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Late Paleozoic igneous episodes in the Pannonian Basin and the Apuseni Mts: petrology, zircon U–Pb dating, and regional correlations

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In the Carpathian–Pannonian region, the products of several Permo–Carboniferous magmatic episodes can be traced in outcrops (*e.g.*, Western Carpathians, Apuseni Mts) or in the basement of the Pannonian Basin well-explored by boreholes (*e.g.*, Southern and Central Transdanubia, Eastern Pannonian Basin). First descriptions and interpretations of the igneous rocks were associated with reports of uranium ore and hydrocarbon exploration (from the 1960–80s) that provided obsolete and/or incomplete information. Therefore, many of them were reexamined in the last decade in the light of modern petrological views (*e.g.*, trace element geochemistry and zircon dating). In the followings, the major outcomes of these investigations are summarized. In the Eastern Pannonian Basin (Tisza Mega-unit), S-type granitoids were drilled that most possibly represent crustal melts in an Early Carboniferous (~356 Ma) continental arc or collisional setting. Similar mineralogical compositions and major and trace element distributions refer to the genetic linkage of these rocks with the Codru granitoids (Apuseni Mts) and their feasible relationship with the S-type metagranites in the Papuk Mts (Slavonia). Many of these granitoids were affected by post-emplacement deformation and/or metamorphism. In Central Transdanubia (ALCAPA Mega-unit), an Early Permian (~281 Ma) dacitic volcanism was revealed, represented by lavas (boreholes in the Balaton Highland) and dykes in the Polgárdi limestone quarry (Szemerédi *et al.* 2020). Trace elements suggest that these rocks are associated with a post-orogenic environment and show similarity with the analogous formations of the Northern Veporic Unit, Western Carpathians. The youngest, Mid-Permian (~271–259 Ma) episode was revealed in a relatively large area of the Tisza Mega-unit (Szemerédi *et al.* 2020), represented dominantly by crystal-rich pyroclastic rocks or lavas in Southern Transdanubia, the Eastern Pannonian Basin and the Apuseni Mts. Trace element distributions suggest the rift-related (A-type) character of these rocks and, along with zircon ages, supported their plutonic–volcanic connection with the 267–260 Ma granitoids (Szemerédi *et al.* 2021) in the Highiş massif (SW Apuseni Mts). It is feasible that the large-volume Mid-Permian silicic magmatism of the Tisza Mega-unit formed a complex cogenetic suite together with mafic and intermediate melts that are prevalent in the Highiş massif (gabbros and diorites) and in the Codru-Moma Mts (basalts and andesites occurring with felsic ignimbrites). These A-type felsic rocks show similarity to some of the analogous formations in the Western Carpathians (*e.g.*, Gemeric, Silicic, and Veporic Units) and might represent similar anorogenic melts in the Paleo-Tethyan realm.

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