sest suspected subductions in the surroundings can be related to the Budva-Pindos or Meliata-Vardar oceans. Extension stresses related to the Budva-Pindos subduction, started in the Mid-Late Cretaceous (Csontos and Vörös 2004), could affected the formation and ascending of the lamprophyric melts in the Tisza sector. However, this subduction seems too late to cause the upper mantle deformation and metasomatism detected in the xenoliths; at least 24 Ma years is necessary for an extensive metasomatism of the mantle wedge (Greya et al. 2002). This process probably could be due to the former closure of the Meliata-Vardar ocean, ended by the Middle Cretaceous (Csontos and Vörös 2004). Even if these subductions could be reasonable candidates for mantle enrichment and deformation in the case of Villány Mts, they can hardly explain the mantle enrichment beneath the Transdanubian region, not being extended west-bound until the Alcapa microplate (Csontos and Vörös 2004). This suggests that, in this case, at least two separated subduction-related enriched mantle domains existed beneath the Alpine-Carpathian-Pannonian area in the Late Mesozoic. Explain the subduction-related deformation and enrichment beneath the Alcapa microplate is even more difficult, the Penninic-ocean seems to be a reliable candidate. However, dating of its opening and closure is uncertain and there have been no direct subduction-related magmatic traces of its subduction detected previously.

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Tertiary Stress Field Evolution in the Eastern Part of the Bükk Mountains, NE Hungary

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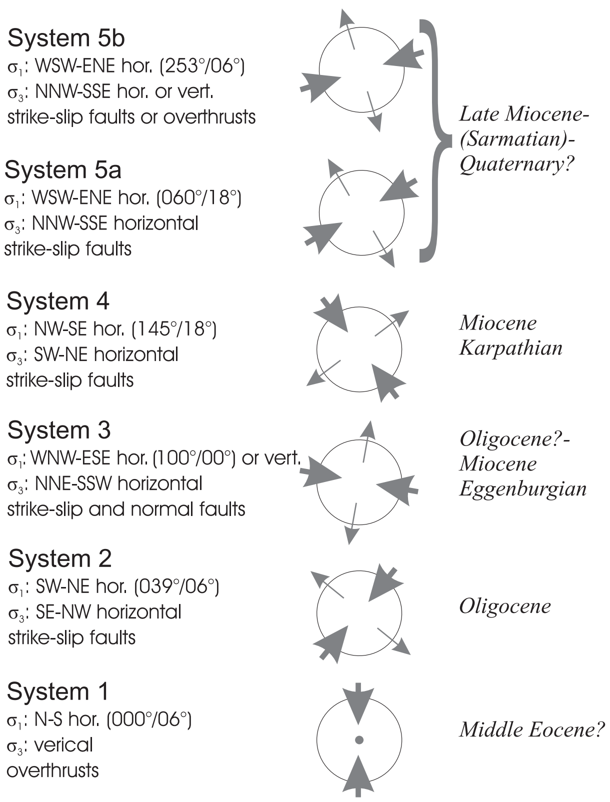
The Bükk Mts. consists of Paleozoic and Mezozoic rocks surrounded by Tertiary sediments and volcanics of the Pannonian basin, so it can be regarded as an uplifted and exhumated part of the basement. According to the 43±8 MY cooling ages of Dunkl et al. (1994) (apatite fission track, cooling under 70°C) and the Late Eocene age of the oldest known Tertiary sedimentary rocks (limestone with Nummulites) of the Bükk Mts. the first Tertiary exhumation occurred in the Middle Eocene. After some periods of sedimentation and volcanism the present state is the almost perfect exhumation of the basement rocks with well-defined edges around and with few remnants of the cover inside the mountains. These basement rocks on the steep slopes of the mountains offer several outcrops with well-preserved striation on fault planes of variable orientation. Some fault planes were active in two or more phases of the deformation history, so based on the observed overprinting relations the phases can be separated and the relative ages of the movements also can be stated. These features are very favourable for fault slip analysis and stress inversion. On the other hand, lack of the coeval sediments prevents the observer from direct dating of the deformation phases.

In my analysis I used the fault slip data of about 70 outcrops (22 of those with more than 10 unambigous data of different plane-striae pairs, 655 such pairs altogether) from the eastern part of the Bükk Mts, on a cca. 80 km^2 area collected during the last two years. I measured the orientation of the fault planes and the slickenlines (striae or slickolites) on these planes. I observed the shear sense indicators and overprinting relations where it was possible. Based on these, I defined sets of striae which could be formed during a single deformation phase with a nearly constant stress field. For stress inversion I used the p-T dihedra method (Angelier 1984) because the necessary inputs of this method were suitable for the collected data set and, because of the limited validity of the assumptions needed for the inversion, there is no possibility to reach a level of accuracy higher than provided by this method. Construction was carried out by the StereoNett 2.46 software of J. Duyster.



■ **Fig. 1.** Movement systems with constructed principal stress directions, characteristic fault types and assumed ages.

The sets of striae were grouped into "movement systems" based on the kinematic similarity of the movements on similarly oriented planes of each outcrop. I strived to minimize the number of these movement systems, so the ones with a difference less than 10° between the estimated principal stress directions were merged if overprinting relations did not contradict it. In this way there remained five movement systems which were active in the whole area and possibly beyond it; some other systems occur only on some adjoining sites and seem to have a local role only. As direct dating of the movement systems was impossible, in the last step I tried to fit in the data with the regional stress field analyses (Márton – Fodor 1995) and with the sedimentary and volcanic records (Pelikán 2002), in this way associating an assumed age to each of them. This step was made from the youngest system towards the previous ones, so I introduce them in an inverse chronological order (fig 1).

System 5 characterized by E-W shortening and WNW-ESE sinistral strike-slip faulting is connected with the faults of the last uplift and the edges of the present Bükk Mts (Németh 2005), so its assumed age is Late Miocene-Pliocene; it may have been active even in the Quaternary. System 4 characterized here by dextral faulting on E-W strike correlates well with the Karpathian state of the regional stress field according to Márton and Fodor (1995). System 3 is characterized by NNE-SSW extension and correlates with the Eggenburgian system of Márton and Fodor (1995). System 2 characterized by NE-SW directed highest principal stress and corresponding strike-slip faulting cannot be correlated with known regional systems, but it is definitely older than the overprinting System 3 so its assumed age is Oligocene. System 1 is characterized by N-S shortening and large-scale overthrusts with considerable amount of uplift. It seems to be connected with zigzag folds and a deformation style change, so I assume it to be coeval with the Middle Eocene cooling age determined by Dunkl et al. (1994). Brittle deformation elements older than these always are associated with folding.

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