Late Anisian rifting in the Neotethys Ocean evidenced by the steinmann trinity of the Triassic Miraka section in the Mirdita Zone (Albania)

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The ophiolites of the Miraka section near Librazhd in central-east Albania are designated as Middle to Late Jurassic in age according to the Geologigal Map of Albania (Xhomo *et al*., 2002). The gabbroic rocks, together with the overlying cherty sediments, occur as a huge slide of nappe size in a Middle Jurassic matrix of radiolarites and cherty limestones. Our age determinations of the radiolarites and cherty shales on top of the ocean floor (gabbro, gabbronorite) yield Middle (to Late) Triassic (Illyrian to Late Ladinian/Early Carnian) ages. The sediment ages also constrain the age of the ophiolites below, since the sediments are the direct, primary cover. The Miraka section is therefore a key section in the understanding of the geodynamic evolution of the Albanides. This Middle Triassic succession reaches a maximum thickness of about 12 m. Most rocks are well-bedded, black to reddish radiolarites and cherty slates with poorly preserved radiolarians. Most radiolarians occur as massive, strongly recrystallized quartz.
We date the black, laminated cherty shales, directly overlying the gabbroic rocks, by the following radiolarians as Illyrian: *Eptingium japonicum* (Nakaseko and Nishimura), *Parasepsagon praetetracanthus* Kozur and Mostler, *Pseudoertlispongus* cf. *hermi* (Lahm), *Pseudostylosphaera* cf. *longispinosa* Kozur and Mostler, *Triassospongosphaera multispinosa* (Kozur and Mostler). The overlying reddish radiolarian-rich laminated wackestones yield a Late Illyrian to Early Ladinian age, again by means of radiolarians, although marker species are missing in this poor assemblage: *Anisicyrtis* sp., *Annulotriassocampe campanilis* Kozur and Mostler, *Archaeocenosphaera* sp., *Pararuesticyrtium* (?) cf. *mediofassanicum* Kozur and Mostler, *Pararuesticyrtium* sp., *Pseudostylosphaera* cf. *longispinosa* Kozur and Mostler, *Welirella weveri* Dumitrica, Kozur and Mostler. The overlying, more massive, reddish-green radiolarites, mostly radiolarian-rich wackestones, are dated as Late Ladinian to Early Carnian (*Muelleritortis cochleata* Zone, *Spongoserrula fluegeli* Subzone) by: *Annulotriassocampe baldii* Kozur, *Archaeocenosphaera* sp., *Carinaheliosoma* sp., *Gomberellus* cf. *hircicornus* Dumitrica, Kozur and Mostler, *Muelleritortis cochleata* (Nakaseko and Nishimura), *Muelleritortis expansa* Kozur and Mostler, *Pseudostylosphaera* sp. (internal casts), *Spongoserrula fluegeli* Kozur and Mostler. This Miraka section represents the original sedimentary cover of the ocean floor preserved in the Albanian ophiolites. This means that at least parts of the ocean floor were formed in Triassic

times and not started to form in Early Jurassic times (Shallo and Dilek 2003 for comparison). The Miraka section shows a similar situation as it is found in the Rubiku Complex, where siliceous shales and radiolarites lie on top of pillow basalts, which are part of the radiolaritic-wildflysch (= „ophiolitic mélange“) mélange. Chiari et al. (1996) described a 9 m thick radiolarite section from Rubiku and dated it as Fassanian to Late Langobardian (Middle Triassic) or Early Julian (early Late Triassic); the basal 1.5 m thick siliceous shales could not be dated.
Based on the Triassic spreading and Middle Jurassic destruction of the Mirdita Ocean we draw the conclusion that the Mirdita ophiolites - as well as their continuations to the north and south - derive from the Neotethys Ocean (Vardar segment) further east, and consequently they are brought into their present position by far-distance transport during W-vergent thrusting in Middle (to Late?) Jurassic times. The age pattern conforms with known ages in the Vardar-Meliata realm (Pamic et al., 2002).

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Xhomo, A., Kodra, A., Dimo, L., et al., 2002: Geological Map of Albania 1: 200 000 scale. Geological Survey of Albania, Republika e Shqiperise.