kyanite + staurolite + almandine assemblage, which may be referred to a Barrovian-type metamorphic event, and a younger andalusite + biotite + (almandine) assemblage, indicating a low-pressure event. In spite of the complete lack of geochronological data, a two-stage metamorphic history for the Tisza Superunit does fit the picture emerging from the literature for the whole Hungarian basement.

Key-words: Hungary, basement, pre-Alpine, metamorphism, mineral chemistry.

Introduction

In Hungary, high- to medium-grade metamorphic rocks only crop out in a very few localities, due to the presence of a very thick Neogene sedimentary sequence making up the Pannonian basin. The little information which may be obtained from boreholes is therefore extremely important, and is the only source on which a general view of the basement buried beneath the Great Hungarian Plain may be founded.

Numerous boreholes crosscutting the crystalline basement have been drilled in the last few years. The Vajta-3 borehole, in the northern part of the Tisza Superunit (Fülöp et al., 1987), is of particular importance because it supplied petrological data which are highly significant for a better understanding of the whole Hungarian basement (Lelkes-Felvari & Sassi, 1981; Arkai & Lelkes-Felvari, 1987).

Petrography and mineral chemistry

Among the numerous rock-types crossed by borehole Vajta-3, the Al-rich metapelites are the most relevant to our aims. Specifically, the occurrence of contrasting mineral assemblages in these rocks indicates a complex history, of which two main stages may be unravelled (M1 and M2).

The metapelites are fine-grained rocks with parallel foliated or crenulated textures visible to the naked eye. Mica-rich bands alternate with quartz-feldspathic granoblastic bands. The minerals occurring in these rocks are:
- white mica (muscovite), developed as postkinematic flakes, often associated or intergrown with biotite or as minute inclusions dispersed in quartz and feldspar. They frequently surround deformed kyanite crystals, without revealing any sign of that deformation;
- biotite, which occurs as large postkinematic flakes and sometimes as randomly oriented polycrystalline pseudomorphs after garnet, together with subordinate white mica. Large biotite flakes, including small dismembered fragments of former large staurolite crystals, are also to be mentioned. The composition of these phyllosilicates is in the range Mg/ (Mg+Fe++) 0.3-0.5; their TiO2 contents are very high (1.5-3 %);