Lacustrine otoliths fauna from the Miocene sediments of Vračević (western Serbia)

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Here we present a rich assemblage of fish otoliths from the late Badenian to early Sarmatian (MN7+8 zone), which were collected along the Grabovac stream in the village of Vračević. They were obtained from freshwater thin-bedded marly deposits of the Vračević part of the Serbian Lake System in the Valjevo-Mionica Basin in western Serbia. This basin covers an area of 350 km² and represents the western part of the so-called Valjevo-Mionica-Belanovica Graben that had formed during the Ottnangian-Karpatian, and later became inverted (Marović et al, 2007).

The stratigraphic position of the Vračević locality is controversial. Based on terrestrial gastropods Neubauer et al. (2016) considered, these freshwater sediments as Sarmatian s.s. in age. According to terrestrial micromammals the sites represent the MN7+8 zone (Marković, 2003). Recently, a shallow well drilled at the hill close to the Grabovac stream, gave evidence of the presence of the marine to brackish Sarmatian s.s. and brackish Pannonian sediments (Bradić-Milinović et al., 2018).

The otoliths correlate well with the fauna from the early to middle Miocene of Klinci (Bradić-Milinović et al., 2019). The fish fauna from Klinci represents an endemic paleobioprovince characteristic to the ancient Serbian Lake System (SLS). We observed a similar type of fish fauna in both localities, which indicates that they have connected through time during the existence of the Valjevo-Mionica Basin. The freshwater community of goby fishes from the early to early middle Miocene of southeastern Europe documents the presence of a lost Miocene freshwater goby fish fauna, before the unrelated Ponto-Caspian fish fauna of today expanded into the freshwater environments of its borderland (Bradić-Milinović et al., 2019).

We idenfied 9 different species, of which two are new and three remain in open nomenclature: *Aphanius jeani, Aphanolebias bettinae* n.sp., *Klincigobius andjelkovicae, Klincigobius haraldahnelti* n.sp., *Klincigobius serbiensis, Klincigobius* sp., *Toxopyge campylus, Toxopyge vracevicensis* n. sp. and *Ponticola* sp. (Bradić-Milinović et al., 2021).

Based on the composition of the fish fauna in the Vračević sediments, we concluded that it could be older in age than Sarmatian s.s., but younger than the fauna from Klinci (Bradić-Milinović et al., 2021). In facts it so far represents the last occurrence of this lost freshwater goby fauna.

References

Bradić–Milinović, K., Rundić, Lj. & Bojić, Z. (2018). A contribution for stratigraphy of the Miocene of Vračević (Valjevo–Mionica Basin). *Proceedings of XVII Congress of the geologists of Serbia,1*, 110–114.

Bradić–Milinović, K., Ahnelt, H., Rundić, Lj. & Schwarzhans, W. (2019). The lost fresh water goby fish fauna (Teleostei, Gobiidae) from the early Miocene of Klinci (Serbia). *Swiss Journal of Palaeontology, 138,* 285–315.

Bradić-Milinović, K., Rundić, Lj. & Schwarzhans W. (2021). Middle Miocene freshwater otoliths from the Vračević lake (Serbian Lake System). *Annales Géologiques de la Péninsule Balkanique, 82(2),* 1-24.

Marović M., Toljić M., Rundić Lj. & Milivojević J. (2007). Neoalpine tectonics of Serbia. *Serbian Geological Society*, 1–82.

Marković, Z. (2003). The Miocene small mammals of Serbia, a review. *In: Reumer, J. W. F. & Wessels, W. (ed.) – Distribution and migration of Tertiary mammals in Eurasia. A volume in honour of Hans de Bruijn – DEINSEA 10,* 393–398.

Neubauer, T., A., Harzhauser, M., Mandić, O. & Jovanović, G. (2016). The late middle Miocene non–marine mollusk fauna of Vračević (Serbia): filling a gap in Miocene land snail biogeography. *Bulletin of Geosciences, 91(4),* 731–778.

Figure 1- The lost early to middle Miocene freshwater goby association of central and southeastern Europe and the role of the Klinci and Vračević faunas in it.