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Investigation of mortars technology applied at the borders of the Roman Empire

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The results of Roman mortars characterisation of the former Danube Limes in Serbia are reported in this paper. The following procedures were used: detailed diagnosis of the defined archaeological sites, in situ characterisation of the building materials, sampling, laboratory analyses, interpretation and utilisation of the obtained results as well as up-to-date literature review of other research groups in the field. These procedures were defined and presented based on the results of the scientific project MoDeCo2000: Mortar Design for Conservation – Danube Roman Frontier 2000 Years after, financed through the programme PROMIS[1].

Mortars dating from I to VI century BCE, covering military and civil locations were collected and analysed. Namely, more than 100 samples of various types of mortar from legionary fortress' ramparts, auxiliary and smaller forts, constructions within them, as well as bridges, city ramparts, baths and villas, basilicas and tombs were characterised [2].

The results of the samples characterisation from the Lederata (Ram) and Egeta (Brza Palanka), Republic of Serbia, which covers only a fragment of the MoDeCo2000 project, are the core of this paper. After in situ investigations and sampling procedure, the laboratory activities of the sampled mortars included visual observations, stereo-optical and digital microscopy, spectrophotometry and colourimetry, mineralogical and petrographic analyses, physical-mechanical tests, thermal characterisation, mechanical and chemical separation of aggregates from the binders, and their characterisation by using FTIR, Raman, XRF and XRD.

The obtained results lead directly to the design and production of compatible mortars for upcoming conservation actions on the Danube Limes in Serbia and contribute to the universal body of knowledge about Roman mortars and architecture in small towns and military fortifications on the borders of the Roman Empire [3,4].

[1] Program for Excellent Projects of Young Researchers - PROMIS, Grant Agreement #6067004, Project acronym MoDeCo2000.

[2] A.L. Velosa, J. Coroado, M.R. Veiga, F. Rocha, Characterisation of roman mortars from Conimbriga with respect to their repair, *Materials Characterization* 58 (2007) 1208-1216.

[3] M. Korać, S. Golubović, N. Mrđić, G. Jeremić, S. Pop-Lazić, *Granice Rimskog carstva- Rimski limes u Srbiji*, Beograd, 2014.

[4] Ferjančić S: History of Roman provinces in the territory of modern day Serbia during Principate, in: *Constantine the Great and the Edict of Milane 313* (eds. I. Popović, B. Borić-Brešković), Belgrade: National Museum in Belgrade, pp. 16–25 (2013)

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