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Living Danube Limes

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Authors:

FAU
Boris Dreyer, Alexander Hilverda, Christina Sponsel-Schaffner
PLUS
Maria Erker, Anna Windischbauer
UAUIM
Ana-Maria Machedon
NTC BG Guide
Desislava Yordanova, Iliyana Hristova
BME
Gergő Máté Kovács, Zsuzsanna Emília Kiss
CHI
Maria Kimber, Elena Simeonova
ADRM
Boryana Stancheva, Maria Tzankova
IAHR
Ivana Ožanić Roguljić, Mislav Fileš
IAB
Nemanja Mrđić
FTN
Milena Krklješ, Olivera Marković, Marina Carević Tomić

And:
Lukas Werther
István Gergő Farkas
Tijana Mrđić

Compiled by DUK.

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Content

1. Introduction

The deliverable on the identification of the potential of historic Roman story telling builds on the idea that identification with and respect for the Roman heritage in the Danube Limes Region can be fostered immensely by identifying Roman stories and traditions that are still alive in the 21st century. By relating to them and bringing them in context with the shared Roman history of all modern Danube Region countries, inhabitants and tourists alike can engage more directly with the Roman past.

To this end the deliverable starts with a brief introduction into story telling as tool, continues with myths and traditions of the 21st century dating back to Roman times, and ends with highlighting possible future research and gaps in our knowledge regarding the Romans living on the Danube, which, if filled will allow for a more detailed portrayal of the Roman times along the Danube Limes.

2. Roman Story Telling as Tool to Bring the Roman Past to Life

Storytelling, heritage interpretation, story writing and gamification in the context of engaging audiences with history, making it tangible and re-liveable, are tools of great importance in the sustainable use and communication of cultural heritage. This chapter brings together these four pillars for successful engagement with the history of the Roman Danube Limes area and briefly explores each of them as basis for the following chapters on even more stories to tell.

2.1. Storytelling

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Storytelling is as old as human beings and existed long before people started to write. When people travelled, they took their stories with them. When returning, they brought back other people's stories. The same happened also in the Roman Empire. People listen to stories because they want to learn, enjoy and have fun; they also want to be part of experiences that excite the mind, the heart and the soul. Storytelling within Living Danube Limes is especially important, as it enables the people of the 21st century living in the Danube Region to engage with the Romans who lived in exactly that area 2000 to 1400 years ago. The term "storytelling" most often refers to orally told stories, but it is also used for techniques applied to unfold or disclose the narrative of a story. By storytelling, most experts and people in general understand the conveying of events and happenings by words. In every culture, stories or narratives have been shared for entertainment, learning and passing on ethical norms and moral values. Each story consists of a theme, topic, characters and narration. Storytelling is everywhere around us; its professional appearance can be observed in the speeches of the lecturers, the priests, the lawyers, the politicians, etc. During the last decades storytelling ventured in the digital form of the 21st century, allowing people to share their stories and creative thinking with the others and get appreciation for their stories from literally all over the globe (*likes*).

Heritage Interpretation

In the last two decades many researches in Europe and the rest of the world focused on the manner in which heritage is displayed and portrayed to the visitor, creating a new scientific discipline under the general name of „heritage interpretation“. A practical definition of heritage interpretation is the one of the National Association of Interpreters (NAI): "*Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and meanings inherent in the resource.*"[1]

Heritage interpretation relates equally to the understanding of the cultural heritage site or objects displayed for the visitor and his motivation and needs. Recently, most academics agreed that heritage interpretation has been the least developed aspect of a venue's promotion to the visitor. Nowadays, interpretation is becoming an integral part of the visitor experience and is influencing what experience visitors take away from the visit and whether they will return. Most visitors are motivated to visit a heritage site or to join a cultural event by the possibility to gain pleasure and learn about the object or activity being displayed.

More and more European museums, galleries, historical sites, natural parks, zoos and botanical gardens, monuments of architectural and industrial heritage, and universities are committed to heritage interpretation. UNESCO and ICOMOS are also actively involved in the topic, especially relevant for museums and historical heritage, where the lack of attention to interpretation has a negative impact on the visitor's interest, attracting audiences and funds for work and modernization. More and more cultural heritage operators around the world create units in their structure that study visitor interests and develop products for personal (guided) and non-personal (texts, messages, etc.) interpretation. The profession of the "interpreter" emerged. Universities are introducing the discipline "Interpretation of Heritage". Standards and criteria for quality of interpretation are defined. A number of European documents and programmes deal with the topic of interpreting heritage, both cultural and natural. Approaches to inclusive interpretation are developed, for example live interpretation and re-enactment.

Museums implement basic steps in heritage interpretation by:

- Designing of new formats of heritage interpretation to retain the current and attract new audiences, using poetry, art, photography, music, live performances like re-enactment or living history, storytelling, or assistive technologies like gamification.
- Exploring ways for access and inclusion of different audiences, as every audience (including individual visitors) engages differently, as it relates differently to the heritage phenomenon.
- Capturing every visitor's opinion on what he or she wants to see, to feel, to learn, etc., when visiting the museum.

The Relation between Storytelling and Interpretation

Interpreters and storytellers have a lot in common, but are not the same. Interpretive storytellers likely have similar motivations to other heritage interpreters, but use storytelling as their preferred medium. For heritage interpreters, storytelling is only one of the multiple

[1] https://www.interpnet.com/ (accessed 19.06.2021).

media by which they communicate various aspects of heritage. They can use various media resources, such as sounds, drawings, dance, music, photography, folklore, gastronomy, or live heritage performance like re-enactment or living history. Quality paradigms that apply for interpretation are authenticity, objectivity, realism, truth, universality, knowledge, uniqueness and credibility. However, storytelling is not necessarily aligned with all of these paradigms.

Quality heritage interpretation is based on science, thus carries objectivity, while storytelling is a highly subjective exercise. The beauty of storytelling is that the same story can be told in different ways, depending on the individuality, the talent and the level of knowledge of the storyteller. Storytelling is one of the ways to introduce people, places and events to audiences. Heritage interpreters explore, reveal, valorise, interpret and communicate heritage in a manner adjusted to individual audiences. Both are working for making a visitor experience or interpretive journey inclusive and accessible.

2.2. Creative Interpretive Story Writing as Tool

Maria Kimber, Elena Simeonova

The aim of these lines is to assist narrators to master the art of effective written interpretation with the aim to connect heritage phenomena with audiences at heritage sites, museums, etc., and engage them through texts, panels, leaflets and other written media.

Experts have long concluded that to combine the sustainable use of cultural and natural heritage with the achievement of upward economic results and its transformation into a factor for development (i.e. of tourism), it is important how heritage is interpreted and transmitted verbally or in written form to visitors and tourists. Interpretive writing should provoke, relate, and reveal: the text should provoke the readers' attention, relate to the everyday live and past experiences of the visitor/reader, and reveal the core idea of the text.

It is commonly agreed that interpretation connects people with heritage, builds identity and values and reveals a huge niche for business and creative industries. Realities confirm that most of the economic activities are directly or indirectly connected to heritage. Why do we need to master interpretive writing? Isn't it enough to tell a story in an exciting and appealing way? One might ask these questions. However, we consider interpretive storytelling and interpretive writing as two sides of a coin. Interpretive storytelling allows us to be flexible in delivering information about heritage phenomena and quickly adjust to the audiences' level of interest, knowledge and understanding. Interpretive writing gives the audience's time to digest the provided information and knowledge and to think about the given point of view. A well-written story has bigger chances to inspire audiences to explore and learn more about the phenomenon. The difference between storytelling and story writing is the same as the difference between listening to the professor's lecture in an auditorium and reading his or her textbook. Interpretive writing has to formulate and achieve learning, behavioural, and emotional objectives towards audiences, supported by appropriate visualization – pictures, sketches, etc. It is recommendable that the interpretive texts, especially for museums, outdoor panels, etc., are evaluated and pre-tested with visitors to make sure that they understand the wording. Interpretive writing is good if the visitors think it is good. Creative interpretive writing guides people at natural or cultural sites to a more sustainable future. It empowers them in reflecting on their heritage and serves as reference for followers. It also supports the integrity of residents and the networking with stakeholders.

Good stories communicate heritage to transnational, multicultural and multigenerational audiences successfully, as they help them understand and appreciate the uniqueness of the sites and places. Good stories follow a storyline, which gives the visitor a clear logic, while just listing the facts makes him or her lost and his or her attention is not captured. Interpretive texts are written to convey and explain the meaning behind the heritage phenomena in museums, galleries, historic sites and buildings, landscapes, events, etc. If there are no texts, but just displays behind glass vitrines in museum, visitors will create own meanings, based on their level of knowledge, former experiences and imagination, which is the least desirable, as it could lead to serious, even dramatic consequences. If an object/artefact is not supported by authentic, objective and true interpretive text, speculative meanings can completely distort the original character and the meaning coded in it. Such examples exist in museum collections, driven by political reasons or lack of depth of the research. The role of the interpretive text is to introduce the object in its wider context, but to still allow the visitor to come to his or her own conclusion.

Writing an Interpretive Text

Interpretive texts in museums or galleries have to be clear and concise. Many visitors are not willing to read a label or panel of more than 100 words. The text should be split into short paragraphs. When the words in a paragraph are more than 60-70, it becomes difficult for people, standing in front of the text to pay enough attention to it, especially when being surrounded by other people. Labels, leading the visitors to the written texts, should clearly refer to the object, be attractive and provoke the visitor's imagination. Obvious things about the object should be avoided in the text. Each word in the text should be carefully chosen to contribute to the story and to guide the visitor emotionally, cognitively and spiritually.

Imagine a sign in a museum on which the text says: "*701. Statuette of the goddess Kybele from Roman times. She is enthroned with a cub in her lap. The missing right arm was originally made in a separate piece*."

Staying in front of the statuette the visitor wonders: Who was Kybele? What kind of a goddess? What and who was protected by her? When was she worshipped? None of these questions are answered by the museum text. The text does not give any relevant interpretation. Creative interpretive writing allows for implementation of feasible solutions that can raise chances for local progress, by:

a) Meeting supply and demand in the cultural heritage and tourism sectors. There is a significant informational asymmetry in supply (outdated cultural heritage products) and demand (co-creation) of visitors, which leads to inefficient and ineffective use of heritage resources.
b) Designing cultural heritage products with a high commercial potential. Today, employment of ICT is necessary for the promotion of ideas, sharing of information and for establishing relationships for advancing cultural heritage and tourism. People create virtual market places, turn hobbies into businesses and ideas into bestsellers.
c) Establishing effective communication with policy makers and general audiences. The cultural heritage of every Danube country reflects the past cultures of the peoples who

settled or passed through. It is an expression of national identity and pride and a core element of a sustainable future.

Interpretive Style and Augmented Visual Support

The written story should evoke visitors' memories and associations based on their former experiences and knowledge, thus engage them with the heritage object. AV support, as an interpretive support, gives additional power to the written story. Soundtracks, visions, etc., should be in harmony with the content of the story.

The storyline of a quality text takes the reader straight to the point and puts objects in their historical and cultural context. The writing style is vivid, so that the narrative is both interesting and informative.

A good storyline is paramount. It

- explains the significance of the phenomenon;
- is stated in the story as the main message we would like the audience to remember;
- uses facts to *support* the main message;
- is formulated in a clear way, understandable for all audiences;
- links tangible to intangible, e.g. how material aspects influence or were influenced by ideas, meanings, beliefs, values, etc. (take the example of the Roman Pantheon of Gods).

Standards and criteria in interpretive writing

The community of heritage interpreters follows standards and criteria, elaborated after analyses of successful writings and by researchers. Without any assistance, the interpreter is able to involve the visitors' heads, hearts and souls, and to encourage encounters and changes of perspective, giving phenomena a meaning beyond facts, and inspiring visitors to support their protection.

The quality of interpretation of heritage is at the core of a constant search and development of "smart" IT models for presentations in tourism (verbal and non-verbal). Museums and exhibitions have already been experimental in these fields for quite some time. The texts, signs and personal communication that serve the tourism business are revealing and exploiting the extraordinary. Interpretation is ever more seen as an art that combines many professions: researchers, scientists, writers, psychologists, sociologists, etc. Through quality interpretation, visitors/tourists get experiences that give them emotions and a provocation of the mind and the thought.

The Chronology of the Story Writing Process

There are three stages in interpretive writing: a) planning for interpretive writing, b) writing itself and c) evaluation of the effect of the written texts on visitors/tourists. We will stress some basic moments in interpretive planning and writing and add writing tips and techniques.

Planning a Statement of Significance

An important step to start with is to produce a statement of significance of the phenomenon (heritage object) at a location/site/museum, etc. This statement of significance is important because it helps to explore and reveal the essence of the heritage phenomenon and conveys its significance. When we identify interesting characteristics connecting the phenomenon with the audience, we can integrate them in an exciting and memorable story that affects the visitor emotionally and behaviourally, makes him or her embrace the heritage values, and supports conservation and protection of heritage. The statement of significance allows to discover deeper values and meanings of the asset, beyond the already known. It is not enough to state that an asset is significant, however. We need to explain and convince our audiences in its significance in a trusted way. Then, we can expect that people appreciate and embrace heritage. There is another positive consequence of the statement of significance. When a heritage phenomenon becomes widely known, many people engage with it, which makes policy and decision makers take action to protect it.

During the preparation/planning stage for story writing, we collect knowledge, ideas, etc., associated with the phenomenon and organize discussions/debates about it. We try to summarize the meaning and importance of the phenomenon in a core message.

The significance assessment process includes the following main criteria, levels of significance and secondary criteria/place modifiers:

Main Significance Criteria:

1. Historical values
2. Aesthetic values
3. Scientific, research, technical values
4. Social values
5. Spiritual and special values

Levels of Significance:

1. Spatial level
1.1. Global level
1.2. National
1.3. Regional
1.4. Local
2. Social Level
2.1. Community
2.2. Group
2.3. Family
2.4. Local

Secondary Significance Criteria (Place Modifiers):

1. Origin (background)
    1.1. Authenticity
    1.2. Originality
    1.3. Designation
2. Integrity
    2.1. Completeness
    2.2. Exemplarity

- 2.3. Bio and cultural diversity
3. Distinctiveness
   - 3.1. Representativeness
   - 3.2. Novelty
   - 3.3. Familiarity
4. Accessibility
   - 4.1. Availability
   - 4.2. Condition
   - 4.3. Transport communication
   - 4.4. Infrastructure: in-situ facilities
5. Interpretive Potential
   - 5.1. Current state of the resource
   - 5.2. Legal state of the resource
   - 5.3. Intervention capacity
   - 5.4. Knowledge of the resource
   - 5.5. Audience segmentation
   - 5.6. Interpretive opportunities
   - 5.7. Media selection
   - 5.8. Presentation technique

Writing the Story

Once the stage of planning is executed, we start writing the story, bearing in mind visitors' perception. The guiding principle for the narrator should be to inspire the visitor to pay more attention to the object, to stay with it longer and to engage with the phenomenon's deeper meaning. There is a specific moment with writing texts for museum galleries, guiding labels and outdoor info panels. Often, there are visualization and technical elements, which supplement the impact of the written story.

The visitor perceives the object with his or her eyesight first. Then, he or she is attracted by the title to read the text. Visual parts of the text – photos, sketches, drawings, etc. – are important too, as they catch the attention and reveal the phenomenon's character. Currently, in most of the cases, the museums offer the visitor the objects on a display, behind a glass vitrine. Some advanced museums offer interaction between the visitor and the artefacts in their exhibitions, sound background, live interpretation performances of historic events and periods, etc., but the texts remain the best way to convey meanings, emotions, understanding, knowledge and inspiration.

Let's have a look on some technical arrangements of the infrastructure that supports the qualitative perception and the effect of the interpretive written texts/stories:

- The number of spots with the placed texts (on the walls of the museum gallery, for example), should not be too big. The visitors should not be overloaded. It is recommended that there be between four and ten texts in a museum gallery, depending on the scale of the exhibition.
- Longer texts should be placed at the beginning of the exhibition.

- Visitors best perceive main texts that contain no more than 200 words.
- The title and subtitle of the text should include a maximum of 15 words.
- The font, colour and background of the text must be readable. A contrast between them should be ensured. The content must be readable from a distance of one to two meters. This is especially important when a crowd gathers in front of a certain text. If those standing behind have to wait for those standing in front to read the text, they might be demotivated and move on without reading what is written.
- Ideally, the wall or panel should contain 30% text, 30% visualization (images), and 30% blank space.

Evaluation

After the interpretive story is written and becomes an integrative part of the phenomenon, we need to evaluate its effect on the visitors by asking ourselves: Was the visitors' behaviour influenced by the interpretive story? Was the visitors' interest increased? Did visitors engage more with the object?

The evaluation feedback can be used for improvement and adjustment of the written story to the needs and demands of the audiences.

Regular Deficiencies in Interpretative Writing

- Very often, texts are written from the point of view of science (history, archaeology, geography, etc.), rarely from the point of view of what might interest the visitors.
- The information does not always reflect the characteristics of the object factually and accurately. The sources of information about the object/phenomenon are not studied sufficiently.
- Interpretation is not always objective and impartial (especially in personal/verbal interpretation). Standard clichés are sometimes used without checking with scientific sources first.
- The texts at the exhibits are often dryly informative, without employing the spirit of the time and the historic environment, without relating to, emotionally engaging and involving the visitors.
- Texts are often difficult to read, i.e. dark letters on a dark background.
- Texts are too long and tiring and disinteresting visitors.
- Texts that are too academically written bore the visitors.
- Often the light is not oriented towards the exhibit and the text and thus makes it hard for the visitor to view and read.
- Museum exhibits are rarely presented in an attractive and understandable way for children. The texts are usually aimed at adults. Leading museums around the world pay attention to the young audiences and work with children's writers who know the world of the small and young visitors.
- Texts which offer only quantified information do not allow to build knowledge about the exhibited item.
- Maps are often displayed without sufficient historical, social and economic context.
- Texts often make suggestions and involve excessive sketches and interpretations that produce distorted perceptions.

In addition, Dany Louise summarizes bad practice in four bullets:[2]

- Too much information into too little space;
- Using art speak and jargon;
- "Dumbing down" or patronising the audience: by over-simplifying the language and omitting central concerns or concepts;
- Incompleteness or unfinished narratives: beginning a story and not finishing it, i.e. stories hinted at but not told, unexplained gaps in timelines, leaps from an artist's controversial status to sudden acceptance as establishment figure, etc.

Anchor Points for Storytelling and Story Writing

Content

- Relate to the theme
- Main message
- Limited numerical info
- Clear timeline
- Inspirational
- Lead visitors to read the text by using an attractive label
- Making contributional quotes
- Content relates to visitors' lives and experiences
- Ask audiences' opinion and feedback

Style/Voice/Sound

- Clear and concise phrasing
- Use of headlines
- Grab the viewers' attention
- Maximum number of words should be around 100
- Use language understandable for non-professional audiences and explain professional jargon if used
- Appropriate for a story narrative voice
- Use emotional voice when appropriate
- Tell a first person story if possible
- Use questions to keep the audiences' attention, provoke their thinking and participation

Design

- Readable font
- Easy to find and see
- Proper colours and images/photos/sketches

Process

- Use props for reference
- Use the visitors' feedbacks

[2] Louise 2015.

- Update the text when necessary

Bibliography

Louise 2015:
Dany Louise (2015): Interpretation Matters Handbook: Artspeak Revisited. Black Dog Publishing.

https://www.interpnet.com/ (accessed 19.06.2021).

2.3. The Gamification Approach in Tourism as additional Step in Story Telling

Desislava Yordanova, Iliyana Hristova (NTC BG Guide)

Gamification is adding game mechanics into nongame environments, like a website, online community, learning management system or business to increase participation. The goal of gamification is to engage with employees, consumers, and other parties to inspire, collaborate, share, and interact. By Gartner's definition, gamification is *"the use of game mechanics and experience design to digitally engage and motivate people to achieve their goals"*[3].

The term gamification first appeared in 2008 and gained popularity from Sebastian Deterding's paper "Gamification: Toward a Definition", published in 2011. In this paper, gamification is defined as "*use of game design elements in non-game contexts*"[4].

Games and the Gaming Concept

The game researcher Jesper Juul[5] defines games as "*rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable.*" Players are the crucial objects interacting with the game system to create artificial experiences, which are different from everyday life.[6] It involves competition and collaboration between the players as well as fighting against the game system. Rules establish the limitations and liberties of gameplay within the system. The quantifiable outcome results at the end of the game in winning, losing or keeping score. Voluntary participation requires that players willingly accept the previous traits for the gameplay. Voluntary play opens the ground for multiple players to join into the game and ensures that challenging and stressful gameplay activities are experienced in a safe and pleasurably environment.[7]

From Games to Gamification

The concept of Gamification is closely related to the idea and design of games and it is defined as "*game design elements in non-game contexts*".[8] Through the years it has reached a variety of contexts, from crowdsourcing, learning and work, to behaviour change. This phenomenon is part of a growing trend in contemporary society, which is characterized by the progressive

[3] Gamification, 18/1/2021, https://www.gartner.com/en/marketing/glossary/gamification
[4] Sebastian D., Rilla K., Lennart E. N., Dan D., 2011, Gamification: Toward a Definition.
[5] Jesper J., "The Game, the Player, the World: Looking for a Heart of Gameness". In Level Up: Digital Games Research Conference Proceedings, edited by Marinka Copier and Joost Raessens, 30-45. Utrecht: Utrecht University, 2003
[6] Benjamin U.C., 2018, Toward an understanding of flow in video games.
[7] Jessika W., Gaming and Gamification in Tourism: 10 Ways to Make Tourism More Playful.
[8] Sebastian D., Dan D., Rilla K., Lennart N., 2011, From game design elements to gamefulness: defining, "gamification".

merge of recreational and serious activities: pervasive games, for example, overflow in real environments, merging reality with the world of game, while serious games join game and educational goals for the purpose of simulation or training. Gamification can be precisely inscribed in such a trend and is now widely affecting the design of interactive systems.[9]

Gamification in Tourism

Tourism industry is a service industry, which emphasises very much on experiences co-created by tourists and service providers. The level of consumer integration in the value creation depends on how tourism organisations empower tourists to play a role in new product development.[10] Within service systems, tourists interact with tourism companies for the co-creation experience. The concept of gamification can be used either to encourage customer engagement and enhance the experience or to improve employee engagement within an organisation. The aim of applying gamification in tourism falls into two groups. First, gamification shall increase the motivation of tourists and employees to gain a behaviour change. Second, gamification shall enable tourists and employees for a value co-creation and thus provoke an intrinsic motivation.[11]

Benefits of Gamification in Tourism

It is becoming incredibly challenging for tourism industries to keep on attracting and entertaining visitors. Gamification is a particularly good and interesting solution to solve the challenges that the tourism sector is facing. Gamification increases visitor's engagement, promotes the destination/place, improves marketing for hospitality and tourism, provokes the attention of the visitors, enhances the overall tourist experience, makes visitors learn more about the places, they are visiting, gives room for social inclusion and implements modern technologies into tourism.

[9] Amon R., 2017, From Games to Gamification: A Classification of Rewards in World of Warcraft for the Design of Gamified Systems.
[10] Piera B., Alfonso M., 2017, Managing the experience co-creation process in tourism destinations.
[11] Jessika W., Gaming and Gamification in Tourism: 10 Ways to Make Tourism More Playful.

Gamification Examples

There are different types of gamification that can be used in tourism; some of them are explored below:

Location-based Augmented Reality Games

Location-based games take visitors on individual and interactive walks through the place being visited. Location-based games bring history alive and create playful interactions between the visitor and the tourist destination (fig. 1).

Fig. 1: Example of a location-based AR,
Source: https://www.androidauthority.com/pokemon-go-arcore-update-913547/

Gamified Travel Tours

Ordinary mobile tour guides become more gameful with the integration of game elements. These gamified walking tours may be themed differently, as they are limited to altered locations. Gamified walking themes may range from criminal investigations or literature walks to unravel destination's secrets. With some gamified applications, visitors are even able to create their own tours. The aim of these tours is to discover hidden spots and compete with other players.

Treasure Hunts

Another way of successfully including gamification into tourism are treasure hunts. Treasure hunts are games in which players try to find hidden objects or places by using series of clues (fig. 2). This activity can be organised both indoor and outdoor, which means that it can be suitable for cities, museums, theme parks, castles, and any other attractions. [12]

[12] Jessika W., Gaming and Gamification in Tourism: 10 Ways to Make Tourism More Playful.

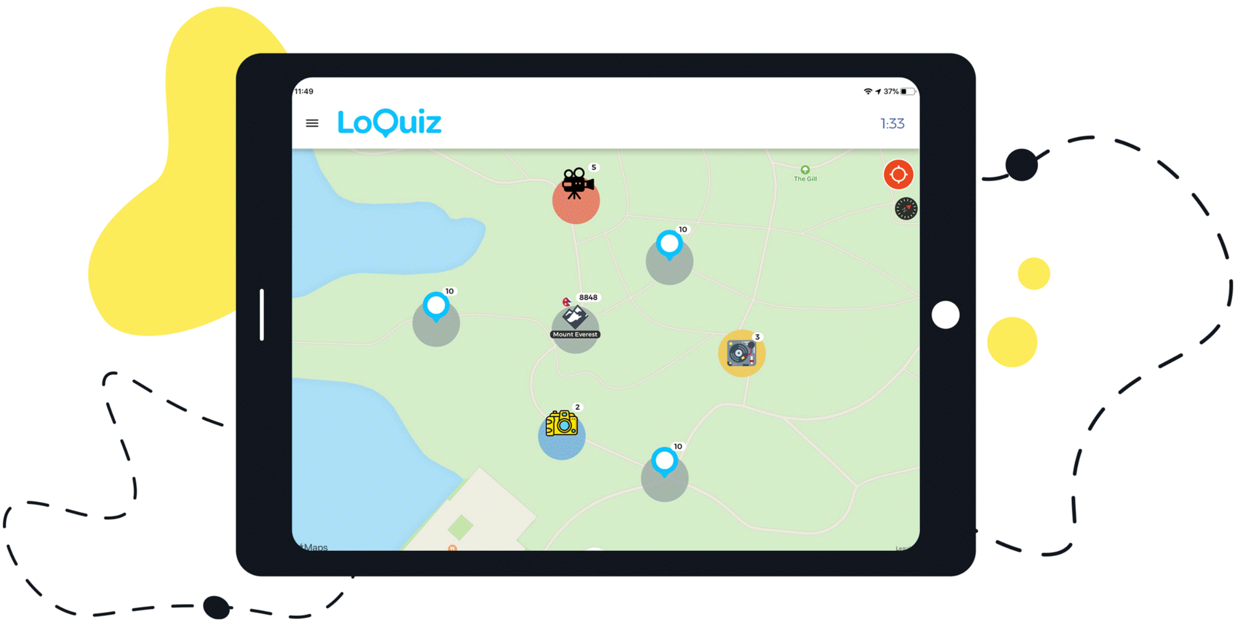

Fig. 2: Example of a treasure hunt game
Source: https://loquiz.com/how-loquiz-works/

Types of Gamification

There are two main types of gamification: structural and content gamification.

Structural Gamification

Examples of structural gamification are progression-based games (these games set a goal to be achieved) and badge-based games (players are given badges) (fig. 3).

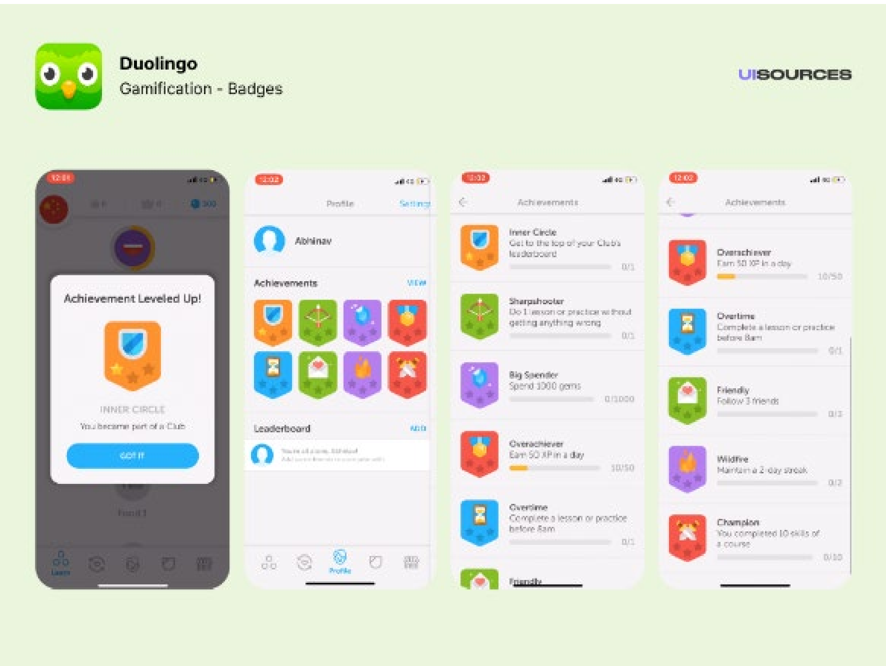

Fig. 3: Example of structural gamification
Source: https://www.pinterest.co.uk/pin/757660337303636673/

Content Gamification

Examples of content gamification are adding story elements to a compliance course or adding a character to narrate an online course. Adding these elements makes the content more game-like but does not turn the content into a game. It simply provides a context and takes the activities typically found in games and adds them to the content being taught.

Gamification in Cultural Heritage

Cultural and historical heritage has been a theme present in the world of video games for a long time. The series of games such as Civilization and Freeciv are good examples for the usage of real historical background while provoking deeper investigation of the real facts. While living in the virtual worlds, players learn about people, the culture, and artefacts from ancient times. The technology allows travellers to time travel and create their individual experience in the form of dialogues with virtual characters, observe foreign rituals and engage in ancient daily life. The advancements of game design support the developments of virtual cultural heritage travelling, which might be an eligible opportunity especially for people with accessibility issues. The games generate emotions, which stimulate the desire of visitors to get to know the world they are present in. Using technology creates something fun and inspiring and can provoke social change (fig. 4).

Fig. 4: Example of gamification in cultural heritage
Source: http://www.romanleicester.dmu.ac.uk/app.html

Gamification and Transmedia Storytelling

Gaming has many different manifestations, and it can be easily combined with storytelling and transmedia storytelling, which uses different media platforms and interactive networks to deliver a story. Participants can alter the story in the game at any time. The biggest advantage of combining a game with a story is that players are feeling more involved and therefore more interested.

With the years, storytelling evolved into a term that is used for the description of the trend where people use digital tools to disseminate their stories – "digital storytelling". The digital storyteller pioneer Dana Atchley described in the late 1990's that the "digital storytelling combines the best of two worlds: the 'new world' of digitized video, photography and art, and the "old world" of telling stories."[13] Bloggers and influencers are digitally telling their stories about places they have visited – and they are going viral. In this way, they compel and emotionally engage the audience. The interaction and combination between the digital storytelling and the gamification is a powerful tool, especially in the tourism industry.

2.4. Gamification and Storytelling working together

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Games can exist without a story (e.g. the monopoly game, which needs no story to work). Yet, combining gamification with storytelling gives a great opportunity to make a story more appealing, influential and motivating. Game elements, intertwined with a story allow to project an imagined reality. It is critical though to mix both gamification and storytelling effectively. Storytelling has a purpose: to achieve the goal by an exciting and intriguing narrative. It gives the the audience knowledge on other people's experiences that can enrich the standpoint and inspiration of an individual for achievements by immersing in a different environment. In the line of the Living Danube Limes project, many good stories are out there to be found – from traditions and myths that are still told and reminiscent of the Roman times to the latest academic research, which sheds light on a very special phenomenon of Roman time lives on the Danube. They all can be made to comply with the basic principles for high quality heritage interpretation, as defined by the National Association of Interpreters:

- RELATE: compare, contrast, make it personal
- REVEAL: help the visitor discover something new
- PROVOKE: inspire profound thought or action
- ARTS: employ multiple learning styles, like re-enactment, living history, gamification
- HOLISTIC: give the resource context (the bigger story)
- APPROPRIATE: consider the audience

[13] Robin, Jackson, Digital Storytelling, 18. Nov. 2019, http://www.jacksonrobin.com/digital-story-telling/

3. National Myths, Traditions and Stories Tracing Back to Roman Origins

When developing possibilities and methods to re-live the Roman past in the Danube Region, myths, stories and traditions that preserve a Roman nucleus and are still known and practiced today, take a very special role in making the Roman past tangible. Travelling along the Danube from Germany to Romania, stories tell us why the Roman Limes was called the devil's wall in later times, we learn about marital and funeral customs, which hold parts of Roman traditions alive and we get to know hairstyles and recipes that are reminiscent of Roman ones. In addition, there are a number of feasts and holidays that date back to Late Antiquity and even older times. In Serbia and Romania, we also meet Roman Emperors in national myths.

The national myths, traditions and stories are listed by Danube countries downstream.

3.1. Germany

Boris Dreyer, Alexander Hilverda, Christina Sponsel-Schaffner (FAU)

Myth „Teufelsmauer“

While in the Weissenburg region the term "Pfahl" (post) for the remains of the Roman wall can be traced back to the 8th century and perhaps already existed during Roman times as a term for the limes, the term "Teufelsmauer" (devil's wall) is a term for the remains of the Raetian wall in Lower Bavarian legend that can be traced back to the 17th century. The legend probably arose after the local population changed with the departure of the Romans. The new settlers did not know anything about the remains of the wall and explained it in the following way:

At the time when Christ was walking on earth as a man, the devil met him one day and said: Listen, you and I do not get on well together; therefore it seems to me that it would be better for you and for me if you would grant me a part of the Earth where I alone am master'. The Saviour agreed to the request, but under the condition that the devil must have his share of land surrounded by a wall before the cock crows. Satan quickly took hold that deal and tore pieces of rock from the mountains that were very heavy and piled them on top of each other. And while he was raising the wall in this way, he burned a deep furrow in the ground with his glowing tail, and this was to be the moat. But according to his greedy and insatiable nature, he laid the plan too roughly and had not half finished his work when the cock crowed and drove him into flight. Since then, the ruins of the construction, which are still hugely visible today, are named 'Devil's Wall' after its creator.[14]

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[14] Brief description of the saga of the „Teufelsmauer” (according to Waltinger 2019, 47 and Müller 1846, 53f.).

3.2. Austria

Maria Erker (PLUS)

In Austria some customs and folklore traditions can be traced back to Roman times, among them gravestones, building sacrifices, and boundary stones

Gravestones

With the Roman culture, the custom of setting gravestones also came to the Celtic-Germanic area. This custom was unknown before. Depicted on the tombstones were images of the dead; name, age, origin and profession of the deceased were listed on the stones as well. Roman gravestones were made of stone or marble and were painted colourfully.

The Austrian tombstones today usually give the dates of birth and date of the deceased, as well as information on the profession, family origin and very often a photograph. Today tombstones are made of stone, marble, glass and metal. Instead of the stone, we often find the Christian cross made of metal or wood with an attached shield, holding the information on the deceased mentioned above.

Building sacrifice

When constructing new buildings, in some of the German-speaking areas a newspaper or a deed, and in some areas coins, are placed in the foundation of the new building. In the Middle Ages, there was the custom of sacrificing animals, eggs or coins during construction, or even bricking them in alive. With the Romans, building sacrifices were also common; probably the current custom goes back to Roman or even pre-Roman times. In the Salzburg Museum there is a small metal bull statuette, which was found on the banks of the Salzach River, which is interpreted as a Roman building sacrifice for a bridge. Possibly, it was as a sacrifice to the river god Iuvo or to Jupiter, the father of the Gods. The Romans built the first verifiable bridge over the Salzach, at the point where the river was narrowest due to its natural position. The bull is currently in the depot of the Salzburg Museum and is not available for public viewing (as of 2021).

Boundary stones

The Assyrian Empire knew milestones since the 8th century BC. Sporadically they were also found among Greeks and Persians. The Romans brought them to the provinces Noricum, Raetia and Pannonia with the expansion of the Roman Empire. They have been common in the Roman Empire since the 3rd century BC; in the Imperial Period, all public roads were regularly equipped with them. A typical milestone could be up to three meters high and indicated not only the name of the donor, in imperial times usually the emperor, but also the distance to the nearest town and provincial border. Today, more than 5000 Roman boundary stones are known. In Austria, Roman milestones partly still functioned as boundary stones in the Middle Ages, as did stones and figurines. Even today, there are local boundary stones and boundary stones between the Austrian provinces, which in their basic idea probably go back to the Roman milestones.

3.3. Hungary

Gergő Máté Kovács (BME), Zsuzsanna Emília Kiss (BME)

On the territory of Hungary, a wide spectrum of traditions recorded derives from different historical layers with an Asian origin, related to Antiquity and the Romans, and of course to Christianity. These traditions were modified by internal and external influences – and in some cases, continuity can be observed. The different customs covered all the Hungarian lands – and some of them were typical only in some villages of a smaller territory. The traditions were historically recorded in calendars – one of the first examples was written by István Székely in 1538. Most of the recorded traditions were connected to feasts and economical activities – providing the periodical commemoration of agriculture, mental and physical health and personal welfare in a magical or sacral way. In the following, some specific traditions are enumerated which are typical in the territory of Hungary and have Roman roots.

January 22, Day of Vince

The name of Vince (Vincent) originates from the phrase "victorious" in Latin. Therefore, this day, which is related to St. Vincent, had the meaning of defeating the dark forces of winter and bringing spring. St. Vince has long been the patron saint of winegrowers in Hungary. The name's etymological background may presume the relation between the phrase 'vinum' and the name Vince. On this day, viticulture farmers cut grape wands and budded them in a warm room. If they sprouted nicely, a good wine yield was predicted from it. In addition, the saying "*if Vince trickles down, the cellar will be full*" proves that according to beliefs, if the snow melts on this day, a good grape harvest is to be expected.

April 24, Day of Szent György (Saint George)

The day is dedicated to Saint George of Lydia, who was the patron of knights, soldiers, gunsmiths, saddlers, and wayfarers. In the territory of Hungary, traditionally the beginning of the real spring period is connected with this day. However, this tradition goes back to Roman times. The Romans celebrated the *Parilia*, the feast of shepherds on this day. In the territory of Hungary, several traditions connected with both the beginning of Spring and the shepherds have subsisted.

The beginning of the real spring period was celebrated in various ways – generally connected with clearing, purgation and renascence. In the central territories of Hungary, the girls were collecting dewfall, in several territories, the vegetables were sowed, and various methods of weather forecasts were recorded (e.g. the sound of frogs before this day meant drought or thunders were the signs of rich harvest).

The inheritance of the *Parilia* is traceable in traditions related to animal husbandry in Hungary. The first time when the animals were led to the fields on this day was accompanied by several beliefs and traditions, which were used to bring about the health, reproduction and milk yield of the animals. To prevent the animals from evil, and for fertility, the neat were led over chains, cleavers, ploughshares, eggs, an apron of women, etc. Great importance was also attached to the green branch with which the animals were first driven out to pasture. In the villages along the river Ipoly, the animals were driven out with the wand, dedicated to the Holy Innocents' day. Farmers also tried to defend their environments from curses with smoke.

Another tradition, which is connected with the Roman shepherd feast, is the fact that this was traditionally the day when the shepherds were hired; the period finished on the day of St. Michael.

April 25, Day of St. Mark

Mark's day, April 25, was called the Sanctuary of Wheat. The custom is certainly a continuation of the Feast of Roman *Ambarvalia*, when during a procession in Rome, a sacrifice was presented to the god Robigus to protect the crops. Even in the first decades of our century, wheat consecration was publicly celebrated in the field, and tradition attributes special power to the consecrated wheat ears. In Nógrád and Heves counties, the men pinned the wheat ears to their hats, the women pressed them into a book. Elsewhere, when a child had soreness, the ears were brewed into tea and textiles soaked with this decoction were wrapped across the sore body.

Pentecost (Whitsun)

The Christian holiday of Pentecost (also called "White Sunday" or "Whitsunday" or "Whitsun", especially in the United Kingdom) which is celebrated the seventh Sunday after Easter Sunday, commemorates the descent of the Holy Spirit upon the Apostles and other followers of Jesus Christ while they were in Jerusalem as described in the Acts of the Apostles. The Whitsun is celebrated in Hungary in various ways; however, one of the most common traditions was to appoint a King of Pentecost as a result of competitions. In this act, the analogy of the festive king of the Roman *Saturnalia* can be observed.

November 11, Day of Szt. Márton (St. Martin)

The traditions on the day of St. Martin can be associated with a person who played an important role in the territory of Pannonia. St. Martin was born in Savaria (Szombathely) in Pannonia around the years 316 and 317 CE. According to the traditions, St. Martin's Church stands above his birthplace. His father served as a wealthy military officer (tribune) and received an estate in Italy as a reward, so the family settled there. Martin was raised as a child in Ticinum (Pavia). However, at the age of 12, he became a catechumen and decided to accept Christianity. As the son of a veteran officer, Martin at 15 was required to join a cavalry *ala* and then at the age of 19 became a legionnaire until the year 341 CE. In the 4th century, the heretic Arian movement was strengthened, following that Martin was expelled from Savaria. Following several wanderings, in 361, he founded the first European monastic monastery in Ligugé. In 371, Martin was elected Bishop of Tours, but he protested his election. According to legends, he tried to hide in a goose shed, but the geese betrayed him. He did important proselytization work and his life was accompanied by miracles and healings.

In the territory of Hungary, several traditions emerged concerning the person of St. Martin. These traditions are mainly related to both the fields of military and agriculture. During the Mediaeval times, as of one of the most popular saints, his memory was preserved by place names and altarpieces. In the 14th century chronicles, it was the day of the renewal of office, salary, and the settlement of serf debits. On St. Martin's Day, the shepherds gave a tree branch as a gift to the farmers. Related to the story, which connected St. Martin to the geese, it was the traditional food of the day as well as a salary for the landlords. From the bones of the geese, the weather could be forecast (white and long bones meant snowy winter, brown and short ones meant that it would be dirty and muddy). The weather of the day could also be translated into forecasts – according to tradition if '*St. Martin arrives on a white horse, the winter will be mild,* *but if on brown, then it will be short and dirty*.' In several territories of Hungary, there was a prohibition of work; fairs and balls were organized.

Christmas

The most obvious example of the traditions with a long and continuous origin is Christmas as one of the most important feasts of Christianity. However, its date is derived from the ancient winter solstice. In ancient Roman beliefs – especially in the Mithras cult – this was the day of the rebirth of the Sun, the '*Dies natalis solis invicti*'. In the Mediaeval times, this period was the beginning of the New Year. The traditions connected to the feast are generally not different from the traditions of other countries in the Carpathian Basin; however, the specific features of the 'Christmas table', the foods, the decoration of the home and the traditional activities contain specific elements.

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3.4. Croatia

Ivana Ožanić Roguljić, Mislav Fileš (IAHR)

Hairstyles

In the early 20th century, several distinct hairstyles worn chiefly by young women in villages throughout the Slavonia and Baranja Regions have been documented. They were identified by the Croatian ethnographer J. Radauš–Ribarić as hairstyles of possible Roman origin. She drew a parallel between these hairstyles and the depictions of empresses on Roman coinage of the 3rd and 4th centuries.[15] The resemblance goes even so far that the same hair ornaments were used, such as coloured bands. This occurrence is not unique for Croatia, for similar hairstyles, tracing their origins to Roman times, can be found in Italy and Lower Franconia.

Lucanicae sausages

Similar to many other countries with this tradition, most notably Serbia, Bulgaria and Greece, a recipe for sausage making dating to Roman times can be found in the present-day region of Srijem. We know of this recipe from the Roman author Apicius, from his compilation of recipes from the 1st century CE. Though his recipe is quite simple, Lukanika today is somewhat different for it uses slightly fermented pork meat, and different spices that are rarely used in sausages like pine nuts, laurel, rue, and savoury. The name of the sausage itself can be traced to the region of Lucania in Southern Italy. In Croatia, the name changed to *Luganiga*. *Luganiga* sausage traditionally was eaten in the period from Christmas to New Year. There is a saying preserved: "*There are more days than Luganiga*," meaning that sometimes the amount of *Luganiga* available did not cover the needs of a family. In many European countries, a version of the name is still preserved.

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3.5. Serbia

Tijana Mrđić
Nemanja Mrđić (IAB)

Milena Krklješ, Olivera Marković, Marina Carević Tomić (FTN)

In Serbia Roman history became part of myths and fairy tales and is still part of the everyday lives in the 21st century with a number of traditions linking to marriage, death and wine.

Emperor Trajan is mentioned under different variations (Trojan) in old myths and fairy tales in ancient Slavic tradition. He is often mentioned as builder of forts on high hills or some cursed buildings and forts. There are beliefs related to the Tabula Traiana in the Iron Gate. There is a myth that Trajan is a deity of the underworld and young girls are sacrificed to him. Another legend is related to Trajan's bridge between Kostol in Serbia and Drobeta in Romania. There is a myth that Saint George, commonly famous for slaying the dragon, at this place defeated Trojan; this is traditionally celebrated in Drobeta Turn Severin in Romania.

Marital Customs and Traditions

Various cultures, both ancient and modern, perceive the wedding as a major transition in one's life. The formal union of a man and a woman is seen as a crucial event, celebrated through well-established social rituals and observed in many cultures. The Ancient Romans also had their rituals and ceremonies; however, in contrast to those rites dominated by men, the Roman wedding placed an emphasis on women. In other words, it was female-centered.[16] The majority of customs and rituals related to the wedding ceremony have their roots in ancient cultures' practices, especially the Roman practices. The wedding ceremony respected in today's region of Serbia has numerous similarities with the Roman one. Naturally, it has evolved through centuries, altering due to the socio-economic factors. What remains constant through the ages is the fact that the bride's role, in both Serbian and Roman ceremonies, dominates over the groom's role. After adopting Christianity as the Empire's main religion, the described Roman customs were gradually altered. During the early Christian period of Rome, the existing customs and rituals were embraced, though slightly adjusted to fit the new dominant religion, all arising from the need to convert the pagans to Christianity more easily. Following their beliefs and ideas, Christians proclaimed marriage the sacred union, valid in both physical and spiritual realms. Thus, the Christian holy matrimony replaced the Roman iron rings and laurel wreaths with wedding rings and crowns. In that aspect, we could say that the Roman rituals live on to this very day. [17]

[16] Hersch 2010.
[17] Ignjatović 2011.

Preparing the Bride

The Roman brides would typically wear their hair separated in six locks, or braids, and they would wear a veil, which is still present and can be seen at weddings. Additionally, they used to wear a crown, a white Roman tunic and some jewellery. Clearly, the Roman bridal attire, the white robe, the veil, the jewellery and the occasional crown still strongly influence our contemporary wedding culture. [18]

Engagement

The engagement (*sposalia*) typically preceded the wedding ceremony. Fathers of the future spouses would agree upon the engagement, after discussing the pre-marital contract and the dowry. The bride-to-be received an iron ring during the engagement and that ring was placed on her left ring finger. In Roman times, similarly to our modern times, the engagement did not oblige the couple to actually get married, however, if someone decided to call off the engagement, both fiancés had to return the valuable pre-marital gifts. [19]

The Wedding Vows "Ubi tu Gaius, ego Gaia"

Once the laurel wreaths were placed on the bride's and groom's heads, they would exchange the wedding vows, while holding hands and standing in front of the guests. The bride was supposed to say: "*Ubi tu Gaius, ego Gaia*" (As you are Gaius, I am Gaia.). Following these words, the priest or *pater familias* addressed the gods through prayer and sacrifices. Finally, the guests congratulated the couple, the newlyweds, and the celebration could begin.[20] This custom can be identified with modern civilian marriages where a municipality registrar also reads legislation formulas and asks newlyweds for simple and short customary answers.

Carrying the Bride over the Threshold

Upon arriving at the groom's home, the bride oiled the entrance door's threshold and then wrapped it in ribbons of fabric. This was done so that she would be protected by the home guardian spirits referred to as *larima*. The groom would then carry her over the threshold to avoid her kicking, stumbling, and falling over, which, if happened, was considered a bad omen or disrespect of her future home.[21]

Making Noise at Wedding Celebrations

There are other wedding day rituals that link modern-day Serbia with the Roman traditions. They are mostly associated with the belief in evil spirits and demonic entities. It is thought that demonic creatures are present during the wedding ceremony, as well as at childbirth, and that the evil intention is to ruin the happiness of the young couple. At weddings, guests in rural areas resort to firing pistols and guns, thus creating a lot of noise that is meant to scare and chase away the evil spirits. In the Roman era, they would fight the demons by very loud singing.[22]

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[18] Hersch 2010.
[19] Ignjatović 2011.
[20] Ignjatović 2011.
[21] Ignjatović 2011.
[22] Ignjatović 2011.

The Meaning behind the Apple and Coins

The most customary pre-marital and marital present in the Province of Vojvodina used to be an apple. It was expected to bestow a lovely red apple upon a girl when asking for her hand in marriage. That special apple used to be decorated with coins or pieces of gold jewellery that would be pierced through its skin making it more ornate. The apple symbolizes life, health, fertility, happiness, love, respect and well wishing. Thus, the apple gifting should guarantee the happy outcome and the girl receiving the apple from her loved one agrees to marry him by the very act of accepting the gift. [23]

Funeral Rites

Remnants of old funeral customs are still present in Serbian rural and Wallachian populations that are present in parts of North East Serbia and Romania. These customs are directly related to pagan traditions and have no base in Christianity, and often are in contradiction to the Christian religion.

Leaving Money with the Deceased

In many Roman graves, a coin was found as part of the grave inventory. This coin was to be paid to the ferryman to cross the river Styx to the underworld. Even today, most families, even with strong Christian tradition, leave some money, both coins and paper money, in the pockets of the deceased, although it has nothing with Christianity as there is no requested fee for the voyage to heaven. When interviewed, almost none of the people could rationally explain this custom and they do not know its origin. The only answer was commonly that it is a custom and that it is "for expenses". Priests do not oppose this tradition and do not try to alter its pagan origins or persuade people to refrain from it.

Libation

Ancient Greeks and Romans believed that the deceased are thirsty and that living relatives and friends should provide the dead with drinks so that their souls would not be angered. Most commonly, the living members of the family would pour wine, milk, honey, oil or a mixture of these liquids into the graves. This took place during the funeral ceremony, just before or after the burial, or at specific dates when the living honoured their dead. The ritual of pouring liquid into the soil in respect of the dead is still practiced today in certain areas.

Liquid sacrifice to the souls of the deceased is also common in Serbian tradition, both in their homes and by their grave at cemeteries. Almost as a rule in *libation*, strong alcoholic drinks are used (rakija, brandy, schnapps). Wine is rarely used, and in modern time, children use juice, as a modern variant of the ancient custom of strong alcoholic liquid. At the home of the deceased drink is spilled into an empty plate, and in the cemeteries directly onto the grave. You never spill the whole glass but only 1/3 or 1/2 of glass. This is to "share" a drink with the soul of the deceased. Wine is used in many burial rites and it is always spilled both during burial and later ceremonies above the grave. These customs are also commonly participated by the priests who spill wine in the shape of cross and explain that this is the blood of Christ.

[23] Marković 2011.

Nevertheless, it is a clear remnant of the ancient libation sacrifice. This custom has many variations and explanations.

Leaving Food at the Grave

This is not done immediately after the burial and for the major religious holidays related to the dead. All kinds of food are left on plates by the grave for the deceased. It is common to be the food that the deceased liked very much. This is so commonly done that the poorest families go around the cemeteries for religious holidays and collect large quantities of food from the graves. During antiquity, the living would prepare the food for the dead using grains and seeds. Similarly, in our modern culture, there is a specific food called "koljivo" (a mixture of ground wheat seeds and walnut) used in religious ceremonies and funeral rites. [24]

Leaving Liquids at the Grave

This happens in direct context with the burial and major religious feasts related to the deceased. It is customary to leave three small bottles of wine mixed with water and oil, which could be directly related to the Roman burials where we commonly find three jugs. Several types of jugs discovered predominantly at Viminacium's cemeteries but also on other cemeteries in Upper Moesia (Moesia Superior) and Illyricum were produced exclusively for this purpose. These types of jugs are of poor quality and were produced at lower firing temperatures, as their sole purpose was to be part of funeral inventories and these types were never found or used in settlements. Sometimes families today leave only a small bottle of wine as a variant of this custom at the grave.

Building Eternal Houses at the Cemeteries

This is one of the strangest customs that can be found in the whole Eastern Serbia. Instead of a tomb, families build houses in different sizes with full furniture and appliances in them. They also often have electricity. The authorities cannot stop this custom and often these buildings are built without any legal permit.

The Cult of the Snake

Further funeral traditions and burial sites of the past can be analysed at actual archaeological sites. In the region of the modern-day Serbia, archaeologists have unearthed Late Antique necropoleis and the remains of ritually buried individuals lying beside a snake, an apple or an egg, which illustrates the ancient belief in immortal souls and reincarnation. The deceased would be buried in rectangular-shaped ditches, some in caskets, and others not. The examined graves show us that the deceased bodies were dressed in formal clothing, and that women and girls were buried with jewellery pieces. This tradition of burying the dead in formal clothes and with jewellery or other cherished objects survives to this day.

A snake would be killed, or rather, sacrificed to the gods, and placed in a person's grave. There are examples of female bodies found with snakes wrapped around their arms or wrists to mimic a bracelet. At that time, snake-shaped bracelets were extremely popular in the Balkans regions, and they were used by Roman women living in the Balkans provinces together with other decorative items. An upright placed snake "totem" was believed to have healing powers.

[24] Sreten / Nedeljko 2013.

We know that in ancient mythology the snake possessed the power to resurrect the dead. Influenced by those beliefs, our nation also accepted mythical stories of snakes bringing the dead back to life. In Serbian folklore, the snake is the animal through which the ancestral souls continue to exist. [25]

Burying the Prematurely Deceased

In our folk tradition, the apple with coins inserted plays a major role at wedding ceremonies, but that ceremonial apple is also used during the burial rituals of prematurely diseased girls and boys. The apple with the coins symbolizes the ritual otherworldly wedding of the young dead. The prematurely deceased girls' and boys' souls would ritually marry a living peer of the opposite sex because it was considered sinful to bury the young unmarried. The described rite could be called a cult peer wedding, using the apple with protruding coins to mark the custom.[26]

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Wine production and its Importance in Roman Times and the 21st Century

The grapevine belongs to an old plant order. A type of grapevine called *vitis vinifera* dates back to 4,000 BCE and is traced to ancient Mesopotamia. However, some archaeological data show that *vitis vinifera* was grown more than 7,500 years ago in the northern part of the Zagros Mountains in Iran. Written documents describe wine as the drink of choice of ancient Egyptians, Persians, Babylonians and Assyrians, with some of those records going back to 3,000 BCE. The Romans perfected the wine-growing and wine production, mastering every step of it.

The grapevine growing culture reached Europe through Egypt, Greece and Spain. The Greeks were European wine-growing pioneers, having learned the art of winemaking in Egypt. The Egyptian god of wine was Osiris, the Greek god was Dionysus, the Roman god was Bacchus, and so the drink was believed to be the gift from the gods, and, as such, became one of the sacral

[25] Sreten / Nedeljko 2013.
[26] Sreten / Nedeljko 2013.

symbols used in worshipping the almighty deities. The Romans contributed to the grapevine cultivation spreading to the neighbouring European lands. The wine culture travelled alongside the Roman legions venturing into military campaigns, and it spread almost like a disease.

The archaeological records about the ancient wine-growing practices are scarce, incomplete and limited to a small number of existing, non-organic, predominantly architectural remains and fragments. This understanding drives the research beyond the archaeological and historical methodology in an attempt to grasp fully the production of wine in the ancient times. While literary and art records do occasionally answer the queries posed by the solid archaeological evidence, it is the lack of such evidence that limits our understanding of specific regional and local viticulture aspects.

Choosing not to rely solely on the study of the human behaviour, the archaeology was employed to analyse how the grapes were used in the wine production process. Firstly, we look at the agricultural methods used in wine production. This is followed by examining the treatment of the grapes, the storing techniques, as well as the cellar-keeping processes. Secondly, we look into the postproduction stages, including the trade, exchange, consumption and the patterns of usage. The archaeological research done in Pompeii encompasses the well-preserved organic materials. Similarly, the discoveries of both charred and preserved grape seeds offer an invaluable insight into the organic material culture, which dominated the wine-growing processes in the ancient times. Modern archaeological excavation methods, together with the acknowledgement of perishable bio-archaeological material culture, paint a more detailed picture of the past.

The onset of the wine production is not linked directly with the Roman Empire, which, nonetheless, was of huge importance and had a great influence on the development and evolution of winemaking. Although the ancient Greeks were the Romans' viticulture mentors, it was the Romans who refined the wine production technology. During their reign, the Romans introduced several brilliant novelties. As an illustration, the Romans built their wine storage rooms to face the North since that positioning grants more stability and durability. In addition, the wine storage vessels' design was improved in order to minimize the wine aging time. The Romans grew and developed various types of grapes suitable for winemaking, and enhanced the agricultural techniques related to wine production. It should be stated that the Romans shaped the wine production technology, thus changing the history of wine.

Records of wine sales and its trafficking have been in existence since the third millennium BCE. "Canaanite" containers or amphorae represent the earliest material evidence of wine trade, as well as trade of other alimentary goods. In antiquity, amphorae were considered irreclaimable goods. The process of grape treading was executed in an especially dedicated room. The main instrument was a solid and flat platform with a slight slope, under which was a pool for gathering and storing grape juice. Tools and machinery that were used for further wine production and pressing were expensive, so only large vineyards had them. They contained long wooden beams with one end attached to a winch, with which the grapes were pressed; the juices were collected in a basin. Smaller vineyards usually exclusively practiced grape treading, which was repeated one to three times, with the first yielding the finest quality juice, and the third yielding the least quality juice, which later became the cheapest wine. After pressing, grape juice was collected and stored underground in large jars, usually beneath a barn or storage room. Grape juice was stored like this for a minimum of two weeks so it could ferment; meanwhile small holes on top enabled the release of carbon dioxide. After fermenting, the wine was taken out and stored in amphorae. Additional undertakings to reduce acidity in the wine included adding chalk or marble dust to it. In ancient Rome, wine was commonly heated at high temperatures in order to increase its sugar content. This concentrated, boiled wine was mixed in with the rest of the wine in a process known as *defortum*. Substances such as lead, and honey were commonly added to wine in order to enhance its taste and sweetness. Another technique, which was popular in ancient Rome, was adding unfermented grape juice to already made wine to enhance its taste. There were all sorts of wines in ancient Rome, and sweet white wine was considered the best. All wines had a very high alcohol percentage, so they were often diluted with water. Older wines were usually held in higher regard and achieved a higher price. Roman wines were famous for their additional spices and aromas as well, and they used the technique of placing amphorae in a fumatory.

The Republic of Serbia has been known for its exquisite wines for a long time and the types produced differ greatly based on the region of origin. The Serbian wine history is older than a millennium. Ever since the formation of the state in the 8th and 9th century CE, and especially during the reign of the Nemanjić dynasty from the 11th until the end of the 14th century CE, the Serbian rulers cherished the wine-growing culture. The remains of the Roman facilities and cellars, surviving to this day in the village of Grgurevci, and the discoveries of the charred grape seeds at the archaeological site Hrtkovci, dating back to the 1st or 2nd century CE, together with the unearthing of 1,400 seeds belonging to the same historical period and found in the city of Ilok, all suggest that there was a wine production prior to the 3rd century CE. Similarly, the archaeological finds such as the large number of amphorae in the vicinity of Sirmium testify that wine was brought to these areas and kept there for Roman emperors. In validation of the claim, a plaque dated to the 2nd century CE depicting the Roman goddess Libera wrapped in grapevine was found in the town of Čortanovci.

The Importance of Wine

Wine was thought to be as crucial as water, and it had its specific symbolism in the ancient Romans' lives. Consuming wine was almost a requirement among various social structures and, what's more, it was very popular. At the time, wine consumption was enormous and it was made available to everyone including women, soldiers, and slaves. In order to satisfy this huge wine craving, the wine production was constantly on the rise in the Roman Empire. Simultaneously with viticulture developments, the popularity of Roman wine grew, with the demand expanding to other regions, which led to a boom in trading.

Today wine provides an inspiration for venturing to other lands, visiting famous and renowned wine cellars, discovering new wine-makers, as well as getting familiar with foreign cuisines, customs, habits, celebrations and festivals. The Autonomous Province of Vojvodina encompasses well-maintained and long-lasting vineyards with their significant wine productions. These traditional wineries and their wine facilities have barely tapped into their tourist potential. They could soon be in high tourist demand, if we learn from other international success stories. The Republic of Serbia has been known for its exquisite wines since the ancient times and these quality wines differ greatly based on their region of origin.

Large numbers of manual grape crushers and wine presses have been excavated in Serbia, together with the wine dishes belonging to different eras. Furthermore, numerous monuments depicting the grapevines, grapes and the grape harvest can be found. The agro-ecological conditions present in Serbia are beneficial to wine-growing and wine production and, thus, viticulture represents an integral part of Serbian agroindustry. The majority of all grapes in the production process becomes wine, which, being "the most cultivated and the most civilized drink", holds a special place in our modern world and is considered the best option for food and drink pairing.

Winegrowing spreads across the Roman Empire

While its production was in the early years, the Roman wine was not deemed as good as the Greek wine. Moreover, the Roman wine was perceived as the cheap wine fit for the lower classes, slaves and farmers. The higher social classes preferred Greek wine. However, in time, the quality of Roman wine started improving and it reached its "Golden Era" by the end of the 2nd century CE. As the wine production grew, many wheat fields were turned into vineyards. Consequently, the price of wine dropped and, ultimately, there was only a small number of grain fields remaining. At that point, the food production was insufficient for the needs of the growing Roman population. In an attempt to gain more control over the wine growing, Rome issued an Edict in 92 CE. The proclamation forbade the wine growing in Roman provinces. Even though the Edict was never fully enforced, it did limit the wine production significantly. Viticulture and wine production technologies were regulated by the Edict for nearly two centuries. The wine edict was proclaimed null and void by the Roman Emperor Marcus Aurelius Probus just before he planted the first grapevine on the slopes of the Mons Almos (Almos Mons), modern-day Fruška gora, round 280 CE. Probus was often related to the Aureus Mons (present day village of Seone, Serbia) in province Moesia Superior, later Moesia prima, which is sometimes wrongly connected to the province Dacia Ripensis in Notitia Dignitatum comments.

The Wine Culture

There are many stages in the extensive viticulture history that will probably never be completely researched and understood, but we can be certain that wine growing is a purposeful human activity, rather than an accidental seasonal occurrence. Take any ancient records that mention wine: it is repeatedly perceived as especially important. If we put aside its alcoholic properties, wine has often been in the centre of philosophical discussions, more present in the philosophers' minds than in those of the farmers growing and harvesting it. The important Roman poets Catullus, Columella, Horace, Palladius, Plinius, Varius and Virgil defined the function that Roman wine had throughout the history of their Empire, but also the influence exerted on the modern viticulture. Bacchus (also known as Liber and Dionysus), the guardian of wine and viticulture, who was given a special place in the ancient religion and art, was also admired in the central Balkans, particularly in the Roman province Moesia Superior. Bacchus was mainly accompanied by grape bunches and twirling ivy. His cult in the central Balkans managed to survive the modifications in the management of Roman provinces. Numerous epitaphs and other monuments of art discovered in the central Balkans point to Bacchus as the god of vegetation, wine and viticulture, and treat him as one of the supreme deities. Today, the people inhabiting the region of ancient Moesia Superior celebrate Saint

Trifun as the patron saint of all wine-makers. Post-Dionysus and post-Bacchus, a new deity arises, a Christian Saint Trifun, the patron saint of the town of Kotor and the patron saint of all wine producers. St. Trifun is believed to guard all agricultural fields against pests and diseases, so it is safe to assume that this Christian saint was modelled on a Roman deity.

In ancient Greece and Rome, it was customary to drink wine diluted with water. The Romans would eat bread soaked in pure wine for breakfast, but they would not normally drink wine with their lunch or dinner. The ancient Greek tradition was to drink watered wine after dinner, while attending the symposium. Following dinner, the ancient Greeks would first wash their hands and then ritually offer ''livenieu'' (or pure wine) to the gods. The same pattern can be seen during the church Communion service. Holy Communion is one of the secrets of the Christian church, a Christian sacred rite that allows the believers to get closer to God by taking Sacramental bread, which serves as the representation of the body of Christ, and Communion wine, which is the symbolic blood of Christ. In ancient Rome, the man honoured to preside the symposium decided in which measure the wine should be diluted and also, how much should be drunk. Habitually, the host would make the first toast, raising his goblet, then spilling a few drops to honour the gods and finally, he drank to good health of the guest sitting to his right. The guest would then take the goblet, make a toast and pass the goblet to the person sitting to his right, after which the next guest would continue in the same manner. At the time, it was believed that only barbarians would drink unwatered, pure wine. In the Orthodox Church teachings, wine has the key role in the ceremonies of Holy Matrimony, Holy Communion, and in the ritual farewell bidding to the deceased. Wine symbolises both the life and immortality, it is the drink of joy, embodiment of the God's gifts to humankind.

The Symbolism behind the Wine served at Patron Saint Celebrations

The family patron saint celebrations are recorded only in the Serbian Orthodox Church practice, originally introduced by Saint Sava through a liturgical context at the beginning of the 13th century. Saint Sava succeeded in substituting pagan idols with great Christian saints who, once accepted by people, assumed the roles of patrons of Serbian homes. The Christian interpretation of wine as a sacrificial symbol is inspired by the pre-Christian era and the ritual sacrifices to pagan deities, but also by the belief in home guardians and the souls of ancestors watching over the family. Naturally, the Christian interpretation adds another dimension to the use of wine. The ritual celebration of the family patron saint, who is the link between the church and the people, involves the use of "props" which are deeply symbolic, one of them being the wine.

Wine and the Military

Wine was one of the most common elements of military diet and key problem of the military supply, as it needed time to be processed before being distributed to the troops. It was distributed to both garrisons and troops on the march as it provided additional strength to the soldiers. The Late Roman Codex Theodosianus, together with a collection of Roman laws, describes rations of soldiers and mentions that troops should be supplied with: "hardtack and bread, both wine and vinegar, with bacon and mutton". Vinegar was supposed to be used first and should last for at least two days; wine was to be consumed afterwards.

Acetum (sour and low-quality wine, basically vinegar) mixed with water and with added herbs was called *posca*. *Posca* was drunk mainly by lower ranking soldiers because it was long-lived, easy to obtain and cheap. It was thought that it had a healing effect and was used during marches as an energy drink. Good quality wine (*vinum*) was also available and widely used, but not as regular or as everyday ration. Amphorae with inscriptions related to different types of vine or its origins are widely found in military complexes suggesting that wine arrived from remote Mediterranean provinces to what is modern Serbia. During marches, soldiers took three days rations with them, including wine and vinegar. Large quantities were transported in wagons. Pottery bottles, equivalent to modern canteens were found in fortifications along the limes. They belong often to distinctive imported better-quality pottery. Some of the best examples on the Moesian Limes come from the sites Viminacium and Diana. They were used in garrisons and when troops were stationary, but it is rather unlikely that they were carried during marches. Soldiers on the move preferred bronze vessels or blackjacks that were hard to brake.

Initiatives of the emperors to grow wine at the frontier, especially in the Fruška gora and Smederevo regions, were practical as the main consumers were close and distribution did not need a long line of transport. During the Early Empire, soldiers were used to public works, but the later downfall of the discipline led to disastrous events like murder of an emperor after engaging troops in planting vineyards.

In Italy and especially in the Balkans, low quality wines, preferably white ones, are still mixed with water as regular custom even in restaurants, but herbs are rarely added in modern times. Herbs are still added if the wine is heated as mulled wine, especially during wintertime. Today in Serbia three "Wine Routes of Vojvodina" bring the visitors and inhabitants closer to the old European practices: Fruška gora wine route, the Palić Lake wine route and Vršac wine route.

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3.6. Romania

Ana-Maria Machedon (UAUIM)

Romania is an important source of Roman storytelling, beginning with the name of the country that evokes its Latin origins: Romania derives from the Latin word *romanus* with the meaning of *Roman* or *of Rome*.[27]

The Romanian Language

The official language has Latin origins. It belongs to the family of Latin languages. Romanian is the result of the evolution of the Latin language spoken in the Roman province of Dacia. It inherited the phonetics, a large part of the vocabulary and the grammar of the Latin language.[28] The Romanian linguist and philologist Alexandru Rosetti gave a genealogical definition of the Romanian language: "*The Romanian Language is the Latin language continuously spoken in the eastern part of the Roman Empire, in the Danube Roman Provinces (Dacia, South Pannonia, Dardania, Moesia Superior and Inferior) from the moment of its entrance in those provinces till nowadays*".[29]

The myth of Trajan and Dochia

The Romanian literature critic G. Călinescu defined the four fundamental myths of Romania.[30] One of those myths is the story of Trajan and Dochia, called by Călinescu the myth of Romania's ethnogenesis. It can be often found in the Romanian folklore. The legend says that after the conquest of Dacia, the Roman emperor Trajan had met Dochia, the daughter of Decebal, the king of Dacia, and had fallen in love with her. She refused his love and escaped into the high mountains where she gave up all her fortune to become a humble shepherd. However, the emperor Trajan found her and desperate not to become Roman, Dochia prayed to the god Zamolxis to transform her and her herd into rocks so that she would always remain in her land beloved land. The rocks of this legend are located and can be seen nowadays in Moldavia, in the Ceahlău Mountains.

Once Christianity entered the Eastern Roman provinces, many Latin celebrations and rituals were associated with the new religion, many of which are very important today:

Juturnalia

Romans celebrated on the 11th of January *Juturna* the goddess of water sources and wife of the god *Janus*, as described by the Romanian ethnologist and folklorist A.M. Marinescu.[31] In the Romanian Christian Orthodox calendar, the 6th of January is dedicated to the celebration of *Bobotează*. Water, rivers, lakes, seas and all water sources become holy during a special religious service. The holy water is spread on houses, objects and people for protection.[32]

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[27] Academia Română 1998.
[28] Academia Republicii Socialiste România 1966, 179
[29] 1968, 75: "Limba română este limba latină vorbită în mod neîntrerupt în partea orientală a Imperiului Roman, cuprinzând provinciile dunărene romanizate (Dacia, Pannonia de sud, Dardania, Moesia Superioară și Inferioară) din momentul pătrunderii limbii latine în aceste provincii și până în zilele noastre." (translated A-M Machedon)
[30] 1941, 61-62.
[31] 2008, 63.
[32] Nicolau 1998, 34.

The celebration of the god Faun

Faun is one of the most ancient gods of Italy, the spirit of mountains, hills and fields, the protector of cattle, fields and agriculture. Romans used to celebrate *Faun* on the 13th of February.[33] The Romanian Christian Orthodox calendar celebrates on the 10th of February the day of *Saint Haralambie*. Traditionally, peasants bring products from their crops (wheat, corn, flour, etc.) to church for this occasion and a special religious service is held in order to bless the fields, the crops and their animals for protection and abundance.

Mărțișorul

On the 1st of March in Romania, men offer to women and girls *mărțișoare*, small objects decorated with a red and white string. That same day the Romans used to celebrate the god *Marte / Mars,* who was the god of war but also the god of nature, spring and fields.[34] For the Romans, it was also the day of *Matronalia*, a celebration of all Roman mothers called also *Calendae Foeminarium*.[35] God *Marte*'s dual character might be the reason of combining a red and white string. Wearing the small objects called *mărțișoare* would bring luck in the upcoming year. The tradition of *Mărțișor* could have even more ancient roots in local Thracian mythologies.

Floralia

Floralia is an ancient Italic goddess, the fairy of flowers named by Romans also *Flora Mater.* She was celebrated the 28th of April. Romans used to decorate their doors with flowers.[36] In some Romanian regions, the 1st of May is celebrated as the *Armindeni*. In order to be protected from natural calamities, people still decorate nowadays, particularly in villages, their doors with green branches of trees on the first of May.[37] The celebration of *Florii,* in the Romanian Christian Orthodox calendar, is associated to the Roman *Floralia*, one week prior to Easter. During the day of *Florii,* Christians bring flowers to church and decorate houses with flowers.[38]

Rozalia

On the 13th of May, Romans were celebrating the day of roses also called *dies rosae* or *dies rosationsis*.[39] In the Romanian Christian Orthodox tradition, *Rusaliile* becomes the celebration of Pentecost. The *Rusalii* are evil demons that go out during the night of *Rusalii* to dance in the sky and whoever sees them would be cursed. It is forbidden to work during this celebration and not respecting the *Rusalii* would bring misfortune.[40] In the Roman tradition, the day of *Rozalia* is connected with the celebration of the dead.[41] In Dobrogea, the rituals of commemorating the dead, decorating the graves with candles and flowers, especially roses,

[33] Marinescu 2008, 75.
[34] Marinescu 2008, 92-97.
[35] Marinescu 2008, 101.
[36] Marinescu 2008, 139.
[37] Nicolau 1998, 48.
[38] Nicolau 1998, 92.
[39] Marinescu 2008, 148. Pârvan 1911, 111-116.
[40] Nicolau 1998, 102.
[41] Kernbach 1989, 517.

and spreading wine on the graves at the occasion of *Rusalii* have been perpetuated until nowadays even after the arrival of Christianity.[42]

Sânziana and Sânzienele

The Romanian writer, philosopher and historian of religions Mircea Eliade, followed the evolution of the mythological character of *Sânziana*.[43] The Daco-Roman goddess *Diana* might be the same as the goddess *Artemis-Bendis* of the Thracians.[44] *Diana, sancta, potentissima*, as written on an inscription found at *Sarmisegetuza,* could explain how the name of *Diana* has converted to the Romanian *Sânziana* and consequently transformed into a popular character of the Romanian legends.[45] Traditionally, on the 24th of June, Romanians celebrate *Sânzienele*. The day is associated in the Romanian Christian Orthodox calendar with the birth of St. John the Baptist. *Sânzienele* are very beautiful fairies living in woods and fields who protect nature and crops. They come out during the summer night of the 24th of June and dance in the sky. It is forbidden to see their dance, whoever looks to the sky becomes ill and will not become well again. Flowers called *Sânziene* should be put on the entrance door for protection and luck. Young girls should wear flower tiaras.

The celebration of the Roman emperor Constantin and his mother Elena

This celebration has no connection to the Roman mythology as the previous traditions, but is rooted directly in Roman history. On the 21st of May the Romanian Orthodox calendar celebrates the emperor Constantin the Great (*Gaius Flavius Valerius Aurelius Constantinus* 22.02.272 CE to 22.05.337 CE) and his mother Elena, (*Flavia Iulia Helena)*. The Roman emperor had converted to Christianity and became famous for issuing the Edict of Milan in 313 CE, thus establishing freedom to the Christian Church in the Roman Empire. It is one of the most important Christian celebrations in Romania. Romanians with the names of Constantin or Elena celebrate with this occasion the day of their names. Traditionally the name celebrations are as important as the birthday.

Sepulcrum

The Roman graves, *sepulcra*, were cultivated with ornamental plants, flowers and trees, considering that there is a close relationship between them and the defunct: all plants on the grave would grow like the will of the buried person, tender or wild.[46] Nowadays graves are still cultivated with a wide range of flowers and ornamental plants in order to be permanently green and in bloom. In Romania, a traditional and very common condolence message, addressed to the defunct is: "May the ground be light for you!"[35] Marinescu puts this message in connection with the tradition of Roman graves with ornamental plants that would lighten the weight of the ground above.[47]

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[42] Pârvan 1923, 100-101.
[43] 1996, 76.
[44] Pârvan 1926, 163.
[45] Pârvan 1911, 122.
[46] Marinescu 2008, 316.
[47] 2008, 316.

Parentatio or Parentalia

Romans used to celebrate each year the day of the death and birth of the defunct. On this occasion, they decorated the grave with flowers and offered feasts.[48] In the Romanian Orthodox tradition, every year the families celebrate the dying days of their defunct members with a special religious service. Such celebrations are called *Parastas*. The family of the deceased offers food or a feast to the poor called *pomană,* and cleans and decorates the grave with flowers.

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[48] Marinescu 2008, 316.

4. Identifying Research Gaps for a Comprehensive Presentation of the Roman Danube Limes

In order to tell the history and stories about the Romans and people living in Roman times on the shores of the Danube in as detailed a way as possible, we would like to know as much as possible about the people living in the Danube area 2000 to 1400 years ago. Whilst gathering existing knowledge on that period we also came across knowledge gaps that could highlight future research possibilities worth exploring. In the presentation of some of them we follow the Danube downstream from Germany to Bulgaria and in doing so introduce the navigability of rivers in Roman times, harbours and bridges, roads, watchtowers, contacts between Romans and the so-called barbarians and we meet a number of sites that are worth further exploration in the future.

4.1. Germany

In regard to the Living Danube Limes project, the pressing question in Germany is the navigability of the river Altmühl in Roman times, since the fort of Gunzenhausen, which was chosen as German pilot site, lies on the Altmühl and supplying the fort via river would have been the ideal version for the Romans, if possible.

Navigability of Rivers in Roman Times

Boris Dreyer, Alexander Hilverda, Christina Sponsel-Schaffner (FAU)

Ancient rivers, like modern ones, were limited in their navigability. Either they were not navigable from the source to the mouth or only at certain times of the year. It is important to note, however, that ancient inland navigation considered possible low water and that ancient construction methods accommodated these circumstances. Modern centreboard keels or ballast keels were not known. The rowing boats of the type Oberstimm and Lusoria had a maximum draught of 50 cm. Even if the lateral plan was not a hindrance, the oar drive (in the sense of pulling) was limited; the oars widened the cross-section of a patrol boat of the mentioned types from 2.7/2.8 m to 10-12 m, depending on the length of the oars. Rivers like the Swabian Rezat, but also the Altmühl cannot offer this breadth continuously. However, with the alternative propulsion methods of staking or towing, these boats can also be used, if desired. The sail, however, is hardly useful in narrow river courses. The ancient rudders could have caused problems, since - even if they had no greater draught than the boat amidships - they could run aground in narrow places according to the rounded cross-section of the rivers. Even shorter rudders are then no longer an effective aid, so that transportation should be done operating with round stick or in a towboat (in antiquity they were pulled by human power anyway, since the condition of the banks, even if artificially prepared, was difficult to master with draft animals).[49]

In addition to the boat types mentioned above, flat-bottomed vessels, i.e. prahms, which are side-high planked dugout canoes with a wider loading area in the middle and almost timeless use from prehistoric times to the present day, can serve as means for supply. These boats can be built quickly and enlarged as needed, if they are of the Zwammerdam type.[50] With a length of 20-34 m, a width of 6 m and a draught of 1 m, tonnages of 15-80 t were possible, which could

[49] Bremer 2001, 87-90.
[50] Bremer 2001, 62-93. Jaschke 2009, 196-202.

travel 15 km upstream (depending on the towing capacity) and even 20 km downstream per day, which was in any case superior to all transports with pack animals (max. 135 kg when mounted, 640 kg on wagons) on land in terms of speed and performance,[51] even if a road system such as south of the Danube and the Raetian Limes was available. If the river courses became narrower, the cargo could be reloaded at transshipment points, as was probably the case at Haltern, onto smaller prahms for further transport (as can be proved in the case of the Lippe as far as Anreppen), especially since new prahms and the reconstruction of prahms were quickly possible in Roman times because of the simple construction.[52]

In order to ensure such a transport by barge with a load of 6-8 tons - as would have been the case with the Altmühl river[53] - a water flow volume of 20 m^3/s should be available. For rivers with a smaller water volume (such as the Swabian Rezat, including the Regnitz and Rednitz), problem-free transport is questionable.[54] Nevertheless, especially in the latter case, a transport at least as far as the Main across the Central European watershed was also planned in the early Middle Ages, otherwise the construction of the so-called *Fossa Carolina* in 798 CE from Graben at the Altmühlsee to the Swabian Rezat (possibly near Pleinfeld – i.e. a distance over land of 2 km) would not have made sense.[55]

The problems of reconstructing the function of the Danube and the Rhine and their tributaries are complex. In addition to the limited possibilities of determining ancient river courses and flow velocities,[56] there is also the problem of determining the climatically or seasonally varying transport capacities, especially for smaller rivers.[57] Climatologists can provide average values.[58] Old maps showing the conditions before modern river straightening and old inventories (such as those carried out by the Bonarpartian occupation) can provide indications.[59] There can be no final certainty unless additional geological investigations are added, as was recently planned for the Altmühl as far as Graben[60] and as far as Gunzenhausen for the upcoming investigations.

The Altmühl River and its Use as Transport Way

The Gunzenhausen fort was located on the Altmühl, whose name is attested in medieval sources. The supply of the fort with a garrison of about 100 men will, if possible, not have taken place via the existing roads in the hinterland, but via river paths. We can deduce that the forts on the limes at Gunzenhausen, Gnotzheim and Theilenhofen needed food for about 1000 men (for the two 500-man garrisons at Gnotzheim and Theilenhofen, who also garrisoned the fort at Gunzenhausen). With eight kg of wheat per day for a *contubernium*, a section of eight men, we arrive at the requirement of one t of wheat per day for 1000 men. In addition, there are the

51 Jaschke 2009, 198-199.
52 Bremer 2001, 94-97. Jaschke 2009, 199-200.
53 According to the calculations of Bonapartist surveyors in the 18th century: Notes du général D 1801.
54 Eckholdt 1980, 91-93. See also Kirchner/Zielhofer/Werther 2018, 3–20 and the unpublished sections of the habilitation of Lukas Werther, Der Karlsgraben und andere Kanalbauten als Schnittstellen frühgeschichtlicher Verkehrsnetzwerke [unpubl. habil. Univ. Jena 2020a].
55 About the project and implementation see Eckholdt 1980, e.g. 72-73; 91-93. Kirchner/Zielhofer/Werther 2018, 3–20. The dating of the trench has ultimately been revised.
56 Eckholdt 1980, 40-44. See Bremer 2001 on the example of the Lippe, passim, and on an example in the appendix 98-101.
57 Eckholdt 1980, 45-47.
58 Dreyer/Land 2021.
59 Notes du général D 1801. Kirchner/Zielhofer/Werther 2018, 3–20. On the example of the Lippe again Bremer 2001, 16-61.
60 Kirchner/Zielhofer/Werther 2018, 3–20.

other necessary things (other food, supplies of clothing, weapons, luxury goods, etc.). The supply via the Altmühl itself with smaller broughams would have been much more effective with a potential load of 6-8 t per brougham than the transport with pack animals, which can handle a maximum of 135 kg or 650 kg on wagons.[61]

The Altmühl could be navigated as far as the *Fossa Carolina* and, as has been proven, served as a supply river up to there, according to Eckholdt even as far as Gunzenhausen. As early as Napoleonic times, experts proved the river's usability for transports of up to eight tons. Old reports have been preserved that also suggest navigability beyond the *Fossa Carolina*, the remaining 15 km to Gunzenhausen.[62] Investigations by the Bavarian Department for the Preservation of Historical Monuments show for individual places above the *Fossa Carolina* how much water the Altmühl carried and what course it took.[63] The aim is now to systematically test these last kilometres in terms of navigability and the function of the river in supplying the three Roman forts of Gunzenhausen, Gnotzheim and Theilenhofen and thus to clarify the important question of the logistical connection and thus the significance of the fort of Gunzenhausen at the northernmost point of the Raetian Limes. However, the navigability can only be verified in concrete terms on a small scale through elaborate geoarchaeological investigations of the development of the valley and the river.

Roman Navigation on the River Altmühl. Some Remarks and Research Perspectives

Lukas Werther (Tübingen)

As part of the project „Living Danube Limes“, the river Altmühl with the fort of Gunzenhausen, which did exist until the 3rd century CE at the northernmost point of the Raetian Limes, is of crucial interest.[64] The location of the fort might have been strongly affected by the navigability of the river and therefore might be the head of navigation respectively the northernmost point, which could have been accessed by boat. Therefore, it is an open research question, how far the river has been navigable and was navigated. This question should be discussed in this short contribution, which is intended to be a starting point for further research. The spatial focus will lay upon the river stretch between Treuchtlingen/Graben and Gunzenhausen.

This spatial focus has been chosen due to the fact that at least in the 8th century CE, the river Altmühl has definitely been navigable until Treuchtlingen/Graben according to written sources. In 793 CE Emperor Charlemagne travelled by boat from Regensburg upstream the rivers Danube and Altmühl until he came to the construction site of a large-scale artificial canal, which he has ordered to be built in 792 CE to bridge the Main European Watershed between the catchments of Rhine and Danube.[65] Early medieval navigation on the Altmühl is not only

[61] Jaschke 2009, 198. South of the Raetian Limes, at least on constructed paths, see also Bockius 2018, 179-200. Schmidhuber-Aspöck 2018, 229-246.

[62] Notes du général D 1801. Kirchner/Zielhofer/Werther 2018, 3–20.

[63] Hilgart/Nadler 2005, 120-122. About the course of Altmühl especially Hilgart 1995. In comparison with the dimensions of the *Fossa Carolina* and the artificial Schwarzach course near Großhöbing, which is in all likelihood navigable (cf. Liebert 2015), it can be assumed that the water supply and navigation channel dimensions at Gunzenhausen must indeed have been sufficient - and may have been similar in antiquity as they are today.

[64] Czysz et al. 2005, 456.

[65] See further Werther 2020. Werther et al. 2020.

indicated by the royal itinerary, but also by the 9th century *Vita Sualonis*, which describes the suitability of the river for merchant vessels.[66]

However, there are no written sources neither archaeological remains, which do clearly proof navigation on the river Altmühl in the Roman period (fig. 5). Shipwrecks as well as harbour infrastructure have only been documented along the rivers Rhine, Main and Danube as well as several smaller tributaries until now.[67] Concerning this distribution, it has to be taken into account, that a significant part of these remains has been dated to the 4th and 5th centuries CE, when the river Altmühl was no longer part of the Roman Empire. Therefore, the chance for a significant number of archaeological remains is generally much lower. Furthermore, modern river engineering and construction works in the floodplains have been much more intense along Rhine, Main and Danube, which implicates higher chances for buried archaeological remains to be found. Last but not least, the size of the waterways does also play a crucial role and contributes to rather low chances for finding remains of Roman Altmühl navigation. The smaller the river, the smaller and less sophisticated are boats and harbour infrastructure – if there was any at all.

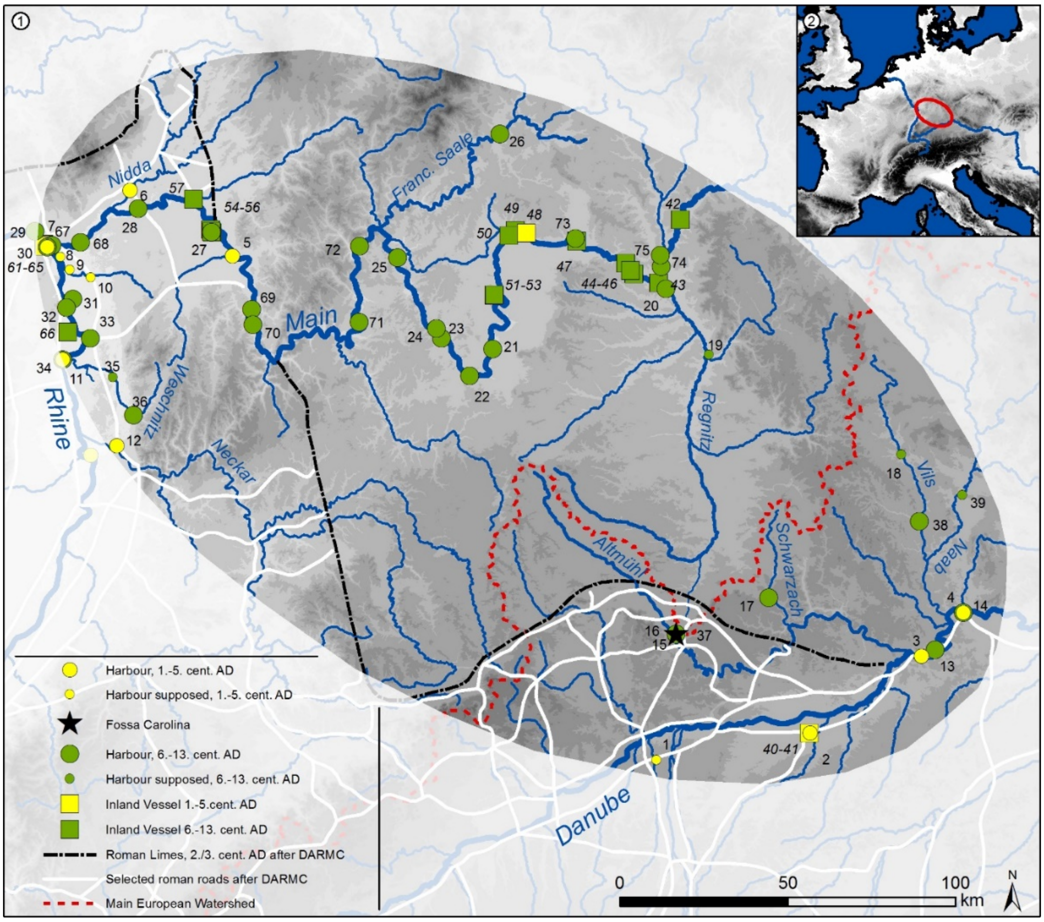

Fig. 5: Map of harbours and vessels proofed by archaeological and written sources at selected rivers between Mainz and Regensburg (1st-13th century AD, status 2016). 2: Location of the study area in Europe (map data SRTM-GDEM © NASA 2009, CCM River and Catchment Database © European Commission 2007. After Werther/Kröger 2017).

[66] Werther/Kröger 2017, 73.
[67] Werther/Kröger 2017, 66-70 with further references. Weski 2010. Wawrzinek 2014.

Nevertheless, it could be discussed if the river Altmühl, especially the stretch upstream of Treuchtlingen/Graben until Gunzenhausen, would have been suitable for Roman inland vessels.[68] To achieve this, the first step must be the reconstruction of minimum requirements for the fairway.[69] The best starting point are the dimensions of Roman inland vessels in the surrounding area on the one hand and artificial Roman canals on the other hands, as both give a rather precise idea of required and intended fairway dimensions. In Central Europe, more than 70 canals of the 2nd century BCE to the 5th century CE have been documented by written sources and archaeological fieldwork within the Roman Empire.[70] 75% of these artificial waterways are inland canals connected to rivers and lakes. The smallest canals, which document the minimum requirements for navigation, are 4-5m wide (for example Tendu, Troyes and Old Tillage).[71] The water depth of the fairway is usually difficult to estimate, but sometimes it has been only 70-80 cm or even less, such as in the harbour canal of Avenche.[72] Nevertheless, this is sufficient for smaller flat-bottomed riverboats with a minimum width and mean draught.[73] The width of the smallest of these boats was only 1-1.2m (e.g. De Meern 6, Woerden 3) and the draught of such small vessels could be estimated with often less than 40 cm (without cargo or only small cargo sometimes only 10-20 cm), which made them highly suitable for even the smallest watercourses.[74]

Therefore, also watercourses, which are far from navigable nowadays, could have been navigated in the Roman period. The crucial problem for estimating pre-modern navigability of rivers is their shifting nature. Therefore, due to natural and anthropogenic changes the modern morphological and hydrological pattern could differ significantly from the Roman period.[75] In 1980, Martin Eckoldt has published a hydrological model to estimate navigability of inland waterways based on widely available modern hydrological data.[76] For the river Altmühl, he concludes that the head of navigation and therefore the northernmost site, which could regularly be accessed by boat, is Gunzenhausen.[77] At the water gauge Treuchtlingen, nowadays the river is already ca. 14 m wide and ca. 0.7 m deep, which is sufficient for small to medium size Roman vessels. In 1800-1801, the river Altmühl has been surveyed by French military engineers in order to evaluate its navigability.[78] At Graben, the have documented a very similar width of 40-50 feet (ca. 12-15 m) and a depth of ca. 2 feet (ca. 60 cm).[79] Furthermore, they state that there are absolutely no obstacles for navigation on the river from the Danube confluence up to this point with a tonnage capacity of 5-8 tons. Unfortunately, the river stretch further upstream has not been described. However, geoarchaeological fieldwork in the Altmühl floodplain at Graben gave proof that there has not been any significant lateral shift of the riverbed from the mid-Holocene to the Central Middle Ages and the modern water level and

68 Concerning the importance of navigation for Roman military supply and operations along Rhine and Danube e.g. Bockius 2002. Fischer 2007. Konen 2008. Steidl et al. 2008. Himmler 2011. Schmidts 2011. Campbell 2012.
69 See Werther et al. 2018.
70 Werther 2019, 276-290.
71 See further Werther 2019.
72 Werther 2019. Bonnet 1982.
73 See Bockius 2003.
74 Werther 2019, 289f. See further Kröger 2018. Jansma et al. 2013. Bockius 2003. Eckoldt 1980, 21.
75 See in general Brown et al. 2018. Eckoldt 1980, 40-44.
76 Eckoldt 1980.
77 Eckoldt 1980, 73.
78 Notes du général D. 1801.
79 Notes du général D. 1801, 625.

riverbed dimension is most likely comparable to the Roman period.[80] This is in accordance with the very similar modern and early 19th century hydrological parameters at Graben. However, this might not be correct for other stretches of the river, as large-scale corrections and straightening of the river downstream of Kelheim did start in 1836 and further upstream for between 1910 and 1920[81]. Especially upstream of Gunzenhausen in the particularly wide Holocene valley floor, a comparison of the modern river course and the pre-modern fluvial topography, which is documented in the detailed early 19th century "Topographischer Atlas vom Königreich", does point to significant changes (fig. 6). However, beyond the local scale the overall fluvial pattern did not change significantly, which is due to the fact that the river Altmühl has a rather low gradient, flow velocity and energy – and the upstream sections have never been a target of river straightening to improve navigability.

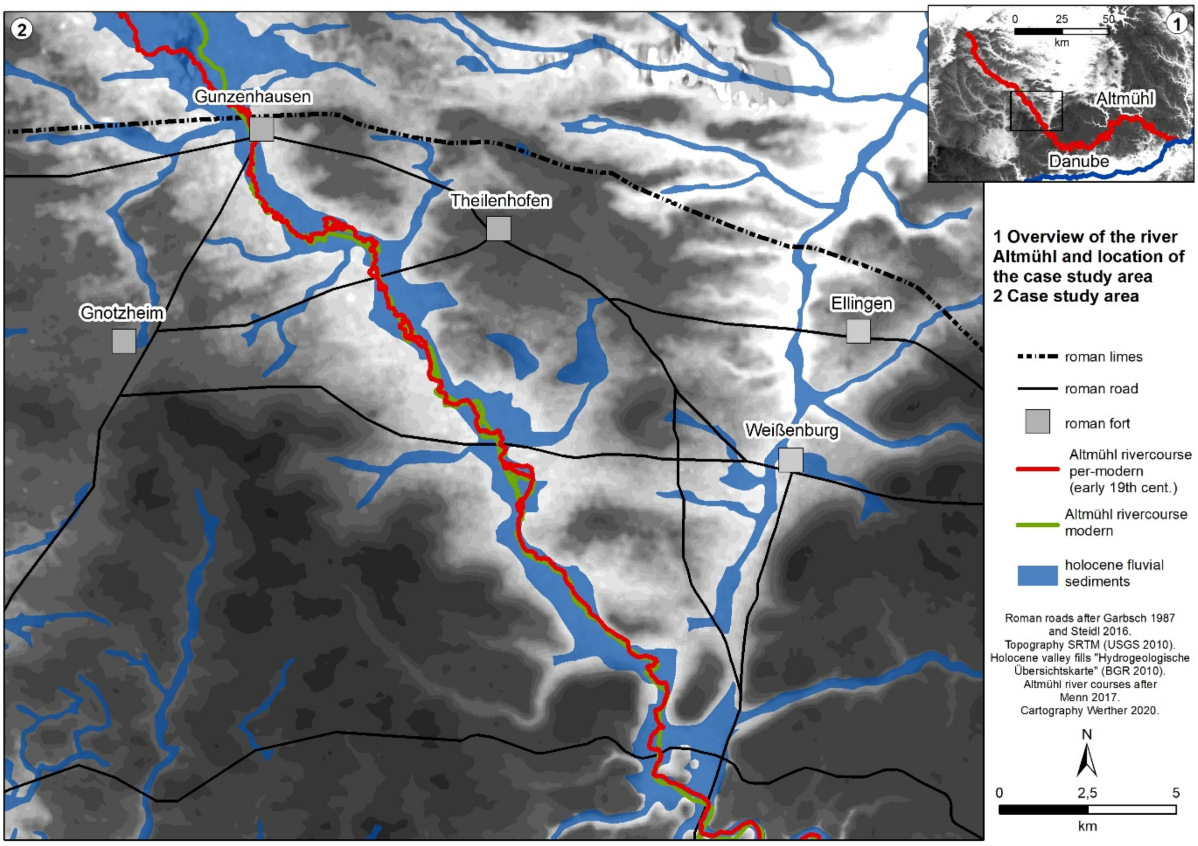

Fig. 6: The Altmühl floodplain and the surrounding landscape between Gunzenhausen and Treuchtlingen/Weißenburg (Werther 2020).

Therefore, it could be summarised that it is very likely that Gunzenhausen was indeed the head of navigation on the river Altmühl in the Roman period – and therefore the northernmost point of the limes in *Raetia*, which could have been accessed by boat. However, even if the river Altmühl has regularly been navigated up to this point, there is no archaeological proof for bulk

[80] Kirchner et al. 2018.
[81] Rümelin/Eckholdt 1998. Klein 2010. Wasserwirtschaftsamt Ansbach 2014. See also Hilgart 1995. Hilgart/Nadler 2005.

goods transported by ship such as large wooden barrels, which are abundant along the river Danube at several Roman sites, but not at the Altmühl.[82]

Gunzenhausen and the Fluvial Landscape around the Roman Fort

Finally, the topography and fluvial landscape around Gunzenhausen should be discussed in detail. The fort, which has most likely been constructed in the 1st half of the 2nd century CE and abandoned in the mid-3rd century CE, is located on the Eastern, flood-free river bank at a bottleneck of the valley, which widens significantly north of Gunzenhausen (fig. 6).[83] Therefore, it is a natural place for a river crossing. Combined with the fact that regular navigability of the river did most likely end at Gunzenhausen, this makes it a perfectly suitable site for a military site like the fort. A Northern and a Southern ford have been documented by archaeological means. The Northern ford, at which the border road did cross the river Altmühl, has been excavated by H. Eidam.[84] It was revetted with stones and a small section of the substructure of the adjacent road has been documented, too.[85] A similar ford revetted with stones has also been excavated near Trommetsheim further south, where another Roman road crosses the river Altmühl.[86] The fact that this ford has most likely been used from the Roman to the modern period underlines the fact, which has been discussed above, that the Altmühl river course is rather stable.

Selected Research Perspectives

The fords in Gunzenhausen and Trommetsheim, if preserved, might be a good starting point for further fieldwork in order to enlighten the fluvial morphology of the Altmühl in the Roman period. The revetments might offer precise information on both riverbanks and therefore the fairway dimension at these bottlenecks. Furthermore, the location where the limes itself does cross the river might also offer a very good starting point.[87] In order to develop a high-resolution age model of fluvial sedimentation, which allows for the identification of Roman levels, existing sediment cores from the Altmühl floodplain near Graben could be re-analysed and dated by further radiocarbon dates.[88] An additional approach could be offered by re-analysing Roman wooden remains dated by dendrochronology, which have been found in the Altmühl floodplain at different locations.[89] Underwater archaeological surveys and water-based geophysical prospection such as side scan sonar, which could be a powerful tool to identify submerged archaeological remains, have already been used to survey the Altmühl riverbed between Graben and Treuchtlingen in a pilot study.[90] However, there have not been any significant results, most likely due to modern river engineering and re-wildering, which did destroy older surfaces and archaeological features.

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[82] See Marlière 2000.
[83] See Hüssen 1987, 94. Ulbert 1987. Rathsam 1986, 6-22. Nadler et al. 2000, XXIV. Kießling 2000, 257.
[84] Ulbert 1987. Rathsam 1995, 15.
[85] Rathsam 1995, 15.
[86] Kießling 2000, 8. Rathsam 1995, 14.
[87] The Bavarian State Department for Heritage conservation, coordinated by Stefanie Berg, did already start to survey these *Limes* river crossings by means of geophysical prospection some years ago. The collected data could offer valuable information for further fieldwork.
[88] See Kirchner et al. 2018.
[89] See e.g. Herzig 2008.
[90] The fieldwork was part of the "*Fossa Carolina*" project funded by the DFG in SPP 1630 and carried out by the author and a team of geophysicists from Kiel University, supervised by Dennis Wilken.

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4.2. Austria

Maria Erker, Anna Windischbauer (PLUS)

The territory of present-day Austria lay in the provinces of Noricum, Pannonia and Raetia during the Roman Empire. Noricum was originally an area settled by Celts, which was incorporated into the Roman Empire under the name *Provincia Noricum* in the first century CE. Noricum bordered Italy to the South, Pannonia to the East and Raetia to the West. Pannonia also entered the Roman Empire as a province in the 1st century CE and, in addition to present-day areas in Hungary, Serbia, Slovenia and Croatia on Austrian territory, included present-day Burgenland and parts of the Vienna Basin and Eastern Styria. Raetia was also established as a province in the 1st century CE, named after the tribe of the Raetians, and included on Austrian territory the Northern foothills of the Alps between the Danube and the Inn, parts of Northern Tyrol and today's Vorarlberg to Lake Constance (Bodensee).[91]

The Austrian border section includes the approximately 350 km long stretch of the Danube between Passau and Bratislava. Four legionary camps (Enns, Albing, Vienna, Carnuntum), at least 16 forts (Oberranna, Schlögen, Eferding, Linz, Wallsee, Pöchlarn, Mautern, Traismauer, Zwentendorf, Tulln, Zeiselmauer, Klosterneuburg, Schwechat, Fischamend, Carnuntum, Höflein) and numerous tower complexes monitored border traffic for several centuries.

Next to the forts and in the immediate hinterland of the border, civilian settlements (and their associated cemeteries) developed either next to the camps or as central settlements in the Hinterland (e.g. Wels in Upper Austria or St. Pölten in Lower Austria). Beyond the Roman border, especially in the forefield of the eastern section of the border, there are individual Roman fortifications used for a short time in the Barbaricum, such as Plank am Kamp, Fels am Wagram, Poysdorf, Bernhardsthal, Niederleis, Kollnbrunn and Stillfried.[92]

Promising research concerning the Romans is linked to fluvial activities and will be highlighted below in sections on ports and bridges.

Roman Ports

The Romans knew both sea and river ports. In the case of river ports, a distinction must be made between civil and military facilities. In Roman antiquity, both merchant and military ships were on the Austrian Danube. A Roman seaport with military use on an inland waterway can also be attested in Austria with the port of Brigantium (Bregenz) on Lake Constance.[93]

In the *Notitia Dignitatum*, a late antique handbook listing the highest civil and military offices in both Eastern and Western Roman Empires, the following military harbours are listed for the present Austrian area along the limes:

- Carnuntum
- Vindobona (Vienna)

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[91] Fischer 2002. Saria 1965.
[92] Museen am Donaulimes 2021. Genser 1986. Friesinger/Krinzinger 2002. Ployer 2018.
[93] Vonbank 1972. Pekáry 1965.

- Lauriacum (Enns)
- Adiuvense (Wallsee)
- Comagena (Tulln)
- Ioviacum (Schlögen)

Only a few of these sites can be proven archaeologically, many must remain speculative or can at least be argued via the troops stationed there. For Carnuntum there is an archaeological note from 1823, in which the location of the harbour on the east side of Petronell, below the ancient well (today's Pfaffenbründl, east of the church of Petronell) is assumed. From a burial inscription for a *magister navaliorum* who served in the *legio XIIII Gemina* stationed in Carnuntum, there is a confirmation for a military port.

In Vienna (Vindobona) at the beginning of the 20th century, archaeological remains were found that could possibly belong to the ancient port of Vindobona. In 1906, during the construction of a new house at the corner of Dominikanerbastei/ Kaiser Franz Josef-Kai (in the direction of Adlergasse), a concrete floor became visible at a depth of nine meters, bedded on a base of gravel stones. At that time, due to the massive construction and the deep location regarding the water, it was suspected that this concrete could have formed the floor of the Danube harbour. In 1999 some Roman ashlars were found at the Northern front of the now known Roman legionary camp, at the present stairway (Rabensteig 3) to the church Maria am Gestade, at the foot of the camp plateau. They might have been part of the quay wall of a late antique harbour facility. The difference in elevation between the site and the former camp plateau was about twelve meters. Halfway up, excavations in 1901/1902 also revealed a paved path and the remains of a fortification (gateway with ashlar work in front). It is not known when the first harbour facilities were built at Vindobona. Based on the construction, the current findings could be dated to Late Antiquity (4th century).

According to ancient literature, Schlögen (Ioviacum) was also equipped with a harbour, of which possibly a harbour edge has already been found. A stone pack running parallel to the bank of the Danube is interpreted as an old bank fortification for the harbour. From there a paved road leading to the settlement was found.

Also in Pöchlarn (Arelape) an ancient harbour is suspected, which seems to be attested by a commander of a naval unit, unfortunately only in writing in the *Notitia Dignitatum*. Today the harbour is assumed to be in the Southern part of the town, where probably once an arm of the Danube was located. This would place the Roman harbour between the known civilian settlement and the fort. Until around 1900, iron rings allegedly existed on the rocky boundary south of the parish church. Whether they were related to the harbour is not sure.

For all other harbour sites on today's Austrian territory mentioned in the *Notitia Dignitatum*, archaeological evidence is missing so far, even if the location of the Roman towns might suggests the existence of a harbour. No remains of Roman ships have yet been excavated on the section of the Danube Limes that belongs to present-day Austria.[94]

Roman Bridges

The Romans knew a whole range of different types of bridges. For example, wooden bridges, stone bridges, bridges with stone piers and wooden deck, arched bridges and stone bridges with archways. In the case of stone bridges, there are bridges with real and fake vaults. Typical for Roman bridges is a division into a roadway (*iter*) and two sidewalks (*decursoriae*) to the

[94] Kandler 1989. Kenner 1909. Mosser 1001. Obermayr 1967. Ployer 2018. BDA 2009. AE 2010, 1261, 1-3.

left and right of the roadway. In addition, mobile military bridges (pontoon bridges) could also be built for military purposes at short notice.[95]

Remains of Roman bridges are hardly found today due to the changed course of the river and modern building development. On Austrian limes territory there is only one preserved bridge, which is assumed to have been built in Roman times. Evidence can be found archaeologically or in writing. One indication of a possible Danube crossing is found near Carnuntum. In the Stopfenreuther Au, on the left bank of the Danube, on the municipal territory of the village Engelhartsstetten, North of Bad Deutsch-Altenburg and near the mouth of the so-called Rosskopf arm into the Danube lie the remains of a presumed small Roman fort. In the vernacular, the ruins there are called the "Öde Schloss". The Carnuntine legionary camp is about three kilometres away. Whether the fort was located on the Northern or Southern bank of the main river in Roman times remains unclear because of the major changes in the riverbed over time. As early as 1850, the visible walls were first examined archaeologically and interpreted as the remains of a fortified bridgehead based on the brick stamps found. Today it is assumed a part of the Amber Road. In addition, the narrowness of the river and the mountain directly on the water of the right bank offered a good place for a crossing. From the fort, the remains of a square tower with strong walls and a smaller building were supposedly still visible until the first half of the 19th century. The investigations are difficult because of the water level and occurring floods. The interpretation remains questionable and can only be clarified by further investigations. Roman bridges are also suspected near Schwechat (Ala Nova). Schwechat is a town on the Eastern edge of the Vienna Basin, about 13 km east of the city of Vienna (Vindobona) on the Schwechat River. In the years 1843/1844, six Roman milestones were recovered in a well on the Eastern outskirts of Schwechat, on the border with the area of today's Vienna-Unterlaa. According to their inscriptions, these milestones probably stood on the road from Ala Nova to Carnuntum. They indicate a distance of 21 Roman miles to Carnuntum. The exact course of the road is not known today. From the inscriptions on the milestones found (*pontes et vias conlabsas vetu state*) it is also possible to infer bridges in this area. In Wels (Ovilavis), due to the location of the Roman city excavated so far, it is assumed that there was a bridge over the Traun River, which was probably located in the area of the present bridge in the city centre.[96]A special bridge is to be found in Lanzing in Lower Austria. Lanzing is a hamlet of the village Dunkelsteinerwald, near Mauer and Melk in Lower Austria. The circular arch bridge in Lanzing, or more precisely Oberlanzing, was first built on this site in the 4th century, renovated repeatedly over the centuries, and is still in use today as a pedestrian bridge. The foundation masonry dates back to Roman times. In the vernacular, the bridge is still called the Roman Bridge.[97]

Mobile Roman military bridges can of course no longer be proven archaeologically today. For the Danube Limes area, however, at least one ship's bridge can be attested based on a surviving pictorial representation. On the column of Marcus Aurelius in Rome (today Piazza Colonna), from the 2nd century CE, there is (at the very bottom) a depiction of a Roman ship's bridge. The relief shows the crossing of the Danube in the area around ancient Carnuntum during the war against the Marcomanni and Quadi (166-180 CE). Both foot soldiers and equestrians are depicted marching over a wooden construction that was laid on ships. Bridges of this type, so called pontoon bridges, were regularly used in times of war, and the use in the Marcomannic

[95] Krause 1965.
[96] Kandler 1989. Genser 1989. Groller 1900. Walter 1957. CIL III 04645.
[97] www.arge-dunkelsteinerwald.at/tourismus (27.02.2021); https://www.mostviertel.at/alle-ausflugsziele/a-roemerbruecke (30.03.2021); https://www.niederoesterreich.at/ausflugsziele/a-roemerbruecke (30.03.2021).

War was not unique. Such a bridge is also depicted on Traian's Column in Rome (at Traian's Forum). These bridges are not a Roman invention, but are found throughout Antiquity and among different peoples, for example, already in Herodotus, who describes them for the war of the Persians against the Greeks (5th century BCE).[98]

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4.3. Hungary

Possible Research Fields and long-term Research Questions related to the Historical Roman Monuments along the Danube in Hungary

Dr. István Gergő Farkas

The Pannonian and Hungarian sections of the limes along the Danube (*ripa Pannonica*) have been the subject of several research activities during the last century. These researches were mainly focused on individual, significant sites of the Imperial era (e.g. Budapest – Óbuda / Aquincum, Komárom – Ószőny / Brigetio, Dunaújváros – Öreghegy / Intercisa, Tác – Gorsium / Herculia, etc.) as well as the preserved monuments visible above ground (e.g. Visegrád – Gizellamajor centenarium fortlet, Visegrád – Sibrik hill fortification from the Late Roman era, Leányfalu – CIR 2 watchtower, etc.). However, the southern section of the Hungarian Limes, between Dunaújváros and Kölked received less attention, since fewer examples of spectacular monuments remained above ground. Most of the watchtowers were built as wooden structures on stone foundations, and the exact location of several forts is either unknown or they were destroyed by fluvial erosion. During the last two decades, the staff of the Pécs Limes Research Center has carried out regular research under the professional supervision of Dr. Zsolt Visy (Pécs Aerial Archaeological Archives of Pécs, CLIR Research Center and various research groups funded by individual projects) related to the UNESCO World Heritage Nomination of the 'Frontiers of the Roman Empire – The Danube Limes' (FRE-DL) programme. As a result, several data were discovered regarding the extension and chronology of the sites. The aim of future research activities is the systematic evaluation and publication of this data in parallel with other sites of the limes.

CLIR Database

The large number of known sites and archaeological features along the limes, their wide spatial and temporal distribution, and uncertainties resulting from research bias necessitates examining this material in a versatile, high-capacity, adaptable online tool, which is the CLIR database. Its purpose is to incorporate and manage all relevant data from archaeological sites and features in a modern, up-to-date database that enables flexible, versatile query and analysis, expanding previous, well-known online archaeological collections. The CLIR database is a responsive and scalable scientific database in English based on a headless Drupal 8.x architecture available at https://clir.hu. The database complies with current guidelines on the use of scientific data (open-data, linked-data) developed in the framework of the ARIADNEplus and FAIR initiatives and internationally approved professional thesauri (UNESCO SKOS, Forum on Information Standards in Heritage - FISH, FRE Thesaurus, etc.).

Specific Proposals for Research Subjects and Fields

The localization of the Kölked / Altinum Early Imperial fort: Several excavations took place in the area of the fort in the 1970s and 1980s. In connection with the FRE-DL World Heritage Designation, several excavations, instrumental fieldwork and ground-based radar surveys were carried out in the area of the fort to clarify the previous excavations. As a result, it has revealed that the Late Imperial fortification in the area of Kölked – Hajlokpart was constructed as a greenfield investment and the Early Imperial fortress can be localised elsewhere in the vicinity. The identification of this site is in progress. (Responsible: Gergely Kovaliczky, Dr. Máté Szabó, and Dr. Gergő Farkas)

In recent years, several sites have become known in Fejér, Tolna and Baranya counties, and the number of previous sites has been supplemented and clarified by the staff of the territorially competent museums with the discovery of several new phenomena. The evaluation of archaeological features and finds is underway; however, a comprehensive evaluation of this limes section has not been completed so far. A similar synthesizing work would require the study and evaluation of the area from the aspect of landscape archaeology, for which the CLIR scientific database could provide a framework (Responsible: King St. Stephen's Museum /Széhesfehérvár/, Wosinsky Mór County Museum /Szekszárd/, Janus Pannonius Museum /Pécs/).

Thematic research projects are currently in progress on key sites of the limes: Győr / Arrabona (urban archaeology), Komárom – Ószőny / Brigetio (Dr. Dávid Bartus et al.), Nyergesújfalu – Sánc-hely / Crumerum (Dr. László Schilling et al.), Tokod – Tokodaltáró (Anita Kocsis), Pilismarót / Ad Herculem (Dr. József Beszédes et al.), Budapest – Óbuda / Aquincum (Hungarian National Museum, Budapest History Museum), Dunaújváros – Öreg-hegy / Intercisa (Dr. Zsolt Visy, Dr. Ádám Szabó).

Bibliography and Further Reading

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Regarding the Northern zone of the limes in Hungary, a new project with the support of Hungarian Scientific Research Fund – OTKA, entitled "Comprehensive archaeological research on the northern zone of the Ripa Pannonica" was launched in October 2020. The research is carried out by László Borhy, László Rupnik and Dávid Bartus.

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Development Areas for Sites along the Limes

We are indebted to Katalin Wollák and Lajos Koszorú for providing the possibility to get familiar with the content of the World Heritage Management Plan titled 'Frontiers of the Roman Empire – The Hungarian section of the Danube Limes'. We would express our thankfulness to Dr. Dávid Bartus, Dean of Faculty of Humanities, Eötvös Loránd University and Dr. Orsolya Láng, Director of Budapest History Museum Aquincum Museum for their valuable contribution. (BME)

- The document entitled 'Frontiers of the Roman Empire – The Hungarian section of the Danube Limes' World Heritage Management Plan implemented for the UNESCO World Heritage nomination process fulfils the specifications related to management plans set out in the Operational Guidelines of the UNESCO World Heritage Convention. Sections that explicate the different levels of the possible development fields are related to the sites in a detailed way. The following fields concern the most important aspects and levels, which are related to the necessary development fields of sites connected to the limes along the Danube: Setup of an operational system for the consolidation of the conditions for organization, institutionalisation, legislation, finances and communication (operative institutions, complex development of museums mandated with maintenance and collections etc.; strategic organizations: forums of cooperation and communication).
- Stabilization and preservation of the sites' conditions (development for the sites in water-covered areas, floodplains, and loess walls; management of estate protection relations, missing declarations of protection, necessary changes of protection status); assessment of the estate conditions of sites and protection zones, preparation and implementation of necessary land developments; content and technical modernization of registers, synchronization of digital real estate register and site register; review of the legal background: the updating of plans in the framework of the management plan; sectoral legislation (primarily to ensure the co-operation and monitoring obligations of public administration bodies); clarification of the legal framework required for the structural conditions and funding responsibilities of the competent authorities.
- Implementation of exploration research tasks necessary for the development priorities (research and conservation tasks of high-priority and sub-priority sites in terms of presentation; exploration and research works related to the implementation of large investments, e.g. EuroVelo, flood protection, etc.; exploration activities related to the preparation of large-scale settlement plans; preparation of heritage protection studies necessary for the modification of settlement plans; researches to define and prepare land development projects).
- Timed development of differentiated conditions for presentation and visit:
    - Investment developments (complex tourism development of selected sites by funding operational programmes /Komárom, Nyergesújfalu, Dunaújváros, Kölked, Budapest Aquincum and Campona, Verőce/, development of smaller visitor centres: lookouts, gardening, tree plantation, etc.; arranging of the environment of other locations, placing signs for all sub-locations).
    - Development of Tourist Destination Management (implementation of the tourism marketing programme of the tourism concept developed by the Hungarian Limes Association, integrated into other tourism development costs, clarification of the qualification system of the visitor centres, conducting the qualification duty of guardianship; structure of the public contents of the digital communication system, creation of a related mobile application background; embracing micro-regional TDM initiatives, supporting of programmes).

4.4. Croatia

Ivana Ožanić Roguljić, Mislav Fileš (IAHR)

Roman Watchtowers

Roman settlements along the Croatian part of the Danube Limes are well known from different sources such as ancient texts and maps, milestones, and the archaeological remains of the sites themselves. The most famous example is the*Tabula Peuntigeriana* with apparent reference to sites such as *Mursa* (Osijek), *Cornacum* (Sotin) and our Croatian pilot site *Ad Labores* (Kopačevo). Unlike urban settlements, the Roman rural hinterlands of the cities are just coming into the researchers' focus. Alongside the Roman *vicus* or village, many watchtowers along the Danube have been identified.[99] These sites served as a watch on the people on the other side of the river and an early warning system for any military movement. In recent years, several such sites have been identified. They are usually situated on a hill overlooking their surroundings from all sides. They are quite small in comparison to Roman forts and might have housed small detachments of Roman soldiers operating the outposts. Research using new methods such as aerial reconnaissance and LIDAR as well as geophysical survey might help identify more of these sites in the future.

Drava River

One of the more prominent features of the Roman Danube Limes in Croatia is the confluence of the Drava River. The Drava is a river flowing from northern Italy, Tyrolean Alps through present-day Slovenia and continues marking the border between Croatia and Hungary until its end, flowing into the Danube near Osijek. Recent research has established that the Drava, in the early expansion of the Roman Empire into the Pannonian plain, served a similar purpose as the Danube, providing a bulwark towards the tribes to the North. It is not by chance that the Roman city of *Mursa* was founded just a few miles upstream from the point where the Drava flows into the Danube. The Drava also provided many underwater finds, with the most famous one being the Roman bridge over the Drava leading from ancient *Mursa* (Osijek) towards *Aquincum* (Budapest). Many similar finds are to be expected along the Drava, as well as locations of watchtowers and road stops, *mansiones*, or even bridges.

Road Network

Roman legions were famous for two things: their iron discipline in fighting the enemies of the Empire and their laborious roadbuilding efforts wherever they went. It is no surprise to find the Roman Danube Limes in Croatia connected with a network of such roads. These roads lead to and from the main centres of the province, such as *Mursa,* to bigger forts and camps as well as to the smaller watchtowers along the limes. The most direct proof, aside from still visible Roman roads such as the one leading from *Mursa* towards *Aquincum* close to the present-day village of Bilje, are numerous milestones or Roman *miliaria* found alongside the roads. It is also impressive that a site of a Roman bridge over the Drava River has been identified, and it is to this exact bridge that the road network connects. These milestones provide us with not just the idea of the extent of the Roman transport infrastructure, but also with the possible locations of sites that are today under modern settlements and partly overbuilt.

[99] Vukmanić 2015.

Roman harbours

We can ascertain that both Drava and Sava as Danube tributaries were suitable for naval transport in Antiquity with considerable certainty. So far, we have only traces of prehistoric and medieval boats, but it would be quite naive to believe that the Romans did not use both rivers in the same way. Most of the Roman sites along the Danube suggest either direct access to the river or a dominant position and watch over a section of the Danube River, but unfortunately, so far, no Roman harbour infrastructure has been uncovered along the Croatian part of the Roman Danube Limes. The northern part of the Danube river in present-day Croatia was quite different in Antiquity. In the 19th and 20th centuries a series of levees and canals were built in Croatian Baranja, thus changing the ancient landscape. While investigating Roman ruins today, one must consider this, as potential Roman harbours could be found on what is today dry land and was once a riverbed. One of such places could be found in the town of Lug, which could be identified as Roman *Albanum*. However, future archaeological excavations will determine that more closely.

Rural sites

For a long time, the primary focus while investigating the Roman Danube Limes in Croatia fell in the scope of the Roman army. Army camps and accompanying infrastructure, military *stelae* and graves were considered prime sites along this limes section. It is in the last few decades that the focus shifted, and we have started to identify and investigate rural sites in the limes hinterlands. Sites of Roman villages and farmsteads were built to support the army stationed on the limes itself. The only military *vicus* at the moment is documented by remote sensing methods near the fort of Dragojlov brijeg. Nevertheless, a more intensive survey of the, up until now, unknown Roman sites yielded a whole plethora of such locations near *Mursa* (Osijek) and *Cibalae* (Vinkovci). A big Roman urban centre in the proximity to the Danube Limes, *Mursa* was a trading hub as well as one of the centres of Roman life in *Pannonia*. A few dozen recently discovered satellite settlements served as smaller agricultural hubs providing fresh produce such as grain, fruit, vegetables, meat and dairy to the residents of Mursa.[100] All of those sites are yet to be thoroughly excavated. Near today's town of Vinkovci, in the village of Nuštar, at the moment the biggest excavations of a Roman *vicus* or village in the broader region of the Roman Danube Limes in Croatia is carried out.

Contact to the Barbarian Tribes

The earliest Roman presence in the region of the Croatian Danube Limes can be found in the early Principate period, the 1st century CE. We know that when the Romans invaded the territory that would eventually become *Illyricum* and later on *Provincia Pannonia*, the area was settled by people of Celtic origins. We even know their name as *Scordici*, from historians such as Pausanias and Diodorus Siculus. We can only assume that they shared the same destiny of many of the Iron Age populations conquered by the Romans: military or political conquest and, a few decades later, total integration into the Roman Empire. The presence of these people can still be witnessed in their names surviving on stone or in the names of river deities such as *Savus* giving its name to the river Sava. From the 3rd century onwards, we can follow the start of the big epoch colloquially known as the great migration period. In *Pannonia*, several of the Germanic tribes can be identified, as well as subsequent Hunnic and Avaric tribes that inhabited this area from the 4th century onwards.

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[100] Ožanić Roguljić 2020.

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4.5. Serbia

IAB

Although there are many impressive sites on the Roman Limes in Serbia, the situation is far from perfect, considering that the scientific, educational or touristic potentials of the limes are not exploited and developed enough. The Roman Limes in Serbia completely follows the course of the Danube and covers the area of two provinces - Upper Moesia and Lower Pannonia. It is estimated that there are over 120 sites on this stretch, of which only about 80 have been identified and partially explored. Among them, only few are adequately protected, and those that are presented in an educational way to the public are extremely rare. Although results of previous research of these sites have been published to some extent, mostly dealing with material culture, there is no comprehensive study of the Danube Limes in general. The best-explored components of the limes are architecture and the material culture of military structures, especially in the Iron Gate area. However, there are still many segments of life in Roman times that remain insufficiently researched, such as funerary practices, social relations, civilian settlements, residential architecture, trade, art, crafts, etc. Despite everything, the Roman Limes in Serbia represents a treasure trove of knowledge whose full significance is yet to be seen.

One of the main issues with the Serbian part of the limes is a lack of public understanding for the importance of Roman cultural heritage. Long term neglecting of the sites and their research is another problem. The process of legal protection is long and complicated. One third of the sites lacks legal protection; experts of the Institute for Archaeology in Belgrade currently work on their state regarding the protection of cultural heritage of the Republic of Serbia. Geophysical prospection is not finished on some of the sites (a project is funded from the Ministry of Culture of the Republic of Serbia). A group of ten sites along the limes completely lacks surveys or excavations and was primarily interpreted only on the base of surface finds. Research on submerged sites in the Iron Gate gorge on the Danube is not finished. For the purpose of the UNESCO World Heritage nomination, more detailed surveys with modern equipment are needed. In addition, the positioning and repositioning of the sites is needed, as there are mistakes in old maps and coordinates. There is an uneven percentage of documentation, description, and even basic surveys of sites between Srem, Central Serbia, the Iron Gate gorge and Eastern Serbia regions, so every one of them needs a different approach.

Srem Region (Roman Province *Pannonia Inferior*)

In spite of the fact that this segment of the limes existed and flourished from the beginning of the period of Roman domination until the end of Late Antiquity, this area was never systematically surveyed. There are several Roman sites noted on the Pannonian part of the

Serbian Limes, but that number is significantly smaller than in the Upper Moesian part. The systematic reconnaissance and/or excavation of this segment of the Pannonian Limes is necessary. There is no presentation on any of the sites so far. Plans for presentations were initiated only after the sites became part of the Serbia's UNESCO World Heritage tentative list. All sites have good potential for presentation if some problems are overcome. The general problem with the sites in this area was the complete lack of any detailed information, plans and maps. This hinders the positioning of the core and buffer zone system, but significant research is in process. Problems with private ownership on many sites should be carefully analysed. The bridgehead at *castellum Onagrinum* at Begeč is in the initial phase. Sites at Stari Slankamen / *Acumincum* and Surduk / *Rittium* are under geophysical surveys and plans for creating archaeological parks are on the way. The problem with these sites is that they are on land that is fully in private ownership. Excavations on these sites were conducted on a small scale only in the second half of 19th and the first half of the 20th century. No modern actions were focused on these sites. Sites in public areas (as Čortanovci / *Ad Herculem*) are being already prepared for different types of presentation. The advantage of these sites is that no modern settlement exists over the Roman remains, but a future problem might be rural development, if no actions are taken in preventing illegal activities.

Central Serbia

There is a lack of a research process, with the exception of capital sites like *Singidunum* and *Viminacium*. There are no systematic surveys except those that are in the process at the moment as part of the preparation of the UNESCO World Heritage nomination dossier. *Viminacium* is the best-preserved and presented site, being an archaeological park with tradition since 2006. It has all facilities for mass tourist visits and developed tourist infrastructure. Newly discovered ships in the area where the river flowed 1600 years ago bring new possibilities for a Roman navigation museum on site. Today the Danube is 3.5 km away from the site of *Viminacium* and at least 2 km further than originally in Roman times. *Singidunum* is the second largest site and legionary fortress, presented partially in the modern urban environment of Serbia's capital Belgrade. Auxiliary forts and Roman towns between *Singidunum* and *Viminacium* are being surveyed and in process of receiving legal protection (Višnjica / *Ad Octavum*, Ritopek / *Castra Tricornia*, Seone / *Aureus Mons*, Dubravica / *Margum*). Zemun's / *Taurunum's* Roman cemetery is fully under modern urban environment and thus will be marked and described on info boards, as there are no other ways for presentation at the moment.

Iron Gate Gorge

Đerdap or the Iron Gate gorge is the most beautiful part of the frontier. It is the largest and longest gorge in Europe, a National Park in Serbia and a newly internationally recognized geopark. With an extraordinary natural landscape and the deepest and narrowest points of the Danube, it is the best combination of culture and natural beauty along the frontier. Most of the Roman sites in the Iron Gate region were submerged after the building of the hydroelectric power plant Đerdap I, but what remains provides extraordinary potential for a non-classic approach to presenting Roman cultural heritage. Possibilities for presentations exist at several sites that are only partially submerged. Čezava/*Novae* and Hajdučka vodenica are the best examples for fortifications in this area. 26 known Roman sites were submerged into the waters of the Danube in 1970 with the construction of the hydroelectric power plant. Eight of these sites are proven to still exist and are part of the UNESCO World Heritage nomination process.

Imperial tablets in Gospođin Vir and Kazan could be presented for visitors from the water with a plan to make an approach via the land possible as well; at the moment this is not possible because of steep cliffs, the original Roman roads and fortification elements are under the water level of the Danube in 5-20 m depth. Initial underwater surveys of the sites are in progress. The possibility regarding the nomination of these sites as UNESCO World Heritage is twofold: either some of them will be nominated as archaeological sites or the whole chain will be nominated, if it can be proven that the sites in question are still preserved after 50 years under water and can remain unchanged in the future.

This region has one unique defensive example, namely walls closing the mouths of small streams that flowed as tributaries into the Danube. In the gorge with often-vertical cliffs, these small streams represented the only way inland and had to be blocked with defensive structures in Roman times. In addition, military storage and distribution centres are located and documented at Porečka reka and Mala Vrbica Konopište.

The River Valley downstream of the Iron Gate

There are several representative sites in this part of the limes. One of them is the Diana auxiliary fort, well excavated and with excellent presentation possibilities. Now no traditional festivities or events exists, because the site it is not yet actively presented, but the municipality Kladovo is highly interested and motivated for a future presentation of the site.

The Serbian–Romanian transnational site of Trajan’s bridge at Kostol and Drobeta Turn Severin (*Pontes* SRB and *Drobeta* RO) is a unique site on the Serbian Limes. Peers on the banks are visible and presentable as well as forts on the approach to the bridge. It has high potential for virtual presentation, for example a projected hologram image of Trajan’s bridge, which looks wonderful as modern 3D virtual reconstruction and does not interfere with the original remains, but gives an adequate impression. This would also not interfere with the modern navigation along the Danube. The site is not actively presented yet, but the municipality Kladovo is highly interested and motivated for future presentations on the site.

Sites downstream from Kostol / *Pontes* are problematic concerning touristic exploitation, because the land is mostly owned by private owners. In addition, most of them do not live in the region, but work abroad, so cooperation with them would be a challenge. In addition to that, the Mihajlovac and Brza Palanka / *Egeta* sites are mostly in private hands (*Egeta* I and III) with owners that actually prevent researchers from accessing to the site.

4.6. Bulgaria

Boryana Stancheva, Maria Tzankova (ADRM)

In Bulgaria 98 archaeological sites with Roman heritage have been identified, distributed by region as follows: Vidin – 17; Montana – 9; Vratsa – 15; Pleven – 30; Veliko Tarnovo – 3; Ruse – 10 and Silistra – 14.[101] 80% of the examined sites in the Bulgarian part of the cross-border region Romania-Bulgaria are located outside urbanized areas. A large part of them is located at a distance of 1 to 10 km from the settlement. 20% of the sites are located entirely or partly in urbanized areas (cities or villages), with large parts of their ruins under the modern settlement. For twelve of the sites located in urbanized areas, conservation, restoration and exposition activities were carried out and they were integrated into the urban part as tourist sites of the cultural heritage of the settlement. Some of these are: Ancient castle Castra Martis (Kula); Kaleto (Belogradchik); Ancient Bononia under the Medieval and Ottoman fortress Bdin (Vidin); Nikopol Fortress (Nikopol); Ancient Fortress Sexaginta Prista (Ruse); the Northern fortified wall of Transmariska (Tutrakan); part of the ancient Durostorum (Silistra). In the ancient city of Almus (Lom), archaeological excavations were carried out, but minimal conservation activities were undertaken. Some of the sites are located in urbanized and non-urbanized areas. Examples are the Roman city Ulpia Eskus, the village of Gigen, and Novae near Svishtov. Some of the ancient ruins are preserved and restored, while others are still under archaeological excavation and restoration activities. For more than one third of the sites in the urbanized area no archaeological excavations have been performed: Ancient Fortress Palatiolum (village of Baykal); Ancient Fortress Trikesa (village of Dolni Linevo, Lom); Ancient Fortress Cebrus (village of Dolni Tsibar, Valchedram), etc. Archaeological drillings have been made for Ancient Fortress Regianum (Kozloduy). Some of the most significant historical sites are located at the border of the urbanized area, where archaeological excavations and restoration activities have been carried out and which operate as tourist attractions: Roman Fortress Kaleto (Belogradchik); Ancient Fortress Storgozia (Pleven); Road Station and Ancient Settlement Iatrus (village of Krivina, Tsenovo); Fortress Cherven (village of Cherven, Ivanovo); Roman Tomb (village of Babovo, Slivo pole). The site's location is an important prerequisite for interpreting the site as a tourist destination. However, the preliminary study shows that criteria such as authenticity, conservation and restoration, and especially the availability of conditions to transform the site into a tourist product are of far greater importance. Only 17% of the sites are located on land with the determined use regimes and protection regimes. 64% of the sites are located on land intended for agriculture and forestry, as well as land with transport functions. 9% of the sites have a clear settlement function.

The Danube Limes sites in Bulgaria have been systematically studied; some of them for more than a century (the first excavations of Ulpia Eskus date back to 1904 and of Nikopolis Ad Istrum since 1900). Nevertheless, the level of research is still considered insufficient. Interest in the various Danube sites has been different over the years. Apart from Bulgarian archaeologists, expeditions from Italy (Ratiaria), Germany (Iatrus), and Great Britain

[101] The data build on ADRM 2017.

(Nikopolis Ad Istrum) were organised. At present, only the Polish expedition in Novae operates. Some sites are better studied on a larger scale, such as Ulpia Eskus, Nikopolis Ad Istrum, Novae, others like Ratiaria and Durostorum – not in so much detail, and for the majority of the sites only drilling has been made. There are also sites that are not yet localized, but their identification is important in order to obtain a complete view of the defence system along the Lower Danube Limes. The study of the legal status of the sites in Bulgaria shows that 25% of them are state property, 15% are municipal and 11% are with joint ownership between the state and the relevant municipality. Fully private are 11% of the sites and 38% are shared state, municipal and private property. For 60% of the identified sites no archaeological excavations have been carried out. For 11% of the sites excavations were carried out, but conservation and restoration work wasn't undertaken. Only 23% of the sites included in this preliminary study have been investigated, and archaeological excavations, conservation and restoration activities were undertaken. The Regional Museum of History – Ruse is very active in their exploration work and carries out annual excavations at Sexaginta Prista, Trimamium and other less popular sites such as the Batin Fortress, the Scaidava Fortress, and the Necropolis at the village of Marten to the Fortress Tegra. Sites of great scientific interest not only for the Bulgarian but also for the foreign scientists are Ratiaria (studies jointly with Italian teams), Iatrus (studied together with German scientists), Novae (studied jointly with Polish teams and using state-of-the-art methods), Nikopolis Ad Istrum (jointly with English experts). The archaeological and scientific value is the highest for the sites with legionary camps – Ratiaria, Novae, Ulpia Eskus, and Durostorum. Major settlements and fortresses on the Danube Limes at that time also have great scientific potential. Many of the sites, especially in Northwestern Bulgaria, gradually lose a lot of their archaeological value because of the devastating treasure hunting. Generally, we can conclude that sites located outside settlements have a well-preserved connection with their physical context and a largely preserved authenticity. The natural and anthropogenic risk factors pose a serious threat to the surrounding environment, especially coastal erosion, landslides in the Danube riverbed, and treasure hunters that often cover large areas. In the settlements, the authentic material structure of the context is irretrievably lost, but in case of proper urban planning the archaeological remains can be appropriately exposed in park environment, as shown by the good examples of Vidin, Belene, Pleven, Tutrakan and Silistra (for parts of the ancient fortresses). This is also possible in Lom. For sites located in or near settlements (Novae, Trimamium), there is interconnection of the archaeological site with the other functional systems of the settlement structure, which is an underdeveloped potential for the whole system. 63% of the sites are currently in poor or very bad condition. Sites often have an undisturbed natural frame or have been destroyed by treasure hunt invasions by machines or trenches. A large part of them is located in uncultivated and deserted terrains, which largely affects their emotional perception negatively. Sites of a highly positive emotional impact, with clear aesthetic qualities include the Medieval and Ottoman fortress Bdin (Vidin); Road station and Ancient castle Dimum; Fortress Cherven (village of Cherven, municipality of Ivanovo); Ancient Fortress Sexaginta Prista (Ruse); Ancient city Transmariska – northern fortified wall (Tutrakan), Kaleto Fortress (Belogradchik), etc. For less than 20% of the sites conservation and restoration measures have been applied, and even less are well exposed and socialized. This to a certain extent is because a comparatively small percentage of the archaeological sites along the Danube Limes are studied. Most of the restorations carried out are already physically and morally obsolete, and the sites are in a poor condition. Few of the sites currently have project readiness. Some of the most representative sites after an intervention include the Medieval and Ottoman fortress Bdin, which is very well exhibited and perfectly socialized in the urban life of the park, the road station and ancient castle Dimum, where the realized project with a European funding is of high quality restoration and conservation activities, perfectly exposed and socialized in a park environment, part of the urban life; Ancient fortress Sexaginta Prista (Ruse) and Ancient city Transmariska (Tutrakan) for which mobile applications were also developed. Most sites under consideration are predominantly large, complex and multi-layered and their degree of study is different. In the present case, the major part of them weren't examined archaeologically or were examined only partially (with a few exceptions such as the Iatrus at Krivina, the Batin fortress and the Roman tombs at Batin and Silistra). Many of the sites have a good (51%) or very good (38%) preserved authenticity of the archaeological substance. We can summarize that in the past 2,000 years, most of the fortresses and sites close to the Danube river bank have lost part of their structures (often the northern fortified walls – for example, Trikesa in the village of Dolno Linevo, Valeriana in the village of Dolni Vadin, Burgo Zono, etc.) due to a landslide in the river bed, which has changed its flow, moving about 20 meters to the South, that is, in the Bulgarian territory. This applies especially to the sites located at a lower altitude, some of which are currently fully flooded by the Danube River (Apiaria in the municipality of Slivo pole, for example). The anthropogenic factors are very devastating for the archaeological sites and should be limited as much as possible by legal restrictions. Investment intentions affect negatively the sites located in the urbanized territories and the arable land and treasure hunting affects all the rest. A very serious problem is the treasure hunt, which led to almost complete destruction of many sites, especially in Western Bulgaria. For each one of the sites, the immediate surrounding environment was examined as a framework, the condition and the attractiveness of this physical context, its authenticity and contribution to the adequate exposure of the immovable cultural property.

Some of the Roman sites in Bulgaria have not been thoroughly excavated and researched so far or would require further investigation. A selected number of these promising sites is listed here, including information on the state of conservation and accessibility.

- Fortress Novo selo, Novo selo
  The site hasn't been studied.
- Fortress in the village of Yasen, Yasen/Novo selo
  The site hasn't been studied.
- Tabia, Gomotartsi/Vidin
  The site hasn't been studied, the condition of the archaeological structures is poor, heavily ruined.
- Fortress Ad Malum, Koshava/Vidin
  The site hasn't been studied.

- Fortress in the city of Dunavtsi, Dunavtsi/Vidin
  The ancient fortification is located 1.65 km southeast from the centre of Dunavtsi. The information is from the National Register of Cultural Monuments. No archaeological excavations have been carried out.
  The structures are difficult to distinguish on the ground following many treasure hunters' excavations.
- Fortress in the village of Tsar Simeonovo, Tsar Simeonovo/Vidin
  The ancient fortification is about 1.72 km from the centre of the village of Tsar Simeonovo. The information is from the National Register of Cultural Monuments. No archaeological excavations have been carried out. Structures cannot be distinguished without archaeological research. Authenticity is compromised by treasure hunters' interventions. No conservation and restoration have been carried out.
- Ancient settlement in the village of Tsar Simeonovo, Tsar Simeonovo/Vidin
  No archaeological excavations have been carried out. Structures cannot be distinguished without archaeological research. Authenticity is uncompromised. No conservation and restoration have been carried out.
- Ancient Fortress in the village of Dobri dol 1, Archar/Dimovo
  The ancient fortification is located 5.93 km east from the centre of the village of Archar. The fortress was built on the right bank of the river Skomlya.
  No archaeological excavations have been carried out. Authenticity is compromised by treasure hunters' intervention.
  No conservation and restoration works have been carried out.
- Ancient Fortress and Road Station Remetodia, Orsoya/Lom
  The ancient fortification and road station Remetodia is located on the grounds of village of Orsoya, 1.7 km south of the Danube.
  The fortress is mentioned in the Peutinger Map of the Roman Empire. The ruins of Remetodia are described by Ivan Bassanovich and Boris Djakovic.
  No archaeological excavations have been carried out.
  The structures of the fortress are probably damaged by the root system of the walnuts planted in the field. They were additionally destroyed by brutal treasure hunters' interventions. No conservation and restoration works have been carried out.
- Ancient Fortress Trikesa, Dolno Linevo, and Lom
  The ancient and early Byzantine fortress Trikesa is located in the central part of the village of Dolno Linevo. The fortification is associated with a report by Procopius of Caesarea, according to which Emperor Justinian (527-565) built the fortress of Trikesa on a site where a separate tower had previously stood.
  It has not been studied. Archaeological excavations are almost non-existent, given the fact that most of the site has collapsed into the Danube River and the rest is in private courtyards.
  The few remaining structures are authentic. No conservation and restoration works have been carried out. Some of the archaeological structures are in private properties the village boundaries.

- Ancient Fortress Cebrus, Dolni Tsibar/Valchedram
  The ancient fortress and road station Cebrus (Cebro, Camistro, Kebros, and Ciambron) is located in the village of Dolni Tsibar, just west of the old bed of the river Tsibritsa. The river Cebrus is mentioned by Claudius Ptolemy, Dion Cassius, in the guidebook of Emperor Antoninus, the Peutinger Map of the Roman Empire and by the Anonymous Ravenna author. According to the Notitia Dignitatum a detachment of shield-bearing equestrians was stationed in Cebrus. In the same document, Cebrus is also mentioned as the headquarters of a military unit under the leadership of the prefect of the Fifth Macedonian Legion, which was stationed in Escus. The fortification is also mentioned in the work of Procopius of Caesarea "On the constructions", as a place whose ruined fortresses were restored by Emperor Justinian.
  Cebrus is described by the pioneers of Bulgarian archaeology Vaclav Dobruski, Ivan Bassanovich, Boris Djakovic and Karel Shkorpil. It is also studied by Veselin Beshevliev and Dimitar Dechev.
  Archaeological excavations of Cebrus have not been conducted. The site is located in the centre of today's village of Dolni Tsibar.
  Cebrus is one of the significant sites of the Lower Danube Limes. However, the site mainly lies in private courtyards and archaeological excavations are very difficult to organize and conduct. The archaeological structures are partially damaged by the modern construction in the village. No conservation and restoration activities have been carried out. There are massive deep excavations in private yards.
- Ancient Fortress Burgo Zono, Kozloduy
  An ancient fortress is in the "Kileir Bair" grounds, 7.25 km west of the centre of Kozloduy. Almost the entire site was swept away by the Danube River. Only its southeastern part is preserved. It was built to guard the Danube coast and is part of the system of fortresses on the Danube. It is studied by Spas Mashov from Vratsa Historical Museum. The fortification, it is believed, was mentioned in the Notitia Dignitatum. According to the document, an auxiliary military unit of Dacian soldiers was stationed here. The same fortification is mentioned in Procopius's work "On Constructions" under the name Onos. Procopius claims that the fortification was overhauled during the reign of Emperor Justinian (527-565).
  Archaeological excavations have not been carried out. The structures not destroyed by the treasure hunters are authentic. No conservation and restoration works have been carried out.
- Ancient Fortress Edava, Oryahovo
  Traces of an ancient fortress can be seen 6.45 km west of the centre of Oryahovo.
  The site has not been studied with archaeological excavations. There are visible outlines of the fortifications and the three walls.
  The site is difficult to access and does not promise serious results if archaeological excavations are organized here. Its authenticity is preserved. There is no interventions conducted.

- Roman Road in Tabia area, Nikopol
  The site is east of Nikopol, along the Danube River, at the foot of the northern slope of the Nikopol Hill.
  The site has not been studied by archaeological excavations. The site was destroyed during road construction. No intervention was carried out.
- Fortress in Zmiiska Kanara area, Nikopol
  The site is located 6 km east of Nikopol and about 0.5 km south of the Danube River in the "Snake Rock" grounds.
  The site has not been studied by archaeological excavations. Its name is thought to have something to do with its proximity to Nicopolis Ad Istrum. The site is completely authentic. No intervention.
- Ancient castle and Settlement Apiaria, Ryahovo/Slivo pole
  The earliest mention of the castle is found on the Peutinger map, where it is marked as Appiaris. In Emperor Antonine's guidebook, the site is marked as Appiaria, and in the Notitia Dignitatum as castellum Appiaria. According to the latter source, it housed a detachment of cavalry and parts of the I Italian and XI Claudius legions. The castle of Apiaria is mentioned by Hieroclus, Procopius and Theophanes Simokata. It is believed that the city existed until 587, when it was conquered by the Avars.
  The site has not been studied with archaeological excavations.
  The site is in the bed of the Danube. At low water level, parts of the wall can be seen. The archaeological structure is completely authentic.
- Fortress and Ancient Settlement, Staro selo/Tutrakan
  Late antique fortress and fortified settlement.
  The site has not been studied; it is located by Vagalinski and Dinchev.
  The authenticity is fully preserved. No conservation and restoration intervention has been carried out.
- Ancient Fortification Nigrinianis 2, Dolno Ryahovo/Glavinitsa
  Ancient fortress and Roman road station "Kaleto"/"Nigrinianis II"/"Nigrinianis II" are located in the area "Bayraktarov chair", 2.54 km northeast in a straight line from the centre of the village of Dolno Ryahovo.
  No archaeological excavations have been carried out at the site.
  The fortress existed from the end of the 3rd century and the beginning of the 4th century and had a very short life, until the end of the 4th century, when it ceased to exist.
  The object is very difficult to distinguish in the field. Authenticity is preserved. No intervention was carried out.
- Ancient Fortification Nigrinianis 1, Malak Preslavets/Glavinitsa
  Ancient earth fortification and Roman road station "Nigrinianis"/"Nigrinianis" are located in the area "Lyaskovets", 3.53 km northeast in a straight line from the centre of the village of Dolno Ryahovo. It is assumed that "Nigrinianis" is named after Marcus Cornelius Nigrinus - the first governor of the province of Lower Moesia, which determines its founding after 86 CE. The earth fortification was located by E. Petkov from Tutrakan and is located 1300 m east of the fortress, marked by Shkorpil in the

area "Bayraktarov chair".

No archaeological excavations have been carried out at the site.

This is one of the most destroyed archaeological sites due to treasure hunters.

Numerous fragments of construction and household ceramics can be seen on the terrain.

Authenticity has been destroyed. There is no intervention, except for illegal treasure hunting.

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