

**INSTITUTE OF ARCHAEOLOGY  
BELGRADE, SERBIA**

**1<sup>ST</sup> INTERNATIONAL CONFERENCE WITH WORKSHOP**

**SCIENCE FOR CONSERVATION  
OF THE DANUBE LIMES**

*Mortar Design for Conservation – Danube Roman Frontier  
2000 Years After*

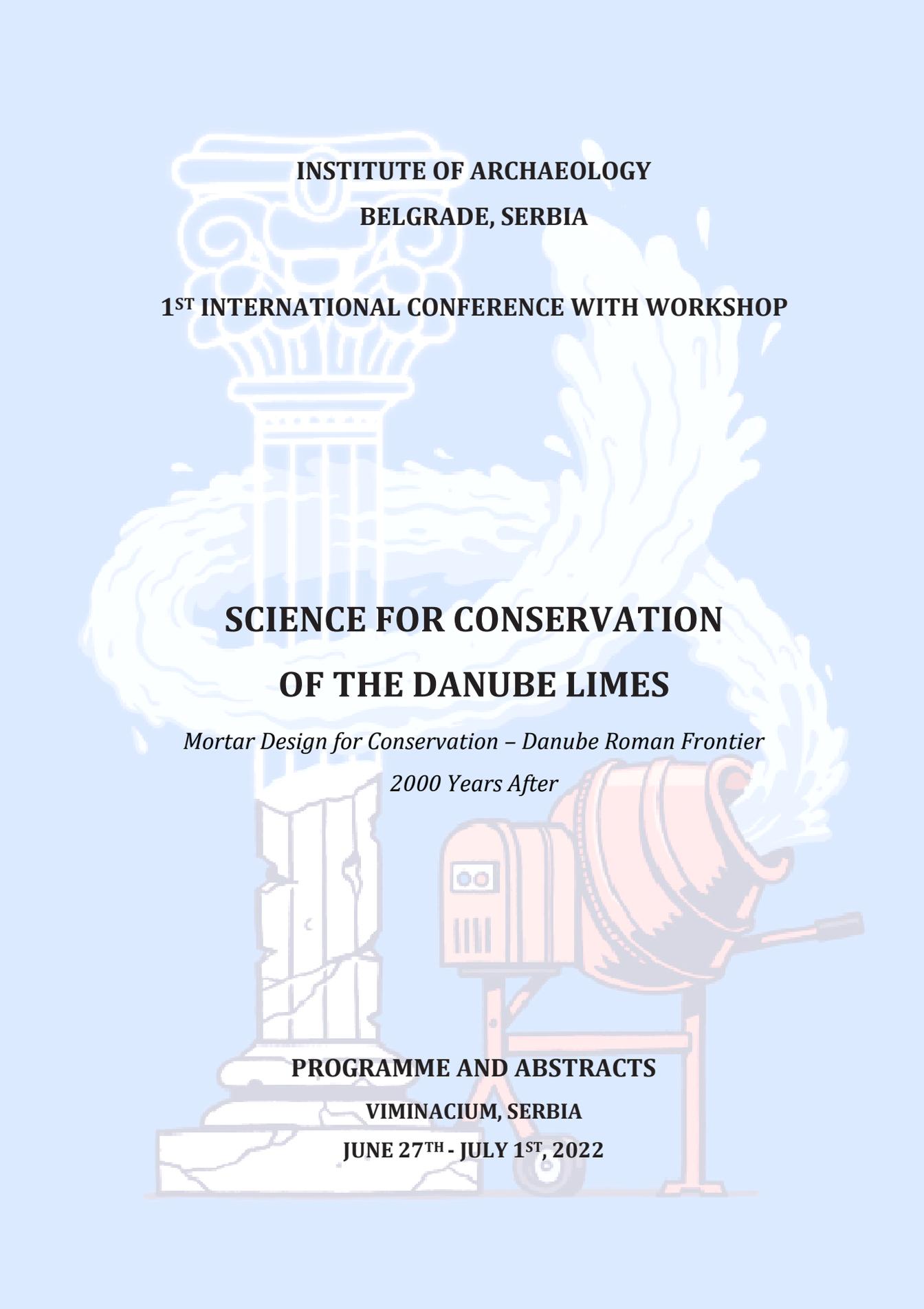


**PROGRAMME AND ABSTRACTS**

**VIMINACIUM, SERBIA**

**JUNE 27<sup>TH</sup> - JULY 1<sup>ST</sup>, 2022**





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# Science Fund of the Republic of Serbia



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institut@ai.ac.rs; <https://ai.ac.rs>; tel. +381 11 2637-191

**Editor in Chief:**

Miomir Korać, Institute of Archaeology, Belgrade, Serbia

**Editors:**

Emilija Nikolić, Institute of Archaeology, Belgrade, Serbia  
Mladen Jovičić, Institute of Archaeology, Belgrade, Serbia

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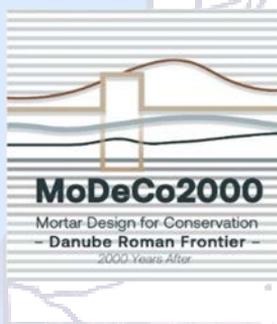
Emilija Nikolić, Institute of Archaeology, Belgrade, Serbia  
Mladen Jovičić, Institute of Archaeology, Belgrade, Serbia

**Proofreading:**

Dave Calcutt

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Dr Mladen Jovičić, Institute of Archaeology, Belgrade, Serbia  
Dr Snežana Vučetić, University of Novi Sad, Faculty of Technology Novi Sad, Novi Sad

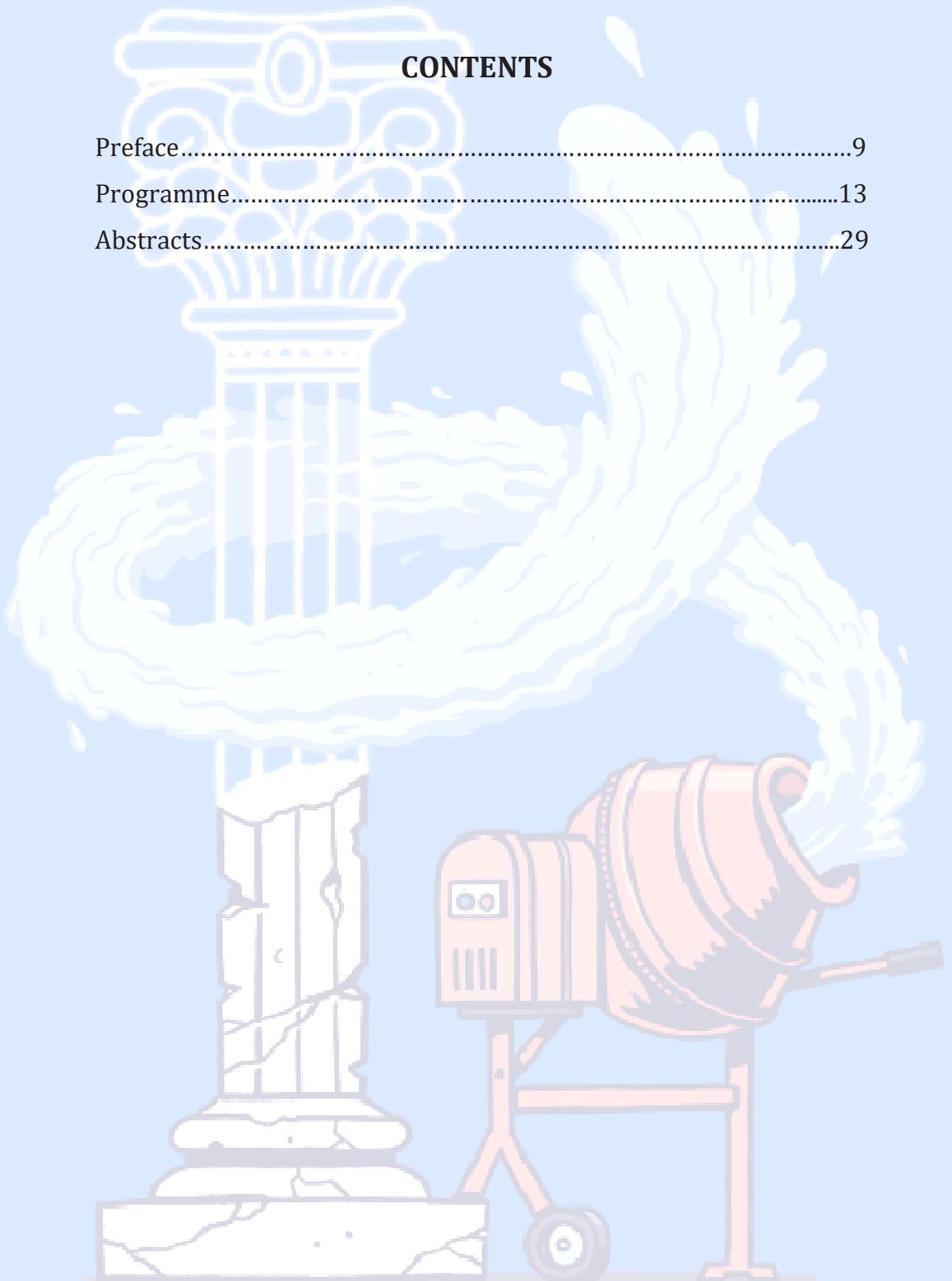
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- Dr Emilija Nikolić, Institute of Archaeology, Belgrade, Serbia  
Dr Mladen Jovičić, Institute of Archaeology, Belgrade, Serbia  
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Dr Nemanja Mrđić, Institute of Archaeology, Belgrade, Serbia  
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Kristina Ponjavić, Institute of Archaeology, Belgrade, Serbia  
Ljubomir Jevtović, Institute of Archaeology, Belgrade, Serbia  
Dr Dragana Gavrilović, Institute of Archaeology, Belgrade, Serbia



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## PREFACE

*The dust that a building is transformed into when it becomes a ruin holds precious traces of the past. The hands of an archaeologist will search through it patiently, and find a necklace bead of a woman that lived in it. The hands of an architect will virtually transform the dust into a mortar, brick, or stone. The first profession sees through the unbuilt. The second one builds from it. However, both perform their work by communicating with the sciences.*

*Throughout history, various components were chosen, measured, and mixed into one of the most complex building composites ever - mortar, whose re-creation is of invaluable importance for architectural conservation. Geologists and chemists will best tell us about its composition. However, sometimes, while excavating a ruined wall, an archaeologist finds a mortar trowel, accidentally left by the past builder. Is this a more valuable trace for revealing the creation of a wall than the binder/aggregate ratio of the mortar used? Can we pick it up and imagine the hands that combined colourful aggregate grains with the earth, gypsum, lime, or cement?*

*From the exploitation, transport, and use of raw materials, to the product called mortar, we pass by the people from the past, the quarries, roads, and rivers, we look at the craftsmen working with tools, and observe the investors negotiating with engineers, and the rulers supervising the construction. The four hands from the beginning of the story can combine the chemistry of the red, blue, green, yellow, black, and white mineral grains with the found trowel, and help us revive many*

*unknown hands from the past. Thus, the research of historic mortars for conservation purposes must not be a purely technical process. Only by understanding the multiple values of a historic building, we can adequately protect it.*

*The project Mortar Design for Conservation – Danube Roman Frontier 2,000 Years After (MoDeCo2000), funded by the Science Fund of the Republic of Serbia, was created with the sincere intent and great hope that it could help in the future discoveries and preservation of the rich heritage in Serbia from the period of the magnificent Roman Empire, whose Danubian monuments are part of the preliminary list for UNESCO World Heritage. Different researchers and professionals - architects, archaeologists, geologists, chemists, materials scientists, physicists, biologists, restorers, craftsmen, and managers have all made an effort to get closer to the fulfilment of the wish of the project creators.*

*After sampling and investigating numerous mortars originating from the structures dating to the period from the 1<sup>st</sup> to the 6<sup>th</sup> century, many conclusions were made, but challenges for future researchers and conservators also arose, telling us we need to continue our work in the future, in an attempt to gain more knowledge and, thus, preserve our heritage more adequately.*

*We welcome you to the Viminacium Archaeological Park and the 1st International Conference with Workshop, Science for Conservation of the Danube Limes. With the hope that many new fruitful collaborations between our guest researchers will be developed on this occasion, taking us one step further towards long-term technical*

*solutions for architectural conservation and civil engineering based on nature, but also to new cognitions about the life of the past people, always for the cause of the preservation of rich world material and immaterial cultural heritage and our planet, we invite you to peruse this publication. All the authors have shown their enormous affection and passionate devotion towards the discoveries of ancient knowledge, advocating its use in the further preservation of the most monumental physical witnesses of the past – buildings, for future generations.*

## **EDITORS**

### **Members of the MoDeCo2000 Project team:**

Dr Emilija Nikolić, PI, Institute of Archaeology, Belgrade

Dr Mladen Jovičić, Institute of Archaeology, Belgrade

Dr Snežana Vučetić, University of Novi Sad, Faculty of Technology Novi Sad, Novi Sad

Dr Jonjaua Ranogajec, University of Novi Sad, Faculty of Technology Novi Sad, Novi Sad

Ljiljana Miličić, Institute for Testing of Materials (IMS Institute), Belgrade

Ivana Delić-Nikolić, Institute for Testing of Materials (IMS Institute), Belgrade

Dr Nevenka Mijatović, Institute for Testing of Materials (IMS Institute), Belgrade

Dr Biljana Ilić, Institute for Testing of Materials (IMS Institute), Belgrade





**PROGRAMME**

**MONDAY, JUNE 27<sup>TH</sup>**

**08.30 – 10.00** *Breakfast / Coffee and registration*

**WELCOME AND INTRODUCTORY SPEECHES**

**10.00 – 10.40**

MIOMIR KORAĆ, Institute of Archaeology, Director

EMILIJA NIKOLIĆ, Institute of Archaeology, PI MoDeCo2000

DUBRAVKA ĐUKANOVIĆ, Institute for the Protection of Cultural Monuments  
of Serbia Belgrade, Director

JAROSLAV KATONA, Faculty of Technology Novi Sad, University of Novi  
Sad, Vice Dean for Finances

**10.40 – 11.00** NEMANJA MRĐIĆ, IVANA KOSANOVIĆ, MILICA MARJANOVIĆ

***Danube Limes in Serbia: On the Way to a UNESCO World Heritage Site –  
Problems, Challenges and Solutions***

**11.00 – 11.20** EMILIJA NIKOLIĆ, MLADEN JOVIČIĆ, IVANA DELIĆ-NIKOLIĆ,

LJILJANA MILIČIĆ, SNEŽANA VUČETIĆ, JONJAUA RANOGAJEC

***Our MoDeCo2000: Results Overview of the Scientific and Research  
Project***

**11.20– 11.40** *Coffee break with snack*

**LECTURES**

**11.45 - 12.05 MLADEN JOVIČIĆ**

***Researching Roman Mortars from the Danube Region - Archaeological Perspective of the MoDeCo2000 Project***

**12.05 - 12.25 SNEŽANA VUČETIĆ, JONJAUA RANOGAJEC, IVANA DELIĆ-NIKOLIĆ, LJILJANA MILIČIĆ, EMILIJA NIKOLIĆ, MLADEN JOVIČIĆ**

***Design of Compatible Mortars for Conservation Interventions***

**12.25 - 12.45 EUGEN VAIDA, VERONICA VAIDA, ALEXANDRA TEODOR**

***The Ambulance for Monuments - Safeguarding Heritage through Community Engagement***

**12.45 - 13.30 NIGEL COPSEY**

***Rediscovering Traditional Mortars, part 1***

**13.30 - 14.30 Lunch break**

**LECTURES**

**14.35 - 15.20 NIGEL COPSEY**

***Rediscovering Traditional Mortars, part 2***

**15.20- 15.35 Coffee break**

**LECTURES**

**15.40 - 16.25 NIGEL COPSEY**

***Rediscovering Traditional Mortars, part 3***

***17.00 - 18.30 Viminacium sightseeing***

***18.30 - 19.30 Dinner***

***21.00 Viminacium Fest / Theatre festival***

***(Closing night in the Viminacium amphitheatre with a jazz concert)***



**TUESDAY, JUNE 28<sup>TH</sup>**

**07.30 – 09.00** *Breakfast / Coffee*

**PRACTICAL WORKSHOP ON LIME MORTARS**

**09.00 – 13.00** NIGEL COPSEY DEMONSTRATION

***Building Experimental Structures of Brick and Stone with Lime Mortar***

**13.30 – 14.30** *Lunch break*

**LECTURES**

**14.35 – 15.05** VLADICA CVETKOVIĆ, KRISTINA ŠARIĆ

***Tuffs of Serbia – What We Need to Know when Characterising Them as Archaeological Raw Material***

**15.05 – 15.35** KRISTINA ŠARIĆ, SUZANA ERIĆ, VLADICA CVETKOVIĆ,

JOSIP ŠARIĆ, DRAGANA ANTONOVIĆ, VESNA BIKIĆ

***Geological Knowledge in Service to Archaeological Investigations: Rock and Ceramic Findings as Examples***

**15.35 – 15.55** YOTAM ASSCHER, MICHELE SECCO, GIULIA RICCI, SERGIO

TAMBURINI, GILBERTO ARTIOLI (*virtual*)

***Evaluation of Ancient Mortars Hydraulicity through the Characterisation of Long and Short-range Crystallinity***

**15.55 – 16.15** LJILJANA DAMJANOVIĆ VASILIĆ, VESNA BIKIĆ, SRNA STOJANOVIĆ, IVANA RADOSAVLJEVIĆ EVANS, DANICA BAJUK – BOGDANOVIĆ, IVANKA HOLCLAJTNER – ANTUNOVIĆ

***Physicochemical Characterisation of the Medieval Pottery Excavated in Serbia***

**16.15 – 16.35** *Coffee break with snack*

### **LECTURES**

**16.40 – 17.00** MARIA STEFANIDOU

***Technological Characteristics of Fired Bricks from Roman and Byzantine Period in Greece***

**17.00 – 17.20** SIMONE DILARIA, CATERINA PREVIATO, JACOPO BONETTO, MICHELE SECCO, ARTURO ZARA, DOMENICO MIRIELLO, RAFFAELLA DE LUCCA, GILBERTO ARTIOLI

***Pyroclastic Rocks in the Structural Mortars of Roman Nora (Sardinia). A Green Material for the Production of Sustainable Concretes in Antiquity***

**17.20 – 17.40** ANNA ARIZZI

***Learning from Historic Mortars: Studies on Lime Manufacturing and Fresco Conservation***

**17.40 – 18.00** MICHELE SECCO SIMONE DILARIA, GIULIA RICCI, ENRICO GARBIN, SERGIO TAMBURINI, YOTAM ASSCHER, GILBERTO ARTIOLI, CATERINA PREVIATO, JACOPO BONETTO

***Novel Scientific Perspectives on Ancient Pozzolanicity***

**18.00 – 18.20 ANDREJA SIRONIĆ (virtual)**  
***Radiocarbon Dating of Historical Mortars***

**18.30 – 19.30 Dinner**



**WEDNESDAY, JUNE 29<sup>TH</sup>**

## **International Danube Day**

**07.30 – 09.00** *Breakfast / Coffee*

### **LECTURES**

**09.00 – 09.20** IVAN BOGDANOVIĆ

***Roman Construction Techniques Used on the Viminacium Amphitheatre***

**09.20 – 09.40** FLORIAN MATEI-POPESCU

***New Archaeological Excavations at the Drobeta Military Amphitheatre***

**09.40 – 10.00** JASMINA POPOVIĆ RUSIMOVIĆ

***Restoration of Ram Fortress***

### **EXCURSION**

**10.15 – 11.20** Viminacium – Golubac Fortress

**11.30 – 12.30** Golubac Fortress Tour

**12.40 – 13.45** Golubac Fortress - Golubinje

**14.00 – 17.00** Hiking to viewpoint Ploče and back (lunch package at the top)

**17.15 – 19.05** Golubinje – Ram Fortress

**19.15 – 20.30** Ram Fortress tour

**20.30 – 21.10** Ram Fortress – Viminacium

**21.10 – 22.10** *Dinner*



**THURSDAY, JUNE 30<sup>TH</sup>**

**07.30 – 09.00** *Breakfast / Coffee*

**PRACTICAL WORKSHOP ON LIME MORTARS**

**09.00 – 13.00** NIGEL COPSEY DEMONSTRATION

***Testing Conservation Mortar Mixtures on a Part of an Authentic Structure***

**13.30 – 14.30** Lunch break

**LECTURES**

**14.35 – 15.05** IOANNA PAPAYIANNI

***Analysis of Ancient Mortars from Roman Monuments in Northern Greece. Design and Application of Compatible Repair Mortars***

**15.05 – 15.25** SLAVICA VUJOVIĆ, RASTKO VLAJKOVIĆ

***Holism as a Framework for Understanding and Preserving Heritage – the Example of the Cultural Landscape of Bač***

**15.25 – 15.45** BURCU TAŞCI ÖZDEMİR, HASAN BÖKE (*virtual*)

***Raw Material Characterisation of Roman Mortars in Western Anatolia (Turkey)***

**15.45 – 16.05** ALEKSA JELIKIĆ

***Lime Kiln. The Divine Crucible***

**16.05 – 16.25 LJUBOMIR JEVTIĆ**  
***Ceramic Building Materials of Viminacium***

**16.25 – 16.45** *Coffee break with snack*

**LECTURES**

**16.50 – 17.10 ANA RADIVOJEVIĆ**  
***The Role of Brick in the Late Antique Architecture of the Central Balkan Roman Provinces***

**17.10 – 17.30 IGOR BJELIĆ**  
***Construction Methods Applied to the Structures of the Trajan's Bridge over the Danube***

**17.30 – 17.50 BOJAN POPOVIĆ**  
***Reconsidering the Archaeological Site of Glamija – Rtkovo, Serbia***

**17.50 – 18.10 TINO LELEKOVIĆ**  
***How to Present the Ancient City of Aelia Mursa***

**18.10 – 18.30 HELENA HIRŠENBERGER, SNEŽANA VUČETIĆ, JONJAUA RANOJAJEC**  
***Cross-disciplinary Collaboration in Conservation Projects – Managing Key Challenges***

**18.30 – 19.30** *Dinner*

**FRIDAY, JULY 01<sup>ST</sup>**

**07.30 – 09.00** *Breakfast / Coffee*

**LECTURES**

**09.00 – 10.30** BRANKO ORBANIĆ

***Traditional Lime Production and its Application on the Monuments of Culture – Experience from the Work on Ancient Monuments***

**10.30 – 10.50** *Coffee break with snack*

**LECTURES**

**10.55 – 11.15** MAJA FRANKOVIĆ, VESNA MATOVIĆ, NEVENKA NOVAKOVIĆ

***Intrinsic Properties of the Limestone Used in the Belgrade Fortress and their Influence on Degradation Processes***

**11.15 – 11.35** DRAGANA GAVRILOVIĆ

***Analyses of the Pigments and Plasters on the Examples of Roman Wall Paintings from Sirmium and Viminacium***

**11.35 – 11.55** MARIA ARGIROVA, GERGANA KABAKCHIEVA, DENITSA YANCHEVA, BISTRA STAMBOLIYSKA, NIKIFOR HARALAMPIEV, DIETER FISCHER, ALBENA LEDERER

***Pigment Identification in the Mural Decoration from the Roman City of Ulpia Oescus by Vibrational Spectroscopy and SEM-EDS Analysis***

**11.55 -12.15** NIKOLA UNKOVIĆ, ŽELJKO SAVKOVIĆ, MILOŠ STUPAR,  
ALEKSANDAR KNEŽEVIĆ, IVICA DIMKIĆ, MILICA LJALJEVIĆ GRBIĆ  
***Fungal Proliferation on Fresco Painting: Deterioration of Mortar and  
Painted Layer***

**12.15 - 12.35** IVAN VANJA MARTINOVIĆ  
***Benefits and Limits of DRMS Technology in the Purpose of Designing  
Repair Mortars by Drilling Resistance Criterion***

**12.35 - 12.50** *Coffee break with snack*

### **LECTURES**

**12.55 - 13.15** MARKO NIKOLIĆ, ENA TAKAČ, JELENA ŠČEKIĆ  
***Contemporary Approaches to the Revitalisation, Presentation and  
Promotion of Cultural and Natural Heritage of the Part of the Roman  
Limes - Case Study of the Late Antique Tomb in Brestovik***

**13.15 - 13.35** SILVANA BLAŽEVSKA, ANGELA PENCHEVA (*virtual*)  
***Master Conservation Plan for the Archaeological Site of Stobi: Goals and  
Outcomes***

**13.35 - 13.55** BOJAN MILJEVIĆ, ALENKA MAUKO PRANJIĆ, SERGEY E.  
KICHANOV, SNEŽANA VUČETIĆ  
***Computed Tomography as a Tool for Non-destructive Investigation of  
Cultural Heritage Materials' Inner Structure***

**13.55 - 14.15** ROMAN BALVANOVIĆ, PERICA ŠPEHAR, DRAGANA SPASIĆ-  
ĐURIĆ, OLIVERA MILOVIĆ, MIHAILO MILINKOVIĆ

***Roman, Late Antique and Byzantine Window Glass from 3<sup>rd</sup> - 6<sup>th</sup> Century  
in Serbia: Chemical Characteristics, Compositional Groups and  
Provenance***

**14.15 - 14.30** *Closing of the event*

**14.30 - 15.30** *Lunch*

## **SPECIAL GUEST OF THE WORKSHOP**

### **NIGEL COPSEY, Stonemason and Building Conservator**

Starting out as a dry-stone waller in Cornwall, Nigel trained after 1989 as a stonemason and carver at Weymouth College, working largely thereafter in the conservation industry across the south and south-west of England, as well as travelling widely in the USA, working and advising upon building conservation projects in Vermont, New York City and Nebraska as well as in Granada, Andalusia, and, more recently, in British Columbia and Alberta, Canada.

Nigel was consultant stonemason for the Irish Hunger Memorial project in Battery Park City, New York, 2001. Since 2001, Nigel has worked extensively as a consultant and practitioner in the field of building conservation and repair in North Yorkshire on a wide range of vernacular and high status buildings, as a building conservation consultant for the Fitzwilliam Estate in Malton, 2003-2010, designing, specifying and executing major repair projects on a wide range of historic buildings within the town, as well as researching, designing and specifying a number of building repair and conservation projects on behalf of Natural England, most recently at Scampston Hall.

A committed SPAB-member, Nigel is also a professionally accredited conservator-restorer and determined advocate for the thoroughgoing use of traditional materials in the care and repair of old buildings, and a leading advocate for the routine use of traditional

earth-lime and hot mixed lime mortars for most applications, working with Historic England, Historic Environment Scotland and CADW and international partners in the delivery of practical training and education regarding the informed use of traditional quicklime mortars for the like for like and compatible repair of historic buildings. In recent years, Nigel has worked closely with the North York Moors National Park, educating and upskilling builders and professionals regionally in the use of like-for-like traditional mortars.

A Research Associate of the Department of Archaeology, University of York, Nigel regularly delivers hot mixed earth and lime mortars and traditional skills training and led the Practical Skills module for the MA Conservation Studies 2012-2018. Nigel has a BA (Hons) in Political Science from the University of York, a PGDip in Building Conservation from Bournemouth University, and an MA (by research) awarded by the University of York in 2019, for his critical review of historic texts, thinking and craft practice in the preparation and use of lime (and earth-lime) mortars.

Nigel has contributed to several volumes of the recently published Historic England Practical Conservation series. He has published a book on the subject of Traditional Mortars (2019) as well as a review of Historic Literature on Lime and Lime Mortars (HES Technical Paper 30 (2019)).

[www.nigelcopsey.com](http://www.nigelcopsey.com)

[www.maltonbuildingsgroup.com](http://www.maltonbuildingsgroup.com)

[www.hotmixedmortars.com](http://www.hotmixedmortars.com)



**ABSTRACTS**



**CONTEMPORARY APPROACHES TO THE  
REVITALISATION, PRESENTATION AND PROMOTION  
OF CULTURAL AND NATURAL HERITAGE OF THE PART  
OF THE ROMAN LIMES - CASE STUDY OF THE LATE  
ANTIQUE TOMB IN BRESTOVİK**

**MARKO S. NIKOLIĆ**

University of Belgrade, Faculty of Architecture, Department of  
History and Theory of Architecture and Art, Belgrade, Serbia

**ENA R. TAKAČ**

University of Belgrade, Faculty of Architecture, Department of  
History and Theory of Architecture and Art, Belgrade, Serbia

**JELENA V. ŠČEKIĆ**

University of Belgrade, Faculty of Architecture, Department of  
History and Theory of Architecture and Art, Belgrade, Serbia

2021\_41001@edu.arh.bg.ac.rs

The Roman Limes is recognised as a cultural landscape of exceptional universal values of international importance by the relevant organisation for the protection of cultural and natural heritage - UNESCO. In the Republic of Serbia, the Roman Limes include

the Danube Valley, where there are sites of different historical periods (prehistoric, ancient, medieval), which represent evidence of the continuity of life on the border of the Roman Empire. Protection, revitalisation, presentation and promotion of sites along the Danube is a prerequisite for the entry of the Roman Limes in Serbia on the UNESCO World Cultural and Natural Heritage List. From 2020, this area is on the UNESCO Tentative List. Bearing in mind the current state of a large number of localities, the question of their protection, revitalisation, presentation and promotion in a contemporary context arises. Referring to the principles of international charters and conventions, including the Document of Authenticity, the Landscape Convention and the Charter on Cultural Routes, the main goal of this paper is to spread knowledge about the possibilities of protection, revitalisation, presentation and promotion of the cultural and natural heritage of the Roman Limes in Serbia through the application of the principles defined in international charters and conventions, all for the integration of cultural and natural heritage into the contemporary environment and the establishment of sustainable landscape development.

The results are presented through a case study of the archaeological site of the late antique tomb in Brestovik, through the conceptual solutions of architecture students, within which the possibilities of integrating contemporary architecture into spaces of natural and historical values were examined, while preserving the identity of natural and cultural heritage that requires specific

protection, presentation and promotion. Through the process of educating students of architecture, there is a possibility of the comprehensive consideration of the problem of preserving cultural and natural heritage, its historical and urban context, origin, development, cultural, urban and architectural values, and examining the possibility and comparison of different approaches to presentation and contemporary use. In designing the future approach to the presentation and inclusion in *the contemporary* life of the late antique tomb in Brestovik and its surroundings, the student analyses focused on comprehensive research of the life of the tomb, from its origins to modern times, as well as discovering specific cultural values that are the basis for future preservation. The goal was to design sustainable solutions that will preserve the development phases, and the authenticity and integrity of the late antique tomb in Brestovik, while ensuring its reactivation and quality integration into its environment, which, despite numerous inadequate modern interventions, has preserved elements of the recognisable historical *ambiance*. Through their proposals, students have filled the complex with a large amount of contemporary cultural, educational and artistic content that correlates with its character and significance, and provides it with an active life. The expected results of the research include raising awareness of the possibilities of integrating natural and cultural heritage into the contemporary context, as well as considering the natural and cultural heritage as a driver for establishing sustainable landscape development.

Keywords – Roman Limes, cultural and natural heritage, late antique tomb, contemporary revitalisation and presentation, sustainable development.

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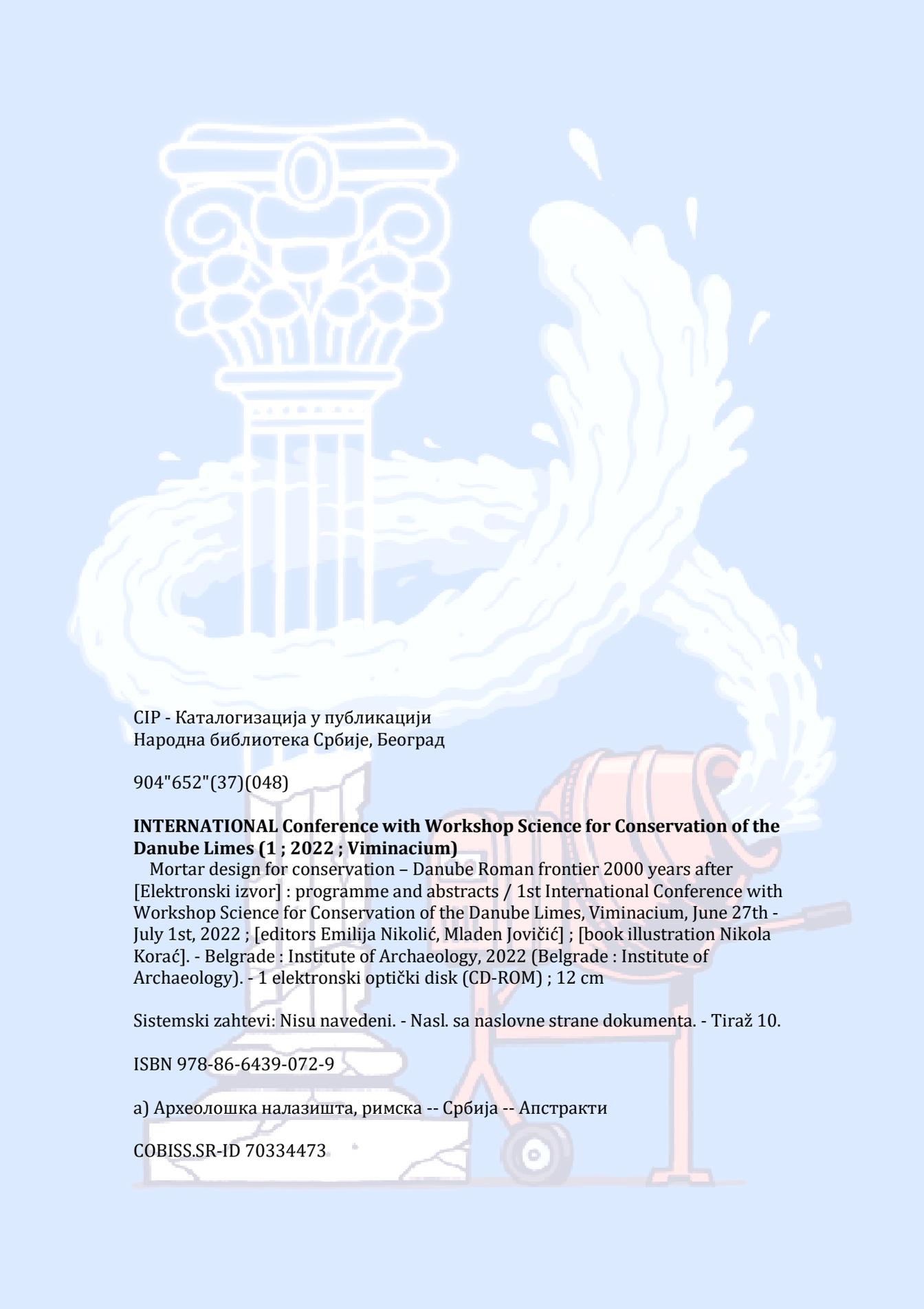
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