FINAL SCIENTIFIC REPORT 2021-2023
"Mapping the prehistoric waterscape from southern Romania (7000-3000 BC). Natural water supply and cultural water demand in the past" (WATERSCAPE), no. PN-III-P4-ID-PCE-2020-2369, contract PCE 165/2021.

The overarching goal of the current project was to elucidate the complex interface between water resources and the prehistoric human communities from Southern Romania for a period of 4000 years (7000-3000 cal. BC) in terms of palaeohydrography, palaeoecology, paleoenvironment, and palaeoeconomy in order to set up the life style patterns of past humans in relation with waterscape. By reconstructing these region's elements, the project sought to illuminate the life patterns of past human populations in relation to the surrounding waterscapes.

Delving into the palaeohydrography revealed the dynamic interplay between water bodies and the landscape, shedding light on how prehistoric communities adapted to and exploited these resources. Unveiling the palaeoecology provided insights into the diverse ecosystems that supported human settlements and the intricate ecological relationships that shaped their daily lives. Reconstructing the paleoenvironment illuminated the climatic conditions and environmental factors that influenced human settlement patterns and resource utilization strategies. Additionally, unraveling the palaeoeconomy offered valuable clues about the economic activities and subsistence strategies that sustained these communities.

By integrating these diverse strands of paleoenvironmental evidence, the project aimed to infer the life patterns of past human populations in connection to the surrounding waterscapes. This holistic approach enabled a deeper understanding of the complex relationship between humans and their environment, providing valuable insights into the resilience and adaptability of prehistoric communities in Southern Romania.

The project took place between 2021 and 2023 and was structured on three main objectives (O) which were realized with the help of five activities (A).

Activity A1. Project management. *Expected results - The setup of research directions, working instruments, and data collection strategy, administrative documentation. Team meetings; Website; Annual reports.*

As part of this activity, working sessions were held with the team members to establish a coherent program for achieving of the project's objectives, establishing the travel periods on the field or fixing the deadlines for completing specific individual tasks.

The realization of the project website marked another significant milestone. Hosted by the University of Bucharest's website (https://unibuc.ro/cercetare/promovarea-rezultatelor-cercetarii/proiecte-de-cercetare/proiecte-cu-finantare-nationala/waterscape/?lang=en), the website serves as a valuable resource for disseminating project findings, showcasing research progress, and fostering collaboration among stakeholders.

Furthermore, administrative changes mentioned in the initial contract regarding the project's structure and personnel were also addressed. These changes were meticulously implemented through the preparation of six substantiation notes that were subsequently approved by the contracting authority. Furthermore, two additional documents were drafted to ensure compliance with the updated contractual requirements.

To meet the project's staffing needs, six recruitment sessions were organized to fill the four vacant positions within the project scheme. These sessions attracted a pool of talented master's

and doctoral students, ultimately leading to the successful recruitment of the required personnel.

The objectives of the Waterscape project

O.1. Tracking the evolution of palaeohydrography and its impact on humans.

This objective was achieved through two activities, A2 and A4. Activity A2 focused on elucidating the adaptation and management strategies employed by different past societies in response to the dynamic hydrological conditions and evolving landscapes of their surroundings. It delved into the intricate interplay between human ingenuity and environmental constraints, revealing how past communities harnessed water resources, mitigated hydrological hazards, and adapted their settlements and practices to the changing waterscapes.

Complementing Activity A2, Activity A4 delved into the resilience or vulnerability of certain societies to hydrological hazards. It examined how past communities coped with floods, droughts, and other water-related challenges, shedding light on their capacity to adapt and endure in the face of environmental stressors. By investigating the factors that contributed to societal resilience or vulnerability, Activity A4 provided valuable insights into the complex interplay between human agency and environmental forces.

In essence, these activities provided a multifaceted perspective on the relationship between past societies and their water-dependent environments. They revealed the adaptability and resilience of prehistoric communities, their ability to harness water resources, and their strategies for navigating the challenges and opportunities presented by the ever-changing waterscape.

Activity A2. Field works, sampling and laboratories analysis for palaeohydrological reconstruction. *Expected results - geo-spatial database, maps, site evolution models, sample databases, field reports and laboratories, statistical data.*

Archaeological researches. The field component of this activity was represented by the participation of the project members in the archaeological research realized on the sites of Măgura Gumelnița (Călărași County), Sultana-Malu Roșu, Chiselet and Măriuța (Călărași County) or Taraschina (Tulcea County). These represented a support for taking new samples, enriching geo-spatial data, and conducting experimental research using local sources of raw materials.

During the archaeological campaigns carried out on the sites of Măgura Gumelnița (Călărași county), Sultana, Chiselet and Măriuța (Călărași county), one of the work objectives was the documentation and recording of geo-spatial data using the drone (UAV) and to obtaining geographic coordinates in an absolute system regarding the location of archaeological materials (flint, ceramics, bones, IMDA etc.). This task was achieved with the help of the Leica TS06 total station. In all these sites, a series of aerial flights were launched to document, on a micro scale, the various archaeological complexes and contexts (eg. pits, graves, dwellings, hearths etc.). The processing of the captured images was carried out using the algorithms of Agisoft PhotoScan, and the derived products are presented in the form of a point cloud, a point mesh, and based on them DEMs (digital elevation modeling) and then Orthophotoplans are created. To achieve high accuracy and precision, these flights were supported by topographical measurements. Also, another objective for recording archaeological data, on a micro scale, was to carry out topographical measurements in the field with the help of the total station. All topographic measurements were documented in the STEREO 70 absolute coordinate system (EPSG:31700) with the aim of recording archaeological material, complexes and archaeological contexts. Also, the photogrammetry method was used to record burial complexes, as well as discovered pits or constructions. This method is considered much more efficient and faster than making an archaeological drawing. DJI Phantom 4 Pro and DJI Mavic 2 Pro drones were alternately used to accomplish this task. As a result of the use of this method, the images of the

archaeological complexes were integrated into the GIS data, georeferenced, and based on them all the plans of the complexes were digitized, significantly reducing the time dedicated to the archaeological drawing in the field.
The results and data obtained were the basis of the presentations at national conferences (Lazăr et al. 2021; Darie et al. 2021; Manea et al. 2021; Covătaru et al. 2022; Lazăr 2023), international conferences (Covătaru et al. 2021; Darie, Lazăr 2022; Lazăr et al. 2023; Manea et al. 2023) or of the published articles (Lazăr et al. 2021; Darie et al. 2022; Opriș et al. 2022; Opriș et al. 2022).

Geoarchaeology. Two cores were drilled with a percussion hammer (Eijkelkamp - Percussion hammer Cobra TT), and the sampling was performed with a closed probe:
i) a 12 m deep core (SUL in the Mostiștea river meadow, near the village of Frăsinetul de Jos (Frăsinet commune, Călărași county)
ii) 10 m deep core (GUM), made in the confluence zone of the Argeș and Danube meadows near the Gumelnița site (at a distance of about 100 m).
SUL core stratigraphy:
The stratigraphic profile obtained for the SUL core indicates five distinct depositional facies:
1. 10-12 m depth: Most likely this facies indicates a river channel environment flooded with coarse materials in MIS 2, respectively the Last Maximum Glacier.
2. 5.25-10 m: This facies is a typical active meadow with multiple floods and frequent changes of the active course.
3. 3.55-5.25 m: a poorly-drained meadow facies in which lake systems co-existed.
4. 1-3.55 m: a swampy facies
5. 0-1 m: the resettlement of the active meadow in this sector.

18 spores-pollen samples were analyzed, out of a total of 40, between 300 and 700 cm deep. Preliminary results show an increase in trees towards the top of the chart from 20% to 65%, due to the higher values recorded by temperate deciduous species: *Quercus, Corylus, Ulmus, and Tilia*. Herbaceous plants are dominated by: *Poaceae, Artemisia, Chenopodiaceae*, and on some levels by *Cichorieae*. Typical local species for shallow areas with stagnant water are more abundant and diverse in the upper part (above 370 cm).
GUM core stratigraphy:
The stratigraphic profile obtained for the GUM core indicates an alternation of four distinct depositional facies:
1. 6-10 m depth: lake facies developed in an active meadow, in which the main course knew ample spatial digressions, so that the studied location alternated between canal environment, grind and then meadow lake.
2. 3.55-6 m: a lacustrine facies
3. 1.2-3.55 m: facies typical to an active floodplain with multiple floods and represents the reactivation of an active course.
4. 0-1.2 m: the lateral movement of the Argeș River and the transformation of this meadow sector into a peripheral one that is less and less flooded.

Other geoarchaeological analyzes were carried out in the area of the Sultana-Malu Rosu and Chiselet site both on the terrace and in the flooded area in collaboration with a team from the University of Kiel. The results captured the evolution of the environment around the sites starting with the prehistoric period as well as the evolution of the Mostiștea River and its floodplain until today.
The results and data obtained were the basis of the presentations at national conferences (Lazăr et al. 2021) and international conferences (Covătaru et al. 2021; Lazăr et al. 2023) but also of several articles that are in the final work stage and will be published in 2024 (Müller et al. 2024; Hofmann et al. 2024-submitted).

Experimental archeology. An experiment of processing common wheat (*Triticum aestivum*) with the help of tools available in the Neo-Eneolithic period was carried out at Sultana-Malu Roșu. Stone tools (grinding stone) experimentally made from stones taken from the Mostiștei Valley were used. As part of this approach, the analysis of the methods of making the tools and subsequently of obtaining flour from wheat was pursued, the aim being to detect different processing techniques and their efficiency, taking into account the time to complete the proposed operations and the amount of flour obtained in the end. Also, from the proximity of the areas where the mentioned activities were carried out, soil samples were collected in order to carry out some palynological analyzes to observe the possible traces that can be accumulated in the soil after such technological processes.

Two other activities were carried out for the experimental archeology segment. The first such approach concerned the manufacture of ceramic vessels shaped by prehistoric methods, from local clay, which were then fired by the same old methods, available in the targeted period (Neolithic and Eneolithic) and the studied area (Southeastern Europe). The purpose of this first experiment, in addition to monitoring aspects related to the technology of making ceramic vessels, was to obtain a batch of at least five containers of this kind, which we will then use in some gastronomic experiments. The second approach was represented by the preparation of some recipes from ingredients available in the period and area studied (mentioned above), such as fish, pork, wheat, lentils, millet, milk, honey, freshwater mussels etc. The recipes were prepared at an experimental hearth, and in the end, the vessels used for this purpose were buried to be excavated in the following years. The endeavors aims was to perform stable isotopic analyzes on the ingredients used. They will be analyzed in their raw state, after they have been cooked, as well as after they have been excavated and affected by post-depositional activities. The same ingredients will also be analyzed via SEM in an attempt to test the extent to which it is possible, or not, to identify a particular cooking method based on how the ingredients were degraded during processing.

The results and data obtained were the basis of the presentations at national conferences (Manea et al. 2022) and at international conferences (Manea et al. 2021; Manea et al. 2022).

Activity A4. Stable isotopic analyzes

An innovative study was initiated to create a map of strontium isotopic values in the southern area of Romania, analyzes carried out on plant samples from the spontaneous flora to complete the reference data. Strontium isotopic analysis of human tooth enamel provides us direct evidence regarding the extent of mobility during the period. The interpretation of the results obtained on the human material from Sultana-Malu Roșu and Vărăști necropolis is enhanced by the analysis of contemporary plants at several locations, which constitutes a baseline for the bioavailable strontium (BASr) at a regional level. In addition, these data provide some valuable insights into the land use around tell settlements.

The results have been disseminated in the scientific community at international conferences (Tafani et al. 2023) and at national conferences (Tafani et al. 2023).

Objectives O2 and O3 were achieved through two activities A3 and A4.

O.2. Establishing the palaeoecological and palaeoenvironmental framework of waterscape in order to set up its economic impact on the past human communities.

The impact o of fishing activities and mollusc's gathering practices in the food acquisition strategies correlated with seasonal availability, climatic variations / changes, and the position of this food source in the economy of past communities was tracked. Also, the importance of aquatic reptiles and mammals in economy. Moreover, the valences of aquatic environment as primary source for food, raw materials source was taken into consideration.

O.3. Defining the waterscape role in the past people life-style.

The main focus was on the eco-hydrological aspects of past water management, hydrological-cultural modelling of human societies, along with set up of the impact of the aquatic diet in the past human life. It was also tracked over time the human adaptation strategies on waterscape changes correlated with documented climatic changes in the studied time span (6.0 kyr BP - 5.2. kyr BP Rapid Climatic Change events)

Activity A3. Field works, sampling and laboratories analysis for aquatic bioarchaeological reconstruction. *Expected results - aquafauna database, maps, wetlands vegetation database and laboratories reports, statistical data.*

During the bioarchaeology activities, both field trips were made to complete the data of archeozoology or palynology but also to take new samples for specific analyzes in this field (isotopes of C / N / H / O atoms, 14C carbon dating, hard animal materials industry, etc.). In this sense, databases have been created for bioarchaeological materials from different sites: Milcovu din Deal (Dudești and Vădastra cultures), Techirghiol, Constanța, Palazu Mare (Hamangia culture), Sultana Ghețărie (Boian culture), Sultana terrace and Sultana tell, Gumelnița (Gumelnița culture), Taraschina (Gumelnița), Măriuța (Gumelnița).

A referential regarding the frequencies of faunal remains for the sites researched with priority in this project was made (Taraschina, Năvodari, Techirghiol, Cheia, Luncavița, Brăilița, Hârșova, Borduşani, Cernavoda, Lișcoteanca, Insurației, Săveni, Mărița, Sultana, Chitila, Cernica, Gumelnița, Bucșani, Pietrele .Lăceni, Măgura, Vitănești, Mavrodin, Grădinile, Ostrovul Corbului, Schela Cladovei, Icoana). The aim was to introduce those informations in cultural or regional synthesis paperworks to characterize the various aspects of the animal paleoeconomy of the various human populations that inhabited the territory of Romania.

The collected data were used to create cultural or regional synthesis papers that were disseminated in the academic environment through several presentations made at international conferences: Starčevo-Criș culture (Bălășescu, Radu 2021; Bălășescu et al. 2022), Hamangia culture (Bălășescu, Radu 2021; Bălășescu, Radu 2022; Bălășescu et al. 2023), Cernavoda I culture (Bălășescu, Radu 2021) and at national conferences: neo-eneolithic period (Bălășescu 2021; Bălășescu, Radu 2022; Radu, Bălășescu 2022; Radu, Bălășescu 2023), Dudești culture (Bălășescu 2021; Bălășescu, Radu 2022) Hamangia culture (Bălășescu, Radu 2021), Stoicani Aldeni culture (Bălășescu 2023; Bălășescu, Baciu 2023) and Cernavoda I culture (Radu et al. 2023).

Another synthesis paper that was published (Brassard et al. 2022) aimed to select materials from various Neo-Eneolithic sites for analyzes of canids from prehistoric sites. We analyzed 525 dog mandibles from European archaeological sites dated between 8100 and 3000 BC. These were compared to a reference sample of modern dogs, wolves and dingoes. The conclusions obtained reflect that in prehistoric animals there is less variation compared to modern relatives suggesting a low degree of intentional human selection.

Faunal analyzes have brought important information about the animal paleoeconomy including, of course, data about the role of aquatic resources. Several presentations made at national conferences included data related to the Techirghiol sites (Hamangia culture, Bălășescu, Radu 2022), Chiselet (Gumelnița culture, Radu et al. 2022) or Hârșova (Gumelnița culture, Radu, Bălășescu 2022).

For the first time for the Eneolithic in the area of Dobrogea, a remains of a seal was identified. The information related to this animal as well as the environmental conditions specific to the period were presented at a series of national conferences (Bălășescu et al. 2022; Bălășescu et

al. 2022).

Futhermore, very important is the contribution of the acquired information to the capture of some aspects related to environmental changes in the settlement area as a result of climate changes or the evolution of the Black Sea level with important consequences on the evolution of the Danube valley. Such data were also used to establish the coastline in prehistory. Archaeological research carried out in the past few years for several Hamangia sites located in the Dobrogea region (SE Romania), such as Cheia, Techirghiol, Constanța, dated to the Early Eneolithic period (end of the 6th millennium - first half of the 5th millennium BC) or Gumelnița site like Năvodari (second half of the 5th millennium BC) revealed the presence of bones remains from marine fish species. During this time span, the Black Sea level was rising due to marine transgression so at the end of the 5th millennium BC the prehistoric coastal settlements were flooded and abandoned. Therefore, we carried out a study in which we correlated the ^{14}C data obtained for different levels of Hamangia or Gumelnița sites with the list of fish species identified for each of them as well as the existing marine geomorphology data. Based on the ecological requirements of the fish, several characteristics of the Black Sea coast were outlined in the period between the end of the 6th millennium and the middle of the 5th millennium BC: the rise in the level of the Black Sea is evidenced by the formation of marine lagoon areas starting from the south to the north; Lake Techirghiol was already a lagoon around 4900 BC; while in the north, in the area of Lake Tașaul, there was a freshwater lake fed by the Casimcea River and a marine lagoon around 4300 BC.

The results have been disseminated in the scientific community at international conferences (Radu et al. 2022; Bălășescu, Radu 2023) and at national conferences (Radu et al. 2021) and an articles that are in the final work stage and will be published soon (Radu et al. forthcoming).
The involvement of the research team in the study of the M92 grave from Sultana-Malu Roșu led to the creation of a corpus with biometric data for about 1500 constituent elements of the present inventory (829 snails *Lithoglyphus* sp., 680 ornaments *Spondylus* sp.) as well as the establishment of a photographic archive for them. Analyzes were carried out for identification of raw material (SEM) and specific determination in the case of molluscs, manufacturing methods or wear present. The materials used are varied such as mollusk shells, clay, bone or rocks. The use wear observed indicates their use in complex assemblages of objects connected by a thread and in the case of snails and their association on a probably textile material. Different use-wear indicates that lost items have been replaced. Some of the objects are made of exotic materials such as the Spondylus valve or even those made of rocks. The use of clay or bone, excluding the aesthetic function, shows us that local materials are used to imitate the exotic ones of Spondylus. These ornaments were worn before being placed in the grave because they retain specific traces of use-wear.

The results have been disseminated in the scientific community at international conferences (Radu et al. 2021; Mărgărit et al. 2023; Lazăr et al. 2023; Stoicescu et al. 2023) and at national conferences (Radu et al. 2023; Stoicescu et al. 2023) and an articles dedicated to the M92 inventory that are in the final work stage and will be published soon (Lazăr et al. forthcoming).
The physical anthropology research activities focused on the analysis and photography of the human bones discovered in the Măriuța site (M6, M7, M8, M9, M10 taken from the *Francisc Rainer* Institute of Anthropology) and Sultana-Malu Roșu (M5), transportation of bone materials, taking ^{14}C samples from sites such as Sultana-Malu Roșu, Măgura, Măriuța and Gumelnița, as well as the collection of samples necessary for isotopic analysis from the individuals discovered in the previous archaeological campaigns at Sultana-Malu Roșu and Gumelnița.

The results and data obtained were the basis of the presentations at national conferences (Toma et al. 2021; Lazăr et al. 2021; Toma et al. 2022).

Activity A4. Stable isotopic analyzes. *Expected results – stable isotopic database, field and laboratories reports, statistical data.*

In order to establish the impact of aquatic resources in the food economy of of the Chalcolithic people of Gumelnița a multi-bioarchaeological investigation (archaeobotany, zooarchaeology, anthropology) was conducted on vegetal, animal, and human remains alongside radiocarbon dating and stable isotope analyses (δ13C, δ15N).

The stable isotopes of 16 human skeletons from the 2017-2019 campaigns, with different ages and sex classes, were studied. In order to characterize the diet of Gumelnița peoples, the stable isotopes (δ13C, δ15N) of domestic animals (cattle, sheep, goats, pigs and dogs) and wild animals (boar, horse, deer, deer, wild boar, beaver and rabbit, n = 38), fish (carp and catfish, n=8), reptiles (n = 3), molluscs (n = 18) and plants (n = 24) were analyzed.

According to the results of δ13C and δ15N values and FRUITS, the inhabitants of Gumelnița had a diet based on crops and using natural resources, such as fish, freshwater molluscs and game. Although domestic fauna was occasionally exploited for meat, it had a role in providing secondary products. Dogs and pigs fed on human waste, although the diet of the latter is more similar to that of wild boars. Foxes had a diet close to dogs, which may indicate synanthropic behaviour. Radiocarbon dates were calibrated with the percentage of freshwater resources obtained by FRUITS. As a result, the corrected dates for the freshwater reservoir effect (FRE) have a delay of an average of 147 years. According to our data, this agrarian community developed a subsistence strategy under the pressure of some climatic changes that started after 4300 cal BC, which corresponded to Gumelnița rapid collapse/decline episode tracked recently (and begins around 4350 cal BC). This matching of our data in the two models (climatic and chrono-demographic) allowed us to capture the economic strategies chosen by the Gumelnița community at the end of the 5th millennium BC.

The results have been disseminated in the scientific community at international conferences EEA from Budapest and Belfast (García-Vázquez et al. 2022, 2023) or Kiel (García-Vázquez et al. 2022) and Oxford (García-Vázquez et al. 2023). The most important results were published in the journal *Scientific Reports* (García-Vázquez et al. 2023).

The materials for the paleogenetic analyzes for canids from the prehistoric sites of Milcovu de Deal, Cheia, Vitănești, Hârșova or Bordușani were also selected. Some of the results were published in an article (Brassard et al. 2023). A combination of stable isotope analyzes (from bone collagen δ15N and δ13C) and three-dimensional geometric morphometry was used to test the differences in diet and mandibular morphology of dogs between three subcontemporary and geographically close sites (Hârşova-tell, Bordușani-Popină and Vităneşti- Măgurice) of the Gumelniţa culture in Romania (4550-3900 cal. BC), characterized by different socio-economic systems. Dog diet and mandibular morphology thus appear to be a marker of human practices. The differences observed between the three sites reflect dogs' adaptation to various socio-economic systems.

A methodological study was also carried out (García-Vázquez et al. 2024) for the freshwater bivalves that are common vestiges in the archaeological sites of the Gumelnița culture (5th millennium BC, Romania). This is an innovative study that will establish the basic principles for this topic related to the role of aquatic resources in the diet of prehistoric people. Proteins from these shells are often preserved and can be used to reconstruct diet using stable isotopes and past ecosystems. To obtain the empirical relationship between the isotopic composition of the organic shell matrix and soft tissues, the body (leg and mantle), muscle, shell conchiolin and

stomach contents of modern individuals of *Unio tumidus* from the Danube were analyzed. A quality criterion for the freshwater mussel organic matrix of 3.6 (± 0.3) for C:N was established, and an offset of $\Delta^{15}N_{conchiolin\text{-}defatted\ body}$ = +0.95‰, $\Delta^{13}C_{conchiolin\text{-}defatted\ body}$ = +0.93‰ for soft tissues and an offset of $\Delta^{15}N_{conchiolin\text{-}muscle}$ = +1.7‰, $\Delta^{13}C_{conchiolin\text{-}muscle}$ = +0.3‰ for muscle. Obtaining this compensation is useful in studying the diets and ecosystems of past populations using stable isotopes.

Other analyzes were carried out for the ornaments from grave M92 at Sultana. Samples from *Lithoglyphus naticoides* gastropods as well as from Spondylus bivalves were analyzed from the point of view of stable isotopes. The results in the case of snails show us a clustering of the obtained data which corresponds to a unique sampling site of these gastropods and in the case of bivalves a grouped distribution of some specimens but also the existence of some scattered points that indicate a mixture of materials from various sources. The information already presented at national conferences (Radu et al. 2023) will be integrated in the article related to the M92 study (Lazăr et al. forthcoming).

Activity A5. Dissemination and exploitation of the scientific results of the project *Expected results - 5 articles in ISI, Scopus, ERIH Plus indexed journals, - 10 presentations at national or international conferences – 3 summer school, 3 academic seminar for students*

The Waterscape project team disseminated the results through:

i) publications (**16**) - 6 articles were published in Web of Science indexed journals (article influence score/journal impact factor) qaurtile Q1 (*Journal of Archaeological Science, Archaeological and Anthropological Science, Proceedings of the Royal Society Biolocical Sciences)* and qaurtile Q2 (*Scientific Reports, Journal of Archaeological Science - Report*); 7 articles in journals indexed in international databases BDI (*Materiale și Cercetări Arheologice, Peuce, Pontica, Documenta Praehistorica, Studia Praehistorica, Revista de Cercetări Arheologice și Numismatice*); 3 chapters in volumes published by publishing houses accepted by CNCS (*Editura Cetatea de Scaun, Editura Istros*).

ii) conferences (**53**) - 23 communications at international conferences, 20 of which with selection committees (Congress of the Union Internationale des Sciences Préhistoriques et Protohistoriques (UISPP); Annual Meeting of European Association of Archaeologists (EEA); International Landscape Archaeology Conference; Scales of Social, Environmental and Cultural Change in Past Societies, Kiel; Radiocarbon and Diet Conference, Oxford; Société Préhistorique Française, Universitatea Paris-Nanterre; University of Liverpool și EXARC) and 30 at those held in Romania (Metodă, teorie și practică în arheologia contemporană, Institutul de Arheologie „Vasile Pârvan” al Academiei Române; Cercetări Arheologice și Numismatice, București; Oltenia. Interferenţe culturale, Craiova; Sesiunea Științifică Internațională PONTICA, Constanța; Sesiunea Națională a Muzeului Dunării de Jos, Călărași; Tendințe în biologie: de la molecule la sisteme complexe, Universitatea „Al. I. Cuza” din Iași; Conferința Anuală de Comunicare a Rezultatelor Cercetării la Universitatea din București; From the Black Sea to the Black Forest. On the neolithisation process in the Danube River Basin, Piatra-Neamț).

iii) other events (**8**) - 2 seminars were organized for students (*Introduction to Bioarchaeology* / *Introducere în Bioarheologie*) in collaboration with the “Vasile Pârvan” Institute of Archeology and University of Bucharest (ICUB-Archeoscince), 3 workshops and 3 panels at internațional conferences (two in Romania and one in Germany): **a)** 7th International Landscape Archaeology Conference, 10 – 15 September 2022, Iași – Suceava. *Session 06.* How does the waterscape influences, affects and infers the human community’s development, evolution, vulnerabilities, and resilience over time? **b)** Scales of Social, Environmental & Cultural Change in Past Societies, Kiel University, March 13-18, 2023. *Session 39.* Waterscape: Humans, Environment,

and Hydrology in the Holocene. **c)** PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area", Constanța, 4-6 October, 2023. Session: *Bioarchaeological Approaches to Human Past Reconstruction.*

Publications (16)

Articles indexed ISI Web of Science (6)

1) 2023, Monica Mărgărit, Valentina Voinea, **Adrian Bălăşescu**, Pointed bone tools from the Hamangia culture on the Lower Danube: Manufacture and function, *Journal of Archaeological Science: Reports* 52, 104278. Q2
2) 2023, **Ana García-Vázquez, Adrian Bălăşescu**, Gabriel Vasile, Mihaela Golea, **Valentin Radu**, Vasile Opriș, Theodor Ignat, Mihaela Culea, **Cristina Covătaru**, Gabriela Sava, **Cătălin Lazăr,** Unravelling the resilience of the KGK VI population from the Gumelnița site (Romania) through stable isotopes, *Scientific Reports* 13, 8499. Q2
3) 2023, Colline Brassard, Marie Balasse, **Adrian Bălăşescu**, **Valentin Radu**, Morgane Ollivier, Denis Fiorillo, Anthony Herrel, Stéphanie Bréhard, Morphological and dietary adaptations to different socio-economic systems in Chalcolithic dog, *Journal of Archaeological Science* 157, 105820. Q1
4) 2022, **Valentin Radu**, Monica Mărgărit, Valentina Voinea, Adina Boroneanț, Ioana Daniela Dulama, Processing the Testudo carapace in Prehistoric Romania, (8th and 5th millennia BC), *Archaeological and Anthropological Sciences* 14, 60. Q1
5) 2022, Colline Brassard, **Adrian Bălăşescu**, Rose-Marie Arbogast, Vianney Forest, Céline Bemilli, Adina Boroneanţ, Fabien Convertini, Muriel Gandelin, **Valentin Radu**, Patricia A. Fleming, Claude Guintard, Tracey L. Kreplins, Cécile Callou, Andréa Filippo, Anne Tresset, Raphaël Cornette, Anthony Herrel, Stéphanie Bréhard, Unexpected morphological diversity in ancient dogs compared to modern relatives, *Proceedings of the Royal Society Biolocical Sciences* 289: 20220147. Q1
6) 2022, Vasile Opriș, Alin Velea, Mihai Secu, Arpad-Mihai Rostas, Angel-Theodor Buruiană, Corina-Anca Simion, Dragoș-Alexandru Mirea, Elena Matei, Cristina Bartha, Mădălina Dimache, **Cătălin Lazăr**, 'Put variety in White': Multi-analytical investigation of the white pigments inlaid on Early Chalcolithic pottery from Southern Romania, *Journal of Archaeological Science: Reports* 42, 103402. Q2

Articles indexed in international databases (BDI) (7)

7) 2023, **Radu Valentin**, Micu Cristian, Analyse archéozoologique des restes de poisson du tell de Luncavița «Cetățuia» (culture Gumelnița, 5e millénaire av. J.-C.) *Peuce S.N.* XXI, p. 269-296.
8) 2022, Adelina-Elena Darie, Dragoș-Alexandru Mirea, Valentin Parnic, **Cătălin Lazăr**, PIXE and XRF analyses of copper artifacts from the Gumelniţa area (Romania), *Studia Praehistorica* 16, p. 159–172.
9) 2022, Monica Mărgărit, Valentina Voinea, **Adrian Bălășescu**, **Valentin Radu**, Industria materiilor dure animale din așezarea Hamangia de la Techirghiol *Dealul Minerva - Paloda* (campania 2020), *Pontica* 55/LV, p. 163-183.
10) 2022, Vasile Opriș, **Bogdan Manea**, Theodor Ignat, Roxana Bugoi, Mircea Lechitan, **Cătălin Lazăr**, Between object and subject: Multiple approaches on a prehistoric human-shape pot from Romania, *Documenta Praehistorica* 49, p. 2–17. https://doi.org/10.4312/dp.49.3
11) 2021, **Adrian Bălășescu**, Adina Boroneanț, **Valentin Radu**, Clive Bonsall, Mesolithic Icoana revisited (II) – a reappraisal of the faunal remains, in R. Dobrescu, A. Boroneanţ, A. Doboş (eds.), *Materiale și Cercetări Arheologice*, Serie Nouă, Supplementum I,

Scripta Praehistorica. Miscellanea in Honorem Mariae Bitiri Dicata, Cetatea de Scaun, Targoviste, p. 373-412

12) 2021, **Adrian Bălăşescu**, **Valentin Radu**, Fauna de la Techirghiol Paloda. Studiu arheozoologic preliminar, *Pontica* 54/LIV, p. 43-80.
13) 2021, **Cătălin Lazăr**, Vasile Opriș, **Bogdan Manea**, Theodor Ignat, Dan Pîrvulescu, Adelina Darie, **Cristina Covătaru**, Gabriel Popescu, Valentin Parnic, Mădălina Dimache, Theodor Zăvalaș, Mihaela Golea, **Andreea Toma**, Gabriel Vasile, **Adrian Bălăşescu**, **Valentin Radu**, Gumelnița: research results of the 2021 fieldwork season, *Revista de Cercetări Arheologice și Numismatice* 7, p. 11-52.

Chapters in volumes published by publishing houses indexed by CNCS (3)

14) 2023, **Adrian Bălăşescu**, David Baciu, Fauna eneolitică de la Aldeni Gurghiul Balaurului (jud. Buzău), in Ștefan C.E. (ed.), *Aşezarea neo-eneolitică de la Aldeni-Gurguiul Balaurului, jud. Buzău. O reevaluare interdisciplinară*, Muzeul Judeţean Buzău, Biblioteca Mousaios 19, Târgoviște, Editura Cetatea de Scaun, p. 201-236. ISBN 978-606-537-640-3.
15) 2022, **Adrian Bălăşescu**, **Valentin Radu**, Studiul faunei din necropolele preistorice de la Brăilița, in V. Sârbu, C. Schuster (eds.), *Necropolele preistorice de la Brăiliţa, în zona Dunării de Jos: o nouă abordare/The prehistoric necropolises from Brăiliţa in the Lower Danube Region: a new approach*, Editura Cetatea de Scaun & Editura Istros, București-Târgoviște-Brăila, p. 427-433. ISBN 978-606-537-598-7.
16) 2021, **Adrian Bălăşescu**, Adrian Mestecăneanu, Fauna neo-eneolitică de la Milcovu din Deal (culturile Dudești și Vădastra), în C.E. Stefan (ed.), *Cercetari interdisciplinare în asezarea neolitica de la Milcovu din Deal (jud. Olt, Romania),* Editura Cetatea de Scaun, Târgoviște, p. 235-254. ISBN 978-606-537-531-4.

Articles submitted or in progress (2024 or later):

i. 2024, Johannes Müller, **Adrian Bălăşescu**, Wiebke Kirleis, Theodor Ignat, Valentin Parnic, **Valentin Radu**, **Andreea Toma**, Stefan Dreibrodt, Mihaela Golea, Yevhenii Sliesariev, Manuel Zolchow, Adrian Șerbănescu, Vlad Bindea, Marta Dal Corso, Sonja Filatova, Amelie Schmücker, **Cătălin Lazăr**, *Sultana-Malu Rosu tell profile: First results and interpretation on site formation, absolute dating, subsistence economy, material culture,* Journal of Neolithic Archaeology (BDI).
ii. 2024 (submitted), **Ana García-Vázquez, Valentin Radu, Cristina Covătaru, Cătălin Lazăr**, *Exploring the acid-insoluble shell organic matrix of freshwater mussels (Unionoida) as a proxy for palaeodietary and paleoenvironmental studies,* Science and Technology of Archaeological Research (ISI).
iii. 2024 (submitted) , Robert Hofmann, **Adrian Bălăşescu**, Wiebke Kirleis, Adelina-Elena Darie, **Valentin Radu**, Yevhenii Sliesarie, **Andreea Toma**, Marta Dal Corso, Mihaela Golea, Sonja Filatova, Theodor Ignat, Gabriel Vasile, **Cristina Covătaru**, **Cătălin Lazăr**, Johannes Müller, *Late Neolithic and Chalcolithic Sultana-Gheţărie, Lower Danube: First results and interpretation on site formation, absolute dating, subsistence economy and material culture,* Journal of Neolithic Archaeology (BDI).
iv. **Valentin Radu**, Valentina Voinea, **Adrian Bălăşescu** (forthcoming), *Fish remains from archaeological sites as indicators of sea-level variations. A case study for the Hamangia culture, VIth-Vth millennia BC, Romania.*
v. **Cătălin Lazăr, Andreea Toma,** Monica Mărgărit, **Bogdan Manea,** Daniel Stoicescu, **Nicu-Viorel Atudorei, Valentin Radu** (forthcoming), *Exploring the quantitative wealth of past people. A case study from Sultana-Malu Roșu cemetery (Eneolithic; Romania)*.

Conferences (53)

International conferences (23)

1. **Ana García-Vázquez, Adrian Bălășescu**, Gabriel Vasile, Mihaela Golea, **Valentin Radu**, **Cătălin Lazăr**, *Land and water-use in the Gumelnița site (5th millennium BC, Romania): a study on stable isotopes*, p. 143. Scales of Social, Environmental & Cultural Change in Past Societies, Kiel University, March 13-18, 2023. Abstract book Kiel Conference, *Scales of Social, Environmental & Cultural Change in Past Societies*, Kiel University, March 13 – 18, 2023, Franziska Engelbogen, Nicole Taylor, Andrea Ricci (eds.), Institut für Ur- und Frühgeschichte, Kiel, doi.org/10.38071/2023-00120-3
2. Monica Mărgărit, **Valentin Radu**, Viorel Atudorei, **Bogdan Manea, Cristina Covataru**, Theodor Ignat, Vasile Opris, **Cătălin Lazăr**, *Versatile dimension of the shell adornments: perforated* Lithoglyphus naticoides *from the Sultana-Malu Roșu tell settlement and cemetery (Romania)*, p. 145. Abstract book Kiel Conference, *Scales of Social, Environmental & Cultural Change in Past Societies*, Kiel University, March 13 – 18, 2023, Franziska Engelbogen, Nicole Taylor, Andrea Ricci (eds.), Institut für Ur- und Frühgeschichte, Kiel, doi.org/10.38071/2023-00120-3
3. **Cătălin Lazăr, Valentin Radu**, Monica Mărgărit, **Viorel Atudorei, Bogdan Manea**, *Shells adornments, waterscape, and past people behaviours. A case study from the Romanian Eneolithic*, p. 160. Abstract book Kiel Conference, *Scales of Social, Environmental & Cultural Change in Past Societies*, Kiel University, March 13 – 18, 2023, Franziska Engelbogen, Nicole Taylor, Andrea Ricci (eds.), Institut für Ur- und Frühgeschichte, Kiel, doi.org/10.38071/2023-00120-3
4. **Aurelian Tafani**, Snoeck, C., Greco, E., Robert H. Tykot, **Cristina Covătaru**, Theodor Ignat, **Cătălin Lazăr**, *Examining mobility and land use in the Mostiștea River Valley, Romania during the Eneolithic through Strontium isotopic analyses of plants and human tooth enamel*, Poster, p. 147. Abstract book Kiel Conference, *Scales of Social, Environmental & Cultural Change in Past Societies*, Kiel University, March 13 – 18, 2023, Franziska Engelbogen, Nicole Taylor, Andrea Ricci (eds.), Institut für Ur- und Frühgeschichte, Kiel, doi.org/10.38071/2023-00120-3
5. **Ana García-Vázquez, Adrian Bălășescu**, Gabriel Vasile, Mihaela Golea, **Valentin Radu**, **Cătălin Lazăr**, *Paleodiet and freshwater reservoir effect in the Danube River: the case of Gumelnița site (5th millennium BC, Romania)*. Radiocarbon and Diet Conference. Oxford, England, June 20-23, 2023.
6. **Ana García-Vázquez, Adrian Bălășescu**, **Valentin Radu**, **Cătălin Lazăr**,, *The relation of foxes and other wild carnivores with human communities during the Neolithic of Romania: a stable isotopes approach*, 29th Annual Meeting of the European Association of Archaeologists in Belfast, Northern Ireland, 30 August - 2 September, 2023.
7. **Bogdan Manea**, **Cristina Covătaru,** Theodor Ignat, Vasile Opriș, **Cătălin Lazăr**, Cristian Panaiotu, Daniela Dimofte, *Buried with the dead. Archaeometric investigation of an atypical Chalcolithic adobe building discovered in Romania, within the Sultana-Malu Roșu necropolis.* 29th Annual Meeting of the European Association of Archaeologists in Belfast, Northern Ireland, 30 August - 2 September, 2023.
8. **Cătălin Lazăr**, Cornelis Stal, Theodor Ignat, **Cristina Covătaru,** *Towards identifying a settlements pattern in the Southeastern Eneolithic Block from Northern Balkans*. 29th Annual Meeting of the European Association of Archaeologists in Belfast, Northern Ireland, 30 August - 2 September, 2023.
9. **Adrian Bălășescu**, Valentina Voinea, **Valentin Radu**, *The evolution of animal paleoeconomy in the coastal environment. A case study for the Hamangia sites (VIth-Vth millennia BC, Romania).* 29th Annual Meeting of the European Association of Archaeologists in Belfast, Northern Ireland, 30 August - 2 September, 2023.
10. Daniel Stoicescu, Sebastian Dumitrescu, **Valentin Radu,** Monica Mărgărit, **Viorel**

Atudorei, Bogdan Manea, Cătălin Lazăr, Fashion for the dead. Assessment of beads variability within a Chalcolithic grave from the Sultana-Malu Roșu necropolis (Romania), by means of archaeometric analysis, the 6th Workshop Young Researchers in Archaeometry, Tübingen, Germany, October 4-6, 2023.

11. **Valentin Radu**, Valentina Voinea, **Adrian Bălășescu**, *Fish remains from archaeological sites as indicators of sea-level variations. A case study for the Hamangia culture, VIth-Vth millennia BC, Romania*, 7th International Landscape Archaeology Conference, September 10-15, 2022, Iași - Suceava, Romania.
12. **Cristina Covătaru**, Cornelis Stal, Ionela Opriș, Mihai Florea, **Cătălin Lazăr**, *Historical land use changes and the effects on archaeological site preservation. Mostiștei Valley case study*, 7th International Landscape Archaeology Conference, September 10-15, 2022, Iași - Suceava, Romania.
13. **Bogdan Manea**, Vasile Opriș, Theodor Ignat, **Cătălin Lazăr**, *The Walk of Fire: understanding the implications of prehistoric pyrotechnology through experimental archaeology*, 3rd experimental archaeology student symposium, University of Liverpool (in partnership with EXARC), June 9th & 10th 2022.
14. **Ana García-Vázquez**, **Adrian Bălășescu**, Gabriel Vasile, Mihaela Golea, **Valentin Radu**, **Cătălin Lazăr**, *Multi-Isotopic (Δ13C, Δ15N) approach to the life in the Chalcolithic site of Gumelnița (Romania)*, 28th Annual meeting European Association of Archaeologists, Budapest, 31 August to 3 September 2022
15. **Adrian Bălășescu**, Adina Boroneanț, Clive Bonsall, **Valentin Radu**, *Mesolithic and Early Neolithic of Southwestern Romania. A view from archaeozoology*, 28th Annual meeting European Association of Archaeologists, Budapest, 31 August to 3 September 2022.
16. Adelina Darie, **Cătălin Lazăr**, *Shaping the metal. New waves of development in the Eneolithic period in the Kodžadermen-Gumelniţa-Karanovo VI area*, 28th Annual meeting European Association of Archaeologists, Budapest, 31 August to 3 September 2022.
17. **Adrian Bălășescu**, **Valentin Radu**, *New archaeozoological data about Hamangia culture*, Conference "New horizons in prehistory. 50 years since the opening of the Varna Necropolis". November 2 - 4, 2022, Varna, Bulgaria.
18. **Adrian Bălășescu, Valentin Radu,** *Arheozoologia comunităților Cernavodă I. Studiu de caz – situl de la Săveni (punctul La Movile, județul Ialomița),* Conferința Ştiinţifică Internaţională „Arheologie interdisciplinară: metode, studii, rezultate / *Interdisciplinary archaeology: methods, studies, results*, Institutul de Cercetări Bioarheologice și Etnoculturale (ICBE) from Chișinău and Rezervația Cultural-Naturală „Orheiul Vechi, August 14-17, 2021, Butuceni (raionul Orhei), Moldova.
19. **Adrian Bălășescu, Valentin Radu**, *Paléoéconomie animalière des communautés Hamangia (5500-4700 BC)*, Virtual metting, The XIX Congress of the Union Internationale des Sciences Préhistoriques et Protohistoriques (UISPP), September 2-7, 2021, Meknes, Morocco.
20. **Adrian Bălășescu, Valentin Radu**, *Interactions homme-animaux au néolithique ancienne en Roumanie*, sesiunea stiintifică a Société Préhistorique Française (Universitatea Paris Nanterre) - *Actualités de la recherche en Préhistoire dans les Balkans - Environnements, chronologies et dynamiques culturelles du Dernier Maximum Glaciaire au début du Néolithique (ca. 23 000 à 6000 ans cal. BC)*, October 4-5, 2021, Paris.
21. **Valentin Radu**, Monica Mărgărit, **Cătălin Lazăr**, *Exploring the quantitative wealth of past people. A case study from Sultana-Malu Roșu cemetery (Eneolithic; Romania)* 27h European Association of Archaeologists (EEA) Annual Meeting, 6-11 sept. 2021, Kiel, Germany.

22. **Covataru Cristina**, Opris Ionela, Opris Vasile, Ignat Theodo, Panaiotu Cristian, Dimofte Daniela, **Lazăr, Cătălin**, *A song of gis and fire. Determination of firing trajectories in an off-tell Eneolithic construction at Sultana-Malu Roşu (Southeastern Romania),* 27h European Association of Archaeologists (EEA) Annual Meeting, 6-11 sept. 2021, Kiel, Germany.
23. **Bogdan Radu Manea**, Opriș Vasile, Ignat Theodor, Popescu Gabriel, **Lazăr Cătălin**, *Kilns and Builders: an experimental study on human factor in the construction and use of pottery firing installations in Chalcolithic*, 27h European Association of Archaeologists (EEA) Annual Meeting, 6-11 sept. 2021, Kiel, Germany.

National conferences (30)

24. **Valentin Radu, Adrian Bălășescu**, *Analiza paleoeconomiei animaliere a comunităților Boian și Hamangia din Dobrogea,* Annual Scientific Communications Session „Metodă, teorie și practică în arheologia contemporană" Institutul de Arheologie „Vasile Pârvan" al Academiei Române, Aprilie, 2023.
25. **Adrian Bălășescu**, *Arheozoologia aspectului cultural Stoicani Aldeni,* Annual Scientific Communications Session „Metodă, teorie și practică în arheologia contemporană" Institutul de Arheologie „Vasile Pârvan" al Academiei Române, April, 2023.
26. **Ana García-Vázquez, Adrian Bălășescu**, **Valentin Radu**, Petra Coman, **Cătălin Lazăr,** *Isotopic evidence of synanthropic behaviour of wild carnivores from Chalcolithic sites from Romania*, PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area" Constanța, October 4th – 6th, 2023.
27. **Adrian Bălășescu**, Valentina Voinea, **Valentin Radu**, *New Data on the Paleoeconomy of Hamangia Communities (5500-4600 cal BC),* PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area" Constanța October 4th – 6th, 2023.
28. **Valentin Radu**, **Ana García-Vázquez,** Gabriel Vasile, **Bogdan Manea**, Alexander Wilkinson, Mihaela Golea, Mihaela Iacob, Petra Coman, **Aurelian Tafani**, Florin Vlad, **Cătălin Lazăr**, *Between the Copper and the Bronze Age. Some Aspects Related to the Bioarchaeological Research on the Cernavodă I Communities,* PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area" Constanța, October 4th – 6th ,2023.
29. **Cătălin Lazăr**, *Tell Settlement from Sultana after 100 Years (1923-2023),* PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area" Constanța, October 4th – 6th, 2023.
30. **Ana García-Vázquez, Adrian Bălășescu**, Gabriel Vasile, Mihaela Golea, **Valentin Radu**, Vasile Opriș , Theodor Ignat, Mihaela Culea, **Cristina Covătaru**, Gabriela Sava, **Cătălin Lazăr**, *Abordarea izotopică ($\delta^{15}N$, $\delta^{13}C$) a vieții din situl de la Gumelnița (România, mileniul V î.Hr.),* Annual Research Results Communication Conference at the University of Bucharest – 2023 Edition, November 16-17.
31. **Valentin Radu, Andreea Toma**, Monica Mărgărit, **Bogdan Manea**, Daniel Stoicescu, **Cătălin Lazăr, Nicu-Viorel Atudorei**, *Între bogăție, ritual și obiceiuri de zi cu zi. Cazul mormântului M 92 din necropola de la Sultana-Malu Roșu (mileniul V BC),* Annual Research Results Communication Conference at the University of Bucharest – 2023 Edition, November 16-17.
32. **Adrian Bălășescu**, David Baciu, *Noi date despre arheozoologia aspectului cultural Stoicani Aldeni (4600-4400 cal BC),* Annual Research Results Communication Conference at the University of Bucharest – 2023 Edition, November 16-17.
33. **Aurelian Tafani**, Cristophe Snoeck, Hannah James, Robert H. Tykot, Kevin Salesse, **Andreea Toma**, Vasile Opriș, **Cristina Covătaru**, Theodor Ignat, Enrico Greco, **Cătălin Lazăr**, *Examining Mobility and Land Use at Sultana, Romania during the Eneolithic*

through Strontium Isotopic Analyses of Plants and Human Tooth Enamel, Annual Research Results Communication Conference at the University of Bucharest – 2023 Edition, November 16-17.

34. **Adrian Bălășescu**, **Valentin Radu**, *Noi date privind arheozoologia comunităților Dudești pe teritoriul României*, the National Session of the Lower Danube Museum, Cultură și Civilizație la Dunărea de Jos, 19th edition, June 2 - 4 2022, Călărași, România.
35. **Valentin Radu**, Robert Hofmann, Johannes Müller, Theodor Ignat, **Cătălin Lazăr**, Marian Voicu, **Andreea Toma**, **Adrian Bălășescu**, *Analiza unui lot de fauna dintr-un sondaj realizat in tell-ul eneolitic de la Chiselet (jud Călărași)*, the National Session of the Lower Danube Museum, Cultură și Civilizație la Dunărea de Jos, 19th edition, June 2 - 4 2022, Călărași, România.
36. **Manea Bogdan**, Opriș Vasile, Ignat Theodor, **Lazăr Cătălin,** *Gestionarea resurselor umane pentru progresul tehnologic. Analiza experimentala privind construirea si utilizarea unor instalații preistorice de ardere a ceramicii*, the National Session of the Lower Danube Museum, Cultură și Civilizație la Dunărea de Jos, 19th edition, June 2 - 4 2022, Călărași, România.
37. **Adrian Bălășescu**, Valentina Voinea, Corina Anca Simion, Mirela Mihon, Alexandru Petre, **Valentin Radu**, *Prima descoperire de focă în neoliticul din România*, "Tendințe în biologie: de la molecule la sisteme complexe", Faculty of Biology of the „Alexandru Ioan Cuza" University of Iași, Romania, with Botanical Garden „Anastasie Fătu" and Natural History Museum, Iași, October 27-28, 2022.
38. **Adrian Bălășescu**, **Valentin Radu**, *Le Néolithiques ancien de la Roumanie. Nouvelle données archéozoologiques de la culture Starčevo-Criș*, International Colloquium "From the Black Sea to the Black Forest. On the neolithisation process in the Danube River Basin", Piatra-Neamț, Romania, November 8-10, 2022.
39. **Valentin Radu**, **Adrian Bălășescu**, *First agro-pastoral communities from Dobrogea (6th-5th millennia BCE). Archaeozoological considerations*, International Colloquium "From the Black Sea to the Black Forest. On the neolithisation process in the Danube River Basin", November 8-10, 2022, Piatra-Neamț, Romania.
40. **Valentin Radu**, **Adrian Bălășescu**, *Paleoeconomia animaliera a comunităților eneolitice de la Hârșova-tell (mileniul V BC)*, PONTICA International Scientific Session, 55th Edition: „History and Archaeology in the West – Pontic Area", November 16 – 18, 2022, Constanţa, România.
41. **Adrian Bălășescu**, **Valentin Radu**, Corina Anca Simion, Mirela Mihon, Alexandru Petre, Valentina Voinea, *Foca din Marea Neagră: dovezi arheologice din eneoliticul romanesc, cultura Hamangia (mileniul VI BC)*, PONTICA International Scientific Session, 55th Edition: „History and Archaeology in the West – Pontic Area", November 16 – 18, 2022, Constanţa, România
42. **Andreea Toma**, Theodor Ignat, Gabriel Vasile, **Cristina Covătaru**, **Cătălin Lazăr**, *Necropola eneolitică de la Sultana-Malu Roșu (Jud. Călărași, România). Date arheo-antropologice privind mormintele din campania 2022*, PONTICA International Scientific Session, 55th Edition: „History and Archaeology in the West – Pontic Area", November 16 – 18, 2022, Constanţa, România.
43. **Adrian Bălășescu,** *Interaction between man and animals during the neo-Eneolithic in SE Romania,* workshop-ul „Archeoclimate BP (I) - Interactions between climatic and environmental conditions and human societies during the Holocene in SE Europe", February 16-17 2021, Cluj-Napoca.
44. **Adrian Bălășescu, Valentin Radu**, *Exploatarea animalelor în cultura Hamangia. Studiu de caz - situl de la Techirghiol Paloda (jud. Constanta),* Symposium „Cercetări Arheologice și Numismatice", 7th edition, September 17, 2021, Bucharest.
45. **Cătălin Lazăr**, Johannes Müller, Theodor Ignat, Vasile Opriș, Adelina Darie,

Mădălina Dimache, Theodor Zavalaș, Valentin Parnic, **Cristina Covătaru, Bogdan Manea, Andreea Toma, Valentin Radu**, Adrian Șerbănescu, Gabriel Popescu, Cristian Panaoitu, Daniela Dimofte, Ovidiu Frujina, **Cristian Roth**, Vlad Ioan, Mihai Florea, Marian Voicu, **Adrian Bălășescu**, Mihaela Golea, Robert Hofmann, Wiebke Kirleis, Marta dal Corso, Sonja Filiatova, Mila Shatino, Stefan Dreibrodt, Walter Dorfler, Ingo Feser, Wolfgang Rabbel, Natalie Pickartz, Manuel Zolchow, Elisabeth Glück, Maurice Enriko Weber, Ercan Erkul, Simon Fischer, Erman Lu, Eileen Eckmeier, Giacomo Bilotti, Yevhenii Sliesariev, Khadijeh Alinezhad, Agnes Heitmann, Cornelis Stal, *Primele rezultate ale proiectului internațional „The dynamics of the prehistoric communities located in the Mostiștea Valley and Danube Plain (between Oltenița and Călărași),* Symposium „Cercetări Arheologice și Numismatice", 7th edition, September 17, 2021, Bucharest.

46. Adelina-Elena Darie, Dragoș-Alexandru Mirea, Valentin Parnic, **Cătălin Lazăr**, *Noi date privind piesele din cupru din arealul Gumelnița pe baza analizelor PIXE si XRF*, Symposium „Cercetări Arheologice și Numismatice", 7th edition, September 17, 2021, Bucharest.
47. **Andreea Toma**, Gabriel Vasile, Pavel Mirea, **Cătălin Lazăr**, *Analiza antropologică preliminară și datarea radiocarbon a materialelor osteologice eneolitice descoperite la Măgura (jud. Teleorman),* Conferinţa naţională „Oltenia. Interferenţe culturale", 10th edition, Craiova 10-12.11.2021.
48. **Adrian Bălășescu**, *Arheozoologia comunităților Dudești pe teritoriul României*. National Conference „Oltenia. Interferenţe culturale", 10th edition, Craiova 10-12.11.2021.
49. **Adrian Bălășescu, Valentin Radu**, *Exploatarea mamiferelor în cadrul paleoeconomiei animaliere a comunităților Hamangia (mileniile VI-V, România),* PONTICA International Scientific Session, 54th Edition: „History and Archaeology in the West – Pontic Area", November 17-19, 2021, Constanța.
50. **Valentin Radu**, Valentina Voinea, **Adrian Bălășescu**, *Importanța peștilor și a pescuitului în paleoeconomia animală a comunităților Hamangia (mileniile VI-V, România),* PONTICA International Scientific Session, 54th Edition: „History and Archaeology in the West – Pontic Area", November 17-19, 2021, Constanța.
51. **Cătălin Lazăr, Bogdan Manea, Cristina Covătaru, Andreea Toma**, Vasile Opriș, Theodor Ignat, Adelina Darie, Gabriel Vasile, Mădălina Dimache, Valentin Parnic, Tiberiu Sava, *Cimitirul preistoric de la Gumelnița*, PONTICA International Scientific Session, 54th Edition: „History and Archaeology in the West – Pontic Area", November 17-19, 2021, Constanța.
52. **Bogdan Manea**, Mircea Lechitan, Gabriel Popescu, Theodor Ignat, Vasile Opriș, Florin Constantin, Mădălina Dimache, Valentin Parnic, Roxana Bugoi, **Cătălin Lazăr**, *Analiză interdisciplinară a unor greutăți preistorice din lut ars,* PONTICA International Scientific Session, 54th Edition: „History and Archaeology in the West – Pontic Area", November 17-19, 2021, Constanța.
53. Adelina-Elena Darie, Dragoș-Alexandru Mirea, Valentin Parnic, **Cătălin Lazăr**, *Rezultatele analizelor elementale realizate pe un lot de piese din cupru Gumelnița*, PONTICA International Scientific Session, 54th Edition: „History and Archaeology in the West – Pontic Area", November 17-19, 2021, Constanța.

Three conferences (held in Vienna, Horten and Călărași) for which Waterscape members submitted four presentations were cancelled due to the health situation generated by the COVID pandemic:

i. **Valentin Radu**, Valentina Voinea, **Adrian Bălășescu**, *New evidence of fishing in the Black Sea during Hamangia Culture (VI-Vth millennia, Romania)*, Paper ID: 51652,

International Council for Archaeozoology, Fish Remains Working Group (ICAZ FRWG), 23-28 august 2021, Viena, Austria.

ii. **Adrian Bălășescu**, *Noi date privind arheozoologia comunităților Dudești pe teritoriul României*, Sesiunea Ştiinţifică, Cultură și Civilizaţie la Dunărea De Jos, Ediţia a XVIII a, Muzeul Dunării de Jos Călărași, 4-5 noiembrie 2021, Călărași, România

iii. **Bogdan Manea**, Vasile Opriș, Theodor Ignat, **Cătălin Lazăr**, *Analiză experimentală privind construirea și utilizarea unor instalații preistorice de ardere a ceramicii*, Sesiunea Ştiinţifică, Cultură și Civilizaţie la Dunărea De Jos, Ediţia a XVIII a, Muzeul Dunării de Jos Călărași , 4-5 noiembrie 2021, Călărași, România

iv. **Bogdan Manea**, Vasile Opriș, Theodor Ignat, **Cătălin Lazăr**, *Befriending Clay and Fire: the critical importance of experimental archaeology in providing new data regarding individuals and the process of ceramic manufacture in Prehistor*, The Norwegian Forum of Experimental Archaeology (NFEA) 2021, 17-19 septembrie, Midgard Viking Centre, Horten, Vestfold and Telemark County, Norway.

Other events

i. *Introduction to Bioarchaeology* seminar organized by the "Vasile Pârvan" Institute of Archeology & University of Bucharest (ICUB-Archeoscince) for students of the faculties of Biology and History. It was hosted by the Institute of Archeology and had two editions in 2021 and 2022. The seminar was dedicated to students, masters and doctoral students, to conduct introductory courses related to the interdisciplinary research of the past, in terms of methods specific to the field. The event aims to be an introduction to the field of bioarchaeology, more precisely in the study directions of physical anthropology, carpology, palynology, zooarchaeology, malacology, and archeohtiology. The necessary guidance was provided by specialists from the ArchaeoScience # RO, ICUB department of the University of Bucharest, and members of the Waterscape project, **Valentin Radu**, master student **Andreea Toma** and **Adrian Bălășescu** together with researchers Mihaela Golea and Vasile Gabriel from the Institute of Archeology "Vasile Pârvan " but also with the students Franceska Știrbu and David Baciu (University of Bucharest). https://iabvp.ro/introducere-in-bioarcheologie/

ii. Workshop organized by the Collaborative Research Center 1266 'Scales of Transformation' of the Christian Albrechts-University of Kiel, Germany from November 24-27 2021. Members of the Waterscape team participated with several presentations related to the preliminary results obtained for the prehistoric sites on the Mostiștei Valley (Sultana Malu Roșu area), during the field campaign in the summer of 2021 (July 9-August 27, 2021). The following presentations were given by members of the Waterscape project team: i) Theodor Ignat, **Cătălin Lazăr**, Stratigraphic Matrix: All for All !; ii). **Adrian Bălășescu, Valentin Radu, Andreea Toma**, Osteological Materials (Ex-Humans & Ex-Animals); iii). **Bogdan Manea**, Vasile Opriș, Theodor Ignat, Ceramics here, ceramics there, ceramics everywhere; iv). Vasile Opriș, Theodor Ignat, **Bogdan Manea**, Past lessons and future prospects: The Boian-Vidra pottery from Sultana-Gheţărie; v). **Cristina Covataru**, Do good things always come to an end? Things from the current past, lessons for the current future! The next thematic workshop in this series will take place in March 2022, in Bucharest and will be organized under the auspices of the Waterscape project.

iii. Archeoclimate BP (II) - Interactions between climatic and environmental conditions and human societies during the Holocene in SE Europe, an event organized by the ArchaeoSciences Division within the Research Institute of the University of Bucharest (ICUB), on May 13, 2021, in Bucharest, brought together specialists from ICUB, "Vasile Pârvan" Institute of Archeology Bucharest, Cluj-Napoca Institute of Archeology and Art History, "Emil Racoviță" Institute of Speleology Cluj-Napoca and the National Museum of History of Romania. The event was organized under the auspices of the Waterscape project and with partial support from the University of Bucharest through the CNFIS-FDI-2021-0405

D6 / 2021 project. Members of the Waterscape team participated with several presentations: i) **Valentin Radu** – *Data related to aquatic resources from the transition period from Mesolithic to Neolithic in Romania, as well as some observations from Neolithic-Eneolithic*; ii) **Cătălin Lazăr** - *The Neolithic process of the Balkans and data about the so-called 'Neolithic Package'*; iii) **Adrian Bălășescu** - *Data on domestic and wild mammals from the Early Neolithic*. The main aim was to integrate the results obtained into complex, relational databases that will be the subject of siting articles for geographical and cultural areas in the northern Balkans.

iv. Between 19-23 May 2022, the 2nd Post-fieldwork Meeting Workshop was held at the Research Institute of the University of Bucharest, within the international project *"The dynamics of the prehistoric communities located in the Mostiștea Valley and Danube Plain (between Oltenița and Călărași)"*, coordinated by the University of Bucharest, in partnership with Christian-Albrechts-Universität zu Kiel (CAU), Germany, HoGent, Belgium, Bucharest City Museum, Lower Danube Museum Călărași, Oltenița Culture Directorate - Gumelnița Oltenița Civilization Museum and the "Vasile Pârvan" Institute of Archeology of the Romanian Academy, Romania. Members of the Waterscape team participated with several presentations related to the preliminary results obtained for the prehistoric sites in the Mostiștei Valley (Sultana Malu Roșu area), during the field campaign in the summer of 2021 (July 9-August 27, 2021): (i)**V. Radu, A. Toma, A. Bălăsescu** - *Sultana-Ghețarie site. Archaeozoology results of the 2021 campaign*, (ii) **V. Radu, A. Toma, A. Bălăsescu**, *Chiselet tell. Archaeozoology results of the 2021 campaign*, (iii) **V. Radu, A. Toma, A. Bălășescu**, *Sultana tell. Archaeozoology results of the 2021 campaign*, (iv) **A. Toma**, G. Vasile, *Broken bones: some insights about M5, Sultana-Ghețarie.*

v. Organization of a session within *the 7th International Landscape Archeology Conference, 10-15 September 2022, Iași - Suceava, Romania,* under the title *Session 06. How does the waterscape influences, affects and infers the human community's development, evolution, vulnerabilities, and resilience over time?* Organizers **Cătălin Lazăr** (Waterscape), **Valentin Radu** (Waterscape), Cornelis Stal (HOGENT University of Applied Sciences and Arts, Department of Built Environment, Ghent, Belgium), Laurent Carozza (UMR 5602, CNRS, - Géographie de l'Environnement , Maison de la Recherche de l'Université du Mirail 5, France) brought together presentations on water as an essential source for survival, economy, communications, transport, protection, etc. and the hydrological aspects of the climate-culture-aquatic landscape interaction. The 8 communications presented by researchers from Belgium, Finland, Greece, France, Italy, Romania and Spain had topics of geoarchaeology, bioarchaeology, archaeometry, GIS and archeology that fell on a period between the Neolithic and the medieval period.

vi. Organization of a session within PONTICA International Scientific Session, 56th Edition: „History and Archaeology in the West – Pontic Area" Constanța 4th – 6th October 2023 under the title: *Bioarchaeological Approaches to Human Past Reconstruction*. Organizers: **Valentin Radu, Adrian Bălășescu** (Waterscape) and Margareta Simina Stanc and Luminița Bejenaru (University "Alexandru Ioan Cuza" from Iasi). The contributions were submitted and presented, under a broad range of topics belonging to archaeozoology, archaeobotany, and paleoanthropology, all correlating biological data with aspects of ecological and cultural contexts (e.g., animal and plants used for food and other purposes, anthropic pressure on landscapes, human diet, health and lifestyle, economic life, ritual practices etc.). The 16 communications presented by researchers from Romania, Spain and England covered topics from the Neolithic to the modern period. https://minac.ro/pontica-2023---organizare.html

vii. Organization of a session within the *Scales of Social, Environmental & Cultural Change in Past Societies* conference, Kiel University, March 13 – 18, 2023, under the title S39: *Waterscape: Humans, Environment, and Hydrology in the Holocene*. Organizers: **Cătălin Lazăr** and **Valentin Radu** (Waterscape), Cornelis Stal (HOGENT University of Applied

Sciences and Arts, Department of Built Environment, Ghent, Belgium), Stefan Dreibrodt (Institute for Ecosystem Research Christian-Albrechts-University of Kiel). Submitted contributions illustrate topic such as: the dynamics of the shores and coasts of the watercourses (river basin variability, sea-level variations, natural or anthropic impact on human lifestyle, etc.); eco-hydrological aspects of ancient water availability and management (natural water supply, environmental carrying capacity, aquatic ecology, hydrological system variability, water strategies,etc.); aquatic palaeoeconomical aspects (irrigation, water supply management, aquafauna and aquavegetation exploitation, seasonality, dietary impact, etc.); aquatic architecture (harbors, channels, dwellings on pillars, bridges, dams, etc.); the hydrological hazards to societies (tsunamis, floods, droughts, erosion, etc.); hydrologicalcultural models (wetlands sites, water use in artifacts processing technology) as an essential source for survival, economy, communications, transport, protection, etc. and hydrological aspects of climate-culture-waterscape interaction. The 9 comunication and a poster presented by researchers from England, Germany, France, Italy and Romania had topics of geoarchaeology, bioarchaeology, archaeometry, GIS and archeology that were temporally framed over the entire Holocene.

Estimated impact of project results

During the entire project implementation period (2021-2023), the project members promoted the term –waterscape- associated in this project with archaeohydrology, which investigates water in an archaeological context and which search for connections between natural water supply, natural hydrological conditions, environments and socio-cultural evolutions of past human societies. Two panels dedicated to this topic were organized at international conferences with a selection committee: *Waterscape: Humans, Environment, and Hydrology in the Holocene* (Landscape Archaeology Conference 2022) and *How does the waterscape influences, affects and infers the human community's development, evolution, vulnerabilities, and resilience over time?* (Scales of Social, Environmental and Cultural Change in Past Societies 2023).

The research initiated to identify the complex interface between water and prehistoric human communities in the south of Romania, involved in addition to the classical fields (archaeology, geomorphology), a wide spectrum of disciplines from the interdisciplinary field such as paleohydrology, paleoecology, paleogeography, archaeoichthyology, malacology, anthracology, radiocarbon dating and stable isotopic analyses. The most significant results were disseminated by project members by publishing 16 articles, presenting 53 communications at conferences, initiating 2 seminars, participating and organizing 3 workshops and organizing 3 panels at international conferences.

The impact related to increasing the research capacity of the host institution was achieved by including internationally recognized researchers in the national research system through collaborations with universities such as Albuquerque (USA), Brussels (BE), Kiel (DE), Ghent (BE), Edinburgh (UK), Paris (FR), Tampa (USA), York and Sheffield (UK) or with recognized research centers (CNRS-Paris, France; Archaeological Institute Zagreb, Croatia; National Archaeological Institute and Museum Sofia, Bulgaria). This fostered an exchange of knowledge, expertise, and methodologies, propelling the host institution's research capabilities to new heights.

The training of researchers in the field of archeology was achieved by including two young researchers from Spain (postdoctoral student) and France (doctoral student) in the project team and who contributed with studies that were completed with articles and presentations at international conferences in the field of archaeology. Among the most significant results related to the mobility of prehistoric populations, we mention the creation for the first time of maps of strontium isotope values for southern Romania (Tafani et al. 2023), the calculation

for the first time of reservoir effect values in the case of ^{14}C dating for prehistoric populations who lived in the Gumelnița settlement, and by analyzing the results of the stable isotope values δ13C and δ15N and the FRUITS analysis, also for the first time, it was possible to characterize the diet of the inhabitants of this site (García-Vázquez et al. 2023). Also in this sense, with a unique character, is the introduction of bivalves in the analyzes for the study of the diet by carrying out a methodological study (García-Vázquez et al. 2024) to calculate the isotopic values for these food sources. Two other members, Romanian master's students, integrated into the team and co-opted to carry out archeology and physical anthropology analyzes contributed to the publication of the results. They will continue their studies in the field of archeology at doctoral level within the doctoral schools of the universities of Bucharest (ISDS) and Sheffield.

The reconnection of the local academic environment to European and international research networks was achieved through the participation of members in international congresses (Congress of the Union Internationale des Sciences Préhistoriques et Protohistoriques - UISPP; Annual Meeting of European Association of Archaeologists – EEA), organizing workshops (Scales of Transformation' of the Christian-Albrechts-University of Kiel; Archeoclimate BP - Interactions between climatic and environmental conditions and human societies during the Holocene in SE Europe) or publication of high-impact articles in ISI Web of Science indexed journals: *Archaeological and Anthropological Science, Journal of Archaeological Science: Reports, Proceedings of the Royal Society Biolocical Sciences; Scientific Reports, Journal of Archaeological Science*.

Conclusions

The "Mapping the prehistoric waterscape from southern Romania (7000-3000 BC)" project (WATERSCAPE) conducted between 2021 and 2023 aimed to identify the complex interaction between water resources and prehistoric human communities in Southern Romania over 4000 years. The focus was on studying aspects such as palaeohydrography, palaeoecology, paleoenvironment, and palaeoeconomy to understand the lifestyle patterns of past human populations concerning waterscapes. This investigation provided insights into how prehistoric communities adapted to, exploited, and managed water resources and how these aspects influenced their economic activities and subsistence strategies.

The project was structured around three main objectives, achieved through five activities. These included project management, setting up research directions, data collection strategies, administrative documentation, and team coordination. A significant milestone was creating a project website hosted by the University of Bucharest, serving as a key platform for disseminating findings and fostering collaboration.

In sum, the current project covers some key elements, included:

1. Palaeohydrography and Human Impact (Objective O.1): This involved understanding how past societies adapted to dynamic hydrological conditions. The activities focused on the evolution of watercourses and their impact on human habitation, highlighting the adaptability and resilience of prehistoric communities in response to hydrological hazards like floods and droughts.

2. Field Work and Laboratory Analysis for Palaeohydrological Reconstruction (Activity A2): This involved archaeological research at various sites such as Măgura Gumelnița, Sultana-Malu Roșu, Chiselet, Măriuța, and Taraschina. The objective was to collect new samples, enrich geospatial data, and conduct experimental research using local raw materials.

3. Stable Isotopic Analyses (Activity A4): An innovative study was initiated to create a map of strontium isotopic values in Southern Romania, providing direct evidence of human mobility during the period under study. This included analyzing human tooth enamel and plant samples for bioavailable strontium at a regional level.

4. Palaeoecological and Palaeoenvironmental Framework (Objective O.2 and O.3): The project investigated the economic impact of aquatic resources on past human communities, including the role of fishing activities and mollusc gathering. It also focused on the eco-hydrological aspects of past water management and the impact of aquatic diets on human lifestyles, tracking human adaptation strategies in response to climatic changes.

5. Aquatic Bioarchaeological Reconstruction (Activity A3): This involved field trips and laboratory analyses to create databases for bioarchaeological materials from various sites, contributing to understanding aquatic resources in the region's paleoeconomy.

6. Dissemination and Exploitation of Results (Activity A5): The project team disseminated their findings through publications in prestigious journals, presentations at national and international conferences, and academic seminars for students, ensuring broad exposure and impact of their research.

Overall, the WATERSCAPE project significantly contributed to understanding the interaction between prehistoric human communities and their waterscape environments in Southern Romania, offering new perspectives on their adaptability, resilience, and economic strategies in the face of environmental changes.

Project leader: Radu Valentin

06.12.2023